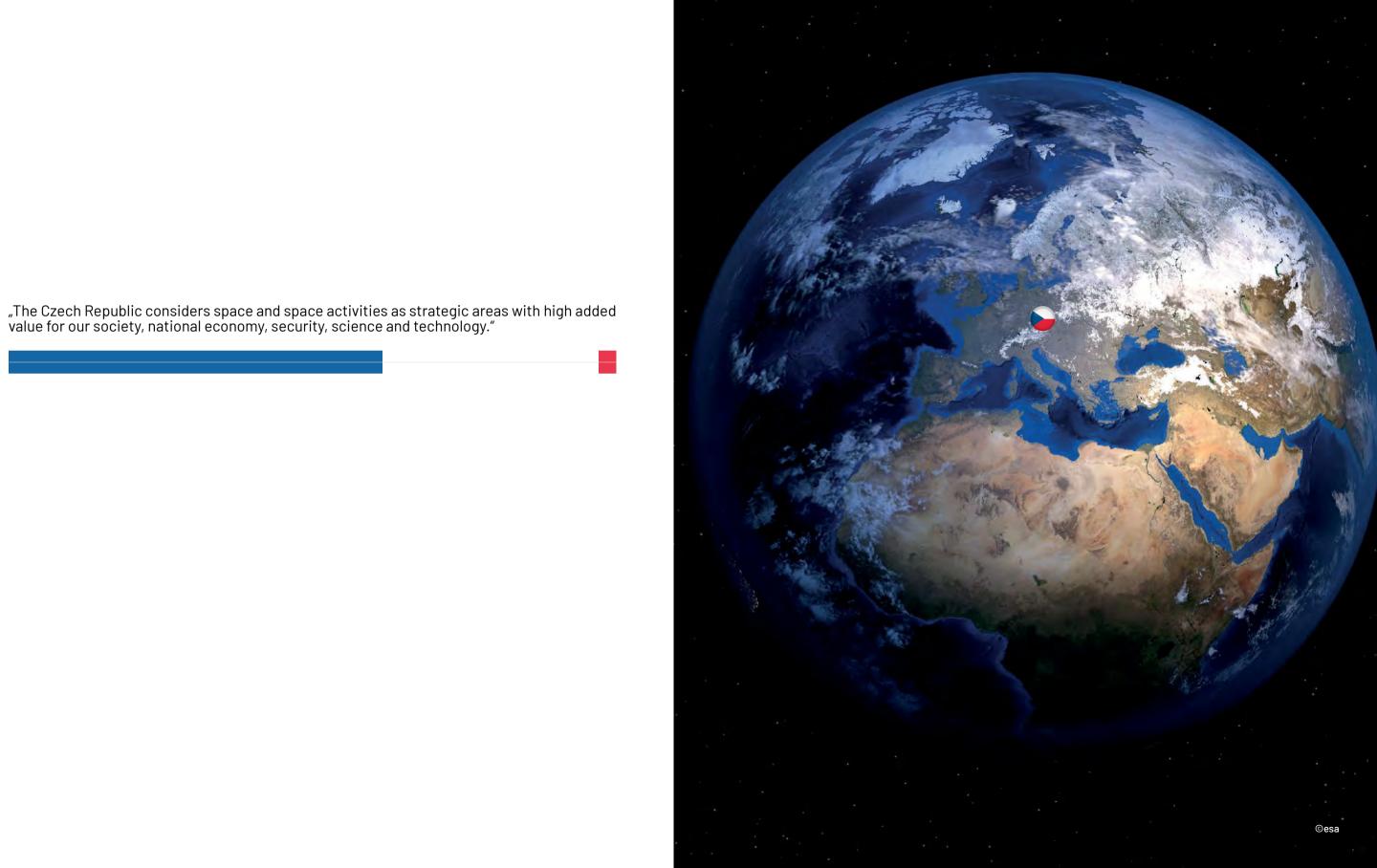
# CZECH SPACE











Organisation of Space Activities	' 6
Space Strategy and Major Activites	7
Contributions to ESA	9
Evolution of the Czech Space Activities	10
Czech Space Capacities and Capabilities	
Czech Space Associations	
Industry	
Startups	
Academia	102
Czech Republic Presence in the European Union	, 130
Czech Republic Presence in International Organisations	136
ESA Initiatvies in the Czech Republic	144
Field of Activities, Industry	150
Field of Activities, Academia	
Czech Space Industry and Academia	
General Information and Contacts	
•	



### **Organisation of Space Activities**

Since 2011 the Ministry of Transport of the Czech Republic is the coordinator of all space activities in the Czech Republic. For effective and transparent coordination, the Minister of Transport established a Coordination Council as his permanent advisory and initiatory body.

The Coordination Council consists of high level representatives of the Ministry of Transport, the Ministry of Industry and Trade, the Ministry of Education, Youth and Sport, the Ministry of the Environment, the Ministry of Foreign Affairs, the Ministry of Defence and the Office of the Government of the Czech Republic. The Coordination Council has established cross-sectional committees as an interface with industry and academia – "Industry and Applications" and "Science Activities". The "Security and International Relations" Committee deals with security and international aspects of space activities.

The Ministry of Transport has been responsible for elaborating and delivering the National Space Plan to the Government of the Czech Republic. The document has been updated in cooperation with other relevant Czech ministries and bodies and the new plan was approved by the Government in October 2019. The National Space Plan 2020 – 2025 represents a basis for decision-making of further Czech involvement in space, support of industry and academia, and participation in European and international projects and programmes. The Czech Republic acceded to the European Space Agency (ESA) in November 2008 and the Ministry of Transport provides the only formal interface to the European Space Agency in the Czech Republic. The Ministry of Transport is also responsible for all space issues in the European Union, in particular the European space policy and the administration related to Galileo and EGNOS programmes.

Concerning Copernicus Programme, it shares its responsibility with the Ministry of Environment. The successful bid for the European GNSS Agency (GSA) seat in Prague has also been coordinated by the Ministry of Transport team. The GSA has transformed into the Agency for the EU Space Program (EUSPA) in 2021.





### **Space Strategy and Major Activites**

The National Space Plan 2020 – 2025, which was approved by the government in October 2019, defines the long-term vision for the Czech Republic, which builds upon the two previous National Space Plans (from 2010 and 2014), i.e.:

- To have an international image of industrial and scientific excellence;
- To be a high value-added economy;
- To be competitive and innovative:
- To be capable of absorbing and retaining the intellectual capital it creates;
- · To be an example of an excellent complementarity and cooperation between its industrial and academic tissues;
- To be an expert user of space resources and infrastructure in operational products and services (EO, navigation, etc.).

### The main objectives entailed in this vision are:

- Czech Space Capacity and Capability Building to Increase Excellence and Competitiveness »
- Active Position in International Relations to Increase Visibility of the Czech Republic

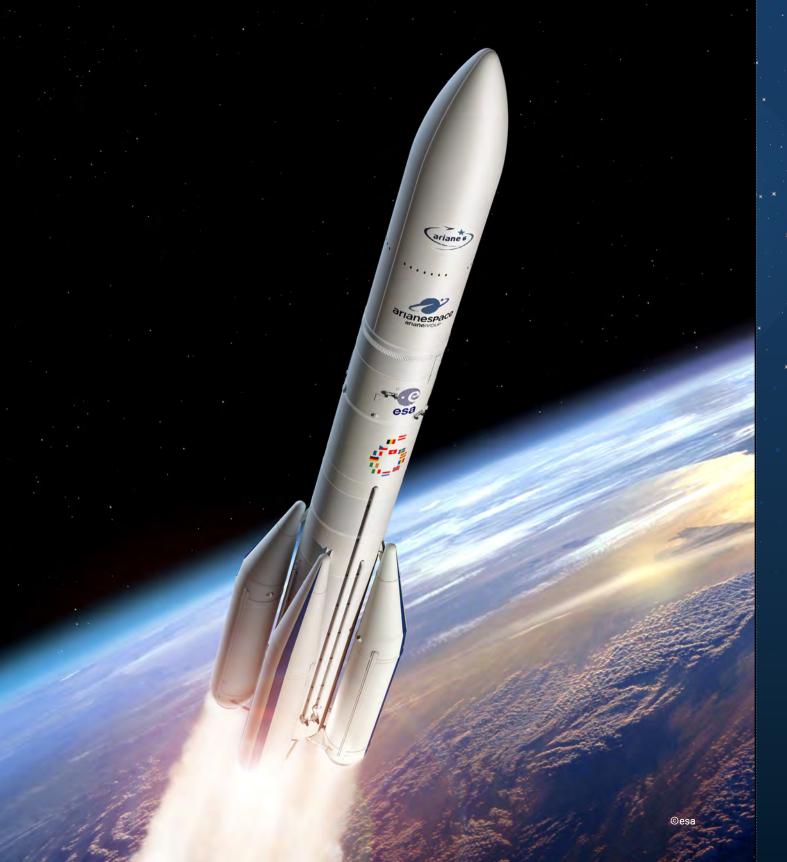
### The plan also sets out specific goals, in particular to:

- maximise return-on-investment,
- be compliant with market trends and needs.
- create, protect and exploit IPR,
- be innovative and disruptive,
- foster excellence
- create synergies between SMEs and large industries,
- increase the ratio of private investments,
- stimulate and accelerate technology and knowledge transfer.

### Space activities of the Czech Republic include especially:

- Participation in ESA mandatory activities and especially in ESA optional programmes, which are the main tool for the development of Czech space activities.
- Participation in EU space programmes and in the EUMETSAT programmes.
- Securing ESA's support of space-related activities in the Czech Republic through a dedicated framework project.
- Development of space technologies, design, analysis and testing.
- Space applications development activities in several sectors, e.g. transport, industry, environment and resource management.
- Space-related scientific research at universities and institutes of the Academy of Sciences of the Czech Republic.





# Contributions to ESA



# **Evolution of the Czech Space Activities**

ESA full membership

Ministry of Transport of the Czech Republic appointed as a national coordinator of space activities

2008

2011



EUSPA was established and replaced GSA in 🗼 Prague

2021,

1996

**ESA Cooperation** Agreement signed IAC organised in Prague

2010

2012

GSA moved to Prague

2018

First Czech Space Week



2022

2<sup>nd</sup> Czech Presidency of the Council of the EU and successful negotiation of a compromise on the new satellite IRIS<sup>2</sup> constellation for secure communication





First astronaut Vladimir Remek and

1978

satellite Magion

# **Czech Space Capacities and Capabilities**

### **Multi-Discipline Technologies**

- Design, Simulation and Testing of Mechanical Systems for Space Applications: Stress, thermal and fluid dynamic calculations; Fatigue life and fracture mechanics evaluation; Design of highly loaded components and their optimization; Numerical computation involving complex physical effects; Climatic, mechanical and life-time testing of components, parts and materials; Additive manufacturing; Composite production and bonded sandwich structures, epoxy adhesives for extra high strength bonds; Production and delivery of qualified mechanical parts, assembled modules and subsystems.
- Flight Hardware Design and Production: Development of digital circuits and single-chip microcontrollers; In-flight use of
  wireless sensors; System health monitoring (SHM); Space hi-rel electronics cleanroom manufacturing activities; Products for
  crystal chemistry, growth of crystals for technical applications, optics including x-ray, acousto-optics, electro-optics etc.;
  Equipment for material sciences and technology in space; Development and manufacturing of apparatuses and devices according to specific requirements, including use of COTS components suitable for space environment.
- Inertial Sensors for Space Application
- Electric Power and Controls for Space Applications: Power management, including conversion and distribution; Electric actuation; Energy storage systems (including energy accumulation and generation); Thermal management;
- Software: On-board software (Flight Software for various missions; Complete software packages; StartUp SW, Mission critical SW & Application SW); Ground segment software (Satellite Control Systems, Mission Control System and EGSE; robotization of antennas and telescopes, control systems development, tracking software); Software development for the Earth Observation and Navigation Services Infrastructure.
- On-board Systems: avionics incl. hardware, software, network interfaces / data buses, modules to provide integrity of onboard data systems, integrated test-beds, AOCS.
- Laser Technologies: various laser instruments, laser communication, laser tracking of space debris (photon detectors),
   space resources prospecting and analysis.
- Development of High Altitude Platforms/Pseudosatellites (HAPs)
- Midstream Segment: Building of whole mission operation centres, uplink and downlink communication antennas and related infrastructure; Building and operation of data centres and archives, computational and dissemination platforms for EO or any other kind of space data; Big data computing, cloud computing.

### Earth Observation (EO)

- EO data processing multispectral, hyperspectral and SAR data. Development of new EO data based products (incl. integrated applications) based on EO data, e.g. SAR ground motion and infrastructure monitoring, SAR, multispectral and hyperspectral data for environment applications, agriculture, land use, land cover, monitoring or natural disasters, monitoring and modelling of atmosphere etc., development of new processing algorithms;
- Laser scanning data use / products development;
- · Integration of EO data based information into GIS and customers systems, services for both midstream and end-users;
- Scientific EO data processing, e.g. GOCE, SMOS, SWARM and others;
- · Machine learning and Artificial Intelligence for EO data processing; blockchain based services / technologies for EO;
- Spectroscopy, spectrometry, SAR interferometry, gravimetry;
- Calibration / Validation, development of Internet of Things (IoT) networks, which could serve for calibration and validation of EO data.
- · Cryogenic and coolers for cooling of the payload on EO satellites;

### Satellite Navigation

- Precise time and clocks (on-board management of atomic clocks or for precise time distribution through optical satellite
  networks); GNSS science (atmospheric effects on propagation of electromagnetic waves); space geodesy; precise orbit determination of satellites;
- Building and operation of GNSS permanent reference station networks (excl. manufacturing of the GNSS receivers / antennas); Developing software suites for real time monitoring performance of GNSS, across all international constellations and over extended periods, showing relative trends among different constellation developments;
- GNSS enabled applications in many domains (transportation and logistics, fleet management, intelligent transport systems, e-Call, drones, environmental protection, civil engineering, precise agriculture and forestry, personal tracking and health monitoring, location based services, sports, geo-marketing, media and entertainment etc.); autonomous mobility (automated and connected cars, precision agriculture by automated tractors and harvesting vehicles); crew management of police and rescue forces in crisis and emergencies.

12

# **Czech Space Capacities and Capabilities**

### **Satellite Communication**

- SatCom airborne terminals development for both civil and military aviation including unmanned aerial vehicles (UAVs), associated products like high power amplifiers, data links and security gateways (focus on safety critical air-ground data and voice communication for air traffic management);
- Secured quantum optical communication (unbreakable quantum encryption techniques, laser photon emitters and receivers and sensor heads):
- modelling of electromagnetic field propagation through the atmosphere;
- space and ground hardware development (super-capacitors, solar panels deployment mechanisms, antenna pointing mechanisms, propellant tanks and other components);
- Satellite TV, integrated applications.

### **Launchers and Propulsion Systems**

- Mechanisms and composite and metallic structures; Low shock Hold Down Release Actuators;
- Monomers and polymeric materials (coatings, adhesives, casting resins); Synthesis and tailored surface modifications of nanoparticles; Nanocomposites and hybrid composites; Thermo-insulation materials; Multifunctional anticorrosive coatings;
- Embedded microcontrollers; In-flight use of wireless sensors; Structural health monitoring systems;
- Pyrotechnical systems; Separation systems for small satellites;
- Computational mechanics; System level design Launcher aerodynamics, aerothermodynamics, launch acoustics;
- Payload Fairing technologies; Isolation systems and payload comfort damping;
- High-performance Valves and control electronics;
- Inertial sensors for inertial navigation, on-board computer navigation and control systems Thrust Vector Control (TVC) technology based on electromechanical actuators;
- Electrically driven pumps for rocket propellants; High-performance valves for cryogenic rocket engines and their control
  electronics.

### Space Situational Awareness (SSA)

Space Weather (SWE): Provision of SWE services (Solar activity forecasts, Real-time Ionospheric monitoring, Daily geomagnetic forecasts, Radiation dosimetry); SWE sensors exploitation (Solar white light and H-alpha imaging, Solar radio observation, Ionospheric measurement, Geomagnetic observations); SWE Application development (Ionospheric disturbance detection and monitoring, Magnetospheric research, geomagnetic disturbance forecasts, Dosimetry applications for crewed space missions); SWE sensors development (various fields); SWE studies and modelling; SWE data processing;

- Space Surveillance and Tracking (SST): SST monitoring and cataloguing; SST data processing and Software applications
  development; SST Assets networking technologies; SST sensors development and qualification (optical and laser technologies); telescope control and processing software;
- Near Earth Objects (NEO): NEO observations & information provision; NEO mitigation support (incl. fireball monitoring); Advanced NEO spectroscopy technologies; Research and development in the field of special optics, optoelectronics systems and optical measurement methods, robotisation and remote control of telescopes; NEO Software development (tasking and scheduling of telescopes, long-term archiving and analysation of NEO data).

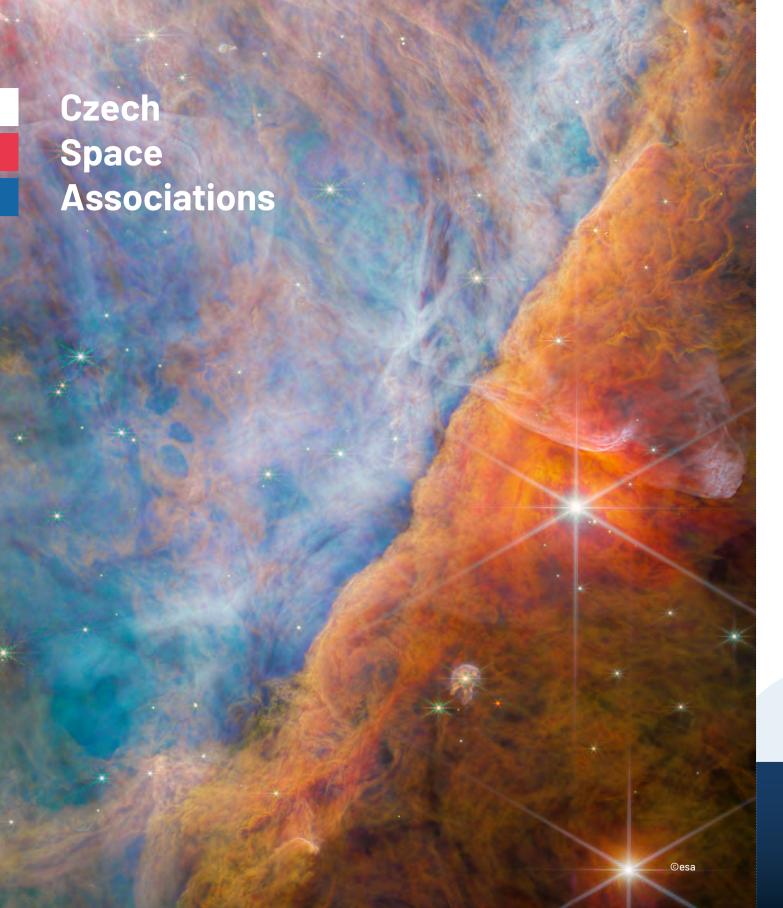
### **Space Science and Exploration**

Various scientific instruments, including e.g.: Langmuir probes, thermal plasma measurement units; Low frequency wave receivers; Wave analysers; Space radiation detectors; Micro-accelerometers; Single photon laser detectors; X-ray scintillation; Power supply and distribution units; Optical assemblies; Plasma wave instrument units for Solar Orbiter mission; Scientific data simulations; High-power lasers; High-resolution mass spectrometry etc.

### The main Czech goals in academia in the field of space R&D area include:

- For space physics: plasma and radiation environment near Earth and in solar system, solar research, meteorite research, objects in solar system, stellar research:
- For Earth sciences and EO data applications: gravitational research, space geodesy, magnetospheric and ionospheric research, planetary atmospheric spectroscopy and analytical chemistry, atmospheric and hydrological research, mineralogical and carbon cycle studies, land cover and urban development, disasters management;
- For life sciences: biological research (algae grow) and radiation biological modelling, psychological aspects (stress) of space-
- For telecommunication research and application: atmospheric radio propagation, generic satellite navigation signal receiver development, indoor signal modelling, microwave onboard transmitters;
- For propulsion systems research: system analysis, innovative thermal protection, structural and thermal modelling, pyrotechnic devices;
- For space platform systems: small satellites systems, electronic and electromechanical systems, robotic systems, composite advanced materials, optical and polarization filters;
- For ground segments: satellite data processing architecture and method development, spacecraft ground control and testing procedures.

14



# Czech Space Alliance (CSA)

CSA is an industry association of 18 companies, mostly SMEs, established in 2006. The members are vying for space business, especially through ESA. The founding members, namely BBT, CSRC (now part of BD Sensors), and Science Systems (now Iguassu Software Systems) participated in ESA and other space projects since the 1990's.

The alliance was established to present the skills of its members at national and international events and establish dialogue and relationship with similar associations and space agencies, be they in Europe or beyond; help its members to develop business relationship with potential partners in other European Space Agency members states and beyond.

Important part of our mission is to represent and to promote the interests of the space industry to the national decision makers, the media and other relevant associations or entities; co-operate with the ministries and all other official entities supporting space activities in the formulation of space policy and creation of suitable conditions for the growth of the space industry.

CSA covers by its members practically all sectors of Space applications:

- Design and simulations: L.K. Engineering s.r.o., OHB Czechspace s.r.o., SAB Aerospace s.r.o., TTS s.r.o.
- Software development: esc Aerospace s.r.o., Iguassu Software Systems a.s.
- Electronics components: KYOCERA AVX Components, BD SENSORS s.r.o., TTS s.r.o.
- Electronics assembly: Terma Technologies Czech Republic s.r.o., BD SENSORS s.r.o., esc Aerospace s.r.o., UNITES Systems
   a.s.
- Scientific instruments: BBT Materials Processing s.r.o., Rigaku Innovative Technologies Europe s.r.o., ADVACAM s.r.o.
- Development of materials: 5M s.r.o., TOSEDA s.r.o. "
- Mechanism and structures: 5M s.r.o., Frentech Aerospace s.r.o., Stratosyst s.r.o.
- Subsystem integration: 5M s.r.o.,, Frentech Aerospace s.r.o., SAB Aerospace s.r.o., Stratosyst s.r.o.
- Testing: 5M s.r.o., ADVACAM s.r.o., BD SENSORS s.r.o., EGGO Space s.r.o., esc Aerospace s.r.o., , Frentech Aerospace s.r.o., L.K. Engineering s.r.o., OHB Czechspace s.r.o., Rigaku Innovative Technologies Europe s.r.o., SAB Aerospace s.r.o., TOSEDA s.r.o., UNITES Systems a.s.

Beginning of Czech industry involvement to Space applications were single component and services even at excellent level. By the time, members of CSA increased competences and increase complexity of their products and involvement to supply chain of the most important Space players in the world such as Thales Alenia Space (TAS) or Airbus Defence and Space. Finally members of Czech space alliance are reliable partners for very complex subsystems now as structures of satellites or solar array mechanical subsystems.

CSA important role is to promote communication between all our members what brings closer cooperation of companies and also new challenges not only within Alliance. CSA final destination is to be a platform for communication of government with all main industrial players at field of Space application in Czech Republic and built picture of Czech Space Industry as strong and reliable partner.

Contacts:

**Czech Space Alliance** 

Richard Pavlica Richard E Pavlica@5m.cz





# Association of the Czech Aerospace Industry (ALKP)

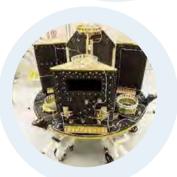
### Sector leaders, innovators and research & development capacities at one address.

Big players or prime manufacturers in the industry teamed up technology innovators and visionaries as well as component suppliers to create a strong industry community on the platform of the Association of the Czech Aerospace Industry (ALKP). ALKP was established in 1996 and represent more than 50 members with more than 12,000 employees. ALKP represent complex capabilities of the whole aviation and space branches. Tradition and deep experience are our added values. Now, ALKP is creating a new chapter of the Czech space industry development which is based on the producers of modern satellites, system and subsystem providers, service providers as well as other companies representing sophisticated solutions, unique know-how and precise production.

### **ALKP Vision and Goals**

- Promote Aviation and Space industry and its living topics as an important knowledge-based part of the Czech economy with a strong impact on the technological, economic and research and development growth of the Czech Republic.
- Support the competitiveness of member companies, especially through the common projects and promotion of national integration programs.
- Promote the continuity of research and development and strengthen member companies' know-how.
- Enhance, improve and foster cooperation between members.
- Foster economic cooperation with other states, namely through maintaining contacts with comparable national and transnational associations.
- Support the interests of the Czech aerospace industry abroad, especially by means of joint exhibitions or trade missions.
- Develop the labour market, mainly through supporting the technical education.





### **Brno Space Cluster**

Brno is the second largest city in the Czech Republic and the surrounding Brno region has a rich history of aircraft industry. Today, it is a strong region full of high-tech industries, including many space companies - that is why in 2021, 9 space entities founded Brno Space Cluster - a local cluster consisting of both companies and academia.

Building on multiple years of previous cooperation, the cluster expanded from 9 to 19 members just in the first year. Currently, the cluster consists of more than 22 members and is still growing. This is making it the biggest space association in the Czech Republic.

The cluster plays a platform role as a place to share and exchange ideas and information, but also an active role in the business itself. To further support business, the cluster can bid as an entity - and the cluster already submitted multiple bids for international tenders.

The cluster is active internationally, organizing business trips, meetings with stakeholders, and trade-show representations.

All of the industrial members of the Brno Space Cluster are companies with heritage in the space industry, that are active in the development of both commercial and institutional projects, as well as products.

As Business & Education are the main goals of the cluster, a new master's study program was established at the Brno University of Technology. Focusing on system engineering, the new master's is held in English and is open for up to 30 students from all over the world every year. The students have multiple classes on space systems as well as an opportunity to gain real experience as the cluster member companies are offering internships for them.

### Our current members:

- BizGarden
- Brno Observatory and Planetarium
- Brno Regional Chamber of Commerce
- Brno University of Technology
- CEITEC
- Corac
- G.L. Electronic
- **GK Servis**
- Groundcom
- Hikade, Huld

- Inpraise Systems
- JIC
- Lightigo Space
- Masaryk University
- Mendel University in Brno
- **SAWtronics**
- Spacemanic
- TRL Space
- UNIS
- World from Space
- Zaitra



Contacts:

ALKP - Association of the Czech Aerospace Industry

Josef Kaspar - president E alkp@czaerospace.org





Contacts:

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Výstaviště 569/3, Pisárky 603 00 Brno Česká republika

Manager of Brno Space Cluster

Václav Havlíček

E manager@brnospacecluster.cz







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5M s.r.o	.22	2
ADVACAM s.r.o.	.23	3
ALEEGO s.r.o	.24	
asphericon s.r.o.	.25	5
ATC Space s.r.o.	.26	5
AŽD Praha s.r.o.	.27	×
BBT - Materials Processing, Ltd:	.28	3
BD Sensors s.r.o., CSRC Space Division	.29	9
Betrian Group a.s.	.30	) =
Big Terra	. 3	1
BizGarden s.r.o.		
BST.COACH s.r.o.		
CGI IT Czech Republic s.r.o		
CleverFarm, a.s.		
daiteq s.r.o.	.36	5
Dronetag s.r.o.		
EGGO Space s.r.o.		
Eltvor Instruments, s.r.o.		
esc Aerospace s.r.o.	.40	Ρ.
Exact Control System a.s.		
Frentech Aerospace s.r.o.	.42	
G.L. Electronic s.r.o	.43	
GINA Software s.r.o. Gisat s.r.o.	.44	
GNSS Centre of Excellence, z.s.p.o.		
GROUNDCOM.SPACE s.r.o.	.40	9
Hikade Technologies s.r.o.	// 5	(+
Honeywell International s.r.o.	٠٠٠	5
Huld s.r.o.		
HVM PLASMA, spol. s r.o.		
Iguassu Software Systems, a.s.		
INPRAISE SYSTEMS s.r.o.		
KYOCERA AVX Components Czech Republic s.r.o.	.54	
LA composite s.r.o.	.55	5
Mapradix s.r.o.	.56	3
MCE Slaný s.r.o		
Meopta - optika s.r.o.	.58	8
Meteolnsight		
OHB Czechspace s.r.o.		
OPTOKON, a.s.		
OteSpace		
PEKASAT SE		
PlasmaSolve s.r.o.  ProjectSoft HK a.s.		
RHEA System s.r.o.		
Ridaku Innovative Technologies Europe, s.r.o.		
S.A.B. Aerospace s.r.o		
SAZ Aerospace s.r.o.	.69	4
Serco Czech Republic	.70	5
SERENUM, a.s.		
SPACEKNOW	.72	2
SPACEMANIC CZ, s.r.o.	. 73	3
Stellar Exploration EU s.r.o.	.74	
STRATOSYST s.r.o.	. 75	5
SYNPO, a. s.		
TOSEDA s.r.o.		
TRL Space Systems s.r.o.		
TTS, s.r.o.		
Uneeqly s. r. o.		
UNEX a.s.		
UNITES Systems a.s.		
UpVision s.r.o.  VZLU – Czech Aerospace Research Centre		
World from Space		
Zaitra s.r.o.		
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### 5M s.r.o.

### **General Description**

5M s.r.o. is a medium-sized company operating in area of the development and manufacturing of composite materials, sandwich panels and related subsystems for space applications, aviation and transportation (trains, trams, buses).

### **Competences & Capabilities**

Development and manufacturing of structural composite parts • such as sandwiches and sturts. Development of mechanical subsystem for solar arrays, manufacturing of small size solar arrays. Design and manufacturing of radiation shielding. Development and supply of structural epoxy film and paste adhesives, epoxy resins, pre-impregnated fabrics (prepregs, semipregs). Development and manufacturing of composite and sandwich structures for optics.

#### **Products & Services**

- Mechanical subsystems, composites and sandwich panels manufacturing
- Testing of composites and sandwiches

### **Major Space Projects & References**

- ESA- PLATO Service Module Structure Model Panel (prime contractor)
- ESA- Flexible Solar Array Mechanical Subsystem Development and EM for NOVACOM II (subcontractor)

### Space Related Equipment, Labs & Certificates

- Autoclave up to 250°C, diameter 2000 mm, length 4000
- Automated cutting of prepreg
- Laser positioning system for prepreg lay-up

- Presses up to 180°C, maximum dimensions 3000 x 1700 mm
- Universal testing machines, load cells up to 100 kN equipped with environmental chamber for temperature range from -180°C to +250°C
- Thermal cycling and thermal vacuum cycling
- CTE measurement with DIL 822 (Dilatometer)
- DMA (Dynamic Mechanical Analyser)
- TGA 2 (Thermogravimetric Analyser)
- DSC 1(Differential Scanning Calorimeter)
- CMM (maximum part dimensions 3000 x 1500 x 1200 mm)
- Ultrasonic and thermographic non-destructive testing
- AS/EN 9100:2009, EN ISO 9001:2009, POA PAR 21.G EASA 748/2012
- DIN 6701 A1, IATF 16949





### INDUSTRY

- ✓ MANUFACTURING
- ▲ R&D
- T TESTING

#### Contacts: Responsible for space and ESA projects:

5M s.r.o.

686 04 Kunovice

VAT C746969250

P +420 572 433 740 M +420 731 616 350 E richard.pavlica@5m.cz

Ing. Richard Pavlica, Ph.D.





### ADVACAM s.r.o.

### **General Description**

We craft miniaturized particle tracking cameras for advanced Space Weather Forecasting and Adaptive Radiation Protection. Our low-power devices ensure safer and more efficient space missions.

Thanks to MiniPIX TPX3 SPACE, the total radiation dose can be measured. Satellite shielding or safe mode is activated only when necessary. It's even possible to forecast more energetic and harmful Sunstorm particles minutes before they approach Earth, providing a valuable window to activate protective mea-

Our cameras, based on CERN's single photon counting technology, are implemented on the International Space Station, NA-SA's Artemis program, the Gateway Lunar Station, and numerous commercial satellites.

### **Competences & Capabilities**

- Space weather monitoring and forecasting
- Radiation dose monitoring
- Adaptive satellite radiation protection
- Particle tracking

### **Products & Services**

Design, develop, and manufacture advanced radiation detection instrumentation such as MiniPIX TPX3 SPACE

### **Major Space Projects & References**

- Space Radiation Dosimeter for space crew onboard Gateway Lunar Orbit Space Station, contract ESA with EK
- Lunar radiation monitor, NASA Moon Lander, with Univ of Lousiana USA
- Radiation Monitor, One Web telecommunication satellite
- INDUSTRY
- ✓ MANUFACTURING
- SOFTWARE
- × SERVICES
- ▲ R&D
- T TESTING

#### Contacts:

ADVACAM s.r.o.

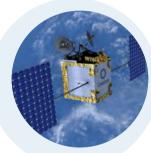
U Pergamenky 12 17000 Prague 7, Czech Republic

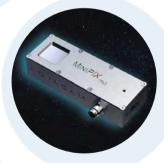
Responsible for space and ESA projects:

Doc. Ing. Carlos Granja, PhD.

- P +420 601 270 076
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- Gamma-ray Tracker wide field-of-view for ESA Space Ryder, with Univ of Coimbra
- Focal-plane X-ray Imager, X-ray telescope payload in LEO orbit onboard Cubesat VZLUSAT-2
- Online radiation dosimeters MiniPPIX-TPX for space crew in LEO orbit onboard the ISS and NASA ORION mission
- Radiation Monitor for GEO-orbit telecommunication satellites contract ESA with IEAP CTU
- Pixel Detector Data Processing Engine, contract ESA
- Space Radiation Capabilities, Technologies, and Payloads contract ESA with VZLU, CSRC/BDSensors, Rigaku









### ALEEGO s.r.o.

### **General Description**

Founded in 2016, ALEEGO is a drone services company which enable companies to digitize their assets and turn aerial data into business intelligence. ALEEGO works with enterprise from various field such as agriculture, oil and gas, power utility and other industries throughout Europe – collecting, processing and extracting real value out of aerial data to improve productivity, operational efficiency, and worker safety.

### **Competences & Capabilities**

ALEEGO online platform count 70 drone pilots onboarded across Europe. The drone pilots registered on ALEEGO platform are qualified by the Operation Manager ensuring permits, equipment, insurance and capabilities are suitable for the customer depending on the mission.

### **Major Space Projects & References**

ESA Kick-start project – Blockchain was implemented onto ALEEGO platform to secure confidential data from our customers and to ensure the ability to submit indisputable original mission documentation. ESA Demonstration project – Locate defects or area of improvement on network of pipeline or powerline for Energy companies using Artificial Intelligence.

### Space Related Equipment, Labs & Certificates

- GPS tracking device ideal for tracking of assets/vehicles:
   GSM connectivity, A-GPS sensor
- · RTK ground station to improve GPS accuracy





- INDUSTRY
- SOFTWARE
- × SERVICES
- A R&D

#### Contacts:

Responsible for space and ESA projects:

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Maxime Brivois

E m.brivois@aleego.com





### asphericon s.r.o.

### **General Description**

asphericon is specialist and technology leader in field of aspheric components and optical systems. With the emphasis to using latest manufacturing technologies, continual innovation process, skilled workers and world class measuring equipment is asphericon able to provide high quality optical solution for more than 600 customers worldwide.

### Competences & Capabilities

asphericon is the pioneer for the first completely digitized production process in photonics. Based on a worldwide unique, self-developed and patented control software for CNC manufacturing, asphericon combines all manufacturing parameters in a central database system. The result is an optimized and flexible manufacturing process for prototypes, single pieces and large series asphericon accompanies its customers from optical design, production and coating, full-surface interferometric measurement and documentation up to the assembly of optical components as well as their optical characterization

### **Products & Services**

**Products:** Custom Aspheres, Spheres, Mirrors, Freeforms, Durable Systems, Miniaturized Systems, High-NA Objectives **Services:** Optical & Mechanical Design, Assembly, Coating, Me-

### Major Space Projects & References

Description: precise polishing for high performance application in UV/VIS

Realization: polishing of precise aspheric components for ultraviolet applications with high end surface form tolerances (≤

0,5 fr) and surface roughness ( $\leq$  0,001  $\mu$ m) from CaF2

#### IRPOL 1&2

Description: precise polishing for high performance application in infra-red

Realization: polishing of precise aspheric components for infra-red applications with high end surface form tolerances ( $\leq$  0,35 fr) and surface roughness ( $\leq$  0,0008  $\mu$ m) from materials Si, ZnS. IG2

### Sentinel 4 / Copernicus programme (ESA/EU)

Description: High-resolution spectrometer

Realisation: Aspheres, spheres with high-end surface form tolerances and surface roughness (≤ 0,5 nm), manufactured from demanding materials (CaF2, LAK9, SF6, SiO2)

# Sentinel 5 / Copernicus programme (ESA/EU)

Description: High-resolution spectrometer system (UV – SWIR)

Realisation: Ultra-precise optical components (spheres, cylinder)

with irregularities ≤ 1fr

# Space Related Equipment Labs & certificates

Facility: 10 000 m2 total area Clean room classes ISO 5 and ISO 7 High-precision labs with controlled climate

### Certificates:

DIN ISO 9001:2015
RoHS & REACH compliant production





- ✓ MANUFACTURING
- SOFTWARE
- × SERVICES
- ▲ R & D
  T TESTING

asphericon s.r.o.

Contacts:

Ing. I

Milířská 449 463 12 Jeřmanice Czech Republic Responsible for space and ESA projects:

Ing. Karolína Sedláčková

Project Manager
M +420 777 511 624
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### ATC Space s.r.o.

### **General Description**

ATC Space (ATS) was founded in 2017 as a 100% daughter of the German company Aerotech Peissenberg. ATS is active in the space business with vision to become centre of competence for milling and assembly operation structures and competences for space applications. Main experience of ATS is with aluminum machining and hand-made assembly parts of booster for ARIANE 6, named as ESR Rear and ESR Forward skirt.

### **Competences & Capabilities**

The main competences of ATC Space in the space division are the machining (cutting and milling) of aluminum alloys, fulfilling required precision in the maximum tolerances. The components and parts produced in Klatovy are mainly on high stress structures and as a result directly responsible for the strength of the structure of space launcher Ariane 6. In the assembly section, ATS operates as a reliable partner in the area of special assembly and riveting for primary structures in the scope of ARIANE 6.

The ARIANE 6 scope of work is performed in a dedicated facility, optimized according the requirements for a nominal production rate of 32 skirts per year, which was finalized in 2018. Always in the view of a high-tech and state of the art production - sustainable for the next 30 years, we set up a dedicated milling center with one of the most modern machinery and special assembly area with robotic. For the time being, we are producing and finalizing the products for flight number ten of flight hardware of the ARIANE 6.

All of the produced parts and components are tested and finally inspected in house by special means before they are released for delivery to the final customer.

In 2022 ATS Space had 37 employees and we are continuously recruiting with a targeted manpower that is 75 employees. Company turnover in full operational capability is planned 15 mil EUR per year in serial production.

### **Major Space Projects & References**

- Ariane 6 ESR Forward and ESR Rear Skirt
- HERA project AIT Handling Adapter





#### INDUSTRY

- ✓ MANUFACTURING

- ▲ R&D
- T TESTING

ATC Space s.r.o.

Schiffauerova 940 339 01 Klatovy Czech Republic

Responsible for space and ESA projects:

Ing. Tomáš Kroták Ph.D.

- M +420 601 351 934
- E tomas.krotak@atc-space.cz



### ΔŽD Praha s.r.o.

### **General Description**

AŽD Praha, as a leading supplier of signalling systems and solutions to railway undertakings and railway infrastructure owners and managers, is highly motivated to provide its customers the most advanced systems and technologies, all developed and produced in its labs and factories in the Czech Republic, Slovakia, Poland and Bulgaria, Since 2021 AŽD is a Founding Member of EU-RAIL JU, which is the only EU's major programme and joint undertaking for railway research and innovation activities. Besides that, AŽD Praha experts are regular and active contributors to the research and standardization activities in several international institutions, associations and consortiums - UNI-FE/UNISIG, CENELEC, ACRI, CAT, etc

### **Competences & Capabilities**

The majority of projects are focused on the complete life cycle of applied research, innovation and development, implementation, validation and assessment of products which are then introduced into a production cycle. The state-of-the-art sample and serial production infrastructure allows us to manufacture prototypes ready to be tested and validated in our own company labs, on our own trains and as well as in accredited labs anywhere in the world.

### **Major Space Projects & References**

- CArrier Phase RESiliencE (CAPRESE), co-funded by ESA in the course of the NAVISP Programme (project No. NAVISP-EL1-017), 2018-2020
- X2Rail-5, Shift2Rail member's project co-funded by EC in the H2020-S2RJU-2020 call (project No. 101014520), 2020-2023

- Space Related Equipment, Labs & Certificates GNSS SIS stationary and mobile test sets
- GNSS RF signal analyzers and recorders
- Measurement and test rail vehicle and train set

R2DATO, EU-RAIL member's project co-funded by EC in the HORIZON-ER-JU-2022-01 call, (project No. 101102001).

FutuRe, EU-RAIL member's project co-funded by EC in

the HORIZON-ER-JU-2022-01 call, (project No. 101101962),

- Regional rail test tracks > 50 km
- many more...

2022-2026

2022-2026





- INDUSTRY
- ✓ MANUFACTURING
- SOFTWARE
- × SERVICES ▲ R&D
- T TESTING
- Contacts:

### AŽD Praha s.r.o.

Záběhlice 106 00 Praha 10 E gurnik.peter@azd.cz Czech Republic

#### Responsible for space and ESA projects:

### Ing. Peter Gurník

P +420 607 023 380





### **BBT - Materials Processing, Ltd.**

### **General Description**

BBT-Materials Processing, s. r. o. (established in 1995) is a private SME company dedicated to R&D activities in the field of world unique high-performance infrared polarisation optics. photonics, acousto-optics and materials engineering for space and terrestrial applications.

### **Competences & Capabilities**

Our group is the world's first to have discovered mercurous halides single crystals and their extraordinary properties. Our technologies are currently based on two halides with exceptional properties - mercurous chloride (calomel) and mercurous bromide.

These unique materials are a great solution for mid-IR and thermal infrared optics, acousto-optic components and high-power laser applications. At present, we are developing together with ESA a polarising hyperspectral camera and an acousto-optic tunable filter for remote sensing.

Ing. Cestmir Barta, Ph.D (CEO)

barta@calomel.cz M +420 602 266 467

E ballada@calomel.cz

M +420 724 875 729

### **Products & Services**

- Polarizers (several types)
- Scrambles
- Polarizing beamsplitters
- Phase delay prisms
- Quarter/half wave plates
- Savart plates
- Wedges
- Acousto-optical tuneable filter (TRL 4)
- Delay lines

INDLISTRY / MANUFACTURING

× SERVICES

T TESTING

Contacts:

**BBT - Materials** 

Processing, Ltd.

184 00 Prague 8

Czech Republic

info@calomel.cz

▲ R&D

- Common path interferometer (CPI)
- Laboratory measurements
- Custom products





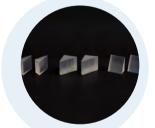
# Responsible for space and ESA projects: Ing. Ondrej Ballada (project manager)

### **Major Space Projects & References**

- ECLIPSE (ESA, 2018-2020) Development and production of Calomel IR polarizer and testing in relevant environment
- IAPETHOS2 (ESA, 2018-2021) Infrared Advanced Polarizers for Space and other Applications 2
- TWINS (ESA, 2022): Birefringent Fourier transform spectrometer for space applications
- Other projects within KONTAKT, PRODEX, FP7, EURO-STARS etc.
- IRCAPOL (ESA, 2023) Development of infrared polarizing camera and increasing the TRL level of the acousto-optical tunable filter based calomel for hyperspectral imagers and commercial applications for EO
- BIRD (ESA, 2023) Development and production of optical and acousto-optical components based on mercurous

### Space Related Equipment Labs & certificates

- Crystal growth units (PVT method)
- Crystal optics manufacturing.
- HW for testing and quality evaluation of optical and acousto-optical component
- RoHS for polarization optics based on calomel (under negotiation)



# **BD Sensors s.r.o., CSRC Space Division**

### **General Description**

BD SENSORS (≈200 employees, ≈13,5 mil EUR turnover) is a European leader in the field of Pressure Sensors Technology and is one of the leading SMEs in Electronics development and manufacturing for Space Applications. Having more than 25 years • of "Space Heritage" via its "CSRC Space Division" BD SENSORS • is experienced in PCB Assembly in accordance with ESA ECSS Standard.

### **Competences & Capabilities**

Electronic Pressure Measurement

- Development and production of Pressure Sensors and Pressure Measurement Devices
- Complex solutions for Pressure Measurement Application (Industry, Aerospace, Space)
- Modern manufacturing technologies
- **Electronics for Space Applications**
- Development and production of Space Electronics
- Electronic Ground Support Equipment (EGSE)
- Power & Energy Storage
- Harness & Cabling Manufacturing and Testing
- Propulsions, PEPE Rocket Engine

### **Products & Services**

Electronic Pressure Measurement

- Portfolio of +100 product types
- **Customer Solutions**
- Production range 0,1mbar up to 6.000 bar
- **Electronics for Space Applications**
- Banks of Supercapacitors
- **EGSE & Unit Testers**
- Automated & manual FM PCB Assembly according to ESA **ECSS Standards**
- INDUSTRY
- ✓ MANUFACTURING
- × SERVICES ▲ R&D
- T TESTING

### Contacts:

### BD SENSORS, s.r.o.

Hradišťská 817 687 08 Buchlovice Czech Republic

- M +42<u>0 602 266 467</u>
- E marek.simcak@bdsensors.eu

### **Major Space Projects & References** INTEGRAL, PSAC Unit

- PROBA 2, DSLP&TPMU Units
- CubeSats (VZLUSAT-1, VZLUSAT-2, BDSAT) PCB Assembly
- ISS / ACES, European Laser Timing Instrument
- Solar Orbiter, PWR for RPW & STIX Instruments
- FUCLID, SVM Flectrical Simulator and FGSF
- NEOSAT, Thermal Vacuum Test Benches JUICE / APME, Manufacturing and Testing

### Space Related Equipment Labs & Certificates Equipment

- Cleanroom 100.000 class / 200 m2 + 10.000 class
- Automated SMT line for FM PCB Assembly / ECSS-certified
- Manual soldering workstation for FM PCB Assembly /
- Manufacturing process in accordance with ECSS stan-
- Software Design & Design Tools (Altium Designer, Solidworks, Structures, Thermal)
- Accredited Calibration Laboratory, EMC Laboratory
- Temperature and Humidity Chamber

### Cerificates

- IS09001
- ECSS-0-70-08, -38, -26 and -28
- Safe Enterprise
- Type Approval
- Inspection
- EN9100 in progress







Ing. Marek Šimčák, Ph.D.

P +420 572 411 320





### **Betrian Group a.s.**

### **General Description**

Betrian Group is involved in the development of autonomous train control technology, the RCAS (Rail Collision Avoidance System) and smart assistants for safer train travel. With its innovations, it plans to contribute to the modernization of European ETCS security in the future

### **Competences & Capabilities**

We use Egnos and Galileo (including RTK) for very precise navigation of trains - our vision is to build and certify positioning system for every train condition like tunnels, underground stations etc. Special goal is to develop a secondary safety system, so called RCAS - Railway Collision Avoidance System. More details about our RCAS system can be found on www.navsuite.cz. While the RCAS system is a vision, our flagship NavCom is already in regular use by rail carriers in its first versions. We would like to develop this early bird together with ESA to the certified status mentioned before in this article. If this happens - there will be a solid base for the certified positioning system for the next generation European Train Control System.

### **Products & Services**

- Navcom-navigation communication unit with fixed installation in the train
- Navcom X- implemented by OSNMA, portable for any vehicle
- Navtrain- navigation application for train drivers
- Navsim-simulation application for train drivers
- Customized HW and SW development

### **Major Space Projects & References**

- "Navcom Train Positioning System powered by EGNOS", funded by EUSPA in the course of the Acceleration of EG-NOS Adoption in Transport Programme (project Nr.GSA/ GRANT/01/2021-02 ), 2022-2024
- NAVISP\_ELM2\_NavComX\_CZ, "NavCom X the modular PNT solution for rail" funded by ESA in the course of the NAVISP Element 2 Programme (project Nr. NAVISP EL2-138), 2023-2025





- INDLISTRY
- ✓ MANUFACTURING
- SOFTWARE
- ▲ R&D
- T TESTING

#### Contacts:

Betrian Group a.s.

Purkyňova 649 621 00 Brno-Medlánky Czech Republic

Responsible for space and ESA projects:

**Petr Sec** 

P +420 721 866 000 E petr.sec@betrian.cz





### **Big Terra**

### **General Description**

Big Terra delivers location-based climate and crop modelling data with one click. Founded in 2017, Big Terra provides a unique fusion of satellite observation, climate, weather and predictive crop modelling data anywhere in the world, helping farmers and organisations to better identify and understand agricultural investment risks, priorities and opportunities in the context of climate change.

### Competences & Capabilities

Big Terra's first ESA-BIC incubated product was our Climate Report, a fusion of Climate and EO data, advanced analytics, and crop growth simulation. Over the years we have developed and now operate a processing pipelines for environmental data ingestion and analytical processing (including satellite data). The results are then used for the reporting and benchmarking services for agriculture, helping to monitor, measure and improve the efficiency of agricultural with a global focus targeting many locations across the globe, in particular developing countries.

### **Products & Services**

### CARBOGNOSTIC

Our flagship product is Carbognostic, a platform for monitoring regenerative agriculture and carbon farming anywhere in the world. It is a logical extension of our location-based climate and crop modeling services. It enables transparent and impartial mapping and monitoring of farming styles in agricultural fields in terms of carbon storage in the landscape. It uses massive processing of satellite data and crop growth models to provide indicators and benchmarks for assessing the actual efficiency and functionality of carbon storage projects. Carbognostic enables stakeholders to evaluate the effectiveness of their investment into soil-based carbon sequestration from their desktop.

- INDUSTRY
- SOFTWARE
- × SERVICES
- ▲ R&D
- T TESTING

### Contacts:

Nedvědice 47 392 01 Soběslav Czech Republic Responsible for space and ESA projects:

### Pavel Juruš

#### CLIMATE REPORTS

Our Climate Reports enable better future preparation for such climate-change related events and provide characterisation of suitable crops for a specified location. We bring useful data to NGOs which enables them to enhance the capability and efficiency of their projects. We provide

- Monitoring of vields
- Identification of the critical points of crop growth
- Related prediction to possible damage to crops
- This consequently helps local farmers manage their investments and expenses related to inputs (fertilizers, machinery, etc.) more efficiently and carefully.

### Major Space Projects & References

- Moldova via UNDP delivered feasibility report for Satellite Data and Communication Platform for Moldovan Agriculture.
- Zambia via CZ Caritas + UNDP (Agribusiness for LIFE) provision of climate reports and created the Terra Crop Zambia app for distribution of mobile agricultural content to farmers.
- Cambodia CDA + CZ Diakonie B2B project delivered "Business plan for climate risk assessment services in Cambodian agriculture" to find suitable partners for providing climate services to Cambodian farmers.
- Finished an ESA Kick-starter feasibility study for our Rebound Potential Index. RPI measures the capability of agricultural areas to produce natural capital, their capacity to rebound from the impacts of a hazard and their future financial potential - adjusted for natural risks
- Iraq, Syria and Ethiopia Climate Report deliveries for larger People in Need projects in various regions



Big Terra

E pavel.jurus@bigterra.com

### BizGarden s.r.o.

### **General Description**

BizGarden s.r.o. is a private non-profit research organisation. Since its foundation in 2010, the company is focused especially on mobile services, utilisation of space technologies and signals in downstream applications and support of space downstream community.

Our main focus is on business model generation and market research, internationalisation and networking.

### **Competences & Capabilities**

BizGarden is specialised in non-technical research and innovation focused on market potential, business model generation and opportunities assessment for space technologies and services, design, development and market roll out of business models. We perform this research on international, national, regional and corporate levels.

#### **Products & Services**

- Professional support for start-up companies and intentions (Start Up)
- Specific and practically focused training in the area of research management
- Marketing activities
- Technology transfer
- Lobbying and representation
- Partnership in EU projects and dissemination of their re-
- Support and consultancy in the areas of research and technology development promotion





- Safety and Information Services for Ski Resorts in Emerging Markets - Prime on Feasibility Study within ESA AR-TES 20, IAP. 2013-2015 https://business.esa.int/projects/ sis-srem-feasibility-study
- SIS-SREM Demonstration project within ESA ARTES 20, IAP. 2015-2016 https://business.esa.int/projects/sis-
- Spin-off of SIS-SREM project Alpdest CEE, s.r.o. (founded 2015)
- AUDROS Autonomous drone services in the CBRNE operations with ESA ARTES, IAP, Feasibility Study 2018 - 2019, https://business.esa.int/projects/audros-1
- Spin-off of AUDROS project DRONHUB INNOVATIONS Sp. z o. o., https://dronehub.ai (Founded 2019)
- AUDROS Autonomous Drone Services for Chemical, Biological, Radiological, Nuclear threats (CBRNe). Customer: ESA & EDA. IAP Demonstration Project 2020 - 2023, https://business.esa.int/projects/audros
- In 2020 BizGarden initiated the setup of Digital Innovation Hub Tourism 4.0 (https://www.t40.cz) which aim is to support digital transfromation in the travel industry in central Europe. Space technol-

ogies and space signals play a significant role in digital transfromation of travel industry.





#### INDUSTRY ■ SOFTWARE

- × SERVICES
- ▲ R&D

Contacts:

Responsible for space and ESA projects:

BizGarden s.r.o.

Příkop 27/2a 602 00 Brno Czech Republic Ing. Ludek Kühr

P +420 605 822 228 E l.kuhr@bizgarden.cz





### BST.COACH s.r.o.

### **General Description**

Founded in 2022, BST.COACH is a digital physical development platform that helps equip coaches and educators to provide gamified long-term fitness development resources for youth.

### Competences & Capabilities

BST.COACH has taken a unique role in applying satellite navigation to benefit public health through an outdoor exercise initiative. We create reward-based physical activity programs that connect outdoor exercise participants with nearby businesses via a voucher system.

### Sustainability

As part of the latest ESA Kick-Start activity "Inclusive and Accessible Sport" BST.COACH creates and distributes outdoor digital exercise programs to be done in GNSS-stamped locations in parks and hiking trails near relevant businesses. Our gamified ESA exercise programs do not require any equipment and therefore do not need any maintenance materials to continue the initiative long-term. Also, the business voucher reward program will be done 100% digitally via a web app.

### **Products & Services**

- Exercise science-based physical activity routines
- Voucher reward program for the participants
- Marketing service for partner SMEs, hotels, and grocery
- Software and satellite navigation system engineering
- Customer engagement via social media communication

**Reinis Kregers** 

User and IT support services





- INDUSTRY ■ SOFTWARE
- × SERVICES
- ▲ R&D

Contacts:

Responsible for space and ESA projects:

BST.COACH s.r.o.

M +37126493838 110 00 Praha 1 - Nové Město E reinis@bst.coach Czech Republic





### CGI IT Czech Republic s.r.o.

### **General Description**

CGI is one of the largest IT and business consulting firms in the world. Operating in hundreds of locations across around the globe, CGI provides end-to-end capabilities, from strategic IT and business consulting to systems integration. We managed IT and business process services and intellectual property solutions, helping clients achieve their goals, including becoming customer-centric digital enterprises.

### **Competences & Capabilities**

Earth Observation or Space Security are the main topics addressed by the Space division of the Czech branch of CGI. Our company has been actively involved in EO and GNSS since 2009, and today is strategic partner for significant initiatives of organizations such as ESA and EUSPA.

Within EO solutions, CGI focuses mainly on providing services and support to infrastructure operators, e.g. oil and gas pipeline operators, for which we deliver detailed expert analyses, including monitoring and risk assessment.

In addition to Farth Observation and GNSS involvement, CGI places a strong emphasis on satellite navigation and security. We are actively involved in the development of Galileo program and EGNOS.

### **Products & Services**

- CGI IP Solution for Automated EO Monitoring
- Space Security Competence Centre
- Corporate Security Competence Centre

### **Major Space Projects & References**

- Galileo PRS and security support services to EUSPA
- Galileo PRS projects to Czech and Slovak National Minis-
- ESA projects in the area of EO, Navigation, 5G/6G
- Wide industry services and support in the area of EO and E0 commercial services
- EO data management and support

### Space Related Equipment, Labs & Certificates

### Certificates:

- ISO 9001:2015 & TickIT
- ISO 14001:2015
- ISO 20000-1:2018
- ISO/IEC 27001:2013
- EUSPA Security Accreditation Board PRS Support

NSA "Secret" Clearance including certified IS





- SOFTWARE × SERVICES
- A R&D
- T TESTING

Contacts:

CGI IT Czech Republic s.r.o.

Laurinova 2800/4 155 00 Praha 5 - Stodůlky Czech Republic

Responsible for space and ESA projects: Ing.et Ing. Jiri Novak MBA M +420 604 223 680

jiri.novak@cgi.com Ing. Kristýna Žáková

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### CleverFarm, a.s.

### **General Description**

CleverFarm is revolutionizing the agricultural industry by empowering farmers with data-driven insights for enhanced decision-making. Platform provides an all-encompassing view of farm management, optimizing every step from seeding, through fertilization to harvest. It's a beacon of efficiency, ushering in an era where optimal resource utilization and cost savings go hand in hand. CleverFarm is not merely changing the landscape; it's transforming the very essence of farming, sowing the seeds for a future where precision and prosperity grow in unison.

### Competences & Capabilities

In the domain of satellite data processing, we have created the crop model allowing us determine the real biophysical conditions of the plants anywhere on the earth and further expand the services in precise crop nutrition, yield estimation and early warnings of crop damages caused by human and natural conditions. In other words, we show them what is happening on their fields, before it become physically visible. Most of the competitors use the basic vegetation indexes which are limited in the quality of the information provided, we combines in situ observation with mobile laboratory analysis and using machine learning allowing us to determine real plant conditions such as biomass volume, chlorophyll and water content.

Another service of using satellite data is providing farmers analysis of 20 years satellite data history to identify what crops they should grow to achieve the highest possible yields. And we do this while lowering their original resources. CleverFarm bolsters this historic data with IoT sensors - providing realtime information about the humidity, temperature, soil moisture and other critical information to improve crop yields. Farmers are able to use this data to predict pests and diseases in crops prior

to an outbreak - allowing for them to apply pesticides only when

### Major Space Projects & References

- Over 800 paying customers (agriculture subjects) in the CleverFarm platform
- Having 9 partners around the CEE to expand our products
- Scalability in different segments like city greens, golf and football stadiums

CleverFarm - data-based farm management.





- INDUSTRY
- SOFTWARE × SERVICES
- ▲ R&D

#### Contacts:

CleverFarm, a.s. Vídeňská 188/119d Czech Republic

Responsible for space and ESA projects:

Adam Zloty, CEO

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- E adam.zloty@cleverfarm.cz





### daiteg s.r.o.

### **General Description**

daited provides arithmetic extensions for optimal computation of floating-point and fixed-point arithmetic in LEON and NO-EL-V processors, targeting areas of software-defined radio algorithms and image compression algorithms. Technology demos are available for Xilinx, Microchip and NanoXplore FPGAs.

### **Competences & Capabilities**

- Design and implementation of LEON and NOEL-V systems.
- Customizable, IEEE Std.754(2019) compliant floating-point units for LEON and NOEL-V processors.
- Design of application-specific custom instructions for LEON and NOEL-V processors.
- Support for GNSS processing in LEON2-FT and NOEL-V.
- Support for CCSDS 121 compression in LEON2-FT and NO-
- Design for space-qualified NanoXplore, Microchip, Xilinx
- Benchmarking of embedded processors and systems.
- AGGA4

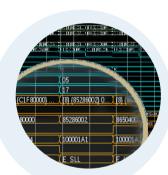
#### **Products**

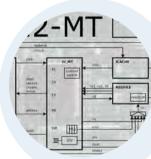
- daited FPU supports a variety of floating-point formats, including packed formats, configurable at synthesis time.
- Ilvm extensions for SPARC and RISC-V. The extensions LEON and NOEL-V processors.

FMC-SRAM board for NanoXplore, Microchip and Xilinx FPGA demo boards.

### Major Space Projects & References

- TRP/ITI: Multi-threaded processor for space applications. Instruction set extensions for micro-threading in
- EO: METOP SG: Design review of the 3MI Filter Wheel Controller Design.
- GSTP: ESA IP core extensions. Configurable floating-point and integer SIMD-unit for LEON2-FT and NOEL-V. Techmap for NanoXplore BRAVE FPGAs.
- EO: AGGA-4 IP core conversion. Modification of the AGGA-4 IP core to suit FPGA targets.





- SIMD-within-a-register (SWAR) extensions for LEON2-FT and NOEL-V. Target areas: GNSS, CCSDS, ANN, data en-
- Floating-point unit for LEON2-FT, LEON3, NOEL-V. The
- support the daited floating-point unit and the SWAR unit in
- INDUSTRY
- × SERVICES
- A R&D T TESTING
- Contacts:

107 00 Praha 10 Czech Republic

daiteq s.r.o. Ing. Martin Daněk, Ph.D.

> P +420 732 732 094 E martin@daiteq.com

Responsible for space and ESA projects:



### Dronetag s.r.o.

### **General Description**

The company envisions a safer airspace by leveraging innovative unmanned traffic management and digitally observable drones. In order to ensure that drone operations adhere to US and EU regulations and enhance safety in the world of drone flying, the company designs UTM platforms and manufactures IoT hardware that augments drones with Remote ID capabilities.

### **Competences & Capabilities**

Dronetag operates as an all-encompassing entity, overseeing every aspect of its activities, from product conception to the development of hardware and software, as well as the manufacturing process, followed by marketing and sales efforts. The Dronetag team boasts a track record of successfully incorporating intricate technologies into their products that others have struggled to bring to market. Their achievement lies in delivering the most compact, lightweight, and cost-effective device for Remote Device Identification. Dronetag is focused on the global market.

Their add-on transmitters enhance existing drones by equipping them with Remote ID capabilities. These transmitters are essential for drones operating in the airspace, while manufacturers incorporate Dronetag modules directly into their drones' internal circuits. The Dronetag device transmits identification and location data to other airspace users via cellular networks and Bluetooth, covering both Network & Direct Remote ID.

Dronetag is actively involved in developing ground receivers that are vital for receiving signals and visualizing the movement of drones using their platform.

The Dronetag platform, compatible with both mobile devices and desktop computers, serves as a cornerstone of the Dronetag ecosystem. It functions as a comprehensive management tool for the devices, aiding in flight planning and execution. Furthermore, it caters to integrators and service providers within the realm of Unmanned Traffic Management (UTM), facilitating the seamless integration of drones in airspace. Dronetag's secondary application, known as Dronescanner, is a public tool designed for scanning nearby airborne drones, and it is readily available for download on iOS and Android devices.

### **Products & Services**

- UTM platform
- Remote ID modules
- Remote ID receivers





- INDUSTRY
- ✓ MANUFACTURING
- SOFTWARE
- × SERVICES

#### Contacts:

Dronetag s.r.o.

Veltruská 602/16 190 00 Praha 9 Czech Republic

Responsible for space and ESA projects:

### Lukáš Brchl, CEO

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37

### EGGO Space s.r.o.

### **General Description**

EGGO Space offers a wide range of services and expertise including testing of EEE components, Industrial Screen-printing&Recycling of contaminated substances. The main range of Test Laboratorys activities consists of climatic, mechanical and Life time testing of components, parts and materials as well as interpretation and processing of results and defect analyses for electrical engineering and related industries. These tests serve customers from various industries including electrical, automotive and aerospace. One of the main activities of EGGO Test House is to provide support services in development or qualification for space devices or components as defined in fields of activity of the Czech National Space Plan, chapter 5.5- Devices and Components and Flight Hardware. EGGO became a member of the Czech Space Alliance at the start of 2011.

#### **Competences & Capabilities**

- Reliability testing
- Failure analysis
- Temperature/ humidity stress
- Mechanical stress, solderability
- Non-linearity measurements
- Corrosion test
- Evaluation testing of passive components (Supercapacitors, Tantalum capacitors, Resistors, Relays) as per ESCC standards (ESCC 2263000)
- Designing and manufacturing of electronic devices for special purpose machinery&test measuring equipment.

### **Major Space Projects & References**

Reliability Testing of AVX low ESR Tantalum capacitors types TPS and TPM for AVX/ CNES project

- Contract no: 400010504/10/NL/PA- Low ESR Tantalum Capacitor Evaluation and Qualification . Contractor: AVX Corporation- Tantalum division, Subcontractor: EGGO Space s.r.o- responsible for the Evaluation of Tantalum Capacitors phase
- Contract no: 4000103977/11/NL/Cbi- Development of Test Facility Dedicated to Passives Components (The project was selected under the CZ industry incentive scheme by ESA&CZ government). Contractor: EGGO Space s.r.o
- Contract No. 4000105661/12/NL/NR ARTES 5.1 Evaluation of Supercapacitors and Impacts at system level, Contractor: EGGO Space s.r.o
- Contract No. 4000111435/14/NL/WE High Density Connector Suitability for Space Application ARTES 5.1. Contractor: EGGO Space s.r.o

### **Further projects**

- Measure maximum rating of components (physical limit)
- Identify limit of current technology and evaluate new technology for high vibration and shock
- Determine derating of components

### Space Related Equipment, Labs & Certificates

- Testhouse with large portfolio of the Test equipment including: Thermal chambers, Vibration apparatus, mechanical shock apparatus, etc
- ISO 9001:2009
- ISO 14001:2005







Contacts:

EGGO Space s.r.o.

Dvořákova 328 563 01 Lanškroun Czech Republic

Responsible for space and ESA projects: Dr. Ing. Petr Vasina, CSc. E vasinap@eggo.cz

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### Eltvor Instruments, s.r.o.

### **General Description**

Eltvor Instruments, s.r.o. (Eltvor) is a startup company founded by HW&SW design engineers, who worked together on number of time&frequency R&D projects in the past, with the mission to continue with the time&frequency products development, especially for industrial customers. Besides government and scientific users, Eltvor long-term strategy is to provide timeas-a-service for critical infrastructure, independent of GNSS.

### **Competences & Capabilities**

The core strength of Eltvor team is in signal processing design and FPGA as well as CPU implementation, time&frequency measurement, RF system design and generic embedded computing centered mostly around C, Linux, FPGAs (namely Zyng and Microchip/Actel), and numerical prototyping and batch pro-

The Eltvor team re-designed, manufactured and programmed its compact camera and tailored it for the VZLUSAT-2 in a 4 months time span, operating on-board since January 2022. One of recent examples of space-related FPGA+SW design is our SpaceWire design.

Current Eltvor's portfolio of proven technology contains laser Doppler instrument, microwave transparent (bent-pipe) transponder, DVB-S2 transmitter, and microwave interferometer at 125GHz, high precision offset phase/frequency generators, micro-steppers.

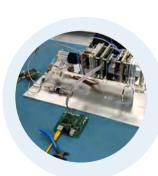
### **Products & Services**

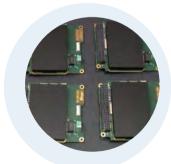
ELT-DPU-Z2CS: CubeSat-compatible OBC/DPU recently upgraded from VCVS2 to be used in frame of Czech government mission

- VCAM1M3-BW, VCAM1M3-RGB: 1.3MPix BW and RGB cam-
- NXDAC: custom electronic board populated with rad-hard European components: EVX12DS130B DAC and nanoXplore NG-MEDIUM FPGA
- Custom instrument development in electronics&photonics with cutting-edge performance for both terrestrial and space segments.

### Major Space Projects & References

- main payload of VZLUSAT-2 satellite: two cameras (HW&SW) for Earth observation
- control computer board for the X-ray imaging detector onboard VZLUSAT-2.
- Digital Modem for Two-Way Satellite Time Transfer in the frame of ESA NAVISP program
- Two-way Time Transfer and Ranging: in-orbit performance demonstrator in frame of ESA GSTP program
- The Eltvor core team worked in the leading engineering roles on several ESA projects in the past:
- comparison of optical time-transfer links for GNSS
- optimal clock ensembling algorithms







✓ MANUFACTURING

■ SOFTWARE

× SERVICES

▲ R&D

Kamarýtova 5

Czech Republic

Responsible for space and ESA projects:

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Contacts:

Eltvor Instruments, s.r.o. M + 420 732 280 497

### esc Aerospace s.r.o.

### **General Description**

esc Aerospace is a leader in the field of space qualified onboard hardware and software in Europe and is one of the leading SMEs in innovative R&D projects with a focus on Space and Defence.

### **Competences & Capabilities**

esc Aerospace is experienced in the areas of Avionics, Autonomous Software, C-UAS and Guidance, Navigation & Control (GNC) systems, esc Aerospace offers services in the field of UAS and satellite payload chains modeling, as well as UAS technologies and drone defence services to eliminate your threats.

### **Products & Services**

- On-board systems: Space Qualified flight hardware (MDE) •
- Space Qualified On-board Computer (OBC, OBDH)
- Avionics for Unmanned Systems
- Quantum Key Distribution (QKD) QKDSat
- Applications: Secure & resilient communications leverag-
- Radiation monitors & sensor systems (ionizing radiation hardened detector payloads)
- Test systems (EGSEs/SCOEs)

### **Major Space Projects & References**

- TRITON-X heavy platform satellites
- SpacePix® radiation monitors
- Space Rider MDE for affordable and routine access to
- LVICE2 esc Aerospace's own Ambicious mission to the Moon - 66x66x61 cm; 3x100 Wh; 140 kg; 6 scientific

#### instruments

- ExoMars, Plato SW verification and validation
- 5 generations of RPAS/UAS avionics VTOL, microUAS,
- Solar Orbiter STIX Instrument On-board flight software
- SWARM ACCelerometer
- OBSW-RAC Space qualified flight software: On-board software reference architecture consolidation. On-board software reuse in a systematic manner, following activities CorDeT and Domeng
- SENTINEL-4 Performance Assessment Tool for the S4/ **UVN Instrument**
- MTG Meteosat Third Generation
- DOC Demise Observation Capsule
- MetOp-SG bootloaders

### **Space Related Equipment**

esc Aerospace applies ECSS standards:

- ECSS-E-ST-40C Space Engineering Software
- ECSS-E-ST-70C Ground systems and operations
- ECSS-M-ST-80C Risk management and SW Product Assur-
- ECSS-Q-ST-20C Quality Assurance

laboratory and manufacturing assembly room / factory 4.0, IoT, equipped with oscilloscopes, DAO stations, spectral and data analyzers, signal generators and soldering stations





### INDLISTRY

✓ MANUFACTURING

- AR&D

Contacts:

T TESTING

### Responsible for space and ESA projects:

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# **Exact Control System a.s.**

### **General Description**

EXACT develops and provides implementation of an effective tool for highway infrastructure asset management, maintenance, reconstruction, and rehabilitation that has demonstrated direct cost savings and inherent environmental benefits. The technological tool is called Exact Street - an innovative solution for the road resurfacing process (milling and paving).

### **Competences & Capabilities**

EXACT has been teaching the construction machine control systems for more than 20 years. We have successfully implemented technologically demanding orders in the field of geodetic works, control of construction machines and implementation of information, robotic, monitoring systems in the Czech Republic, Scandinavia, Canada.

#### **Products & Services**

- Product: Exact GNSS for construction machines control (HW, SW)
- Product: 3D Differential Milling Unit (HW, SW)
- Service for Highways (Canada): Smooth innovations 3D milling makes inroad in Ontario (pg.10-12) www.mediaedgemagazines.com/the-ontario-road-builders-association-orba/or94/
- Service City Roads (Prague): https://cloud.teamexact. cz/s/DBCwxFQJQjPs63d

### **Major Space Projects & References**

Method and apparatus for separation of surfacing and base layer by 3D milling method to achieve higher quality and reduced CO2 emissions in urban environments and areas with high quality or limited GNSS signal (ESA Contract No. 4000141869/23/NL/





- INDLISTRY
- ✓ MANUFACTURING
- × SERVICES
- ▲ R&D

### Contacts:

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Responsible for space and ESA projects: Ing. Vítězslav Obr, Ph.D.

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- Ing. Marek Přikryl, Ph.D.
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- E marek.prikryl@teamexact.com





### Frentech Aerospace s.r.o.

#### **General Description**

Production of parts for aircraft industry, production, integration and testing of mechanisms for space industry, project and PA management, Participation within ESA and ESO projects including commercial space projects.

### **Competences & Skills**

Frentech Aerospace s.r.o. is hi-tech company very well equipped with modern and productive CNC machines, air conditioned inspection department with three CMMs by Mitutoyo. There are also available clean rooms ISO 8, ISO 7 and ISO 5 with thermal testing chamber, thermal-vacuum chamber and CMM machine. The ISO8 is equipped with big-sized thermal vacuum chamber (Space simulator) and equipment necessary for processes like bake-out and contamination control.

The company is focused mainly on production of mechanical parts for aircrafts and space mechanisms including subsystems for space industry. Latest development of the company . is focused on design, development and construction of subsystems for satellites and other subsystems for space industry. In • this field Frentech Aerospace cooperates within scientific and commercial projects with major space integrators and ESA.

Frentech Aerospace cooperates with technical universities and • Czech Academy of Science. The company has long term experience with international cooperation within space projects.

### **Products & Services**

- Precision machining delivery of fine components for satellites, launchers and aircrafts
- Delivery of deployment mechanisms for solar panels
- Delivery of specific structures (cryostat structures, components for optical systems)

- Production, assembly and testing of space mechanisms
- Development of space mechanisms including integration (ESA and commercial projects)
- Testing activities (thermal-vacuum testing, geometrical, mechanical leak-proof, particulate
- and molecular control)
- Application of tribological coatings for Aerospace
- Qualification of Ti screws for space
- Bake-out and thermal balance testing
- Production, assembly and testing of propulsion valves for
- Project management
- PA management

### Major Space Projects & References

- Iridium NEXT, 03B/GB2, OneWeb
- NEOSAT
- MTG and Copernicus (Cryostat structures)
- J-BOOM(ESA)
- JUICE (HDRM & MAG Boom)
- E-ump for cryogenic rocket propellants
- ATHENA Magnetic Diverter
- Rotary Actuator for Space Applications
- Space Rider (Landing gear & Mechanism)
- MetOp SG
- VEGA launchers
- Ariane launchers





### INDUSTRY

- ✓ MANUFACTURING
- AR&D

Contacts:

T TESTING

#### Responsible for space and ESA projects:

### Frentech Aerospace s.r.o. Pavel Sobotka

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www.frentech.eu



### G.L. Electronic s.r.o

### **General Description**

G.L. Electronic s.r.o. (SME) is a Czech company that since 2008 specializes in the complete realization of Hi-Rel electronic equipment and assembly of cable harnesses in the aerospace industry. The company also provides testing services in certified cleanroom ISO 8 and in a test laboratory accredited according to the international standard ČSN EN ISO/IEC 17025:2018.

### **Competences & Capabilities**

The production of electronic devices takes place within the framework of ESA standards and ECSS standards in ISO 8 certified cleanroom. The production is carried out by technicians certified according to ESA standards.

#### **Products & Services**

#### Products

Design, assembly, electrical test of electronic boards and cable harnesses.

### Services

- Quality assurance according to ECSS specifications,
- technical co-engineering support in the field of design,
- final routing and integration of harnesses,
- testing: climate and vacuum chamber, wire tension test, microsection of crimped joints, endoscopic visual inspection.

### **Major Space Projects & References**

Harness manufacturing, testing and integration:

- ClearSpace
- CIMR
- ARIEL
- FLPP VPX Cards
- SALT0
- INDUSTRY
- ✓ MANUFACTURING
- × SERVICES
- ▲ R&D
- T TESTING



Hrázky 804 768 11 Chropyně Czech Republic

### G.L. Electronic s.r.o Manufacturing 612 00 Brno

Czech Republic

### Responsible for space and ESA projects:

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AHA for ROSE-L

HERA

NAOS

**ESAIL** 

RPDA

Cleanroom:

ISO 8.

Certifications:

PCB.

ISO 9001:2015,

ČSN EN ISO/IEC 17025:2018,

and certified technicians),

JUICE-LRF

Biomission

ISSPresso

TRITON-X

BIOMISSION

VEGA SSMS, VV18

VEGA SSMS POC Dispenser VV16

**Space Related Equipment Labs & Certificates** 

ISO 8, class 100 000 (production and storage area: 210 m<sup>2</sup>),

integration hall with a 2000 kg crane for flight HW: 150 m<sup>2</sup>,

ECSS-0-ST-70-61/18/26/28 for CAT2 & CAT3 (ESA trained

IPC-J-STD-001 (Soldered Electrical and Electronic Assem-

IPC-A-610 (Acceptability of Electronic Assemblies), Verification process of SMD hand soldering of flight level

continuous temperature and humidity measurement,

JUICE MGAMA

METOP SG MWI

PCB hand soldering assembly

SOLAR ORBITER TRISHNA



**G.L.**Electronic

### GINA Software s.r.o.

### **General Description**

GINA Software is a technology company developing and providing a public safety and security management system called GINA. The company was established in 2010 and since then has become a specialist in provision of AVL systems and field cooperation applications used by Public Safety and Defence Agencies, Humanitarian Organizations, Oil & Gas and Mining Industries.

### **Competences & Capabilities**

The main goal is to Allow tactical coordination between commanders and field units over the same map. Respond faster & make informed decisions using the most reliable situational awareness platform.

The ultimate tool for reaching this goal is an interactive map providing constant real-time visibility of all units from variety of devices combined in a single interface with advanced features such as history of movement, data visualization, automatic reporting, video surveillance and data analysis.

In addition to that, GINA has developed an in-vehicle public safety field cooperation application featuring incident information, navigation, live data feeds, video streaming and field informational support tool.

#### **Products & Services**

- GINA Central a modern tactical AVL software providing real-time information.
- GINA Tablet/Mobile a emergency response/field response app.
- GINA GO a location tracking app with panic button.

### Major Space Projects & References

- Search and Rescue Operations (Haiti Japan, Lebanon, Czech Republic)
- Fire and Rescue Services of the Czech Republic, Slovakia, Germany, Switzerland.
- Deployment for Security Organizations
- Deployment for European Commission
- ESA FIRTS RESPonse Project (118 Verona Italy)

### Space Related Equipment Labs & certificates

- Assets & Vehicle Tracking devices: Rugged GPS tracking devices, GSM connectivity, A-GPS sensor, Programmable buttons, Configurable Tracking frequency.
- Mobile Terminals: Robust device with ergonomic design for whole day usage, enabling extension by accessories: Smartphone features, GPS location sharing.
- Iridium Satellite Terminal: Unique solution for intelligent tracking over satellite and mobile networks: Iridium/ GSM/3G network connectivity, Price equivalent to personal satellite trackers, Predictive location sending, Interactive map.







### T TESTING Contacts:

INDUSTRY

■ SOFTWARE

× SERVICES

A R&D

GINA Software s.r.o.

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Ing. Jiří Janíček

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E janicek@ginasystem.com

Responsible for space and ESA projects:





### Gisat s.r.o.

### **General Description**

Actionable intelligence from Earth observation

With 30 years of experience, we transform complex remote sensing data into insights ready to serve your decision making. Acting globally in a wide range of thematic domains, our mission is to provide our clients a complete portfolio of value delivering geo-information services based on Earth Observation data. We are committed to supporting sustainable living and using Earth's resources by enabling everyone to make better decisions about our environment.

### **Competences & Capabilities**

Combining remote sensing, artificial intelligence and big data analytics we operate a complete value-chain to unleash the power of Earth Observation data at one place. Our online platform solutions introduce ready-to-use spatial data exploration tools and integrate them into clients' decision-making mechanisms. We provide our service and products to a diverse group of clients that includes international & financial Institutions, public & state authorities and businesses worldwide.

### **Products & Services**

- Agriculture: Operational agricultural monitoring and food production assessment serving farmers, industry, governments and agencies
- Sustainable Urban Development: Geospatial solutions for livable and vibrant cities and regions
- Geohazards Mapping And Monitoring: Risk assessment support via up-to-date information about hazard status and insight into its evolution in space and time
- Utility And Infrastructure: Early identification of risks and support to planning, construction and maintenance of util-

- ity and infrastructure assets
- Environmental Monitoring And Natural Accounting: Monitoring services providing critical support for our challenging commitments targeting the resilience of ecosystems and society

### Major Space Projects & References

Dozens of research and commercial projects provided to industry, governments, public institutions and international agencies (ESA, EC, EEA, JRC, EUSC, World Bank, ADB, IADB).

### Space Related Equipment Labs & certificates

The company is ISO 9001 & ISO 14001 certified to guarantee the quality of provided services and to reflect the responsibility in environmental impacts of its activities.







- INDLISTRY
- SOFTWARE × SERVICES
- ▲ R&D T TESTING
- Contacts:

GISAT s.r.o.

Czech Republic

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Responsible for space and ESA projects:

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### **GNSS Centre of Excellence, z.s.p.o.**

### **General Description**

GNSS Centre of Excellence (GCE) is a non-profit association founded by Czech Railway, Air Navigation Service Provider, Road and Motorway Directorate, and Czech Railway Infrastructure Administration. GCE is not only an association or a consultation company but has technologically experienced personnel working on R&D projects.

### **Competences & Capabilities**

GCE's mission is to accelerate the development and deployment of Galileo and EGNOS through active cooperation with its members which include Universities, Research Institutes, and R&D companies incl. SMEs. GCE has competencies in the development, testing and deployment of GNSS-based products, services and applications, expertise in GNSS technology, project management, background research, monitoring of trends and opportunities in GNSS.

### **Products & Services**

**GNSS** expertise:

- GNSS and RFI RFI detection & mitigation, critical infrastructure protection
- GNSS and aviation RNP Approaches & PinS implementation
- GNSS in rail signalling systems
- **GNSS** for inland waterways

**Project Management competencies:** 

- Management of large & complex projects under different granting schemes
- Competencies in HORIZON granting process
- Procurement process of the ESA and EUSPA
- National granting schemes & procurement processes

### Major Space Projects & References

Project: GNSS vulnerability & mitigation in the Czech Republic

ESA NAVISP project to support activities towards safe and robust GNSS utilisation for critical infrastructure, state and governmental institutions. Real-time on-field testing campaigns to further understand impact of the GNSS RFI.

### Project: GNSS RFI detection at highways

develop a static GNSS RFI detection system to be used at tolling gantries complemented with hand-held detectors for police.

### Project: Implementation of PinS procedures and Low-level routes in Czech airspace

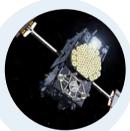
utilise a functional way for broad implementation of PinS and LLR in Czech aviation.

### Project: NavComX

OSNMA implementation into highly accurate modular positioning device for rail vehicles

### Space Related Equipment, Labs & Certificates

GNSS receivers' performance and robustness testing at unique Czech railroad testing circuit









- × SERVICES
- A R&D

Contacts:

T TESTING

### Responsible for space and ESA projects:

Dr. Tomáš Duša

director of the GNSS Centre of Excellence

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### GROUNDCOM.SPACE s.r.o.

### **General Description**

Groundcom is a Czech based company founded in 2020 aiming to provide affordable ground segment infrastructure for LEO small satellite constellations. Business focus includes Ground Station-as-a-Product (GSaaP) and Ground Station-as-a-Service (GSaaS).

### **Competences & Capabilities**

Company designs and develops ground stations for satellite operations, TT&C and payload data downlink. Ground stations are specialized to support Earth Observation (EO) or telecommunication satellite constellations on Low Earth Orbit (LEO). Groundcom also operates a network of shared ground stations located on various continents. For customers requesting nonshared hardware. Groundcom offers to build and operate a dedicated ground station network.

Groundcom core team and founders combine experience from ESA, RF R&D, Mission Control and leading technical R&D projects. Due to this, company is also dedicated to supporting research and the startup community with ground segment services and communication expertise with individual conditions.

#### **Products & Services**

- VHF/UHF ground station
- S-band ground station
- X-band ground station
- Ground station-as-a-Service (GSaaS)





- INDUSTRY
- ✓ MANUFACTURING
- SOFTWARE × SERVICES
- ▲ R&D
- T TESTING

#### Contacts:

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Czech Republic 46 **INDUSTRY** 

252 61 Jeneč

**GNSS Centre of** 

Excellence, z.s.p.o.

# Hikade Technologies s.r.o.

### **General Description**

Hikade Technologies is a team of experts with passion for challenging R&D tasks in various areas of mechatronics.

### **Competences & Capabilities**

We draw on our previous professional career and experience in space, aerospace, advanced technologies as well as biomedicine and electron microscopy. We deliver complex development and production of entire devices in the fields of mechanical and electrical engineering, optics as well as advanced SW programming.

#### **Products & Services**

Our main focus is the development of a two-axis positioning device for HAPS. With this project, we have been successful in the TACC+ competition (Supported by Taiwan Vehicle Corporation) and also in the Innovx program (Supported by ERSTE). We are expanding our own testing facilities laboratory and testing equipment.

### **Major Space Projects & References**

- Gimbal for HAPS (in progress)
- Torque Test Bench (Continuously adjustable rotational load designed 2x80 kW)





- INDUSTRY
- × SERVICES
- ▲ R&D
- T TESTING

Responsible for space and ESA projects:

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### Honeywell International s.r.o.

### **General Description**

Honeywell has a long and proud heritage in the Czech Republic. Since opening its first office in 1962, Honeywell has expanded to operate from three locations in the Czech Republic: Prague, Olomouc and Brno. In space sector, Honeywell provides innovative products that have contributed to the mission success of • many different and varied space platforms.

### **Competences & Capabilities**

Honeywell provides various solutions and products required for • accurate momentum control, pointing, guidance and navigation, data control and other satellite, launch vehicle, missile related products. Close cooperation with ESA also led to several breakthrough solutions and technologies in the field of satellite communication.

Utilizing this experience and a dedicated development laboratory, Honeywell has expertise leading to a high probability of mission success, regardless of the spacecraft challenge presented.

### **Products & Services**

Leveraging our industrial and research capability across the Czech Republic, Honeywell serves space users with state-ofthe-art products and services in number of areas:

- Satellite Guidance & Attitude Control
- Momentum Control Systems & Control Moment Gyros
- MEMS Inertial Sensors & Units
- Antenna pointing mechanisms
- Satellite Communication & Optical Communication

### Space Related Equipment, Labs & Certificates

Various test beds are enabling Honeywell to support its customers in risk-reduction testing of new dynamic and structural control systems for new satellite programs. Honeywell offers:

- Upfront modeling and simulations
- Validation of modular and scalable designs
- Experimentation with various attitude, momentum and vibration control scenarios and interactions
- Verification of new control schemes and code
- Testing of hardware and software in an open or closed looped test environment





- INDLISTRY
- ✓ MANUFACTURING
- SOFTWARE ▲ R&D
- T TESTING

Contacts: Honeywell International s.r.o.

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Responsible for space and ESA projects:

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Honeywell

### Huld s.r.o.

### **General Description**

Huld is a European technology design house with over 450 employees and 11 offices in Finland and the Czech Republic. Huld offers an internationally unique combination of software and product development expertise. We bring more intelligence to our customers' business. We always work for a more intelligent future and care about the world around us.

### **Competences & Capabilities**

Huld provides high-reliability software solutions for many of Europe's most ambitious space missions and customers such as Airbus or OHB as well as innovative startups. Our purpose is to provide technological design expertise to our customers on their journey beyond tomorrow, safely & securely. We have broad experience with ESA projects but also new space projects focusing on embedded software, GNSS technologies or ISVV.

### **Products & Services**

- Onboard Software
- Onboard Data Processing
- **Ground Processing**
- Independent Software Validation and Verification
- Test Software & Simulations
- **Development & Validation Services**
- Space Security

### **Major Space Projects & References**

Milani CubeSat is part of the deep space mission Hera. We are responsible for On-Board Software and Data Processing Unit development. The DPU fulfills industry standards as well as includes experimental

- Al algorithms to measure image quality and is optimized for reliable operation in deep space missions.
- HERA AI FDIR project's goal is to design and develop Albased failure detection application. The AI will be deployed on OBC and allow faster and better anomaly detection and
- Block-box for an optimized GNSS spectrum monitoring network using Al
- Memory Control Sub-System for Low Earth Orbit Applica-
- Advanced Algorithms & Techniques for Resilient Time Pro-
- The TIIRA project addresses the first step towards the standalone GNSS/ Galileo receiver with an open-source solution and resulted in a Minimum Viable Product and a commercially viable solution for cooperative navigation targeted to a premium mass market.
- Orbitcon is a mission control system (MCS) customized for small sats. It offers standard interfaces and easy mission instantiation. The service is hosted in a cloud environment, accessible globally, with all tools needed to cover a whole lifecycle of a mission.
- Plato the PLAnetary Transits and Oscillations of stars mission. Huld is the Spacecraft Software Prime in a consortium led by OHB.







# INDLISTRY

- / MANUFACTURING
- × SERVICES
- ▲ R&D

### Contacts:

Huld s.r.o.

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Anna Rojková, Director of Huld Czechia

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E anna.rojkova@huld.io



### HVM PLASMA, spol. s r.o.

### **General Description**

HVM PLASMA was founded 1992 and provides PVD job coating services in its two job coating facilities (mainly tribological thin film coatings for automotive customers), designs and manufactures key components for PVD equipment and vacuum chambers and provides analysis of materials and thin films.

### **Competences & Capabilities**

The main competencies in space sector are space qualified PVD coating of Au thin film at cleanroom conditions, manufacturing of vacuum equipment for analysis and testing, thermal vacuum outgassing test according to ECSS-Q-ST-70-02C and outgassing measurement/degassing of objects of size up to 20x20x-30cm. We can provide several types of thin film coatings based on customer needs.

#### **Products & Services**

- Space qualified PVD Au coating (magnetron sputtering) of components at cleanroom conditions
- Design and manufacturing of vacuum chambers and equipment
- Thermal vacuum outgassing test according to ECSS-Q-ST-70-02C and outgassing measurement/degassing of objects of size up to 20x20x30cm at conditions inspired by ECSS-Q-ST-70-02C
- Surface, material and thin film analysis

### **Major Space Projects & References**

- Au coating for cryostats of Meteosat Third Generation (MTG) satellites
- Au coating for cryostat of Copernicus CO2M satellite

- Part of team of Cubesat VZLUSAT-1 (TiN and Au coatings on structural components)
- Part of team of ESA project SR-CPT (Space radiation capabilities, technologies and platforms for small spacecraft and CubeSats) - outgassing measurement and outgassing sensor response characterization.

### Space Related Equipment, Labs & Certificates

- Manufacturing, job coating and testing according to
- PVD equipment for thin film deposition (magnetron sputtering) placed in cleanroom conditions
- Laboratory for Thermal vacuum outgassing test of materials according to ECSS-Q-ST-70-02C and for Thermal vacuum outgassing measurement/degassing of objects of size up to 20x20x30 cm at temperature up to 250°C







- INDUSTRY
- ✓ MANUFACTURING × SERVICES
- ▲ R&D
- T TESTING

Contacts:

Responsible for space and ESA projects:

HVM PLASMA, spol. s r.o. Mgr. Aleš Marek, Ph.D.

Na Hutmance 347/2 158 00 Prague 5 Czech Republic

P +420 251 087 132 E Ales.Marek@hvm.cz





### Iguassu Software Systems, a.s.

#### **General Description**

Iguassu Software Systems (ISS) software solutions for ESA, Eumetsat, Spaceopal, ESSP, EUSPA, TAS, Airbus DS and other international customers.

Core expertise SBAS/Galileo, SSA (robotic & fly-eye telescopes, • asteroid detection). Ariane 6 software

### **Competences & Capabilities**

In space technologies since 1994 e.g. Meteosat TP MCC CF, SCOS, ground segment systems ESOC, ESRIN, IRIDIUM terminal test software, MSG, MCF, MSG PGS etc. Since 2005 (ESA membership) ISS has been developing space software solutions for

- MEOLUT (Medium Earth Orbit Local User Terminal (MEO-LUT) for GJU with Indra
- GNSS, E.g. SBAS performance tools for ESA, Collision Risk Estimation & Automated Mitigation (CREAM#3), Machine learning to model GNSS. For EUSPA we work e.g. on Galileo HAUT, EGNOS V2 support and EGNOS V3
- SSA robotic telescope test bed, fly-eye telescope, optical sensors qualification, telescope data processing chain, European Optical Network
- Sat-com (Antares with TAS-I & Indra), IRIS (INMARSAT)
- Launchers Ariane 6 telemetry onboard processing software, and ground segment s/w We can also work in Spanish, German and Portuguese, with basic French, and Japanese

### **Commercial Products**

Our software runs in the TAS-F EGNOS simulator (5 year maintenace contact), CNES, ESA, West Africam ANS, ESSP(EGNOS operator), Romanian Space Institute, UK Lighthouse Authority,

Telespazio, CNES, and even in the Japanese government institute (OZSS) ENRI.

- EVORA real-time GNSS performance monitoring, multi-constellation, dual frequency (MCDF)
- SBAS Simulator II volume simulator, MCDF
- SENDAL long term GNSS performance monitoring statistics and data mining too, MCDF

### Clients, partners

ESA (ESOC, ESRIN, ESTEC, EGNOS Project Office Toulouse), Eumetsat, GJU/Indra, ACS-I, CAM GmbH, Iridium sub., SciSvs-UK, Indra-E, Integral-F, TriPolus-UK, Airbus SD-D&F, TAS-F, TAS-I, GMV-E&R&PL, Sybilla-PL, Integricom-NL, Vega-D, Quasar-E, Clemessy-F, Critical Software-D&P, Telespazio-F, Ariane Group, ESSP, SpaceOpal, ENRI-Japan, ASECNA-West Africa....





- INDUSTRY
- SOFTWARE
- AR&D

#### Contacts:

Iguassu Software Systems, a.s. Evropska 120 160 00 Prague 6 Czech Republic

Responsible for space and ESA projects:

**Petr Bares, Managing Director** M +420 603 85 44 77 Jiri Doubek, chief engineer and deputy MD E mailus@iguassu.eu





### INPRAISE SYSTEMS s.r.o.

### **General Description**

Inpraise Systems develops high-speed rotating machines for integrated solutions of special compressors, pumps, turbines, and their components, including special bearings, high-frequency stators and rotors, and integrated power electronics for sensorless control of motors operating at extremely high . speeds.

### **Competences & Capabilities**

Focused on specialized applications, our emphasis is on small-series production. Our rotating machines have wide-ranging applications, from space-related technologies such as rocket engines and thermal control systems for satellites to terrestrial sectors like energy, power, and transportation. They play a vital role in supplying air to fuel cells in stationary power sources and next-gen hydrogen vehicles.

#### **Products & Services**

### Machine systems:

- High-speeded electric pumps, compressors, turbines (including turbochargers)
- High-speed electric motors
- Variable-frequency drive (VFD) power inverters

### Components and sub-systems:

- Fluid bearings (gas bearings, ultra-low viscosity bearings, aerostatic bearings)
- Shaft sealing (dynamic sealings, static bearings, hybrid
- High frequency high-speed motor elements (stators, ro-
- Integrated work stages (pumps, compressors, turbines)
- Power electronics, motor controllers, power management
- INDUSTRY
- ✓ MANUFACTURING
- × SERVICES
- ▲ R&D T TESTING

### Inpraise systems s.r.o.

Veveří 2581/102 616 00 Brno Czech Republic

#### Responsible for space and ESA projects:

### Petr Váňa

### electronics, control firmware

### Engineering competencies:

- CAD modeling
- Mechanical engineering (rotordynamics, bearing design, concept design, hydraulic design)
- Electric motor design
- Electrical engineering (power electronics, control electronics, FPGA design, prototyping, production)
- Numerical analysis (CFD analysis, FEM static and dynamic
- Test engineering (machine vibration analysis, tribological analysis, finite element analysis, optical structural analy-
- Systems engineering
- Project management & product assurance

### Major Space Projects & References

- MON/MMH E-Pumps for a Storable 6kN Rocket Engine
- MON/MMH E-pumps for Deep Throttling 2-7kN Rocket Engine for EL3 (Nammo Raufoss AS)
- Ammonia Pump Package for Thermal Loop of Large Satellites (ESA / Thales Alenia Space)

### Space Related Equipment Labs & certificates

- Multidisciplinary engineering development office
- Electronics laboratory
- Mechanical & test laboratories
- High-speed motor stators pro duction facility







Contacts:

P +420 734 325 925

E petr.vana@inpraisesystems.cz



# KYOCERA AVX Components Czech Republic s.r.o.

### **General Description**

KYOCERA AVX is a leading global manufacturer of advanced electronic components. The company has manufacturing facilities spanning more than 15 countries around the world. KYOCERA AVX designs, develops, manufactures and supplies advanced capacitors, antennas, connectors, circuit protections, timing devices, sensors, controls, filters, fuses, diodes, resistors, couplers and inductors optimised for employment in the international 5G, IoT, aerospace, automotive, consumer electronics, industrial, medical and military markets.

The KYOCERA AVX Lanškroun plant has many technological innovations able to offer a wide range of electrolytic capacitors for all kinds of applications.

In 2004 the plant's capabilities were extended to include conductive polymer technology. AVX was the first company to market with several new polymer technologies.

In 2013 the TCH (hermetic polymer series) was developed in cooperation with the ESA. This product is suitable for application where the highest reliability and extended lifetime within harsh environments is required.

KYOCERA AVX is acting in various space programmes throughout the world. We have an established supplier position for the European Space Agency and offer surface mount tantalum capacitors under TAJ ESCC (1993), TES ESCC (2013) and polymer • TCS ESCC (2020) drawings.

### **Products & Services**

- Chip SMD capacitors (standard tantalum and polymer electrolytic capacitors)
- Specialities: microchip, wet, hermetic, modules

For consumer, industrial, geological, automotive, high reliability, medical, military and aerospace applications.

- INDUSTRY
- / MANUFACTURING
- × SERVICES
- ▲ R&D
- T TESTING

Contacts:

KYOCERA AVX

Republic s.r.o. Dvořákova 328

Components Czech

### Responsible for space and ESA projects: Slavomir Pala

E slavomir.pala@kyocera-avx.com

Ing. Jaroslav Tomáško

P +420 465 358 682

E jaroslav.tomasko@ kyocera-avx.com

Meet performance requirements for projects including: Voyager Space Probe, Mars Rovers, ISS, Shuttle.

### Major Space Projects & References

- NASA Artemis project back to the moon: part of the Artemis project comprises a multi-purpose crew vehicle and service module on the Orion. The service module was designed and built by ESA and incorporates TES/TAJ-ESA components.
- INDIA Chandrayaan mission: TCH/TES on the ISRO Prag-
- Part on low orbit satellite projects: GEO/LEO/MEO. Various range of PN portfolio.
- 630 pcs TBM tantalum capacitors are powering the Chem-Cam module laser on the Curiosity Mars Royer.
- 350 pcs TBM perseverance on follow-up design in laser supply boarding in Supercam.
- Part on the TURKSAT Satellite Programme (TES, TAJ-ESA).

### Space Related Equipment Labs & certificates

- IATF 16949:2016 Automotive
- ISO 9001:2015 0MS
- ISO 14001:2015 EMS
- ESCC 3012/001 SMD solid tantalum chip capacitors
- ESCC3012/004 Low ESR tantalum chip capacitor
- ESCC3012/006 Polymer solid electrolytic multi-anode
- MIL-PRF-790 established and high reliability QPL std.
- MIL-PRF-39006 Military spec. for wet capacitor
- MIL-PRF-32700 Military spec. for polymer capacitor



www.kyocera-avx.com

# **KYOCERa**

# LA composite s.r.o.

### **General Description**

LA composite s.r.o. is a company dealing with the design, development and production of composite parts for the aerospace industry. LAC is a qualified supplier for Airbus, Airbus Helicopters, Leonardo Helicopters (formerly Agusta Westland), Daher-Socata and others, including special processes. In terms of R&D activities, LAC cooperates on research projects with Czech technical universities and the Czech Aerospace Research Centre. Besides the space applications and aerospace industry LAC produces components for the transportation and general industry as well.

### **Competences & Capabilities**

Manufacturing and development of monolithic and sandwich composite components, primarily using the prepreg technology. LAC also provides moulds, tooling design and production, bonding of composite structures and non-destructive testing of the produced parts.

### **Major Space Projects & References**

### Project: ESA SWARM

Scope: Bonding of sandwich structure of microaccelerometer MAC04

### Project: Development of processes applicable to development and production of components for the space industry

Scope: Development of processes for the production of precise weight-sensitive sandwich panels for the space industry. Development of processes for production of long stiff beams, used for carrying sensors.

### Project: Micro Wave Imager - MetOp SG

Scope: Manufacturing of base plate sandwich panel, monolithic thermal skirts and assembly of the produced parts for 5 satellite

models. The contract was carried out under the MetOp-SG programme of and funded by the European Space Agency.

### Space Related Equipment, Labs & Certificates

AS 9100, ISO 9001

- Workshop area 1000 m2
- Clean room class ISO 8
- Freezer for prepreg storage 180 m2

- Laser positioning system for prepreg lay-up
- 5-axis CNC milling machine 6000 x 2220 x 1000 mm
- NDI equipment
- Chemical Laboratory
- Autoclave 1(up to 200°C) 2600 x 9000 mm
- Autoclave 2 (up to 200°C) 2300 x 7000 mm
- Ovens up to 3000 x 2500 x 7000 mm (250°C)

### **Ouality Control**

- CMM
- NDI (provided by mother company ATG s.r.o.)
  - Penetrant Testing
- Magnetic Particle Testing
- Ultrasonic Testing
- Eddy Current Testing
- Radiographic Testing
- Visual Testing
- Leakage Testing
- Infrared Testing







- ✓ MANUFACTURING
- AR&D
- T TESTING

### Contacts:

### LA COMPOSITE, s.r.o.

Beranových 65 199 02 Prague 9 Czech Republic

Responsible for space and ESA projects:

### Ing. Ivan Šonka

- M +420 604 146 136
- E sonka@lacomposite.com





54 **INDUSTRY** 

563 01 Lanškroun

Czech Republic

### Mapradix s.r.o.

### **General Description**

Mapradix is a company specializing in satellite Earth observation and geospatial technologies development. Its main purpose is to foster innovation in the operational mapping and monitoring of the land.

### **Competences & Capabilities**

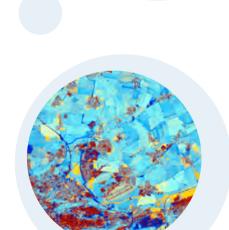
The company was established in 2016 and since then it develops technology for very-high resolution continuous change monitoring. The company is providing services in a number of downstream sectors: agriculture, hydrology, forestry, and land mapping in general. The company developed a specialized technology for image time series quality assessment and Analysis Ready Data (ARD) processing, which fits directly in the land change monitoring system.

#### **Products & Services**

- Land Cover and Land Use mapping
- Land Change and Continuous Land Dynamics monitoring based on satellite time series
- · Earth observation data quality assessment
- · Consultancy in land monitoring

### **Major Space Projects & References**

- ESA: Spatiotemporal Land Change Monitoring with Sentinel-2 and VHR Images
- EEA: Natura 2000 evolution study (Copernicus programme)
- ESA: Quality Control Manager for Land Monitoring Services
- Urban Street Surface Mapping



### • INDUSTRY

- ✓ MANUFACTURING
- SOFTWARE
- ▲ R&D
- T TESTING

#### Contacts:

Mapradix s.r.o.

Jindricha Plachty 1 150 00 Prague 5 Czech Republic

E info@mapradix.cz





### MCE Slaný s.r.o

### **General Description**

Founded in 1991, MCE Slaný s.r.o. is the largest steel structure construction company in the Czech Republic. Specializing in bridges, heavy steel construction, and large-scale weldments, MCE Slaný is a subsidiary of the Austrian HABAU GROUP. MCE is dedicated to meeting our customer requirements in steel structure construction with customized, individual solutions. MCE Slaný is an expert, all-in-one general contractor whose Hi-Tech projects include deliveries of Airbus assembly and handling products, supply of aerodynamic and aero-acoustic tunnels for Mercedes-Benz and BMW, and delivering on demanding, non-traditional projects for both assembly and production.

### Competences & Capabilities

We manufacture reliable and high-quality steel structures and our proven best-practices, advanced production technologies, and highly-qualified professional workforce ensure compliance and satisfaction from start to finish. We specialize in medium and heavy steel construction with materials up to 690 MPa, including special steels such as HARDOX. We deliver comprehensive project security from technical support and equipment development to all stages of construction, including oversized transport, assembly, and installation. Our customers, Airbus, ABB, and Siemens are world leaders in innovation and technology.

### Major Space Projects & References

All-inclusive production of the deflector shield for the ELA 4 Launch Ramp of the Ariane 6. Weighing ca. 650 tons, plus ca. 120 tons in parts, MCE Slaný developed or assisted in every stage of the project including but not limited to: Device development (and calculations) 3D model production

- INDUSTRY
- ✓ MANUFACTURING
- × SERVICES
- ▲ R&D
- T TESTING

# Manufacture and supply of Toolox spare parts

- Space Related Equipment, Labs & Certificates
   10,000 tonnes of steel structures per year
- 440,000 hours of production capacity per year

Final assembly (Kourou, French Guiana)

- 35,600 m2 of production area
- 3 paint shops

Finish coat

Transport

Overseas packaging

Maximum parts manufactured dimensions (100 tons,  $30 \times 7 \times 4.5 \text{m}$ )

Deflector shield assembly and water-cooling system per-

Metallizing all components via hot-dip galvanizing

- Staff and devices for NDT testing UT, MT, PT, all level 2
- ISO 9001ISO 14001BS OHSAS 18001EN ISO 3842-2, EN 1090-1, -2 EXC -4EN 15085 CL -1 M







Responsible for space and ESA projects:

### MCE Slaný s.r.o

Netovická 538 27401 Slaný Czech Republic

### Ing. Igor Chorovský

#### ,

P +420 312 510 104 M +42<u>0 724 106 243</u>

E igor.chorovsky@mce-hg.com





### Meopta - optika s.r.o.

### **General Description**

- Global manufacturer of precision optics.
- Specialized in the design, engineering and assembly of complex optical, opto-mechanical and photoelectronic systems.
- Innovative, total solutions for the consumer, industrial and military markets.

### **Competences & Capabilities**

- Long tradition of producing high quality precision optics and mechanics for components, subsystems and full turn/ key systems.
- Development process from the development of an initial prototype through the serial production of a final product.
- · Team of outstanding designers and engineers.
- Guarantee of the highest level of quality and performance in manufacturing.

### **Major Space Projects & References**

The main ESA projects:

- TESLA 0H-0B (Prism&band filters design, development, production, coating, and qualification).
- Flex (Mirror&coating design, development, production, and qualification).
- OHB SHS project (Optical and mechanical design, development, production, and qualification).

### Space Related Equipment, Labs & Certificates

- Manufacturing area of 58.000m2.
- Clean rooms with class up to 10 (equivalent ISO 4) + AMC control.

- In house testing equipment (excluding thermal vacuum and radiation).
- More information about our lab possibilities: www.testinqlab.meopta.com
- Certificates: IS09001, IS014001, AQAP2110





#### INDUSTRY

- ✓ MANUFACTURING
- SOFTWARE
- ▲ R&D
- T TESTING
- · IESTING

### Contacts: Responsible for space and ESA projects:

Meopta - optika, s.r.o.

Sales Dire

Kabelikova 1 750 02 Prerov Czech Republic **Libor Grygar** Sales Director P +420 581 242 621

M +420 603 228 774 E Libor.Grygar@meopta.com





### MeteoInsight

### **General Description**

Let's Earth is the developer of MeteoInsight solution - an online application that helps building energy assessors and energy managers in improving the reliability of their data-driven energy-efficiency recommendations while saving time on data processing by providing them with instant access to ready-to-use meteorological datasets specific to a building site.

Our commitment to delivering the highest-quality data is reinforced by the use of satellite-enhanced meteorological datasets and advanced machine learning algorithms.

### **Competences & Capabilities**

- Extracting meteorological conditions for a specific building site (meteorological modelling)
- · Processing of meteorological data:
  - ▶ Of specific months and years (weather data)
  - ► For long-term averages and extremes (climate data)
- Calculating energy-related weather indices: Heating Degree Days and Cooling Degree Days
- Preparing meteorological data for building energy calculations and simulations:
  - Historical meteo data (1950-2023)
  - ► Future meteo data (2024-2100) using IPCC emission scenarios
- Creating reports for adapting buildings to local climatic changes (e.g. heatwave analyses)

### **Products & Services**

 MeteoInsight – an online application for building energy assessors and energy managers, providing instant access to ready-to-use meteorological datasets specific to a building site.

### Major Space Projects & References

 Climate-proofing of buildings – feasibility study under ESA Business Applications (you can find it at: https://business. esa.int/projects/climate-proofing-buildings





- INDUSTRY
- SOFTWARE
- × SERVICES
- ▲ R&D

#### Contacts:

Let's Earth s.r.o.

Jungmannova 36/ 110 00 Praha 1 Czech Republic Responsible for space and ESA projects:

Ing. arch. Adrián Babiš, M.Sc.

- P +420 777 763 536
- E adrian@meteoinsight.com





### OHB Czechspace s.r.o.

### **General Description**

Since 2018 OHB Czechspace, located in Brno, Czech Republic, has been a member of the Space and Technology group OHB SE, one of the space industry leaders in Europe. OHB Czechspace focuses on development, design, verification, procurement, testing, and related product assurance tasks of spacecraft and launcher structures for governmental space agencies as well as for other space industry players in accordance with ECSS and/ or Customer's requirements.

### **Competences & Capabilities**

### System Engineering

Systems development from the definition phase to the realization including requirements definition and management, verification planning and performance.

### Spacecraft Design

Design of spacecraft systems from the conceptual phase to detailed design and manufacturing support including spacecraft accommodation, mass estimation and IRD generation.

### **Structural Analysis**

Analysis and verification of space products, such as structural items, sub-assemblies, satellite systems, electronic equipment including:

- Generation of FE models (including Condensed models)
- Structural analyses and verification
- Design optimization

### Thermal Design & Analysis

Design and Analysis of the space thermal control subsystems including:

- Generation of thermal models (GMM/TMM)
- Definition of critical environments, boundary conditions and thermo-optical properties, subsystem requirements

- Analyses (steady state/transient heat flow)
- Thermal components definition/selection and optimization

### Maior Space Projects & References

OHB Czechspace has been awarded various contracts within ESA programmes.

SOVA - Satellite Observation of waves in the Atmosphere

NEP - Study on the Use of Nuclear Energy for Challenging Space Missions

HERA - Development, design, verification, and supply of the complete spacecraft's structural subsystem and MGSE including spacecraft's vibrational test campaign.

PLATO - Structural analysis of the spacecraft's central tube, leading and execution of static load test.

CO2M - Platform structural analysis.

### Space Related Equipment, Labs & Certificates

ISO 9001:2015





### INDLISTRY

/ MANUFACTURING

- × SERVICES
- ▲ R&D
- T TESTING

#### Contacts:

OHB Czechspace s.r.o.

Purkyňova 648/125 Brno 61200 Czech Republic

Vit Pavelec

M +420 777 999 583 E vit.pavelec@ohb-czech.cz

Responsible for space and ESA projects:





### OPTOKON, a.s.

### **General Description**

OPTOKON, a.s. is a 100% Czech owned joint- stock company with over 30 years of experience in the information and communications technology market, OPTOKON develops and manufactures connectivity solutions for high-quality communication networks. The company significantly contributes to operational reliability and safety in global voice, data and video transmission through its fiber optic systems. The high product quality and forward-looking system designs means that OPTOKON ensures that networks are fit for the future and that investments remain sound in the long term. OPTOKON connectivity solutions are used in offices, data centers, by network operators, in homes, in industry and the military, where OPTOKON NATO approved solutions dominate the global market. A new Military Testing and Training Laboratory Competence Center for army solutions operate at OPTOKON. The OPTOKON Czech and Malaysian calibration laboratories offer accredited calibration services.

Our Testing Division carries out mechanical, thermal, EMC tests meeting MIL-STD-461G, EMI tests (CE102, RE102) and EMS tests (CS101, CS114, CS115, CS116, RS103).

### **Competences & Capabilities**

Main areas of activity include:

- Connectors, Cable Assemblies
- Cable Management Systems
- Splitters, WDM, CWDM & DWDM Data Network Equipment & rugged cables
- PON Solution
- Fiber Optic Test Equipment with Bluetooth wireless and USB control
- OPTOKON Ruggedized Harsh Environment Optical Network Products
- INDUSTRY
- ✓ MANUFACTURING
- SOFTWARE
- × SERVICES ▲ R&D
- T TESTING

#### Contacts:

OPTOKON, a.s.

Červený Kříž 250 586 01 Jihlava Czech Republic

#### Responsible for space and ESA projects:

### Ing. Jiří Štefl

- P +420 564 040 111
- E stefl@optokon.com
- E OPTOKON@OPTOKON.COM

- Optical, hybrid and special cables for mobile and tactical
- Service and Calibration Center

OPTOKON specializes in the production of military tactical components for use in harsh environmental conditions, aerospace and broadcasting and currently supplies the military forces of more than 20 countries with high quality military tactical components using unique Expanded Beam technology.

### Major Space Projects & References

Astronomical Institute ASCR- Telescop interconnection, fiber optic infrastructure

### Space Related Equipment, Labs & Certificates

- OPTOKON Research & Development Innovation Depart-
- Testing climatic chamber for individual test methods, according to the standard ČSN EN ISO/IEC 17025
- Accredited Calibration Laboratory No. 2315
- EN ISO 9001:2015 Certified Quality system
- EN ISO 14001:2015 EMS system in all processes
- AOAP certified











### **OteSpace**

### **General Description**

OteSpace, s.r.o. was founded in 2022. It is engaged in the development and manufacture of rocket engines for low-Earth orbit payloads.

### **Competences & Capabilities**

Our company was founded in 2014, when a group of enthusiastic scientists realized the development of liquid rocket engines. From 2014 to 2023, the development and validation tests of this engine took place in order to develop engines for the launch stages of rockets delivering cargo to low Earth orbit. Our company possesses a unique technology that has been developed for maximum efficiency, sustainability, low economic cost and using environmentally friendly - non-toxic fuels. This technology includes specific components of the entire fuel transport system and combustion chambers, developed by us, so as to achieve maximum reliability of the performance effect and economy.

#### **Products & Services**

- development of uncooled combustion chamber
- development of pumps and control units for fuel supply
- development of a cooled combustion chamber
- improved development of tanks, pumps and control units for these combustion chambers

### **Major Space Projects & References**

Work for company BD SENSORS



- INDUSTRY
- ▲ R&D
- T TESTING

#### Contacts:

OteSpace, s.r.o.

Klatovská 424/22 Ponava, 602 00 Brno Czech Republic

Responsible for space and ESA projects: Filip Otevřel, Executive Director

P +420 776 592 650

E filip.otevrel@otespace.cz Petr Kavinek - PR

P +420 773 687 959

E otespace.pr@otespace.cz





### PEKASAT SE

### **General Description**

PEKASAT SE is the European joint-stock company founded in 2012, specialized in ground segment systems, equipment and operations for satellite networks. It operates its own ground station located near the city of Kyjov and HQ/offices in Brno, Czech Republic. Using its long-term experience in satellite communications and cooperating with the most important satellite operators from around the world in domestic and international regulatory processes of satellite networks and ground stations.

### **Competences & Capabilities**

The core capability of PEKASAT is the operation of the ground station for LEO/MEO/GEO satellites in South Moravian region of Czech Republic, where on almost 40 000 m2 with excellent natural and technical properties provides services for its domestic and international customers with satellites on various orbits • and frequency bands.

Among others, PEKASAT SE has developed several RF components and assemblies for antenna systems, such as X-band waveguide feed, LNAs, filters, frequency converters, etc.

Last but not least is the development of SW Skycoor for interference calculations between satellite networks, ITU requirements and spectrum database tool for international frequency coordination and regulatory processes.

### **Products & Services**

- Services in S-/X-band and UHF/VHF
- Satellite Monitoring and Control (TT&C)
- High-speed Payload Data Downlink
- IT services
- Antenna/equipment hosting
- HW development (RF equipment, Antenna assemblies)
- INDLISTRY
- ✓ MANUFACTURING
- × SERVICES
- ▲ R&D

### Contacts: PEKASAT SE U Leskavy 764/20 625 00 Brno

info@pekasat.com

+420 605 532 797

Responsible for space and ESA projects: Michal Tulek, CEO and Chairman of the Board M +420 732 677 855

E michal.tulek@pekasat.com

Ing. Ján Segiňák, CTO and Member of the Board

E jan.seginak@pekasat.com

### SW development (Skycoor, MOC, Data processing)

- Assistance in frequency coordination and regulatory pro-
- **Analyses and Consultancy**

### Major Space Projects & References

Project AMBIC (ITT2)

- Consortium member responsible for ground segment and communications
- Prime contractor: VZLU
- Project partners: SAB Aerospace and World From Space
- Duration: 2022-2023

### Project QUVIK (ITT3)

- Consortium member responsible for ground segment and communications
- Prime contractor: VZLU
- Project partners: Masaryk University and TOPTEC
- Duration: 2022-2023

### Certificates

- DIN ISO 9001:2015
- DIN ISO 27001:2013
- Member of World Teleport Association











### PlasmaSolve s.r.o.

### **General Description**

PlasmaSolve specializes in cutting-edge digital twin simulation tools for space technologies. We are dedicated to fostering innovation in space exploration by providing simulation and virtual prototyping services. With a strong foundation in plasma, thermal analysis, low pressure aerodynamics and material science, our expertise extends beyond space applications, making us a versatile and trusted partner in the aerospace sector.

### **Competences & Capabilities**

At the core of our capabilities lies our proficiency in developing digital twin simulation tools tailored to the unique demands of the space industry. We excel in:

- Electric Propulsion System Simulation: We have a proven track record of assisting companies in the development of groundbreaking electric propulsion systems, such as the PlasmaJetPack by COMAT or SpaceLabEU air-breathing thruster, revolutionizing space propulsion technology.
- Thermal Balance Simulation: Our expertise extends to simulating thermal balance in orbit, ensuring that spacecraft maintain optimal operating temperatures in the harsh conditions of space.
- Aerodynamics in Low Earth Orbits: We have actively contributed to European Space Agency (ESA) projects by conducting simulations of aerodynamics in very low Earth orbits, enabling precise orbital planning and control.
- Material Science: Our in-depth knowledge of material science empowers us to develop advanced materials and coatings for both space and nonspace applications, enhancing the durability and performance of aerospace components.

### **Products & Services**

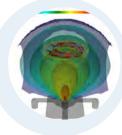
- Simulation Services: Expertise in conducting complex multi-physics simulations for space-related projects, ensuring mission success and cost-effectiveness.
- Virtual Prototyping Services: Virtual modeling and testing to validate designs, reducing the need for physical prototypes and accelerating development cycles.
- Material Science Consultation: Consultation and development of cutting-edge materials and thin film coatings for aerospace and non-space applications.

### **Major Space Projects & References**

Our contributions to the space industry include collaboration on significant projects and references, such as:

- ESA Projects: Active participation in ESA projects aerodynamics analysis at (very) low Earth orbits.
- PlasmaJetPack Development: Pivotal role in assisting companies with the development of the groundbreaking PlasmaJetPack electric propulsion system.
- SpaceLabEU Development: Design and development of the ionization source for an air-breathing electric propulsion system of SpaceLabEU.
- Advanced Coating Solutions: Designing advanced thin film coatings for space applications, enhancing component longevity and performance.





- INDUSTRY
- SOFTWARE
- × SERVICES
- ▲ R&D

Contacts:

PlasmaSolve s.r.o.

Sukova 49/4 602 00 Brno Czech Republic Adam Obrusník

E obrusnik@plasmasolve.com

Responsible for space and ESA projects:



### ProjectSoft HK a.s.

### **General Description**

ProjectSoft is an automation and engineering company focused on technology processes, information and robotic systems. Our customers are prestigious scientific institutes, space agencies and different industries all over the world.

### **Competences & Capabilities**

ProjectSoft belongs among the top suppliers of automatic technology processes, information and robotic systems. Our customers are industrial enterprises and scientific institutes. The essential part of our activities is implemented in the food industry. We own and create our know-how for the robotization and control of astronomical devices. We have developed and have been improving our system for the visualization of technological processes. We supply entirely new technologies and also provide reconstructions and refurbishments of existing technologies or their parts. We provide a wide range of services – from machinery equipment design and supply, energy distribution systems, through automation parts up to information systems. Yet our work doesn't end with the project's delivery.

### **Products & Services**

- Feasibility studies, creation of visions
- Supplies of complete technology
- Supplies of parts of technology and apparatuses
- Reconstructions and modernisation
- Supplies of measuring and regulation devices and electro devices
- Energy optimisation
- · Technological engineering
- Development and creation of software equipment

- · Training of operators and specialist staff
- Service provided by our non-stop help desk

### Major Space Projects & References

- Four 2-meter telescopes made by Carl Zeiss Jena were robotized by our company.
- Robotization of 1,54m Danish telescope full reconstruction and remote control of the Danish 1.5m telescope at ESO's La Silla Observatory in Chile.
- Robotization of OGS 1m telescope The main objective of the project was to extend and improve the precision of tracking of objects moving in the vicinity of the Earth.
- ProjectSoft's fully robotized observatory BluEye 600 is an ultra-speed Alt/Az installation (speed of moving is up to 90°/sec) telescope with a diameter of the mirror of 0.6m.
- Robotization of ESO 1,52m telescope on La Silla observatory in Chile. The project is part of the PLATO Spec groundbased support for exoplanetary space missions.
- The control system for the William Hershel telescope is the biggest project of our astronomy department.

### Space Related Equipment, Labs & Certificates

Certificates: ISO9001





- INDUSTRY
- SOFTWARE
- × SERVICES
- ▲ R&D

Contacts:

ProjectSoft HK a.s.

Eliščino nábřeží 375

Eliščino nábřeží 375 500 03 Hradec Králové Czech Republic Responsible for space and ESA projects:

Ing. Tomáš Turek

- P +420 495 052 153
- E tomas.turek@projectsoft.cz



### RHEA System CZ s.r.o

### **General Description**

RHEA System CZ is part of RHEA Group, a professional engineering and solutions company, offering system development, security and engineering services for space, government, defence and other critical infrastructure organizations across Europe and Canada, Over the past 30 years, RHEA Group has supported over 120 satellite missions, including CubeSats, SmallSats, complex science spacecraft, Earth observation and communication satellites, and multi-satellite constellations. Our clients in the space sector include ESA, EUMETSAT, the European Commission, EUSPA and national space and defence agencies.

### **Competences & Capabilities**

RHEA System CZ is mainly dedicated to supporting the European Union Agency for the Space Programme (EUSPA), providing a wide range of space, security and cybersecurity expertise. Its mission is to help improve the quality of the services rendered under existing European navigation programmes (Galileo, EG-NOS) and support the integration of GOVSATCOM, space situational awareness (SSA) and Copernicus into the EUSPA remit. RHFA is ISO 9001 and ISO 27001 certified.

### **Products & Services**

- System Engineering: RHEA's heritage lies in space systems engineering. We provide our clients with the best engineers, unrivalled expertise and the unique capabilities required for complex space programmes and missions, from ground segment operations to space security systems.
- ASTRAL: is a component-based satellite ground segment offering, allowing a high degree of flexibility for customers to integrate their own or third-party components, and in-

- terface to other systems, it supports small missions and constellations, reducing ground segment and operations costs through end-to-end automation of ground segment elements as well as spacecraft. ASTRAL builds on RHEA's long-standing operational heritage in ground segment development, mission automation and operations prepa-
- CDP4-COMET: RHEA is a pioneer in the implementation of concurrent design and the development of platforms to support it. Our concurrent design services include setup, training, hands-on support and audits. Using our unique, standards-based, open source CDP4-COMET software, teams can interact and share engineering models, designs, data and documents in near real-time.
- CITEF: RHEA's Next Generation Cyber-Range Services are based on its leading-edge CITEF assets emulation and automation platform. CITEF has been developed by RHEA to deliver an advanced, state-of-the-art cyber-range capability equipped to support the demanding needs of cybersecurity for space assets and other critical infrastructures.

#### Customers

- European Union Agency for the Space Programmes (EUSPA)
- European Space Agency
- **European Commission**





- INDUSTRY
- ✓ MANUFACTURING
- SOFTWARE
- A R&D T TESTING

RHEA System CZ s.r.o Pobřežní 667/78 186 00 Prague 8 Czech Republic

Responsible for space and ESA projects:

Nicolas Vincent

M +420 777 830 624

E n.vincent@rheagroup.com





# Rigaku Innovative Technologies Europe, s.r.o.

### **General Description**

Rigaku Innovative Technologies Europe s.r.o. (RITE) belongs to the Rigaky Corporation group (Tokyo, Japan). RITE is European center of excellence for the design, development and manufacturing of X-ray optics, X-ray detectors and X-ray sources, as well as other related scientific products for industry and research.

### **Competences & Capabilities**

RITE expertise and experience focuses on various optical technologies (especially replicated and Multi-Foil X-ray Optics), X-ray detectors and X-ray sources. RITE and its specialists can, due their long experience, test facilities and measurement • devices, offer consultations and expertise in these fields.

#### **Products & Services**

- X-ray optics (Lobster Eye, Kirkpatrick-Baez system, ellipsoidal, parabolic and Wolter I optics)
- X-ray detectors

### **Major Space Projects & References**

- VZLUSAT2 mission X-ray optical payload equipped with Rigaku X-ray Optics and miniaturized TimePix detector with CdTe sensor (www.vzlusat2.cz).
- VZLUSAT1 mission Experimental verification of space products and technologies on nanosatellite (www.vzlusat1.
- Wide X-ray System for X-ray imaging with detector Timepix - rocket experiments (assembled at Penn State University), co-operation with CTU.
- Space radiation capabilities, technologies, and platforms for small spacecraft and CubeSats (SR-CTP) - the second-
- INDUSTRY
- ✓ MANUFACTURING
- SOFTWARE
- × SERVICES ▲ R&D
- T TESTING

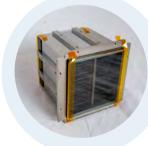
Contacts: Rigaku Innovative **Technologies** Europe, s.r.o. Novodvorska 994 142 21 Prague 4 Czech Republic

- generation Czech CubeSat was built at the QEM level which includes radiation composite shielding. X-ray optics telescope coupled to a pixel detector Timepix as X-ray focal plane detector, and outgassing sensors.
- Novel X-ray Optics Technologies for ESA X-ray Astrophysics Missions - ESA PECS Applications of Kirkpatrick Baez Imaging Systems in Space - co-operation with Colorado, Iowa University and CTU.

### Space Related Equipment, Labs & Certificates

- AFM, SEM, 3D laser confocal microscope and White Light Interferometer (WLI)
- Contact profilometer
- Software for design and raytracing of X-ray optics for space and laboratory applications
- X-ray optical test bench
- X-ray optical vacuum test bench







P +420 273 136 951 E prague@rigaku.com

### S.A.B. Aerospace s.r.o

### **General Description**

S.A.B. Aerospace s.r.o. is a SME located in Brno, Czech Republic, operating since 2014, one of the most experienced Czech space companies. Its main focus is development of satellites, launchers components, and MGSE. SAB Aerospace holding also includes branches in Italy, Poland, and Romania.

### **Competences & Capabilities**

S.A.B. Aerospace is an ESA registered supplier, also has been audited to deliver with the major players such as Thales, and Ariane Group. The core business is design of mechanical structures and thermal control systems for satellites and launchers as well as development of microgravity facilities.

SAB has been developing a network of verified subcontractors and suppliers from the Czech Republic and other European countries, including hardware and software providers.

#### **Products & Services**

- PROJECT OFFICE (PM, SE, PA, Procurement)
- ENGINEERING (Mechanical, Structural, Thermal, MA, Sys-
- ASSEMBLY/INTEGRATION AND OUALIFICATION
- LAUNCH SERVICES

### **Major Space Projects & References**

PLATO - Scientific mission PLATO is a M-class mission, ture.

- Microgravity Biomission 2019 development of space laboratories for experiments on the ISS and IOSLAB - pressurised facility for the Space Rider.
- ROSE-L Copernicus radar satellite for Earth Observation. SAB is responsible for the design of the satellite structure and Thermal Control System TCS, procurement and MAIT.
- ARIANE 6 Sequencer Development of the sequencer for multiple launch services on board Ariane 6.
- **SLAVIA** Scientific project related to the space resources prospection. SAB is a prime and system integration for the mission.
- IOSHEX In-Orbit Servicing System based on the SSMS structure. SAB is a prime contractor.
- LCS4 Development of the low cost separation system for small satellites.

### Space Related Equipment, Labs & Certificates

- Clean room ISO8
- ISO 9001:2009 certified
- Audited by ESA, Thales, Ariane Group



- VEGA SSMS Dispenser a launcher structure enabling a launch of multiple small satellites on board of VEGA flight. Recurring project.
- which will search for exoplanets. SAB is responsible for design and procurement of the service module (SVM) struc-
- INDUSTRY × SERVICES
- ▲ R&D
- T TESTING

Contacts:

Responsible for space and ESA projects:

S.A.B. Aerospace s.r.o. Inna Uwarowa

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M +420 734 257 296

E iuwarowa@sabaerospace.cz



### **SAZ Aerospace s.r.o.**

### **General Description**

SAZ Aerospace s.r.o was found as an Aircraft Design Company which continues a long tradition of Aerospace Industry in the South Eastern Czech Region and connecting with The SA Group's headquarter in Denmark and many branches World wide. Nowadays the company expands its capabilities in the space industry.

### **Competences & Capabilities**

SAZ Aerospace s.r.o is mainly concentrated on Design and Development of Satellite subsystems and Aircrafts, offering Engineering Services in the Field of installation of Avionics and Electronic Systems, Airframe Design/Modification including Strength Analysis and other Analysis related to completion of Certification Documentation.

#### **Products & Services**

Electronic systems Design and Installation

- cockpit lavouts,
- wiring diagrams,
- harness routing.
- harness topology and production drawings
- load Analysis

### Certification and Field Support

- certification ground test methodology
- certification Flight test methodology
- system safety assessment
- functional hazard assessment
- certification documentation
- HIRF and Lightning analysis

### Airframe and Mechanical System Design

- airframe
- aircraft component
- aircraft systems
- interior panels
- interior equipment
- composite structures
- parts, assemblies and drawings

### **Analyses and Computing**

- strenath
- fatique
- dynamic (modal, vibration)
- thermal
- external and internal aerodynamics CFD

#### Production Management and Support

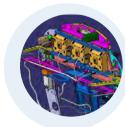
- jigs and tools design
- installation and testing instructions
- production ensuring

### Major Space Projects & References

- ROSE-L harness design and installation including all relevant analysis
- ADRIOS harness design, routing, installation including all relevant analysis
- SCOUT cryogenic tank demonstrator production management

### Space Related Equipment, Labs & Certificates

Certificates: AS9100D



- INDUSTRY ✓ MANUFACTURING
- AR&D
- T TESTING

Contacts:

SAZ Aerospace s.r.o.

Pekařská 1640 686 04 Kunovice Czech Republic

Responsible for space and ESA projects:

Ivan Jensen, CEO

P +45 40 10 46 36 E i.jensen@saz.aero





### **Serco Czech Republic**

### **General Description**

Serco Czech Republic is a Czech company belonging to Serco Group, the public services expert employing more than 50,0000 people specialising in the delivery of essential public services and managing over 500 contracts worldwide. In Czech Republic, Serco operates since 2020 with space being the core business.

### **Competences & Capabilities**

Serco's teams of engineers, consultants and operations specialists support a wide range of space and ground activities: from data archiving and exploitation, data processing; to systems design, operation and maintenance; data production quality control; and the scientific and technical support for EO satellite data exploitation projects. In addition, as part of our user-facing functions, we provide specialised EO Helpdesk and Service desk.

Beyond Serco Czech Republic, our European Space portfolio offers programme management and end-to-end service delivery across a wide range of activities in the Space domain, from developing, launching and operating satellites, to processing data and developing applications. Alongside satellite operations, Serco is a key actor in the domain of Earth Observation data, implementing and operating one of the largest data dissemination services worldwide, providing complete, free and open access to Copernicus Sentinel data, enabling more than 350,000 users to utilise data to meet their needs.

### **Products & Services**

- Operational services and engineering support to satellite
- Real time and ground segment operations

- Software and system engineering,
- Data processing and dissemination
- User and IT support services

### Major Space Projects & References

Our employees play an important role in supporting prestigious European programmes, such as the EGNSS and EU Copernicus programmes, where Serco Czech Republic provides key services for EUSPA to ensure the Market Uptake of EU Space Data and provides Operations and Evolution of Data Access and User Support Services to the European Space Agency as part of a Serco-led consortium.





- SOFTWARE
- × SERVICES

#### Contacts:

Serco Czech Republic

Perlová 371/5 110 00 Praha Czech Republic

Responsible for space and ESA projects: Jacopo Ovarelli: P+420 773 062 682 E jacopo.ovarelli@serco.com **Gianmaria Giaconia:** P +393 456 571 541 E gianmaria.giaconia@serco.com Guido Vingione: P +393 484 917 892 E guido.vingione@serco.com





### SERENUM, a.s.

### **General Description**

Serenum Space is a CubeSat component and BUS manufacturer, integrator, and service provider based in the Czech Republic. We are a commercially oriented subsidiary of Czech Aerospace Research Centre, giving us the benefit of years of research in Space and Aviation industries and allowing us to bring premium value to academic, government, and commercial customers.

#### **Products**

- CubeSat platforms
- **Cubesat Components and Subsystems:**
- VAC02 ADCS for CubeSats
- Reaction Wheels
- Sun Sensor
- Structures
- Flight software
- MGSE and EGSE

### **Services**

- Satellite qualification and acceptance testing
- Satellite as a service
- Custom space hardware and software development
- Consultation services

### **Major Space Projects & References**

- Took part in and delivered subsystems for major space projects such as Proba 3 and SWARM
- Wide variety of test campaigns
- Delivered flight subsystems for multiple CubeSat missions



- INDLISTRY
- SOFTWARE
- × SERVICES ▲ R&D
- T TESTING

### Contacts:

SERENUM, a.s.

Jana Babáka 2733/11 Královo Pole, 612 00 Brno Czech Republic

Responsible for space and ESA projects:

### Ondrej Sluka

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### **SPACEKNOW**

#### **General Description**

SpaceKnow empowers decision-makers with geospatial intelligence on a global scale. Our achievements result from the seamless combinations of our exclusive Al-powered analytics engine with the most comprehensive collection of earth observation imagery from various satellite constellations worldwide.

SpaceKnow's mission is to create a virtual encyclopedia of the • physical world for the benefit of businesses, governments, and our planet. We provide actionable intelligence by fusing satellite imagery data with advanced statistics, machine learning, and industry expertise. Space Know is pioneering the use of spacebased data to nowcast trends of the global economy, business activity and support the decision-making of governments, defense actors, financial markets professionals, and non-profit organizations world wide.

#### **Competences & Capabilities**

SpaceKnow offers intelligence and analytics as a service: a fully automated and scalable cloud solution for any area of interest for a variety of applications:

- Geointelligence for national security (military, energy, economy)
- Economic indexes (production monitoring)
- Construction sites monitoring
- Environmental monitoring
- Agricultural production
- Natural resources

#### **Products & Services**

SpaceKnow leverages its expertise in image processing, computer vision techniques, machine learning, and deep neural

- INDUSTRY
- × SERVICES
- A R&D
- T TESTING

#### Contacts:

SPACEKNOW, INC., odštěpný závod

Karlín, 186 00 Praha Czech Republic

Responsible for space and ESA projects:

Jaroslav Javornický, CEO

E defense@spaceknow.com M +420 603 202 622

### networks to provide:

- Object detection using diverse remote sensing data including high and low resolution optical and radar (SAR)
- Generalized change detection using optical and SAR data
- Near-real-time monitoring, alerts, early warnings, and situational awareness
- Scene semantic segmentation into regions of interests
- Estimation of economic trends and design of economic
- Geospatial intelligence

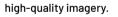
#### Major Space Projects & References

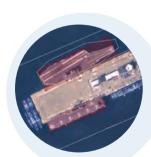
Leading financial, industrial, and defense organizations rely on SpaceKnow's services.

#### Space Related Equipment, Labs & Certificates

SpaceKnow utilizes cutting edge technology both in software and hardware domain and highly skilled researchers and data scientists in order to deliver our customers with ac-tionable intelligence.

Our software solutions reflect the latest and most efficient trends within the Machine Learning & Artificial Intelligence fields, while our cooperation with leading providers of satellite data ensure up- to-date and







# SPACE KNOW

### SPACEMANIC CZ, s.r.o.

#### **General Description**

Spacemanic is a turnkey nanosatellite solutions provider and CubeSat components manufacturer.

The company is focusing on design, development and testing of small satellite components based on the plug&play methodology.

#### **Competences & Capabilities**

Our main objective is to shorten the time needed for nanosatellite missions to move from the drawing board to space. With a proprietary line of subsystems, we lower the cost for launching the customer's payload, whole satellite or a fleet of satellites, making space accessible to scientific institutions, universities, and private customers with various budget sizes. Spacemanic provides all related services: launch campaign management, environmental testing, ground station software, and operations.

#### **Products & Services**

Full portfolio of plug&play nanosatellite components including:

- Celeste GNSS receiver
- Eddie and Deep Thought On-board computers
- Murgas UHF/VHF transceiver
- Amun Power supply unit for 1-3U CubeSats
- Cubesat structures
- Ra solar panels

And many others...

#### **Major Space Projects & References**

Nanosatellite missions:

- skCube
- GRBAlpha
- VZLUSAT-2.
- BDSat-1.
- Planetum-1





- INDLISTRY
- ✓ MANUFACTURING
- SOFTWARE × SERVICES
- ▲ R&D

Contacts:

612 00 Brno

Czech Republic

Responsible for space and ESA projects: Daniela Jović

Spacemanic CZ s.r.o.

P +385 99 190 9472





## Stellar Exploration EU s.r.o.

#### **General Description**

Stellar Exploration EU s.r.o. is a sister of Stellar Exploration Inc. based in San Luis Obispo, California having a history of 20+ years and a workforce of 25+ engineers. The EU company is destined to use experience from the U.S. and transfer it to Europe as well as perform its own development and manufacturing.

#### **Competences & Capabilities**

Main specialization of the company is in equipment for small satellites, especially power management, propulsion and RF technology. Other fields of expertise include electronics, prototyping and spacecraft structures.

#### **Products & Services**

- Space Battery incl. Power Management 200 Wh..10k Wh
- Directional Deployable Helix UHF antenna for deep space
- Propellant tanks
- Hypergolic propulsion systems

#### **Major Space Projects & References**

- Iceye SAR satellites
- Capstone mission
- Mars Synchronous Orbiter

### Space Related Equipment, Labs & Certificates

- Clean space ISO 5
- Sunstone welding equipment
- Multiple 3D printers





#### INDUSTRY

- ✓ MANUFACTURING
- ▲ R&D
- T TESTING

#### Contacts:

Stellar Exploration EU s.r.o. 155 21 Praha 5 Czech Republic

### Responsible for space and ESA projects:

#### RNDr. Tomáš Svoboda

- E svobodat@stellar-exploration.eu
- E office@stellar-exploration.eu







### STRATOSYST s.r.o.

#### **General Description**

Stratosyst is a system integrator active mainly in High-altitude Pseudo-satellites (HAPS). The company develops a stratospheric Airship for Earth observation and telecommunication. The platform is designed with a focus on smaller payloads (initially designed for CubeSats), and easy global transportation and operation.

The maximal payload mass is 30kg (HD camera, Telco Antenna, Scientific experiments).

Besides technology development, the company offers a wide range of engineering and consultancy services and testing capabilities in the stratosphere for satellite payload verification or qualification of components. The customer is provided with tailored solutions based on their requirements: Payload mass, mission duration, altitude, and power.

#### **Competences & Capabilities**

Stratosyst provides engineering solutions for applications in the stratosphere & harsh environments (low temperature, low pressure, UV radiation). The company is also active in developing optical systems for Earth Observation with a high resolution of 15 cm.

#### **Products & Services**

- ZPB and SPB balloons for stratospheric flights
- Design of systems for harsh environment
- Gondolas for testing and science
- Optical payload and stabilization
- Propulsion system
- **HAPS Service**
- INDUSTRY
- × SERVICES
- ▲ R&D
- T TESTING

STRATOSYST s.r.o. Technology Centre CAS 160 00 Prague 6 Czech Republic



Major Space Projects & References

- National Competence Centre for Aeronautics and Space
- Frontex HAPS Study
- EuroHAPS, EDF







STRATOSYST

# SYNPO, a. s.

#### **General Description**

SYNPO is a research and manufacturing company focused on development and smallscale production of polymers and related materials. SYNPO closely collaborates with companies in the Czech Republic, EU, and worlwide. Synpo complies with ISO 9001:2015.

#### **Competences & Capabilities**

The research and development areas of the company includes:

- Synthesis of epoxy, alkyds, polyesters, and polyurethanes resins
- Formulation of novel types of paints, composites, and adhesives
- Development of nanostructured polymers and composites
- Synthesis of emulsion and solution polymers and acrylic dispersions
- Synthesis of polymers from biobased raw materials
- Targeted modification of nanoparticles

SYNPO has experience in technology transfer, from laboratory through pilot plant to manufacturing.

#### **Products & Services**

Products of interest to the aerospace industry:

- Paints and coatings
- Composite materials
- · Laminating resins
- Casting and sealing compounds
- · Adhesives, sealants, and putties
- Functional resins for 3D printing
- Thermal protection systems
- Materials for cryogenic applications

- · Antistatic and conductive composites
- Antimicrobial coatings
- · High-temperature resistant
- · Coatings with high abrasion resistance

#### Major Space Projects & References

Projects supported by ESA

- Development of coating for the rocket propellant tank
- Polymer materials based on epoxy filled foam
- Carbon Nanotube Composites

#### Space Related Equipment, Labs & Certificates

Testing Laboratory of Analytical and Physical Chemistry, Testing Laboratory of Evaluation and Testing, Calibration Laboratory of Viscometry are accredited by the Czech Accreditation Institute, according to ČSN EN ISO / IEC 17025.





#### INDUSTRY

- ✓ MANUFACTURING
- ▲ R&D
- T TESTING

#### Contacts:

### SYNPO, a.s.

S. K. Neumanna 1316 Zelené Předměstí 532 07 Pardubice Czech Republic

#### Jan Hyršl, Ph.D.

Responsible for space and ESA projects:

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E jan.hyrsl@synpo.cz





### TOSEDA s.r.o.

#### **General Description**

TOSEDA s.r.o. is an SME providing contract research and development, testing services and small-scale production in the field of polymer chemistry and nanotechnologies. The mission is to fill the gap on the market with specialties that are commercially unavailable or produced out of the EU region.

#### **Competences & Capabilities**

- Custom design, development, and commercialization of hi-tech polymeric and nanocomposite materials (composites, adhesives, elastomers, coatings, foams, aerogels, sensors etc.)
- Registration at ESA (2012)
- Member of the Czech Space Alliance (2013)

#### **Products & Services**

- 4SPACE TOSEDA® Pads and pastes with extremely high thermal conductivity (electrically conductive and non-conductive versions)
- Nanohybrid transparent polyimide foils for thermo-optical applications (stability at 350  $^{\circ}\text{C}$  / 500  $^{\circ}\text{C}$ )
- Multifunctional "black" primer for thermo-optical applications
- One component epoxy adhesive (storability ≥ 1 year, curing ≥ 120 °C)
- Expandable adhesive curable at low temperature (≥ 70 °C)
- Barrier coatings and composites with improved resistance against liquid gasses (LH2...)
- Resins with extended pot life for out-of-autoclave manufacturing CFRP parts
- "Green" conformal coatings and potting materials for electronics
- Cryogenic insulation (foams, aerogels)
- INDUSTRY
- ✓ MANUFACTURING
- ▲ R&D
- T TESTING

#### Contacts:

#### TOSEDA s.r.o.

U Panasonicu 376 530 06 Staré Čívice Czech Republic

# Responsible for space and ESA projects: Ing. Tomáš VIček, Ph.D.

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E tomas.vlcek@toseda.cz

M +420 605 407 306 E jiri.zelenka@toseda.cz

# Major Space Projects & References Development of epoxy based st

- Development of epoxy based syntactic foam encapsulant (2013-2016)
- Design of inner wetted thermal system for LH2 metallic tank (2014-2016)
- Thermal joint development for NEOSAT Phase C (2017-2022)
- Extended pot life resins for out of autoclave processing for large and complex part (2017-2021)
- Electrically conductive "black" primer CCN1: Extension for optical applications (2017-2022)
- Development of "green" polyurethane materials for use in spacecraft and launcher applications - CCN1: Extension towards applications as conformal coatings and potting material (2017-2022)
- Transparent polyimide films for thermo-optical applications (2020-2023)
- European resin for high voltage and high temperature space applications (2022-2024)

#### Space Related Equipment, Labs & Certificates

- Outgassing (ECSS-Q-ST-70-02)
- ATOX (simplified method)
- UV irradiation
- AFM, SEM, optical microscopy, DMA, DSC, TGA, rheology, thermal and thermo-mechanical properties, FTIR, NMR











# TRL Space Systems s.r.o.

#### **General Description**

We are a small satellites and probes system integrator, covering the entire project cycle and adding value for customers by combining heritage technologies with new products.

#### **Competences & Capabilities**

Since Czech Republic joined ESA in 2008, our team has worked on VEGA's launcher structures, Ariane 6's sequencing system, PLATO's SVM structure, bio-laboratories for the ISS, System Engineering for Galileo, and parts of Sentinel, BepiColombo, Swarm Solar Orbiter, Juice, Lisa, and Galileo missions. As a system integrator, we cover the full project cycle from mission definition and system engineering, mechanical design, structural and thermal analysis, electrical and software development, subsystems procurement, all the way to manufacturing, integration, assembly, testing, qualification, launch provision and mission control.

#### **Products & Services**

- SmallSat Custom development we offer either full development or co-engineering activities. We have experience with satellites and also probes platforms.
- Universal EO Nano Satellite 12/16U smart 12U or 16U satellite with high-resolution, modern and highly usable nano satellite. From order till launch only 18 months.
- Hyperspectral Sensing customized definition, algorithmization, and validation of automated hyperspectral detection of a wide list of events/cases from satellite imag-
- TRULY Al-based software for automated satellite imagery analysis with over 80 proprietary algorithms for detecting and classifying objects or changes from agricul-

- ture to security.
- LiDAR our space-based LiDAR provides satellites with precise detection of objects to enable quick collision avoidance on the increasingly crowded Earth's orbits.

#### **Major Space Projects & References**

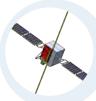
- TROLL Czech demonstration satellite with a planned launch in mid-2024 will showcase most of our products. Following its demonstration, the TROLL will be used for further in-orbit SW validation and high-resolution hyperspectral sensing for our customers.
- Lunar Geology Orbiter (LUGO) With the main goal to map surface and subsurface geology on the Moon, this international space mission will generate groundbreaking scientific knowledge, aid the future establishment of Lunar settlements and resources utilization, and develop key deep space capabilities for unlocking Lunar economy.

#### Space Related Equipment, Labs & Certificates

- 180m2 Clean Room (ISO 8, ISO 5)
- 40m2 Space Lab for Electronics
- ISO 9001 certified







#### Contacts:

TRL Space Systems s.r.o.

Plynárenská 499/1 602 00 Brno Czech Republic

INDUSTRY ■ SOFTWARE

× SERVICES

A R&D T TESTING

Responsible for space and ESA projects:

Václav Havlíček E havlicek@trlspace.cz

E hello@trlspace.cz

TRL SPACE 1

### TTS, s.r.o.

#### **General Description**

TTS (Thin Film Technological Service) is a small Czech company providing service in the field of thin film deposition by PVD technologies and in the field of radiation analysis for space applications.

#### Competences & Capabilities

TTS specialises in custom-made thin films for electronic and optical applications, thin film metallization and production of thin film components. It has more than 50 years of experience in design, development and production of thin films for which it uses the technology of magnetron sputtering, ion beam etching and UV photolithography.

Its space related activities have focused on the development of coatings for the enhancement of properties of composite materials and on the use of trace moisture sensors in space. Some of its products (HAL2 moisture sensors and coatings) have recently been experimentally verified on board of VZLUSAT-1 • nanosatellite.

#### **Products & Services**

- Thin film technologies deposition and patterning of wide range of thin films
- Moisture sensors comprehensive solutions for trace moisture detection
- Radiation analysis computer simulations of the effects of space radiation

### **Major Space Projects & References**

Design and Testing of Far and Medium Ultraviolet Coatings (2020 - 2023); Prime contractor: TTS, s.r.o.; funded by ESA

- Space radiation capabilities, technologies and platforms for small spacecraft and CubeSats (2018 - 2022); Prime contractor: Rigaku Innovative Technologies Europe s.r.o.; funded by ESA
- Qualification of Shielding Applied to Structural Panel for JUICE (2014 - 2016): Prime contractor: 5M s.r.o.: funded by
- Experimental verification of space products and technologies on nanosatellite VZLUSAT-1 (2013 - 2017); Principal Investigator: Czech Aerospace Research Centre, a.s.; Funded by Technology Agency of the Czech Republic

#### Space Related Equipment, Labs & Certificates

- PVD 4 sputtering and ion beam devices
- Photolithography and wet processes
- Metrology characterisation of thin films and calibration of moisture sensors
- Electronics laboratory
- Workplace of computer simulations for radiation analysis
- ISO 9001:2015 certificate







- ✓ MANUFACTURING
- INDUSTRY × SERVICES
- ▲ R&D

### Contacts: TTS, s.r.o. 142 00 Praha 4

Czech Republic P +420 239 042 545 Fax +420 239 042 545 Responsible for space and ESA projects: Ing. Lenka Mikuličková +420 239 042 716 E mikulickova@tts-co.eu

Entity Code: 1000015113 Member of the Czech Space Alliance





## Uneeqly s. r. o.

#### **General Description**

Uneegly digitised loyalty systems for everyone.

Uneeqly is a platform that offers digitised loyalty systems for SMEs, regions, destination agencies, etc., giving them the opportunity to quickly implement their own digital loyalty programme, regional card or gamification card in minutes with a significantly lower investment than other alternatives.

#### **Competences & Capabilities**

Thanks to Uneeqly platform, businesses, regions, tourism organisations, in short, anyone who wants more customers and to effectively build a relationship with them directly, without additional hidden costs, will benefit from Uneeqly. We deliver promotions or messages to customers' mobile phones.

www.uneeqly.com/podnikatele/

Simply register your business using the web interface and post, for example, a special offer, an announcement or just a loyalty program. The offers are then immediately visible to all Uneeqly users who are in the area and looking for similar services. Users then don't have to provide any personal information to take advantage of the offers. The Uneeqly platform allows users to load loyalty points completely independently by verifying their exact location and time, which prevents attempts to abuse the system and reduces the demands of serving businesses or tourist destinations.

The biggest advantage of the app is the synergy effect - regions can easily promote the app to tourists and locals, making it attractive for businesses to promote their services there. Another advantage is the low cost of setting up and running the service,

making it sustainable in the long term even with a small budget. The system is also sustainable in terms of environmental burden and human resource requirements, as it does not require special knowledge for its set-up and ongoing maintenance.

#### Products & Services

- Digitisation of the loyalty and tourists card
- Interaction of SMEs with tourists
- Loyalty system within the framework of the regional and tourists card
- Linking cultural and historical heritage with tourismSMEs, gamification
- · of points collection
- Blockchain
- Uneeqly as a digitize platform is using data provided by mobile phone GNSS chip all currently sold mobile phone already include GNSS chip with Galileo support including Egnos service.

#### Major Space Projects & References

- Succes feasibility study EUROREGIONAL TOURIST with ESA business application program
- Czech space card guide to famous places in the Czech Republic with space themes and experiences





- INDUSTRY
- SOFTWARE
- × SERVICES
- A R&D

#### Contacts:

#### Uneeqly s. r. o.

Korunní 2569/108, 101 00 Praha - Vinohrady Czech Republic P +420 604 376 456 E info@uneeqly.com IČO: 09414495





### UNEX a.s.

#### **General Description**

Metallurgical and engineering group UNEX is a world-known manufacturer and an experienced supplier of heavy engineering components and a long-term partner of numerous multinational industrial corporations. The experience and expertise of the people; together with modern technologies, robotised and automated workplaces, a number of heavy machine tools and extensive production facilities enable to efficiently produce high quality products for various industries according to drawings and requirements of the most demanding customers.

#### **Competences & Capabilities**

- · Design and development work
- Castings production
- Die forgings
- Cutting and forming of materials
- Welding
- Machining
- Heat treatment
- Surface treatment and painting
- Quality control
- Servicing, completion and assembly

#### **Products & Services**

- Bucket wheel excavators and mining equipment
- Welded steel parts and structures up to 120 t in weight and 40 m in length
- Die forgings from 2 kg to 25 kg

#### Major Space Projects & References

 manufacture of 16 sets of undercarriages and coupling components which will form part of the mobile building of a new Ariane 6 rocket launch platform at the Guiana Space Centre

#### Space Related Equipment, Labs & Certificates

More than 40 Czech and international certificates and permits demonstrates the quality of our company and products e.g. ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, ISO 50001:2018, ... In the welding industry, we are certified according to the ČSN, EN and DIN standards, but we also have experience with welding according to the ASME IX, AWS D 1.1 and NORSOK M101.





- Castings from 50 g up to 20 t
- Die lorgings from 2 kg to 25 kg
- INDUSTRY
- ✓ MANUFACTURING
- × SERVICES
- T TESTING

#### Contacts:

UNEX a.s.

Brnicko 1032 783 91 Unicov Czech Republic

#### Responsible for space and ESA projects:

#### Jaromír Radil

P +420 585 073 300 E jaromir.radil@unex.cz



## **UNITES Systems a.s.**

#### **General Description**

UNITES Systems a.s. is a private company located in the Czech Republic with more than 30 years of experience in development and production of dedicated test and measurement systems -ATE solutions for semiconductor devices and FCT/ICT platform for assembled PCB testing (PCBA). Currently (July 2023), we have 80 employees.

#### **Competences & Capabilities**

UNITES has developed mixed-signal tester - UNIMET 2020 (formerly known as SZ M3000 or UNIMET 3000) which is widely used in Space sector for component qualification and characterization of semiconductors.

#### **Products & Services**

- Mixed-signal laboratory testers for component qualification / incoming inspection
- Production testers for discrete semiconductors (MOS-FETs, IGBTs, Diodes, Power Modules)
- Testers for new semiconductor technologioes (GaN, SiC)

#### **Major Space Projects & References**

- Testers in EEE labs: Airbus, ESA, Boeing
- Testers in characterization labs: General Dynamics, ISRO, Dassault, Diehl, Thales

#### Space Related Equipment, Labs & Certificates

- ISO 9001
- UNIMET 2020 and M3000 testers, various DMMs like Keysight 34465A, PicoScope 6000 Series, Spectrum Analyzers, etc.
- INDUSTRY
- ✓ MANUFACTURING
- SOFTWARE
- × SERVICES
- ▲ R&D
- T TESTING

### Contacts:

Kpt. Macha 1372 757 01 Valašské Meziříčí Czech Republic

Mr. Ondrej Betak UNITES Systems a.s. **Sales Director** E obetak@unites.cz

Entity Code: 1000001015

Responsible for space and ESA projects:









### UpVision s.r.o.

#### **General Description**

UpVision is one of the biggest drone operator in the Czech Republic founded in 2013. Main activities in the technical applications of the drones and using special sensors like multispectral, • hyperspectral, thermal, LiDAR with focus on EO, GIS, BIM. Very active in the R&D and the future Unmanned Traffic Management (U-space).

### **Competences & Capabilities**

UpVision provides various outputs based on the using drones mainly for technical application like aerial mapping, inspections and monitoring. Very active in the international research activities based on GNSS application including the development of drone deliveries services and Urban Air Mobility.

Focusing also on the integrated system for whole drone ecosystem consisting of Unmanned Traffic Management (UTM), Network ID, C-UAS system and future integration of ATM and UTM systems for supporting safety and advanced drone usage options. UpVision cooperate with many partners in the Europe on testing and validation drone activities and special safety features and to make the internal process of customers more effective like in power lines inspections or medical deliveries. Provides also various trainings and consultancy for risk asesement, drones flying, drone flight scenarios and Urban Air Mobility integration.

UpVision is a member of the European U-Space stakeholders network and co-founder of the UAV Alliance Czech Republic with several awards like from the Galileo Masters.

#### **Products & Services**

- Drone services Photogrammetry, EO, GIS, CAD, BIM, Inspections, Monitoring, Mapping
- USSP U-space service provider (Maia SW platform)
- R&D and practical testing and validation of drones applications
- Project management
- Training and consultations

#### Major Space Projects & References

- ESA NAVISP MEDuSA Monitoring and Estimation of Drones' passage for augmented Security in critical Areas (2022 - 2024)
- H2020 EUSPA CERTIFLIGHT Certified E-GNSS Remote Tracking of Drone and Aircraft FLIGHTs (2022 - 2025)
- Galileo Masters between 10 best European GNSS applications - Protection of wild animals before crop harvest by GNSS enabled UAV (2017)





- INDLISTRY
- SOFTWARE
- × SERVICES
- A R&D
- T TESTING

#### Contacts:

UpVision s.r.o.

Kbely, 197 00 Praha Czech Republic

Responsible for space and ESA projects:

#### Ing. Jakub Karas

P +420 601 373 937

E jakub.karas@upvision.cz





# **VZLU - Czech Aerospace Research Centre**

#### **General Description**

The Czech Aerospace Research Centre (VZLU) is the Czech national hub for aviation and space research, development, innovations, and testing.

#### **Competences & Capabilities**

In the field of space, VZLU focuses on research and development in the field of complete Space missions and Space technologies; its focus is on technologies applicable to the space segment of small satellites and the associated services and capabilities required for them. Capabilities include complete research, development, and production of composite materials for space and ground segments. VZLU has also experience in static and fatigue testing of launchers.

#### **Products & Services**

- Turnkey Space Missions with Small Satellites for LEO
- Integration to Spacecraft for various types of payloads
- Development of electronical systems and subsystems
- Software development
- Space qualification testing
- Ground Stations and Mission operation activities

#### **Major Space Projects & References**

- QUVIK Small Satellite mission for Astrological prospections with UV telescope
- AMBIC Small Satellite E0 mission for state users from the Czech Republic
- SWARM design, and manufacturing of three micro-accelerometer units for 3 ESA EO satellites
- D3S Nanosatellites for Space weather, cooperation on phases 0 and A
- INDUSTRY
- ✓ MANUFACTURING
- × SERVICES
- A R&D
- T TESTING

#### VZLU - Czech Aerospace **Research Centre**

Czech Republic

P +420 725 746 513 190 00 Prague 9 - Letnany E space@vzlu.cz



### PROBA 3 - supplied front door assembly for ASPIICS coronograph.

- FSA Flexible Solar Array
- IOD nanosatellites missions VZLUSAT 1, 2

### Space Related Equipment, Labs & Certificates

Quality assurance certificate ISO 9001:2015 Software tools

CATIA, Autodesk Inventor, Nastran, Altair hyperworks, FE-MAP, Ansys, Matlab, C, C++, PADS, KiCAD, Valispace

#### Clean rooms

- ISO 8 39.6 m2 (+ 140 m2 in 2024)
- ISO 6 33.1 m2 (+ 60 m2 in 2024)

#### Equipment

- Thermal vacuum chamber (<10-3 Pa, 1 meter cubic, tem-</li> perature from -120°C to +150°C)
- Vacuum tunnel (<10-3 Pa, 10m length)
- Shock Table (10000 qSRS)
- Shakers (max. weight of the specimen under test 350 kg, usable frequency range 1 - 3000 Hz, peak sine force 22.2 kN, max. RMS random force 22.2 kN, peak shock force 66.7 kN, max. velocity 2 ms-1, max acceleration 600 ms-2
- Ground station UHF, S band, X band (in 2024)



# **World from Space**

#### **General Description**

World from Space is a deep-tech company that utilizes Earth Observation data to create positive impacts in agriculture, NewSpace, and beyond. It is leading the way in the development of downstream and ground segment applications powered by advanced Al techniques.

#### **Competences & Capabilities**

- Automated cloud-based EO data processing pipelines (AWS, GoogleCloud, SentinelHub, Xcube, CDSE, OVH Cloud
- Batch processing, analytical data store, distributed data store, Big Data Workflows, Load balancing
- Raw optical data preprocessing (RAW/Level 0 Level 2/
- Calibration and validation of optical instruments
- User requirements gathering and analysis for EO mission
- Copernicus data processing, analysis and consulting (CDS, ADS, EFFIS, GDO, CLMS, CEMS etc.)
- EO analysis based on Sentinel, Landsat, Planet and VHR data (Pleiades, Worldview, SPOT, etc.)
- Machine learning with EO data (eo-learn, pytorch, GAN, Tensorflow, etc.)
- Global crop monitoring based on Sentinel-1 and Sentinel-2
- Soil moisture and drought assessment based on EO and IoT data fusion
- Domain specific analysis in agriculture, urban, climate change, land use, wetlands, and air quality

#### **Products & Services**

- DynaCrop- Powerful Al-based crop monitoring platform for precision farming. DynaCrop refines fertilizing, seeding, soil sampling, and overall farm operations within users' digital agriculture tools.
- ORBIS Services tailored for smallsat missions encompass a ground segment data processing platform, thorough analysis of customer requirements for mission data, as well as calibration and validation processes.
- Tailored EO Analytics We help you to design, execute and evaluate industry-specific geospatial projects.

#### Major Space Projects & References

- ORBIS Ground segment data processing platform for smallsats (ESA, 2023-2024)
- AMBIC -Czech national E0 mission data segment design (phases 0.A.B1)(ESA, 2022-2023)
- TAVAP Timing and variable rate applications for digital agriculture (ESA, 2022-2023)
- LAICA satellite vegetation monitoring using AI for SAR and optical data fusion (2022-2023)
- EO Clinic 6 services for international development banks (ESA, 2020-2023)
- Urban Green Urban greenery prediction and analysis service (ESA, 2022-2023)
- EuroGEO Showcases: A cloud-based contribution to EO. (H2020, 2021-2023)



- INDUSTRY
- SOFTWARE
- × SERVICES
- A R&D
- T TESTING

Orlí 516/20

602 00 Brno

Czech Republic

#### Contacts:

World from Space

E labohy@worldfrom.space

Jan Labohý, CEO

E office@worldfrom.space

Responsible for space and ESA projects:







### Zaitra s.r.o.

#### **General Description**

Zaitra is delivering Intelligence for Space Missions. We specialize in on-board data processing for satellite missions. Our customers are mainly Mission Integrators & Operators and Sensor & Payload Developers.

#### **Competences & Capabilities**

We are developing complex on-board data processing solutions for Earth Observation missions equipped with optical cameras. Our solutions improve satellite data analyses directly in space by edge device intelligence integrated into satellites. It allows processing of high volumes of data generated on-board of satellites, while reducing latency and saving downlink-related costs by minimizing unnecessary data transmission. Most of our products are based on artificial intelligence. Zaitra has demonstrated its ability to perform Al-based on-board data processing tasks in space, on-board the VZLUSAT-2 demonstration mission. The experiment was successful and Zaitra proved that its technology can effectively process data in space environments. Currently, Zaitra is preparing for 2 commercial satellite missions and 4 ESA projects. We are also leading 2 R&D projects focusing on further development of on-board data processing for specific cases.

#### **Products & Services**

SKAISEN - Al-powered on-board cloud detection solution, available in three variants, giving you the choice of a single component up to a comprehensive full mission on-board data processing solution:

SKAISEN Edge - Standalone FPGA IP Core with AXI DMA interface or a CPU optimized binary to a specific embedded

- SKAISEN OS Customized operating system designed to work seamlessly with SKAISEN Edge on Xilinx® ZyngTM 7000 and Xilinx® ZyngTM UltraScale+TM boards.
- SKAISEN Payload SKAISEN OS delivered together with one of the Data Processing Units (DPU) available on the

On-board object detection solution

#### Major Space Projects & References

On-board data processing solution for missions:

- SLAVIA on-board meteor detection
- VZLUSAT-2 on-board object detection
- TROLL onboard cloud screening and object detection

On-board control software:

Biomission19 - embedded software modules controlling microgravity experiments.



- INDUSTRY
- × SERVICES
- ▲ R&D

Contacts:

Zaitra s.r.o.

Plynárenská 4<u>99/1</u> 602 00 Brno Czech Republic

Responsible for space and ESA projects:

Marek Marušin

M +420 603 360 655 E marek@zaitra.io









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AdvaScope					9
AerialComm s.r.o					9
CORAC Engineering					
Dartsat					
ECOTEN urban comfort s.r.o					
Festka					
FlyinDiamonds s.r.o.					
Hydronaut					
ICEE.Space Czechia s.r.o					
InsightART					
Intellmaps s.r.o.					
Mapotic, s.r.o					
Nandrania 07 a r a					ەى م
Needronix CZ s.r.o					
SkyMaps s.r.o.					
SPACERACE s.r.o.					
StatoTest, s.r.o					
Turncircles s.r.o					
UDX s.r.o					9
Varistar, s.r.o.					10
Vrgineers, Inc					
Startups incubated by ESA BIC	; 				10



## AdvaScope

#### **General Description**

We see what others do not. AdvaScope is developing particle detectors for electron microscopy whose exceptional sensitivity and speed surpass current solutions. This can contribute to the emergence of a new generation of electron microscopes that, for example, are not at all troubled by noise. This imaging technology is derived from solutions originally developed for experiments in the giant particle accelerator at CERN. AdvaScope is a spin-off of the Prague company ADVACAM, whose radiation detectors protect astronauts and electronics in space but also serve in the fields of art, medicine, construction, and energy.

### **Competences & Products & Projects**

We design and manufacture solutions for the following applications:

(4D) STEM in SEM/TEM, µED (micro electron diffraction), EBSD, EELS, Micro/nano CT, Ptychography



Contacts:

Responsible for space and ESA projects:

- P +420 604 861 118
- E info@advascope.cz







**CORAC Engineering** 

#### **General Description**

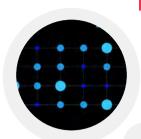
CORAC Engineering is a space technology company developing cyber-security solutions for satellites, communication channels, and ground stations. The company follows international space and cyber-security standards such as CCSDS, NIST, OWASP, MITRE and serves private and government customers.

#### Solutions:

Satellite uplink channel protection, Satellite downlink channel protection, Cyber-risk

analysis of space missions, Automation of space cyber-security processes, Space software supply chain cyber-risk mitigation Competences:

CCSDS communication and cyber-security standards for satellite infrastructure. Public Key Infrastructure (PKI), Knowledge of NIST, OWASP, MITRE ATT&CK standards, Encryption, authentication, authorization, data integrity and non-repudiation, Python SW development



Contacts:

**CORAC Engineering** 

Bělehradská 858/23 120 00 Praha 2 Czech Republic

Responsible for space and ESA projects:

Dušan Mondek







### AerialComm s.r.o.

#### **General Description**

AerialComm s.r.o. is a startup dedicated to research, development and productization of advanced materials in antenna design. Thanks to the state-of-the-art design our High Gain Class 6 Antenna can offer unrivalled improvements in antenna mass and size making it versatile for applications from drones to large commercial aircraft.

### **Competences & Products & Projects** Competences:

Aerospace Antenna Research & Development, Software Development, RF Design, Electronic Design

#### Products:

Satellite Communication L-Band High Gain Class 6 Antenna, RF Power Amplifier and Pre-Distortion

#### Projects:

L-Band High Gain Class 6 Antenna



# **Dartsat**

#### **General Description**

Dartsat is developing HW and SW for the ground segment of satellite communication. The company aims to provide products and services for satellite operators and GSaaS (Ground Station as a Service) providers with the most up-to-date HW and SW for efficient and reliable communication with their satellites.

#### **Competences & Products & Projects**

- Tracking parabolic antennas
- Wideband satellite communication
- RF components



Contacts:

Responsible for space and ESA projects:

Petr Vokoun

E petr.vokoun@aerial-comm.com





Contacts:

Dartsat s.r.o. Czech Republic Responsible for space and ESA projects:

Jakub Horký



90 STARTUPS

Czech Republic

AerialComm s.r.o.

### ECOTEN urban comfort s.r.o.

#### **General Description**

ECOTEN urban comfort s.r.o. is a data delivery and consulting company working on supporting cities in developing climate resilient urban environment through data-driven approach using earth observation and microclimate simulation technology. We provide services to city planners and urban development stakeholders such as urban designers, architects etc. We have worked with various clients in the public and private sector worldwide including Stadt Wien, IPR Praha

and City of Helsinki amongst others. We have also worked with EU Horizon Europe projects and were received funding by ESA BIC Czech Republic and TACR for developing new technologies and services for cities.

#### **Competences & Products & Projects**

- Urban Heat Vulnerability Assessment
- Urban Microclimate Simulation Assessment
- Urban Resiliency API Service Suite

#### Contacts:

**ECOTEN urban** comfort s.r.o. Lublaňská 1002/9 120 00 Praha 2 Czech Republic

**Festka** 

Responsible for space and ESA projects:

Ing. Jiri Tencar (PhD) CEO & Founder

E tencar@urban-comfort.eu







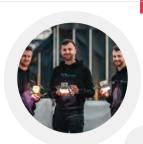
### FlyinDiamonds s.r.o.

#### **General Description**

FlyinDiamonds is drone light show company, where we specialize in creating truly mesmerizing experiences. Our state-of-the-art technology, combined with our skilled team of experts and innovative control software. allows us to offer a completely custom solution for air coordination of hundreds of drones in the sky. Imagine a sky full of drones choreographed to create breathtaking formations and an incredible 3D effect.

#### **Competences & Products & Projects**

- · All-in-one drone light show solution for fireworks of the future.
- · Innovative business potential and breathtaking promotion opportunities.
- · Advanced technology drone adaptive and safe flight trajectories.
- · Skilled team of experts with vast knowledge and experience in the field.







# **Hydronaut**

Contacts:

FlyinDiamonds s.r.o.

Purkyňova 649/127 612 00 Brno Czech Republic

### **General Description**

Festka brings to the cycling industry a unique combination of flexibility, exclusivity, science & technology and know-how. As a producer of high-end bicycles based in the Czech Republic, the brand focuses on custom production based on technological innovation. The company's ambition is to grow into a technological leader and trend-setter in the cycling industry through partnerships with leading scientific research institutions

and centers of technological innovation. Making its products from locally manufactured filament wound carbon tubes puts Festka on the cutting-edge of technological solutions befitting rockets and satellites and unique in the cycling industry.



### General Description

The Hydronaut DeepLab is a research and training station designed for long-term stays of smaller crews in the ICE environment, both on land and underwater. Station can be used to train astronauts, special forces of the ISS, for medical, biological and psychological research, as well as to test technologies in extreme conditions. Research and training programmes are conducted on a time-limited mission basis and combines partners' requirements while optimising the joint use

of backbone technologies.

#### **Competences & Products**

Own on-board system for crew communication, Rental of a research station, Provision of missions for research purposes: Analog missions, Training missions for emergency services, Scientific experiments in the fields of psychology, medicine, pharmacy, agricul-

**Projects:** Development of the platform for maintaining and monitoring the physical conditions in ICE environments (2023-2025)





Festka

Responsible for space and ESA projects:

Michael Moureček

Jana Masaryka 28 120 00 Praha 2 Czech Republic

E michael@festka.com





Contacts:

Responsible for space and ESA projects:

Responsible for space and ESA projects:

Hydronaut Project a.s.

Pod velkým hájem 1647/13 E jiri.schneider@hydronaut.eu 153 00 Praha 5 Czech Republic



## ICEE.Space Czechia s.r.o

#### **General Description**

ICEE.Space is an international space test, research, and development start-up for future human space exploration. With our analogue missions in Isolated, Confined and Extreme Environments, such as CHILL-ICE, we provide commercial analogue astronaut training and experiences as testbeds for upcoming lunar research and systems in extreme environments on Earth. In addition, ICEE.Space aims to help develop the first European space suit, inflatable habitats and remote power and communication systems, using the latest market technologies. ICEE. Space aims to make space research and analogue missions easier to understand, safer, and accessible to all.

Analogue Astronaut missions (CHILL-ICE (ICELAND), APICES (SPAIN)); ECHO Inflatable modular habitat for extreme environments; Simulated space suit for analogue astronaut missions: Power & communication systems for remote & underground locations

Analogue Research to



#### Contacts:

Beranovych 130 199 00 Prague Czech Republic

Responsible for space and ESA projects: Marc Heemskerk, CEO Charlotte Pouwels, CTO

www.chill-ice.com

E Charlotte@icee.space



# InsightART

#### **General Description**

InsightART is revolutionising the art world with next-generation x-ray imaging technology previously available only at the cutting-edge of particle physics research. Our mission is to safeguard the world's artistic heritage with state-of-the-art tools designed to assist art restoration experts and to unmask forgeries.

InsightART is the only company on the art authentication market using scanners with single-photon processing detectors. No

competitor can match the level of quality and information that we provide.

#### **Competences & Products & Projects**

- · InsightART uses advanced x-ray technology from particle physics research for art restoration and forgery detection.
- A subsidiary of the NASA-certified ADVA-CAM, it harnesses the patented WidePIX detectors developed from CERN research.





#### Responsible for space and ESA projects:

### InsightART

Prague U Pergamenky 1145/12 170 0<u>0, Praha 7</u> Czech Republic

Josef Uher

P +420 605 420 680



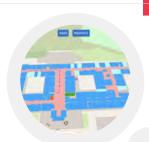
## Intellmaps s.r.o.

#### **General Description**

Our digital twin technology is employed for efficient asset management. Our cloudbased solution streamlines your operations and reduces costs. We utilize a cutting-edge mobile laser scanner to create detailed building maps. We seamlessly integrate all spatial data related to your infrastructure into a user-friendly online application. You'll have access to a comprehensive toolkit tailored to your specific requirements, featuring multiple layers and modules.

#### **Competences & Products & Projects**

- · Intellmaps provides digital asset management solutions through a distinctive blend of technology (hardware) and software (SaaS).
- · We construct a "digital twin" of a building by combining extensive datasets of point clouds, 360° imagery, and 2D technical maps. This includes seamless integration with CAD/BIM files, all within a cloud-based online application.



Contacts:

Intellmaps s.r.o.

Čumpelíkova 1885/11a 182 00 Praha 8 Czech Republic

Responsible for space and ESA projects:

Ing. Ladislav Čapek, MBA

E Ladislav.capek@intellmaps.com





# Mapotic, s.r.o.

#### **General Description**

Mapotic is an easy-to-use cloud platform that empowers organizations worldwide with innovative map-based products and services. It offers an interactive map builder and geolocation data processing platform, branded mobile applications, and solutions for real-time or near real-time visualization of changing human or sensor input, GNSS data, including weather and satellite imagery, or data from global connectivity providers.

### **Main Benefits**

- Time savings Rapid deployment and reduced development and data processing costs using simple, yet flexible, pre-built applications.
- Cost reduction Optimize the cost of running high-traffic mapping solutions by integrating optimized cloud services and a variety of providers.
- · Location data automation Automate the processing of geospatial data.





Mapotic, s.r.o.

Pod Hajkem 2204/1 180 00 Prague Czech Republic

Responsible for space and ESA projects:

Ivoš Gajdorus



MAPOTIC

## **MapTiler**

#### **General Description**

MapTiler started as a small project and grew to a much bigger company in just a few years. We all share one thing - a passion for maps, and truly loving what we do.

With our platform for building digital maps, clients produce maps that positively impact lives of millions of people. Every month, 300 million people see MapTiler's digital maps in our customers' mobile apps and websites. We innovate in the field of digital maps and

make maps accessible to as many people

as possible for everyday use. We always try to push the boundaries of cartography a bit

#### **Competences & Products & Projects**

- Online maps
- Offline maps
- Geodata processing
- Mapping solutions



MapTiler

Tišnovská 1505/137 61300 Brno Czech Republic





**3L Robotics** 

#### **General Description**

3L Robotics is revolutionizing last-mile delivery with its cutting-edge solution. Our flagship product, the Drone Helipad, is a game-changer in the world of parcel delivery. This innovative hardware landing pad boasts an advanced navigation and communication system, serving as the ultimate resource for drone operators. The helipad not only ensures the safe landing of drones but also provides crucial information to operators in real-time. Moreover, our helipad takes

convenience to the next level by seamlessly transporting delivered parcels into buildings, simplifying the logistics process.

#### **Competences & Products & Projects**

- Hardware and software development
- Geolocation
- Drone flight control system
- · Civil Project engineering



Contacts:

Responsible for space and ESA projects:

Petr Přidal

Contacts:

**3L Robotics** 

Nove Sady 988/2 602 00 Brno Czech Republic

Responsible for space and ESA projects:

Luboš Lněnička

E Lubos.lnenicka@3lrobotics.com





### Needronix CZ s.r.o.

#### **General Description**

Needronix specializes in nanosatellite integration and development of innovative spacecraft components. Our components are easy to integrate and we are pushing the limits of size by designing them to be as small as possible and lightweight while offering great performance.

Whether you're embarking on a new mission or searching for reliable components, we're here to support your journey through space.

### **Competences & Products & Projects**

Needronix offers comprehensive expertise in nanosatellite missions, providing end-toend services encompassing every aspect of your mission's success. From design and development to launch and operation, we are your trusted partner in the world of nanosatellite missions.

Our mission is to significantly reduce cost and time of CubeSat integration so delivering customers payload into space will be faster and cheaper than ever.





### General Description

SkyMaps s.r.o.

Founded in 2016, SkyMaps s.r.o. is providing smart farming solutions, making farm management better through digital tools. Starting as a software-focused company, Sky-Maps s.r.o. created CultiWise, a project that uses basic computer vision to make sense of farm data collected from satellites and UAVs. The CultiWise shows SkyMaps s.r.o.'s strong desire to push agritech forward, aiming to improve farming worldwide through machine learning, better detection, and easyto-expand tech infrastructure. SkyMaps s.r.o. continues to play a major role in moving traditional farming to a modern, data-driven, and eco-friendly approach.

#### **Competences & Products & Projects**

CultiWise is a modern, cloud-based platform dedicated to empowering the agricultural sector with state-of-the-art technology solutions. Our innovative software streamlines the process of precision agriculture, allowing farmers to seamlessly upload data and create comprehensive prescription maps.



Contacts: SkyMaps s.r.o. Responsible for space and ESA projects:

Martin Kapšo





Responsible for space and ESA projects:

Needronix CZ s.r.o. Patrik Lászlo

Prague Czech Republic

Czech Republic

### SPACERACE s.r.o.

#### **General Description**

SPACERACE is focused on making the space companies faster through standardized electromechanical products.

ESA BIC supported SPACERACE for development of ATLAS - release actuators for around testina.

Release actuators for space can retain a high preload and release it on demand - for example to unfold solar arrays. They are indispensable, extremely reliable and very expensive which often prevents small to medium companies to test their products properly. ATLAS is representative to the original space devices, but designed for easy use and efficiency in ground testing - reducing the cost and risk for the customer.

#### **Competences & Products & Projects**

- ATLAS Release actuators (22kN)
- ATLAS electronics for simultaneous control of up to 5 actuators
- · UNIKA Preload devices for hold down and release mechanisms



SPACERACE s.r.o. **Richard Hynek** 

Purkyňova 649/127 639 00 Brno Czech Republic

Contacts:







#### **General Description**

Turncircles specializes in developing and manufacturing custom electric motor technologies that provide a superior power-toweight ratio for small to medium-sized applications in robotics, E-Bikes, power tools as well as space and aerospace applications. Turncircles also designs and manufactures alternators and electrical generators for other types of equipment such as combustion engines or wind turbines. The company can offer various quantities from small series of

prototypes to higher serial production volumes. Turncircles proprietary designs allows for quick customization and shorter lead

#### **Competences & Products & Projects**

- Custom electric motors
- Custom generators and alternators



Contacts:

Turncircles s.r.o.

Czech Republic

Responsible for space and ESA projects:

Kaan Ozgen

www.turncircles.com



**ETURN**CIRCLES

# StatoTest, s.r.o.

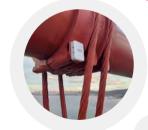
#### **General Description**

The comprehensive Statotest monitoring system represents a modern and unique technology that continuously and in longterm measures and records selected physical quantities indicating the current state of building structures. For our customers, we offer a complete service related to the design of monitoring, its implementation, creation of reports, notification of changes, data analysis and visualization, and prediction based on artificial intelligence. We can

provide measurements of large structures. bridges, retaining walls, geological formations, masts, towers, and equipment for industry and energy.

#### **Competences & Products & Projects**

- Monitoring system
- Predictive maintenance
- GNSS structure monitoring



Responsible for space and ESA projects:

STATOTEST, s.r.o. Petr Klokočník

U Jezu 525/4 460 01 Libered Czech Republic





### UDX s.r.o.

#### General Description

We are an aerospace startup committed to delivering electric flying vehicles for human use. Although we operated in relative silence for three years, we are now eager to increase our visibility. Our headquarters are located just outside Prague.

Our envisioned vehicle boasts vertical takeoff and landing capabilities. To enhance safety, we are integrating tiltable electric ducted fans instead of open rotors, which is the current industry standard. Among our various objectives, we plan to utilize our product for conducting rescue operations in challenging terrains. We are a dedicated team of four engineers, passionately working to turn this vision into reality!

#### **Competences & Products & Projects**

- Design and production of composite parts
- Flight software
- Aerodynamic simulations
- Fast iterations
- Manufacturing of electric ducted fans (EDFs)



UDX s.r.o.

Responsible for space and ESA projects:

Czech Republic





Jiri Zachardala

E jiri.zachardala@gmail.com

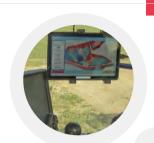
### Varistar, s.r.o.

#### **General Description**

Varistar offers huge decrease of ecological burdens in industrial crop production thanks to the usage of historical and actual data about fields (earth observation technologies, soil samples, elevation models and other resources). Based on these data, farms apply optimal rate of fertilizers or crop protection products in each part of fields. As a result, there is a maximum use of inputs by plants and a dramatic reduction in the release of fertilizers or pesticides into the en-

#### vironment.

Varistar system divides fields into many production zones with different yield potential and treats each of these zones based on its needs. Varistar offers to its clients to start with precision farming and variable rate applications without huge investments, learning new skills and additional operational workload mostly with existing machinery by deployment of Varistar One or Varistar Direct



Contacts:

Responsible for space and ESA projects:

Jan Semrád

K Varadovu 250 252 03 Řitka Czech republic

Varistar, s.r.o.





# Vrgineers, Inc.

#### **General Description**

Vrgineers, Inc. stands at the forefront of cutting-edge simulation technologies of the next generation. Our team consists of experts in virtual and mixed reality, fully committed to creating the most immersive tools for professionals and military clients. We engage in extensive research, development, manufacturing, and integration of advanced virtual and mixed simulators. Our ultimate goal is to bridge the gap between simulation

and reality, ensuring the safety of professionals in their real-life endeavors.

#### **Competences & Products & Projects**

Vrgineers offers the highest-quality and most effective training for military pilots with the most advanced XTAL Virtual and Mixed Reality headsets and aviation simulators, that form the basis of a modern synthetic training platform.



Contacts:

Responsible for space and ESA projects:

Vrgineers, Inc.

Jankovcova 1037/49 170 00 Prague 7





## Startups incubated by ESA BIC

- NG AVIATION SE
- Triphood s.r.o.
- Tuddy Tuddy s.r.o.
- InsightART s.r.o.
- R&D SPECTRE, s.r.o. (Festka)
- Big Terra Alpha s.r.o.
- NaviRider s.r.o. (former Right Rider s.r.o.)
- Let's Earth s.r.o. (MeteoInsight)
- FoxWorks Aerospace s.r.o.
- UptimAI s.r.o. (former SMUP-UQ s.r.o.)
- ALEEGO s.r.o.
- strafos s.r.o.
- ZetJet Technologies s.r.o.
- MapTiler s.r.o. (former OctoGeo s.r.o.)
- World from Space s.r.o.
- NeuronSW SE
- Suborbitality s.r.o.
- Dronetag s.r.o.
- Skymaps s.r.o.
- STRATOSYST s.r.o.
- Spacemanic CZ s.r.o.
- Entrant s.r.o.
- Vrgineers, Inc.
- Varistar, s.r.o.
- Numer8 s.r.o.

- Uneegly s.r.o.
- mobis0ne s.r.o.
- Zaitra s.r.o.
- GROUNDCOM.SPACE s.r.o.
- Hydronaut Project a.s.
- Intellmaps s.r.o.
- EigenSpace s.r.o.
- Needronix CZ s.r.o.
- Turncircles s.r.o.
- ECOTEN urban comfort s.r.o.
- MARS Buildings s.r.o.
- FlyinDiamonds s.r.o.
- AdvaScope s.r.o.
- VisionCraft s.r.o.
- StatoTest s.r.o.
- CORAC Engineering s.r.o.
- SPACERACE s.r.o.
- ICEE.Space Czechia s.r.o.
- Dartsat, s.r.o.
- Betrian a.s.
- Mapotic s.r.o.
- 3L Robotics, s.r.o.
- AerialComm s.r.o.
- UDX s.r.o.
- X ENDER Space s.r.o.

vrgineers Ing. Marek Polčák

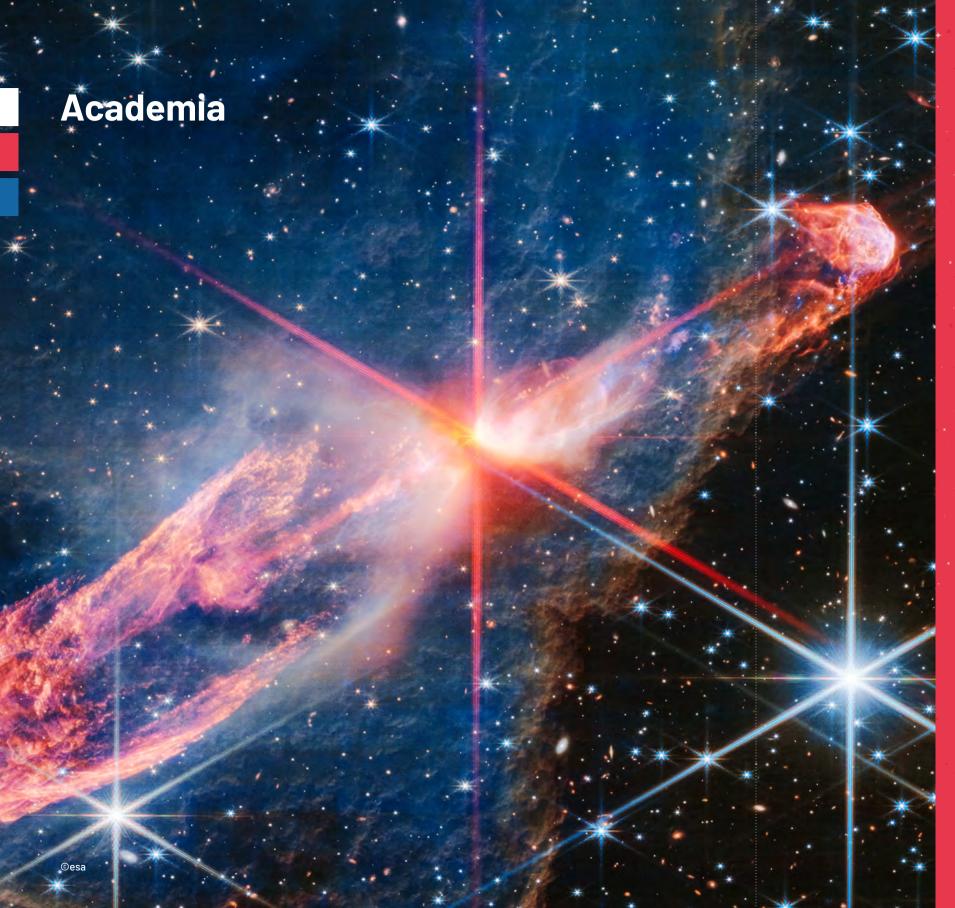








Czech Republic





Astronomical Institute, CAS	
Brno Observatory and Planetarium	10
Brno University of Technology	10
CESNET, z. s. p. o.	10
Czech Hydrometeorological Institute	10
Department of Geoinformatics, J. E. Purkyně University in Ústí nad Labem	10
Department of Physical Electronics, CTU	11
Department of Soil Science and Soil Protection	.1
Faculty of Applied Sciences, UWB	1
Faculty of Electrical Engineering, CTU in Prague	11
Faculty of Mathematics and Physics, Charles University	11
Faculty of Mechanical Engineering, CTU in Prague	1
Faculty of Science, Palacký University Olomouc	1
Global Change Research Institute CAS (CzechGlobe)	1
Institute of Botany (IBOT), CAS	1
Institute of Experimental and Applied Physics, CTU in Prague	1
T4Innovations National Supercomputing Center	12
JIC	1:
Klet Observatory :	12
Nuclear Physics Institute of the CAS	12
Planetum	12
Research Institute of Geodesy, Topography and Cartography	. 12
Teplice Observatory	12
The Institute of Atmospheric Physics of the Czech Academy of Sciences (IAP) $\dots$	12
TOPTEC   Institute of Plasma Physics of the CAS	12



### **Astronomical Institute, CAS**

#### **General Description**

Astronomical Institute of the Academy of Sciences of the Czech Republic is a professional research institution with focus on a wide range of research topics; from the immediate environments of the Earth to distant galaxies and black holes in their cores. The research activities are carried out in four scientific departments: Dept. of Solar Physics, Dept. of Stellar Physics, Dept. of Interplanetary Matter, and Dept. of Galaxies and Planetary Systems. Main areas of research activities include physical processes in the Sun, especially in solar flares, physical processes in stars, interaction of the interplanetary matter with the Earth atmosphere, asteroids and comets, dynamics of the Solar System bodies, formation and evolution of galaxies, and relativistic astrophysics.

#### **Competences & Capabilities**

Large international collaborations represent a significant part of the research activities of the Astronomical Institute. Scientists from the Institute are involved in many international projects of new-generation astronomical instruments for ground-based as well as space-based telescopes, the latter usually done in a close co-operation with the European Space Agency (ESA). The Astronomical Institute takes the coordinating role in the programme 'Space for Mankind' of the Strategy AV 21 project of the Czech Academy of Sciences (www.vesmirprolidstvo.cz). This programme involves several other institutes of the Czech Academy of Sciences, prime universities and industry.

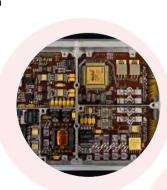
#### **Products & Services**

- power supply units for STIX and RPW
- web pages that are part of SWESNET Portal providing

suspot group classification, solar flare forecast, daily bulletin and synoptic images of the Sun.

#### **Major Space Projects & References**

- Solar Orbiter design, development and manufacture of the three scientific instruments on board: Spectrometer-Telescope In X-rays (STIX), Radio and Plasma Wave experiment (RPW), and METIS in collaboration with IPP TOPTEC. Mission launched in 2020, all the components made in the Czech Republic work perfectly.
- Coordination and the scientific part of the project "Front Door Assembly and Primary Objective together with Relay Optics" - done by national industrial partners, including participation in setting of the scientific requirements for the ASPIICS coronagraph onboard Proba 3.
- Design, development and delivery of radiation hardened low-voltage power supply for Radio and Plasma Wave Instrument (RPWI) on the JUICE mission (ESA).
- Lunar Dusty Environment and Plasma Package (L-DEPP)
  experiment for Lunar Lander: design study for complex
  instrumentation for dust and plasma analysis in the lunar
  near surface environment. Experiment was proposed as a
  potential payload for Lunar Lander mission (ESA). Project
  was funded under ESA open ITT contract.





#### ▼ ACADEMIA

- ▲ R&D
- ) DESIGN
- T TESTING

Contacts: Astronomical Institute, Czech Academy of Sciences (CAS) Fričova 298 251 65 Ondřejov

Czech Republic

### Responsible for space and ESA projects:

RNDr. Jiří Svoboda, PhD

P +420 226 258 428 M +420 777 214 434

E jiri.svoboda@asu.cas.cz





## **Brno Observatory and Planetarium**

#### **General Description**

To fly into space, look into the microworld, discover the secret of life, immerse yourself into the realm of fantasy, partially reveal the future and live a science-fiction story. All of that, actually much more, can be found at the Brno Observatory and Planetarium.

We are a centre for popularization of various sciences, especially in the field of inanimate nature. First of all, it is of course astronomy, but we do not avoid geology, chemistry, physics, mathematics, geography and a lot of other fields. All of that in a form which is understandable, entertaining and interactive. We are not a scientific workplace, but you can encounter science at every step. We are also engaged in promotion of Brno universities and big scientific projects carried out in the area of Brno.

The digital planetarium will immerse you with its scene and sound. The series of special projectors combined with tens of computers can conjure a surprisingly true model of the space on the projection screen with a diameter of 17 meters. The repertoire of the digital planetarium does not include only astronomical shows. We will take you to the places that are hard to get to – under water, inside a human body, to the near future, to the microworld and macrocosm. Many of our shows are simultaneously projected in English.

Up-to-date premises of the Brno Observatory and Planetarium are an ideal place for medium size events of congress and incentive tourism, specialized events for sponsors and advertising or barter partners, cultural activities (theatre and musical performances) as well as a little more intimate meetings.





- ★ ACADEMIA
- ▲ R & D
- × SERVICES

#### Contacts:

Brno Observatory and Planetarium Kraví Hora 2 616 00 Brno Czech Republic

#### Responsible for space and ESA projects:

#### Mgr. Jiří Dušek, Ph.D.

M +420 775 354 555 E dusek@hvezdarna.cz vww.hvezdarna.cz



Hvězdárna a planetárium Brno

# **Brno University of Technology**

#### **General Description**

Brno, the capital of the South Moravian Region, has the largest concentration of the space industry in the Czech Republic. Brno University of Technology is one of the largest technical universities in the Czech Republic, which dominates in the preparation of highly educated professionals for this space industrial sector.

#### **Competences & Capabilities**

The university focuses on (but not only): conceptual design of space vehicles, structural design and testing (static, quasistatic, dynamic incl. vibrations), dynamic impact tests, manufacturing of airframe parts (complete integration of the vehicles), flight testing at earth conditions, space tribology, additive manufacturing, solar corona observations, habitats for extreme environments, wireless communication, electronic control units, machine learning, computer graphics and interaction, cyber-physical systems, software development + verification and testing, embedded systems etc.

#### **Products & Services**

- SpaceApps International Masters Space Study Programme
- Mechanical, electrical and software engineering (MS.c. and Ph.D. programme)
- Close cooperation with partners from the space industry
- Custom research and development

#### **Major Space Projects & References**

- Miniaturized heat switch for probes and satelites, ESA
- Moon Drone Feasibility Study, ESA, Thales-Alenia Space

- MetOp-SG Instrument 3MI (Multi-view Multichannel Multipolarization Imaging), ESA
- MetOp-SG FWC module (Filter Wheel Control Unit), ESA
- L-BAND communication system High throughput wireless communication for Aerospace applications, ESA
- MILANI CubeSat for HERA mission onboard hyperspectral data processing, ESA
- Advanced onboard compression and filtering of hyperspectral data, ESA
- SLAVIA (Space Laboratory for Advanced Variable Instruments and Applications) - Czech ambitious mission

#### Space Related Equipment, Labs & Certificates

The University has two large excellently equipped laboratory

- NETME Centre New Technologies for Mechanical Engineering - see http://netme.cz/
- CEITEC Central European Institute of Technology see https://www.ceitec.eu/









) DESIGN

T TESTING

#### Contacts:

**Brno University of** Technology 60190 Brno

Responsible for space and ESA projects:

Ing. Vratislav Šálený, Ph.D.

M +420 602 828 223



## CESNET, z. s. p. o.

#### **General Description**

CESNET is a research organisation established in 1996 by Czech universities and the Czech Academy of Sciences to operate and develop the national e-infrastructure for research, development and education which encompasses a national research and education network (NREN), national grid and cloud computing infrastructure and large-scale data storage services. This services are complemented with tools and for managing access to resources, communication security and data protection tools, and services for efficient collaboration between distributed users and teams.

#### **Competences & Capabilities**

- Network data transfer (100 Gbps)
- Data processing and data storage services
- High-performance computing
- Monitoring and security services
- Forensic analysis, penetration and infrastructure stress
- Online collaboration tools & Multimedia
- Identity management & Middleware
- Research and development in the field of information technology

#### **Major Space Projects & References**

CESNET operates national Data Hub system, which enables users fast and reliable transfer and access to the Sentinel mission's data (products). Located at CESNET, the Data Hub Relay is able to capitalize CESNET's high speed connection to GÉANT as well as CESNET's extensive experience in operating distributed infrastructures, storages and high throughput computing.

The choice of data sets distributed through the Relay is driven by the needs of partners involved in the relay network, and by the needs of users active in the Czech Republic and surrounding





- **⊼** ACADEMIA
- ▲ R&D
- ) DESIGN

Contacts: CESNET. zájmové sdružení právnických osob Generála Píky 430/26 CZ-16000 Prague 6 Czech Republic

Responsible for space and ESA projects:

Ing. Zdeněk Šustr

E datahub@cesnet.cz





# **Czech Hydrometeorological Institute**

#### **General Description**

Czech Hydrometeorological Institute (CHMI) is a central state institute of the Czech Republic in the fields of air quality, meteorology, climatology, hydrology, and water quality. The objective of CHMI's activity in the above fields is to establish and operate monitoring stations with the aid of a telecommunications networks. The related activities include building national networks for monitoring the atmosphere and hydrosphere, to assess observations, measurements and monitoring data and to create and maintain databases in a unified information system, to provide information to the public and to report to regional and national authorities/ institutions as well as to the EU bodies. CHMI consists of five divisions, including Meteorology and Climatology, Air Quality, and Hydrology Divisions.

#### **Competences & Capabilities**

The CHMI is authorized by the Ministry of the Environment to operate the State air quality monitoring network of the Czech Republic. It is also authorized to ensure in the long term the operation and development of the Air Quality Information System including the national air quality database. Among all of the core products of the Air Quality Information System Department, air quality maps play a particularly important role. The maps are constructed both using near real time data (up-to-date) and annual average data, with the underlying methodology based on the data fusion of the monitoring, modelling and other supplementary data.

#### Major Space Projects & References

SAMIRA (Satellite based Monitoring Initiative for Regional Air quality) was a project funded by the European Space Agency.

In the project, seven organizations from four counties (Norway, Czech Republic, Poland, and Romania) were involved, including CHMI. The overall goal of the SAMIRA project was to improve regional and local air quality monitoring through synergetic use of data from present and upcoming satellites, traditionally used in-situ air quality monitoring networks and output from chemical transport models. The examined pollutants were Particular Matter (PM10, PM2.5), Nitrogen Dioxide (NO2), and Sulphur Dioxide (SO2). The time steps were hourly, daily, and annual data.





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- ▲ R&D
- ) DESIGN
- T TESTING

Contacts: Czech Hydrometeorological Institute Na Šabatce 17 143 06 Praha 4 Czech Republic Responsible for space and ESA projects:

RNDr. Jindřich Šťástka, Ph.D.

P +420 244 033 509

E jindrich.stastka@chmi.



# Department of Geoinformatics, Faculty of Environment,

### J. E. Purkyně University in Ústí nad Labem

#### **General Description**

Jan Evangelisty Purkyně University in Ústí nad Labem, a public university founded in 1991, represents a modern center of education and scientific-research in the region. It is formed by eight faculties with a wide range of study programs ranging from natural and social sciences to engineering, art and health. The Department of Geoinformatics provides teaching of geoinformatics, computer science and mathematics, and research activities in the fields of remote sensing, cartography and geodetic applications in environmental studies.

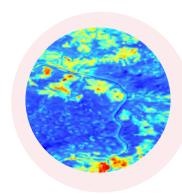
#### **Competences & Capabilities**

The main tasks of the Dept. of Geoinformatics are educational and research activities in the region. We study and introduce the students to the potential application of Earth observation data for various environmental issues. Our main focus is on spatio-temporal changes of landscape, specifically changes in land-use, regeneration of post-mining landscapes, remains of past human activities in cultural landscape, archeological research, ecosystem disturbances due to invasive species, wild-fires and pests, and climate change mitigation. In our work, we combine field measurements with drone, airborne and satellite observations, and emphasize applied research and the practical implementation of Earth observation methods and tools for nature conservation and landscape management.

#### Space Related Equipment, Labs & Certificates

- equipment for multispectral and laser scanning, and for bathymetry
- variety of unpiloted aerial vehicles (drones)
- · corresponding software and field equipment





- ▼ ACADEMIA
- ▲ R&D
- ) DESIGN
- T TESTING

Contacts:
Faculty of Environment,
Jan Evangelista Purkyně
University

Pasteurova 3544/1 400 96 Ústí nad Labem Czech Republic Responsible for space and ESA projects:

Mgr. Jana Müllerová, PhD.

P +420 475 284 137

E jana.mullerova@ujep.cz



JAM EVANGELISTA POINTYNE UNIVERSITY IN OSTI NAD LABEM 774-77 ELYN FRANKENSKI

# **Department of Physical Electronics, CTU**

#### **General Description**

Department of Physical Electronics is a technical university department with a long heritage in space related projects under various roofs of Interkosmos, NASA and other space agencies. The department was coordinating the world satellite laser ranging (SLR) network for 20 years, it contributed to planetary missions to Mars and to laser time transfer missions of CNES, NASA, China, and ESA mostly with detectors based on Single Photon Avalanche Diode (SPAD).

#### **Competences & Capabilities**

In pure space segment the department capabilities cover single photon counting in space (from EUV to near IR) for altimetry, ranging, lidar or laser time transfer, x-ray optics and diagnostics. In the ground segment it has a long term experience with picosecond instrumentation for SLR, i.e. picosecond photon counters, picosecond laser sources, sub-picosecond event timing, and in on-site timing calibration of SLR stations worldwide.

#### **Products & Services**

detectors for single photon counting (ranging, altimetry, lidar) in space in VIS and IR single x-ray quantum detection, x-ray optics, and imaging methods for EUV and soft x-ray sub-picosecond event timing

#### **Major Space Projects & References**

- Satellite Laser Ranging (SLR) ground segment network (Interkosmos)
- Portable Calibration Standard for SLR network (Czech and various national grant agencies)

- Mars 92, Mars Polar Lander 98 planetary altimeter & LI-DAR (Russia, NASA)
- T2L2 @ Jason2 on-board detector for laser time transfer (CNES, NASA)
- LTT @ BeiDou 2 / Compass on-board detectors for picosecond laser time transfer (China)
- X-ray Optics and Diagnostics research activity (FP-7Space)
- European Laser Timing (ELT) on-board SPAD based detector for ISS module ACES (ELIPS 3)

#### Space Related Equipment, Labs & Certificates

- Solid state single photon detectors with picosecond temporal resolution, multi-wavelenghts picosecond laser systems, femtosecond event timers, UTC GPS receivers, frequency sources, multipliers and distributors
- EUV tabletop source, single quantum detectors, spectrometers and imaging detectors





- ▼ ACADEMIA
- ▲ R & D
- ) DESIGN
- T TESTING

#### Contacts:

CTU in Prague dept. of Physical Electronics Brehova 7 115 19 Prague 1

in Prague dept. of professor Ivan Procházka sical Electronics

M +420 774 139 637 E ivan.prochazka@f

Responsible for space and ESA projects:

www.lab.blazej.cz



# **Department of Soil Science and Soil Protection**

#### **General Description**

Research of the Department covers a number of topics such as soil pollution, soil degradation by sealing and erosion, soil water dynamics, digital soil mapping using laboratory analysis, remote and proximal sensing. The department possesses various laboratory instruments for wet chemistry, soil physics, and field proximal sensors.

#### **Competences & Capabilities**

The Department contributes actively to the research of up-todate problems related to soil degradation, conservation and protection. The main areas of activity related to space research include remote sensing of soils, imaging spectroscopy and VNIR field and laboratory spectroscopy.

#### Major Space Projects & References

The WORLDSOILS project aims to develop a pre-operational soil monitoring system to provide yearly estimations of soil orgnic carbon (SOC) at global scale, exploiting spacebased Earth observation (EO) data, leveraging large soil data archives and modelling techniques. The ambition of the WORLDSOILS Monitoring System (WOSOMS) is to achieve a system with the following characteristics:

- Modular implementation to allow future extension to additional soil indices.
- Spatial resolution 100 m x 100 m globally and 50 m x 50 m over Europe.
- · Use of large time series of a minimum of 3 years.

WORLDSOILS is an application project with funding from the European Space Agency (ESA) and executed by GMV, Université

Catholique de Louvain (UCL), German Aerospace Center (DLR), International Soil Reference and Information Centre (ISRIC), German Research Centre for Geosciences (GFZ), Aristotle University of Thessaloniki (AUTh), Czech University of Life Sciences Prague (CZU) and Tel-Aviv University (TAU).

Project STEROPES of the European Joint Programme SOIL (https://ejpsoil.eu/) supported by the EC Horizon 2020 programme also aims in mapping SOC using mainly Sentinel-2 data. The project involves development of methods to reduce the effect of soil moisture, texture, salinity and plant residues on the SOC prediction.

#### Space Related Equipment, Labs & Certificates

Spectroscopy lab: FieldSpec-3 (ASD, 350-2500 nm) with field accessories Portable X-ray fluorescence spectrometer Olympus Delta Premium

#### Soil moisture sensors:

- · SM200 with HH2 Moisture Meter
- PR2 Soil Moisture Profile Probe with HH2 Moisture Meter
- TMS2 field soil moisture devices for continuous monitoring





- ★ ACADEMIA
- ▲ R&D
- ) DESIGN
- T TESTING

#### Contacts:

Department of Soil Science and Soil Protection Faculty of Agrobiology, Food and Natural Resources (FAFNR) Czech University of Life Sciences Prague (CZU)

Kamýcká 129,165 00 Prague-Suchdol Czech Republic Responsible for space and ESA projects:

M.Sc. Asa Gholizadehy, Ph.D

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## Faculty of Applied Sciences, UWB

#### **General Description**

The Faculty of Applied Sciences of the University of West Bohemia in Pilsen performs fundamental and applied research in the fields of mathematics, geomatics, physics, cybernetics, information technologies, computer science and mechanical engineering. Since 2015, the faculty has been operating an R&D centre with 200 employees. The centre is equipped with state-of-the-art instrumentation and labs. There are 120 doctoral students at the faculty which participate at its research activities. The faculty cooperates with many partners within the Czech Republic and abroad.

#### **Competences & Capabilities**

The research team of the faculty is competent in the areas of development of cybernetic control systems, identification, intelligent decision-making and communication systems; advanced computer and information systems; research and modelling of heterogeneous materials; testing of mechanical and biomechanical structures; novel nanostructured thin-film materials prepared using plasma processing; qualitative and quantitative investigation of mathematical models; geodesy and geotechnologies.

#### **Major Space Projects & References**

Towards a better understanding of the Earth's interior and geophysical exploration research "GOCE+ Geoexplore II". Project STSE GOCE+ 4000103566/11 of the European Space Agency, 2011-2015 (main contractor and coordinator of 6 European institutions). The overall objective of the project was to combine GOCE gravity gradients with heterogeneous other satellite gravity information to arrive at a combined set of gravity gradients complement-

ing (near)-surface data sets spanning all together scales from global down to 5 km useful for various geophysical applications and demonstrate their utility to complement additional data sources (e.g., magnetic and seismic) to enhance geophysical modelling and exploration.

- GOCE specific tasks on fine gravity field structure of the Earth. PECS Project 98056 of the European Space Agency, 2007-2011 (member of the consortium). The objective of the project was to study the Earth's gravity field as derived from combination of satellite, aerial and surface data. Various functionals of the gravity field potential (gravity acceleration, geoid undulation, gravity gradients) were studied in order to detect signatures which could be linked to past as well as recent mass changes and surface deformations.
- Advanced algorithms and techniques for resilient time provision. EXPRO project E NAVISP-EL1-056 of the European Space Agency, 2022-2023 (subcontractor). The project is devoted to the accurate and reliable estimation of the ensemble time scale based on the statistical processing of an ensemble of particular time scales (clock measurements) which are of different accuracy and providers (physical clocks, internet time protocols, etc.).





⊼ ACADEMIA

Contacts:
Faculty of Applied Sciences
(FAS) University of West
Bohemia, Pilsen (UWB)

Bohemia, Pilsen (UWB) Univerzitní 22 306 14 Plzeň Czech Republic Responsible for space and ESA projects:

prof. Ing. Pavel Novak, PhD.

P +420 377 632 676 M +420 728 383 486 E panovak@kma.zcu.cz www.fav.uwb.cz



## Faculty of Electrical Engineering, CTU in Prague

#### **General Description**

CTU is the leading technical university in the Czech Republic.

The Faculty of Electrical Engineering (FEE) offers first-class
education in the fields of electrical engineering, telecommunications, radio engineering, bioengineering, automation, informatics, and computer science. (https://fel.cvut.cz/en/).

#### Competences & Capabilities

The FEE has extensive research collaboration with top universities and research institutions worldwide. It offers innovative solutions to industrial partners, military and security institutions, including participation in space research and work for governmental agencies. The faculty offers the study programmes taught in English: Electrical Engineering, Power Engineering and Management (BSc and Ing.), Communications, Multimedia and Electronics (BSc and Ing.), Cybernetics and Robotics (BSc and Ing.), Open Informatics (BSc and Ing.), Medical electronics and bioinformatics (Ing. Only), and Aerospace Engineering (Ing. Only). The PhD study programmes cover 10 complementary areas of research (https://intranet.fel.cvut.cz/en/education/phd/obory.html). Graduates find top jobs in industry, research institutions and universities in the Czech Republic and worldwide.

#### **Major Space Projects & References**

- MIMOSA Triaxial magnetometer for the Czech satellite.
- Design and implementation of scientific experimental device at the orbital stations Mir and the ISS, cooperation with DLR Germany.
- ESA participation in the satellite projects in operation (ESA INTEGRAL - since 2002).
- Participation in large satellite ESA ATHENA, M mission candidates THESEUS, , and ESA-CAS mission SMILE.

 Other contracts – e.g. tester for micro accelerometer with VZLU for the satellite project SWARM.

ESA PECS projects, direct ESA contracts.

Cooperation with NASA - USA.

- Satellite navigation
- Nano and Picosatellites
- EU projects
- LVICE2: Czech/ESA ambitions project development of AMR and fluxgate based vector magnetometer
- EDA (European Defense Agency) NEUMANN project.
- Cooperation with the South African Space Agency SANSA on the development of SQUID and fluxgate variometers for prediction of magnetic storms.
- · Educational activities
- For full details please see https://fel.cvut.cz/en/research/ space-activities.html

#### Space Related Equipment, Labs & Certificates

- Equipment for simulation of GPS and GLONASS constellations.
- Receivers of signals of navigation systems (GPS, GLON-ASS, Galileo, QZSS, EGNOS, MSAT, WAAS).
- · Materials testing laboratories.
- Electronics and optical laboratories, devices design and fabrication.
- Equipment for magnetic testing and calibration of magnetometers.
- Anechoic chambers: acoustics and electromagnetic.
- Satellite data / image acquisition and processing.





#### Contacts:

T TESTING

★ ACADEMIA
♠ R & D
DESIGN

### Faculty of Electrical Engineering

Czech Technical Univers in Prague (CTU)

#### Responsible for space and ESA projects:

Bc., Ing. René Hudec, Csc.

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E hudecren@fel.cvut.c





# Faculty of Mathematics and Physics, Charles University

#### **General Description**

The Space Physics Laboratory (SPL) was established in 1990 but the space research activities date down to 1970. SPL participaed in numerous projects in frame of the former Intercosmos activity. From 2007, SPL participates in ESA projects dealing with processes in the interplanetary space. The participation is oriented on the computer modeling of the detector systems, design of measuring process, onboard software for device control and data processing. Manufacturing of the mechanical parts and electronics is arranged by cooperation with external partners.

#### **Competences & Capabilities**

SPL is oriented on the fundamental research of processes in space plasma and the R&D activities are strongly coupled to these topics. We are engaged in the development of ion and electron spectrometers and energetic particle detectors. This development is mainly focused on high-speed measurements in the solar wind and planetary magnetospheres.

#### **Major Space Projects & References**

- PG1 1970, Intercosmos 3, exploration of radiation belts.
- ESA 1976, Intercosmos 17, energy spectrometer for magnetospheric plasma study
- MONITOR 1980, Prognoz 8, fast monitoring of the solar wind parameters
- BIFRAM 1985, INTERSHOCK mission, a complex plasma spectrometer for investigations of shock waves
- MONITOR-3, VDP, MPS, VDPS 1995/96, a complex of plasma spectrometers for four satellites of the INTERBALL mission

Responsible for space and ESA projects:

Prof. Jana Safrankova

- BMSW (Bright Monitor of the Solar Wind) 2011, SPEKTR-R
- SWA (Solar Wind Plasma Analyzer) 2020, Solar Orbiter, detector unit for plasma spectrometer, in cooperation with IRAP, France
- LEES (Low Energy Electron Spectrometer) Comet Interceptor, front end electronics, launch planned for 2026, in cooperation with IRAP, France

#### Space Related Equipment, Labs & Certificates

- Facilities for computer simulation of detector systems
- Experimental set up for investigations of space dust
- Facility for vacuum tests equipped with UV source and electron and ion guns





- A R&D
- ) DESIGN T TESTING
- Contacts: Space Physics Laboratory

(SPL), Faculty of Mathematics and Physics. **Charles University** 

Ke Karlovu 3, 121 16 Praha 2 E jana.safrankova@mff.cuni.cz



# Faculty of Mechanical Engineering, CTU in Prague

#### **General Description**

CTU in Prague is the leading technical university in the Czech Republic. The Faculty of Mechanical Engineering (FME) offers excellent education and research in the fields of materials and coatings, mechatronics, light-weighting design, production technologies including additive manufacturing, non-destructive testing using computed tomography and precise dimensional and surface texture metrology.

#### **Competences & Capabilities**

Mechanical and thermal simulations of complex structures. lightweight design of thin-walled inteligent composite structures, FEM & CFD simulation, SHM & NDT methods, laboratory & operational structural analysis, static mechanical and (thermal) vacuum testing of spacecraft components, design of spacegrade composite structures, orbit modelling, novel space power system analysis, production and inspection of hi-tech parts for satellites and more. The space activities of the FME CTU stem strongly from education, with several aerospace specializations at the master-level study.

#### **Products & Services**

- Design of structures, their numerical and experimental analysis, structure health monitoring
- Additive manufacturing / CNC machining of lightweight structures
- Computed tomography and non-destructive testing, multi-material analysis, assembly inspection
- Ultra precision coordinate metrology and surface texture analysis including optical smooth surfaces

#### **Major Space Projects & References**

- Lunar Vicinity Complex Environmental Explorer (LVICE2): within Czech/ESA ambitions projects
- Preliminary European Reckon on Nuclear Electric Propulsion for Space Applications (RocketRoll): ESA study

#### Space Related Equipment, Labs & Certificates

- Thermal vacuum chambers (<10-3 Pa, 28 I/140 I, -150(-190)°C to +130°C)
- Thermal chamber with controlled humidity
- Centrifuge (payload >5kg, 15g)
- GE Additive Concept Laser M2 printer
- Zeiss Metrotom 1500, large computed tomograph
- CNC machining including 5-axis grinding of ceramics





- ▲ R&D
- ) DESIGN
- T TESTING

Contacts: Faculty of Mechanical Engineering, CTU in Prague 160 00 Prague 6

Czech Republic

Responsible for space and ESA projects:

Ing. Libor Beránek, Ph.D.

E space-applications@fs.cvut.cz





# Faculty of Science, Palacký University Olomouc

#### **General Description**

Palacký University in Olomouc is a university with long-standing tradition. Founded in the 16th century, it is the oldest university in Moravia and the second-oldest university in the Czech Republic. Today it is a modern higher education facility with a wide range of study programs and copious scientific and research activities. Almost 22 000 students are enrolled at its 8 faculties. Palacký University is one of the very top Czech universities, and ranks among the best universities of the world, according to international rankings.

#### **Competences & Capabilities**

The space-related research is being carried out at the Faculty of Science, which is a research-oriented faculty that offers Bachelor's, Master's, and Doctoral studies in various branches of Mathematics, Computer Science, Physics, Chemistry, Biology and Ecology, Earth Sciences. Since 2009, the majority of its worksites have been located in a newly constructed building close to the city center. Thanks to European funding and success in national grant competitions the Faculty managed to build modern facilities with state-ofthe-art equipment. Currently, the Faculty has about 4 000 students.

The Faculty of Science has a lot of creative potential and it can be proud of its abundant profile of original scientific results, which push the limits of our findings, as well as of its multilateral international cooperation. Some of our research teams rank significantly on the international scale as well. According to the Methodology of the Research, Development, and Innovation Board, in 2011, the Faculty of Science ranked fifth among all the faculties and scientific institutions in the Czech Republic. According to a study conducted by the National Economic Institute in August 2012, the Faculty is the most efficient scientific worksite in the field of optics in the entire Czech Republic.

#### Major Space Projects & References

QUARTZ: ESA Scylight project aimed at development of satellite-based quantum key distribution system and service architecture, including core technologies and ground end-to-end testing. Project duration is 2018-2022, Faculty of Science of Palacky University is a part of an international consortium led by SES. The team of Palacky University is responsible for information-theoretical security analysis of quantum cryptography protocol to be developed and implemented within the project.

Super-Resolution via Spatial Mode Demultiplexing and its Applicability to Observational Astronomy: ESA Ariadna project realized in 2018. The team of Palacky University explored the concept of indirect super resolution imaging based on spatial mode demultiplexing, performed theoretical and experimental assessments of the method and studied its applicability to observational astronomy, with special reference to binary star systems and exoplanet detection.







#### **⊼** ACADEMIA ▲ R&D

#### Contacts:

Faculty of Science, Palacký University Olomouc





# Global Change Research Institute CAS (CzechGlobe)

#### **General Description**

Global Change Research Institute of the Czech Academy of Sciences (CzechGlobe) aims to better understand the impact of global change on the atmosphere, biosphere and societal processes - the causes, impacts, adaptation and mitigation using the state-of-the-art instruments, techniques, co-creation approach and knowledge transfer.

#### **Competences & Capabilities**

We use various Earth observation data to assess spatio-temporal changes in natural and managed ecosystems. Combination of in-situ, airborne (in-house Flying Laboratory of Imaging Systems) and satellite (e.g. Copernicus services) observations help us to develop scaling schemes and methods for quantitative assessment of biochemical and structural properties of plants. estimation of plant biomass and carbon stocks, crop yields, evapotranspiration, soil moisture, drought stress, as well for analysis of urban thermal regime.

#### **Products & Services**

- www.intersucho.cz
- www.klimatickazmena.cz
- www.firerisk.cz
- www.agrorisk.cz
- https://mapserver.czechglobe.cz
- https://olc.czechglobe.cz/en/flis-2/

#### **Major Space Projects & References**

CzechGlobe is currently involved in following ESA funded activities:

Yield Prediction and Estimation from Earth Observation (YIPEE0) EXPRO+

- Technical Assistance for the CAIRT Experiment by means of a Balloon-borne Limb sounding Campaign in Canada (CAIRTEX)
- 4DHydrology Hyper Resolution EXPRO+
- Since 2018 the CzechGlobe's airborne facility has been regularly involved in international campaigns supporting the future ESA Earth Explorer mission FLEX (Fluorescence Explorer).

#### Space Related Equipment, Labs & Certificates

- Photogrammetric aircraft Cessna 208B Grand Caravan
- Airborne hyperspectral sensors operating in visible, near, shortwave and thermal infrared (CASI, TASI, SASI)
- Certification for HyPlant, a high-performance imaging spectroradiometer for vegetation fluorescence mapping
- Airborne and terrestrial laser scanners
- Laboratory and field spectroscopy equipment
- Laboratory and field instruments for measuring plant ecophysiological properties and processes
- CzeCos research infrastructure (http://www.czecos.cz/)
- EN ISO 90001:2016 and EN ISO 14001:2016





**⊼** ACADEMIA T TESTING

#### Contacts:

Global Change **Research Institute** CAS (CzechGlobe)

#### Responsible for space and ESA projects:

Ing. Lucie Homolová, PhD.

E homolova.l@czechglobe.cz







# Institute of Botany (IBOT), CAS

#### **General Description**

The Institute of Botany carries out research at the level of species, populations, and plant communities. It specifically focuses on biodiversity and evolutionary trends among plants, the invasive behaviour of species, responses of plants and vegetation to environmental changes and the coexistence of various species in the ecosystem. Our applied research focuses on biotechnology, biofuels, bioindication and revitalisation.

#### **Competences & Capabilities**

Space biology

- evaluation of the physiological status of photosynthetic (micro)organisms
- studies of adaptation/acclimatisation mechanisms to various stresses

#### Regenerative life support systems

- algal mass cultivations
- mycorrhizal symbioses
- growth characteristics and primary production measure-
- algal assays and cyanotoxine detection
- bioremediation and revitalisation

#### Astrobiology

- isolation, cultivation, and characterisation of extremophilic phototrophic (micro)organisms
- detection of limits of survival
- studies of adaptation/acclimatisation mechanisms to var-
- in situ ecophysiological measurements in extreme envi-

biological samples on student stratospheric balloons

#### Major Space Projects & References

- ArtEMISS Arthrospira sp. gene Expression and mathematical Modelling on cultures grown in the International
- CAREX Coordination Action for Research Activities on Life in Extreme Environments Evaluation of effects of radiation on algae and cyanobacteria





- A R&D
- ) DESIGN
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#### Contacts:

Institute of Botany Czech Academy of Sciences

Zamek 1 252 43 Pruhonice

Mgr. Jana Kvíderová Ph.D.

Responsible for space and ESA projects:



# Institute of Experimental and Applied Physics, CTU in Prague

#### **General Description**

The IEAP is a research institute of the CTU in Prague developing radiation spectrometers with over 10 years of space heritage.

#### **Competences & Capabilities**

Main area of activity is R&D of semiconductor detectors and advanced instrumentation for radiation detection, novel methods of radiation imaging and spectroscopy and their applications in different fields such as medical imaging, material sciences and space. The space applications include space weather monitoring, dosimetry and surface mapping of water deposits on planetary bodies. We also provide certified gamma-ray and neutron sources for calibration of space detectors.

#### **Products & Services**

- Miniature low-power radiation monitor HardPix for high-resolution detection, visualization and characterization of mixed radiation fields in space. Provides particle species, flux, energy spectra and doserate. Has flight heritage.
- Semiconductor low-power neutron spectrometers for localization of subsurface hydrogen in lunar regolith onboard rovers.
- Testing and calibration of Gamma-ray and Neutron detectors/payloads.

#### Major Space Projects & References

- Miniature dosimeters onboard the ISS, visualization and detailed dosimetry of radiation inside the station. Five units deployed in 2012.
- SATRAM radiation monitor onboard ESA Proba-V, in operation since 2013 for detection and monitoring of the

- mixed radiation field in LEO. Cooperation with BD Sensors. https://satram.utef.cvut.cz/
- Imaging detector for X-ray telescope onboard the Czech VZLUSAT-1 launched in 2017.
- RISEPix radiation monitor onboard the Japanese RISESAT launched in 2019.
- HardPix radiation monitor onboard D-Orbit satellite ION launched in 2023
- Two HardPix radiation monitors as part of ESA ERSA onboard the Lunar Gateway. Planned launch in 2025.

### Space Related Equipment, Labs & Certificates

- Accelerator VdG (p, d, ESA-compliant source of tagged neutrons).
- 2 ESA-compliant sources for testing of gamma-ray sensitive devices/payloads.
- Central detection and analytical lab equipped with HPGe detectors, Si, GaAs and CdTe pixel detectors.







- ▲ R&D
- ) DESIGN T TESTING

#### Contacts: Institute of Experimental

and Applied Physics (IEAP) Czech Technical University in Prague (CTU)

Husova 240/5, 110 00 Praha 1

Responsible for space and ESA projects:

Mgr. Robert Filgas, Ph.D.





# **IT4Innovations National Supercomputing Center**

#### **General Description**

IT4Innovations National Supercomputing Center at VSB -Technical University of Ostrava is a leading research, development, and innovation centre active in the fields of HPC, HPDA, QA, and Al and their application to other scientific fields, industry, and society. IT4Innovations operates the most powerful supercomputing systems in Czechia and constitutes e-INFRA CZ, a strategic research infrastructure of Czechia.

#### **Competences & Capabilities**

The key research areas of IT4Innovations include big data processing and analysis, machine learning, development of parallel scalable algorithms, solution of computationally demanding engineering problems, advanced visualisation, virtual reality, modelling for nanotechnologies, and material design.

#### **Products & Services**

- Rental of IT4Innovations Computational Resources
- Computationally Intensive Modelling and Simulations
- Advanced Data Analysis and Simulations
- Rendering and Visualization of Scientific Data

### **Major Space Projects & References**

- The Urban Thematic Exploitation (U-TEP) is a web-based and open platform that integrates state-of-the-art processing, analysis and visualisation services and enables any interested user to exploit EO data easily and without data download complications.
- The BLENDED project focused on Urban Expansion monitoring for three European cities using time-series Multispectral and SAR data in a three-decade lifespan.

- The AIOPEN project will create a generic platform to support the Al model development lifecycle and develop algorithms for forest monitoring and urban change detection using the Transformer architecture.
- Within the scope of Czech Copernicus Collaborative Ground Segment we are developing a system for effective nationwide processing of Sentinel-1 satellite data by interferometric and polarimetric techniques for geodetic, geologic or forestry applications.

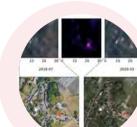
#### Space Related Equipment, Labs & Certificates

IT4Innovations runs three supercomputers:

- Karolina (15.7 PFlop/s),
- Barbora (849 TFlop/s),
- NVIDIA DGX-2, a specialised system for AI computation (130 TFlop/s and 2 PFlop/s in AI).

IT4Innovations is an Information Security Management System certificate holder according to the international ISO/IEC 27001:2013 (Czech version: ČSN ISO/IEC 27001:2014) standard.







- ▲ R&D
- ) DESIGN T TESTING
- Contacts: IT4Innovations National

Supercomputing Center VSB - Technical University of Ostrava 17. listopadu 15, 708 00 Ostrava, Czech Republic

Responsible for space and ESA projects:

Doc. Vít Vondrák, CEO

VSB TECHNICAL | IT4INNOVATIONS UNIVERSITY NATIONAL SUPERCOMPUTING

### JIC

#### **General Description**

JIC is a leading public innovation agency in the Czech Republic, situated in the heart of Europe within the #brnoregion. Its primary mission is to support the foundation and growth of innovative enterprises. Annually, JIC provides support to approximately 100 early-stage and mature companies.

#### **Competences & Capabilities**

JIC is cultivating the space industry ecosystem in the South Moravian region. A significant milestone was the opening of the ESA BIC branch in 2018. Since then, JIC has extended its support to over 15 space industry startups. Starting from October 2023, JIC has been engaged in the ESA Spectrum Sharing Makerspace project. This project is aimed at facilitating the prototyping and validation of early-stage innovative concepts in the field of spectrum sharing technologies. These technologies should enable more efficient use of satellite spectrum and an improved sharing with terrestrial systems.

Startups supported by ESA BIC Brno branch:

MapTiler s.r.o. mobisOne s.r.o. FlyinDiamonds s.r.o. World from Space s.r.o. AdvaScope s.r.o. Skymaps s.r.o. VisionCraft s.r.o. Spacemanic CZ s.r.o. SPACERACE s.r.o. Entrant s.r.o. Betrian a.s. Vrgineers, Inc.

GROUNDCOM.SPACE s.r.o. AerialComm s.r.o.

#### **Products & Services**

- Business consulting and advisory services
- Access to finance service
- Networking and brokering

#### **Major Space Projects & References**

- ESA BIC Czech Republic: Operation of ESA BIC Brno branch
- ESA Spectrum Sharing Makerspace: Project supporting start-ups, university spin-offs and enterprises in prototyping, including technical and commercial validation. JIC serves as the prime contractor, with FEEC VUT as a subcontractor, Contract No. 4000141041/23/UK/AL





Zaitra s.r.o.

- ▲ R&D
- ) DESIGN
- T TESTING

Contacts:

Czech Republic

Veronika Masinova

Responsible for space and ESA projects:

3L Robotics, s.r.o.





P +420 722 914 204 E masinova@iic.cz

## Kleť Observatory

#### **General Description**

The Klet Observatory is a research institution belonging to few natural science centers of Southern Bohemia in the Czech Republic, supported by the South Bohemian Region and various grants. The observatory is situated south of the top of Klet mountain (at altitude of 1070 m), southwest from the town of České Budějovice. There are one hundred and fifty clear nights per year with a good astronomical seeing on the average, as shows data from photographic observations of minor planets and comets since 1968. The Headquarter of Klet Observatory is located at the Observatory and Planetarium in České Budějovice.

#### **Competences & Capabilities**

Ground segment for Space Safety Programme

#### Near Earth Objects (NEO)

- Confirmatory observations of newly discovered NEO candidates, especially fainter and fast moving objects as well as NEO candidates having larger ephemeris uncertainty (both lim. mag. about V = 22 mag. and larger FOV are benefits of 1-m KLENOT Telescope)
- Recoveries of NEOs in the second opposition
- Follow-up astrometry of poorly observed NEOs Virtual Impactors" and PHAs, target of space missions or radar targets
- Cometary features. Analysis of possible cometary activity of newly discovered bodies.
- Search for new asteroids as a by-product. Educational and public outreach activities in related field (asteroid hazard, space safety)





- A R&D
- ) DESIGN
- T TESTING

Contacts:

Kleť Observatory

# Responsible for space and ESA projects:

#### Ing. Jana Ticha

370 01 České Budějovice

P +420 380 123 327

### Major Space Projects & References

Near Earth Object follow-up astrometry as the Cooperating Sensor of ESA-SSA-NEO segment (2014-2017 ESA contract). Observational support from collaborating observatories with DEIMOS SPACE S.L.U, Madrid, Spain as the main contractor with ESA - further sub-contractors are from Germany and Spain (since 2019).

#### References

- Minor Planet Circulars(ISSN 0736-6884) and Minor Planet Electronic Circulars (ISSN 1523-6714), (2013-2023)
- Tichá, J., Tichý, M., Honková, M. KLET OBSERVATORY PRE-PAREDNESS AND PLANS FOR PLANETARY DEFENCE (Proceedings 1st NEO and Debris Detection Conference, 22 January 2019 - 24 January 2019, Darmstadt, Germany, published by ESA Space Safety Programme Office)
- Tichý, M., Tichá, J.: KLENOT Project in the framework of ESA-SSA NEO Programme (Asteroids Comets Meteors 2017, Montevideo, Uruguay, 2017)
- Tichá, J., Tichý, M., Kocer, M.: KLENOT NEO FOLLOW-UP PROGRAM IN EUROPEAN FRAMEWORK
- (2015 IAA Planetary Defense Conference, Frascati, Italy, 2015)

#### Space Related Equipment, Labs & Certificates

- 1.06-m KLENOT telescope with 4-lenses corrector to obtain a plane FOV 0.63 x 0.63 degrees, computer controlled equatoreal mount, equipped with CCD camera
- FLI ProLine 230. Limiting magnitude of mV=22.0mag.
- The hardware and software equipment for KLENOT project consists of local network, servers and workstations for operating CCD camera, instantaneous visual detection, image processing, data reduction, identification of moving objects, ephemeris calculations and orbit computations.

# **Nuclear Physics Institute of the CAS**

#### **General Description**

Nuclear Physics Institute of the CAS, public research institution, conducts research in a broad field of nuclear physics, experimental as well as theoretical. http://www.ujf.cas.cz

#### **Competences & Capabilities**

Research related to space focuses mainly on simulation and measurements of cosmic radiation at high-mountain observatories, onboard aircraft, spacecraft, and satellites, application and development of active and passive detectors, radiation protection, individual monitoring of aircraft crew.

The largest experimental facilities of NPI are cyclotrons U-120M and TR-24, electrostatic accelerator Tandetron TN 4130MC, cyclic electron accelerator microtron MT25, and 300 kV accelerator mass spectrometer MILEA.

#### **Products & Services**

NPI provides services using beams of gamma rays and charged particles, including irradiation services for the subsidiary company RadioMedic Ltd. (production of radiopharmaceuticals), calibrations of dosimetry systems for radiotherapy hospital departments, dosimetry audits of therapeutic irradiation systems, calculations of level of irradiation for aircraft crews, radiocarbon dating of samples, monitoring activities of 14CO2 and 85Kr in the air.

### **Major Space Projects & References**

- DOSIS 3D (Dose Distribution Inside the International Space Station - 3D)
- MARE (Matroshka AstroRad Radiation Experiment)

- SOCRAT-R (3U CubeSat for monitoring of radiation environment and Space Weather at LEO)
- LVICE2 (Lunar Vicinity Complex Environmental Explorer, Czech ambitious missions)
- CRREAT (Research Center of Cosmic Rays and Radiation Events in the Atmosphere)
- RAMAT (Radiation resistant materials based on organic polymers for medical and space applications)
- BICZEPS (Advanced dosimetry for biological systems in near-earth space)
- Space Related Equipment Labs & certificates
- Passive detectors (various types of thermoluminescent and plastic nuclear track detectors) for measurements of integral dosimetric characteristics onboard International Space Station and return satellites
- Active detectors (Si-diode, LET spectrometer based on plastic scintillator and pixel detectors) for continuous monitoring of cosmic radiation
- Individual monitoring of aircraft crew commercial service for Czech and Slovakian aircraft companies







▲ R&D

T TESTING

Contacts:

Responsible for space and ESA projects:

#### Nuclear Physics Institute of the CAS

250 68 Řež Czech Republic

#### Ing. Iva Ambrozova, PhD.





### **Planetum**

#### **General Description**

Planetum is a brand of the contributory organization Observatory and Planetarium of capital city Prague, which includes two observatories (Stefanik observatory, Dablice observatory) and one planetarium in Stromovka

. At observatories you can admire large telescopes. During the day you can look at the Sun using special telescopes, on clear nights you can observe the Moon, details of the planets, places where stars are born in the universe, or distant galaxies. In the planetarium, the universe is projected onto an artificial sky in the shape of a hemisphere. Both observatories and the planetarium have a rich selection of programs - from fairy tales for the little ones to documentaries on astrophysics and cosmology. You will also find unique interactive exhibits dedicated to the exploration of space and cosmonautics. You can sit in the cockpit of the space shuttle, explore the Apollo lunar lander and much more.

The planetarium is a time machine that can travel to the past and the future, a spaceship with which you can fly to the planets, among the stars or leave the Galaxy and look at our home from a distance of tens of billions of light years. All this thanks to modern digital technology that keeps moving forward. As early as 2023, the projection area will be transformed into a giant LED screen with an area of 867 square meters - the Prague Planetarium will have the first so-called LED-dome in Europe and the largest in the world. Planetum also became the first

institution of its kind in the world to send its own satellite into orbit. The Planetum-1 satellite was launched on May 25, 2022. on a Falcon 9 rocket from Florida's Cape Canaveral. It is the first purely educational satellite in the world. In the foyer of the planetarium, you can take a look at its operations center.





#### **⊼** ACADEMIA

- ▲ R&D
- × SERVICES

#### Contacts:

Hvezdarna a planetarium hl. m. Prahy

Jakub Rozehnal

Responsible for space and ESA projects:

planetum

### **Competences & Capabilities** Space-related research is focused to the domains:

**General Description** 

GNSS (Global Navigation Satellite System) - data collection, dissemination and quality control, precise analyses, performance monitoring, products generation (satellite orbits and clocks, Earth rotation parameters, receiver position, atmospheric delays, signal-in-space monitoring, key-performance indicators)

Research Institute of Geodesy, Topography and Cartography

(VÚGTK, v.v.i.) is a public research institution established by the

Czech Office of Surveying, Mapping and Cadastre (ČÚZK). The

institute is responsible for basic and applied research in geodesy, surveying, mapping and cartography and consists of four

research departments and the Geodetic observatory Pecný.

- DORIS (Détermination d'Orbite et Radiopositionnement Intégré par Satellite) - precise analysis of satellite orbits and positions of global receiver for the International Terrestrial Reference Frame
- Gravity field observation and modelling absolute and relative gravity measurements and data analyses, gravity field modelling, LEO gravity field missions and satellite altimetry analyses
- Interdisciplinary research for meteorology and climatology, geophysics and geodynamics, metrology, kinematic positioning etc.

#### **Products & Services**

contributions to international services of the International Association of Geodesy (IAG): International GNSS Service (IGS), International DORIS Service (IDS), European Refer-

- ence Frame (EUREF), International Gravimetric Bureau (BGI), International Gravity Field Service (IGFS), Interna-
- tional Geodynamics and Earth Tide Service (IGETS) development of precise models, analyses, software and
- absolute gravity observations and calibrations

#### Major Space Projects & References

Research Institute of Geodesy, Topography and Cartography

- Galileo and EGNOS Monitoring of Performances (EUSPA)
- Terrestrial Inter-plate Lithospheric Deformation of Earth
- Development of regional augmentation tropospheric model for GNSS positioning (ESA)
- Assessment techniques of Tropospheric Effects for Local Augmentation Systems (ESA)

#### Space Related Equipment, Labs & Certificates

- GNSS receivers, atomic Cs-clock, passive H-maser
- absolute, superconducting and spring gravimeters
- data and analysis services for GNSS & DORIS
- 3D positioning national reference standard
- calibrations and measurements in absolute gravimetry





**⊼** ACADEMIA

- ▲ R&D
- ) DESIGN
- T TESTING

Czech Republic

Contacts: Research Institute of Geodesy, Topography and Cartography, v.v.i 250 66 Zdiby

Responsible for space and ESA projects:

Jan Douša

P +420 226 802 302 E vugtk@vugtk.cz





# **Teplice Observatory**

#### **General Description**

Teplice Observatory is a part of the North-Bohemian Observatory and Planetarium in Teplice (NBOPT). NBOPT is a non-profit organisation funded by the Usti Region and is primarily focused on popularisation of astronomy and science. The observatory is located atop of the Sand Hill situated in the southeast part of the North-Bohemian town Teplice with a moderate light pollution and almost unobstructed view of the whole sky.

#### **Competences & Capabilities**

In research, the Teplice Observatory is focused on observations of artificial satellites and space debris, astrometry of minor bodies in the Solar System and occultations of stars by asteroids. The Southeast dome of the observatory is equipped with the Sand Hill Optical Telescope (SHOT). The SHOT sensor is dedicated to the ESA SST activities based mainly on the ESA contracts and it will contribute to the upcoming EU SST programme.

#### **Products & Services**

 Astrometry and photometry of artificial satellites and space debris (all orbits including GEO, MEO, LEO, HEO)

#### **Major Space Projects & References**

- SSA P2-SST-X: Support Observations and Sensor Qualification
- SSA P3-SST-III: Robotic Telescopes Demonstration
- SSA P3-SST-XIX SST: Sensor Data Acquisition for Endurance Tests and Validation - Phase 2
- SSA S2P S1-SC-09: Support of the development of sensors, joint test and operation of a European Optical Network

#### Space Related Equipment, Labs & Certificates

- The Sand Hill Optical Telescope (SHOT sensor): 0.43-m f/6.8 corrected Dall-Kirkham telescope (Planewave CDK17), direct-drive fork mount with high precision tracking, scientific CMOS camera Kepler FL4040, 0.66x focal reducer, the resulting FOV 64 x 64 arcminutes (1.1 square degree), GPS E 13 50 48.2, N 50 38 18.0, 275 m MSL.
- A major SHOT sensor upgrade to a 0.6-m f/3 system with FOV 1.8 x 1.8 degrees is planned for 2024.





## ★ ACADEMIA A R & D

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RNDr. Zdeněk Moravec, Ph.D,

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# The Institute of Atmospheric Physics

of the Czech Academy of Sciences (IAP)

#### **General Description**

The Institute of Atmospheric Physics of the Czech Academy of Sciences (IAP) is a public research institution oriented toward research of the atmosphere, ionosphere and magnetosphere of the Earth, ionospheres and magnetospheres of planets of the Solar system, and of the solar wind. Areas of expertise are related to space research in the domains of space plasma physics and space weather, including design and development of scientific instruments, in-situ experimental measurements, data analysis, theory, and numerical simulations.

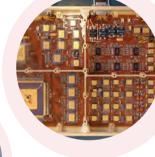
#### Major Space Projects & References

- The Solar Orbiter probe (ESA): Development and implementation of the Time Domain Sampler module for Radio and Plasma Wave instrument.
- JUICE space probe (ESA): Wave analyzer and onboard processing module for low-frequency electromagnetic waves at Jupiter and its icy moons. Co-Principal Investigator of the Radio and Plasma Waves Instrument.
- TARANIS satellite (CNES): Development and implementation of a fast wave analyzer for the IME-HF instrument.
- ExoMars 2022 probe (ESA): Principal Investigator of the Wave Analyzer Module.
- Comet Interceptor Probe (ESA): Development and implementation of the Dust Analyzer & Processing Unit (DAPU).
- Vigil space weather mission (ESA): Development and implementation of the Data Processing Unit.
- Athena X-ray telescope (ESA): contribution to the hardware electronics of the X-ray Integral Field Unit.
- LISA gravitational wave mission (ESA): contribution to the hardware electronics of the Fibre Switch Unit Actuator

- Analysis of data from instruments where IAP personnel participate as Co-Investigators or collaborators in scientific teams (ESA/Cluster, NASA/Polar, NASA/Stereo, CNES/DEMETER, ESA/Double Star, NASA/Themis, NASA/Van Allen Probes, NASA/Cassini, NASA/Juno, JAXA/Arase).
- Spacecraft telemetry reception at the Panska Ves station.
- Ground-based measurements related to space research: A digital ionosonde, continuous Doppler sounding systems, broadband electromagnetic measurements of lightning discharges.

#### Space Related Equipment, Labs & Certificates

- Electronics laboratory for development of spacecraft
- · instrumentation;
- Vibration testing device;
- Thermal chamber;
- Vacuum chamber;
- ISO 7 clean room with thermal chamber;
- Faraday cage;
- Computer equipment including data storage.





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Contacts: The Institute of Atmospheric Physics of the Czech Academy of

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Responsible for space and ESA projects:

prof. RNDr. Ondrej Santolik, Dr.

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# **TOPTEC** | Research Centre for Special Optics and Optoelectronic Systems Institute of Plasma Physics of the CAS

#### **General Description**

The TOPTEC Research Centre for Special Optics and Optoelectronic Systems is engaged in the R&D of unique and application-specific systems (using the application of aspheric optics), the development of ultra-precise mechanical components for optical systems, and the development of thin films and measurement methods, all for scientific and industrial purposes.

#### **Competences & Capabilities**

The combination of many years of research experience and state-of-the-art technologies as well as equipment supporting our capabilities in opto-mechanical design, simulation, construction, manufacturing, and measurement of special optics, enables the TOPTEC Centre to provide comprehensive R&D solutions in the field of optics. In addition, the TOPTEC Centre researchers carry out dozens of contractual research projects every year, both for commercial entities and scientific institutes from various fields of expertise (aerospace, automotive, astronomy, biomedicine, engineering, etc.).

#### **Products & Services**

- Design and implementation of unique optical elements and advanced optical systems;
- R&D and application of precise measurement techniques;
- Development of deposition methods and processes;
- Consultation and expertise in optics, optoelectronics, laser applications, and fine mechanics.

#### **Major Space Projects & References**

Optical design optimization of SBOC (Space-Based Optical Component)

- Optical technology development of TRUTHS (The Traceable Radiometry Underpinning Terrestrial- and Helio-Stud-
- Optical elements of FLORIS telescope for FLEX (FLuorescence EXplorer) mission
- Optical setup of ARIEL (Atmospheric Remote-sensing Infrared Exoplanet Large-survey)
- Optical parts of the Coronagraph METIS on the Solar Orbiter Mission
- Optics of the Coronagraph ASPIICS on the Proba-3 Mission
- NEOSTEL: Testing elements for the NEOSTEL portable collimator and an aspheric lens centring system

#### Space Related Equipment, Labs & Certificates

- Laboratories complying with standards for optical development incl. a clean room;
- A metrology lab with a wide range of measuring instruments, e.g. aspheric interferometer, 3D stitching profilometer, microscopes using different observation techniques, AFM microscopy, White Light Interferometer microscopy, goniometers etc.;
- Software tools for design, numerical simulations, and topological optimization.





- ) DESIGN
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#### Research Centre for Special Optics and Optoelectronic Systems TOPTEC, Institute of Plasma Physics

Czech Republic

Responsible for space and ESA projects:









DIRECTORATE-GENERAL FOR DEFENCE INDUSTRY AND SPACE (DEFIS)	13
EU SPACE PROGRAMME	13
EUROPEAN UNION AGENCY FOR THE SPACE PROGRAMME (EUSPA)	13



## DIRECTORATE-GENERAL FOR DEFENCE INDUSTRY AND SPACE (DEFIS)

The Directorate-General for Defence Industry and Space (DEFIS) leads the European Commission's activities in the Defence Industry and Space sector.

In the area of Defence Industry, DEFIS is in charge of upholding the competitiveness and innovation of the European Defence industry by ensuring the evolution of an able European defence technological and industrial base.

In the area of Space DG DEFIS is in charge of implementing the EU Space programme consisting of the European Earth Observation Programme (Copernicus), the European Global Navigation Satellite System (Galileo) and the European Geostationary Navigation Overlay Service (EGNOS).



#### Contacts:

DIRECTORATE-GENERAL FOR DEFENCE INDUSTRY AND SPACE (DEFIS)

European Commission Rue de la Loi 130/Wetstraat 130 1049 Bruxelles/Brussel Belgium

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# EU SPACE PROGRAMME

The European Space Programme bolsters the EU Space policy in the fields of Earth Observation, Satellite Navigation, Connectivity, Space Research and Innovation and supports investments in critical infrastructure and disruptive technologies.

The following flagship components deliver European space-based services on a daily basis:

**COPERNICUS** is the European Earth Observation (EO) system. It supports the management of the environment, helps to mitigate the effects of climate change and ensures safety and civil security across Europe. Copernicus is the first world provider of 'big' space data.

**GALILEO** is a global satellite navigation and positioning system (GNSS) on which numerous EU economic sectors rely, from transport and agriculture to border management and search and rescue. Its 20cm accuracy makes Galileo a game changer for autonomous driving and commercial drones. Already more than 2.5 billion smartphones are Galileo-enabled.

**EGNOS** is the European Geostationary Navigation Overlay Service: a reliable navigation signal improving the navigation services to aviation, maritime and land-based users over 30+ countries, and already operational in 426 airports and helipads.

In February 2022, the European Commission proposed two new flagship initiatives to boost satellite-based secure connectivity and Space Traffic Management:

IRIS<sup>2</sup> will ensure worldwide access to secure and cost-effective satellite communications services, for governmental communications and commercial use. It aims to protect critical infrastructures, support surveillance and crisis management, as well as enable high-speed broadband everywhere in Europe to best anticipate future challenges of our economy.

Space Traffic Management: The exponential applications of space services involve more and more satellites, thus more traffic in space. As the congestion of satellites and debris threaten the viability of space infrastructure, the European Commission and the High Representative of the Union for Foreign Affairs and Security Policy have presented an EU approach on Space Traffic Management (STM). This would further strengthen the Union's space surveillance and tracking capabilities (already providing collision avoidance services to more than 260 European spacecraft), and set clear standards and regulation for a safe, sustainable and secure use of space.





133

132

# **EUROPEAN UNION AGENCY FOR THE SPACE PROGRAMME (EUSPA)**

EUSPA ensures that Europe meets its GNSS objectives and that the public benefits from European GNSS (EGNOS and Galileo). It also supports the development of applications based on Galileo, EGNOS and Copernicus, and coordinates user-related aspects of GOVSATCOM in support of key EU policy goals.

### Its specific tasks are:

- managing EGNOS & Galileo service provision
- promoting downstream and integrated applications based on Galileo, EGNOS and Copernicus
- engaging the GOVSATCOM user community in shaping the service
- improving GNSS services & infrastructure

### To accomplish this, EUSPA:

- ensure the safe and secure management of all space components
- supports research & innovation
- engages market stakeholders to develop innovative & effective GNSS applications
- leverages synergies between the space programme components
- makes sure that Europe's space-based services are secure, safe & accessible
- provides in-depth market analysis





#### Contacts:

European Union Agency for the Space Programme (EUSPA)

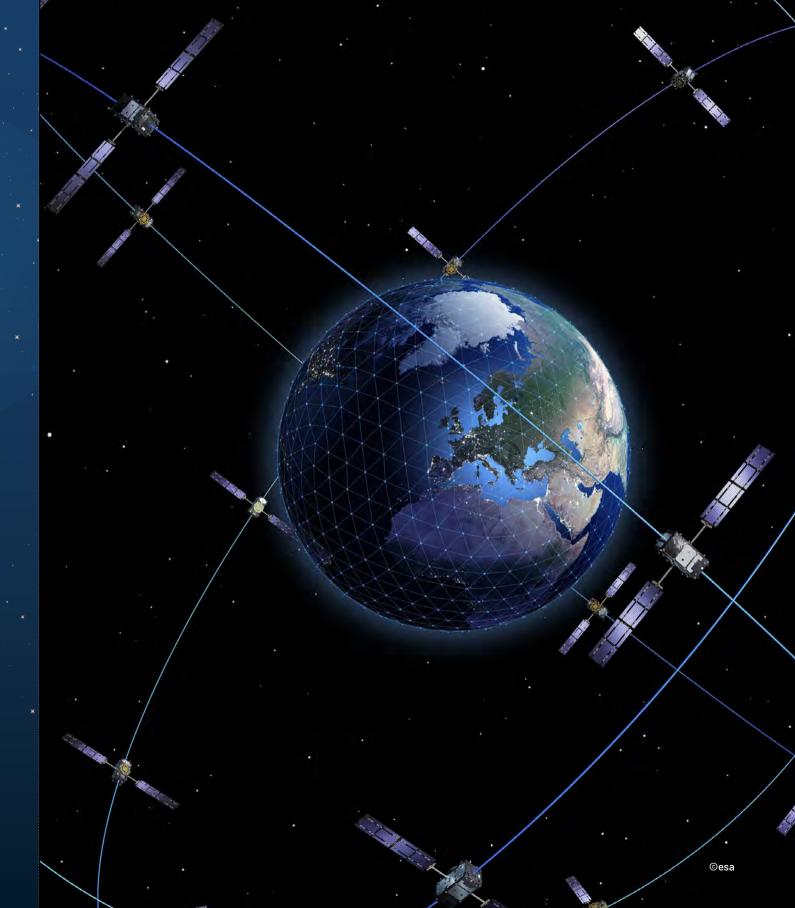
Janovskeho 438/2 170 00 Prague 7 The Czech Republic

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THE EUROPEAN SPACE AGENCY (ESA)	138
Timeline of convergence of the Czech Republic with ESA	140
Czech participation in ESA	.142*
ESA Initiatives in the Czech Republic	144
ESA BIC Czech Republic	
ESA Technology Broker	146
ESER0	147
EUMETSAT	148
United Nations	149



# THE EUROPEAN SPACE AGENCY (ESA)

The European Space Agency (ESA) is Europe's gateway to space. Its mission is to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world. ESA is an international organisation with 22 Member States. By coordinating the financial and intellectual resources of its members, it can undertake programmes and activities far beyond the scope of any single European country.

ESA's purpose shall be to provide for, and to promote, for exclusively peaceful purposes, cooperation among European States in space research and technology and their space applications, with a view to their being used for scientific purposes and for operational space applications systems:

- by elaborating and implementing a long-term European space policy, by recommending space objectives to the Member States, and by concerting the policies of the Member States with respect to other national and international organisations and institutions;
- by elaborating and implementing activities and programmes in the space field;
- by coordinating the European space programme and national programmes, and by integrating the latter progressively and as completely as possible into the European space programme, in particular as regards the development of applications satellites:
- by elaborating and implementing the industrial policy appropriate to its programme and by recommending a coherent industrial policy to the Member States.





Contacts:

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Ministry of Transport of the Czech

Nábřeží Ludvíka Svobody 1222/12 110 15 Praha 1 The Czech Republic

P +420 225 131 111 E posta@mdcr.cz Ministry of Education, Youth and Sport (Space Science and Research)

Karmelitska 529/5 118 12 Praha 1 Czech Republic

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# Timeline of convergence of the Czech Republic with ESA

Treaty on accession to the PRODEX programme (2000)
- this was exceptional because PRODEX is an optional ESA programme and as such reserved for Member States.

2000

Project Charter (PECS Charter) valid for 5 years.

2004

Hosting of the Living Planet Symposium 2016 in Prague, one of the largest Earth observation conferences in the world, with 3,500 participants / 1000 talks over 7 days.

2016

1996

Framework Agreement on Cooperation between the Czech Republic and ESA signed. 2003

Government Agreement on the accession of the Czech Republic to the ESA Plan for European Cooperating States (PECS) signed. 2008

Full membership of the Czech Republic in ESA; the Czech Republic is the first Central and Eastern European country to be a full member of the ESA

# **Czech participation in ESA**

- Approximately 600+ projects in which Czech entities actively participated
- 60+ companies cooperating directly with ESA, dozens of Czech subcontractors
- 50+ start-ups incubated in the ESA BIC business incubator
- Educational programmes for teachers and inspiration of pupils and students reaching over 10,000 teachers and 500,000 pupils and students.
- 25 research institutes and universities
- Participation in the preparation of 3 launchers and 30 ESA missions, both scientific and purely commercial.
- Under the leadership of the Ministry of Transport, a functioning ecosystem to support the development and exploitation of space activities has been created:

**1ESA BIC** Czech Republic business incubator with offices in Prague and Brno. In 2021, it started its second five-year period of operation. The operator is Czechlnvest. The purpose is to support new promising ideas and their application in the market practice, to support startups.

**1 ESA Technology** Broker, which searches for the application of space technologies in terrestrial applications. The operator is the Technology Centre of the Academy of Sciences of the Czech Republic. Negotiations are currently underway on the transfer of technologies to be adopted by Škoda Auto (batteries, sensors).

**1ESA Space Solutions** Ambassador started its activities in 2022, its task is to promote space systems applications, and project opportunities of the ESA Space Solutions programme and to further increase the participation of small and medium-sized companies of the Czech Republic in the ESA programme.

1 Educational Centre on Space Activities, ESERO, (founded in 2016) whose aim is to train teachers and inspire students to study engineering and science.

### The Czech Republic participates in ESA Optional Programmes in the following technology domains:

- General technologies (for example banks of supercapacitors, parts of gyroscopes for satellite stabilisation, development of new materials composite sandwich panels, solar panels, etc.).
- Earth observation (where the Czech Republic participates, for example, in the third-generation Meteosat meteorological missions, where it supplies cryogenics, in the optics for the main instrument of the FLEX mission, in the preparation of 6 new Sentinel satellites, in the processing of satellite data into applications, including applications using machine learning and AI, etc.).
- Satellite navigation (in particular satellite navigation applications and software development for satellite signal monitoring and measurement, etc.).
- Satellite telecommunications (Czech companies are involved in the development of the new NEOSAT telecommunications
  platform, Triton-X, OKD-Sat, Eagle-1 system for satellite communication between air traffic control and transport aircraft
  crews, development of applications for drones, etc.).
- Launch vehicles (computer software for special aerodynamic enclosures that protect the internal systems of the rocket during the atmospheric passage, valves and pumps for rocket engines, eight years of supply of parts for thermal protection of the nozzle for Ariane 5; the Czech Republic is also involved in the preparation of the next generation Ariane 6 and also in the technology for the new Vega-C rocket, a device for launching satellites to detach from the launch vehicle).

142



# **ESA BIC Czech Republic**

#### **General Description**

European Space Agency Business Incubation Centre (ESA BIC) Czech Republic creates opportunities for space-related projects and re-purposing space technology. ESA BIC Prague was founded in 2016, and two years later, it was joined by a branch in Brno. Both incubators provide an incubation program for up to 2 years. The program includes financial support (50 000 EUR) and professional business and technical mentoring.

ESA BIC Czech Republic is part of the ESA Commercialisation Gateway network with more than 25 business incubation centres. They all work regionally to inspire entrepreneurs to turn space-connected business ideas into commercial companies.

More than 1200 startups have been supported by the network to this day. The local operator for the Czech Republic is the CzechInvest Agency in partnership with the City of Prague, the South Moravian Innovation Centre, the Ministry of Industry and Trade, the Ministry of Transport, and the South Moravian Innovation Centre.

#### Competences & Capabilities

- Incubation programme and financial support
- · Technology seminars and competitions
- Space community network and mentors
- Scouting of new technologies and startups
- Business development

#### Major Space Projects & References

- Data Analytics Platform for Climate Resilience: international project focused on promoting use of EO data to enhance climate resilience (funded by ESA)
- Astropreneurs: acceleration programme to support startups by mentoring them on business and technical needs and helping them to access funding opportunities (funded by Horizon 2020 programme)
- Copernicus Incubation Programme: incubation programme to support startups working with Earth observation data (funded by Horizon 2020 programme)
- Copernicus User Uptake: project with the aim to spread awareness and motivate organisations to use data and services provided by Copernicus (funded by Horizon 2020 programme)
- Technical competitions and hackathons: Galileo Masters, Copernicus Hackathon, ActInSpace hackathon and other





Contacts:

.

Czechlnvest

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# **ESA Technology Broker**

#### **General Description**

Technology Centre Prague (TC Prague) was founded in 1994 and has quickly become an important national institution for research and innovation infrastructure which supports participation of the Czech Republic within the European Research Area.

TC Prague offers technology transfer support for firms through the international Enterprise Europe Network and through ESA Technology Transfer Broker Programme. This includes both identifying suitable foreign technologies and offering Czech technologies that have been developed by firms, research institutions or on the basis of private activities of our inventors.

#### **Competences & Capabilities**

Our mission is to support the participation of the Czech Republic in the European Research Area, prepare analytical and conceptual studies for research and development, perform international technology transfers and support the creation and development of small innovation firms.

- TC CAS organisation scheme
- National Information Centre for European Research
- Department of Business Development
- Department of Strategic Studies
- **Economic-Administration Department**
- Acceleration programme Business Runway

#### **Major Space Projects & References**

- The National Information Centre for European Research (NICER) organizes information events about the opportunities involved in EU Framework Programmes for research and development, publishes specialized publications and an electronic newsletter and operates an information portal www.fp7.cz about the 7th Framework Programme for Reserach and Developmnet and also about the successor EU Framework Programme for Research, Development and Innovation - Horizon 2020 - www.h2020.cz
- National ESA Technology Broker
- National annual space conference Gate2Space organizerSpace Radiation Capabilities, Technologies, and Payloads contract ESA with VZLU, CSRC/BDSensors, Rigaku

#### Space Related Equipment, Labs & Certificates

- Member of Czech space community
- H2020 Space projects advisory
- Access to ESA Technology Transfer Database
- Member of ESA Space Solutions Network





### **ESERO**

#### **General Description**

The European Space Education Resource Office (ESERO) is the European Space Agency (ESA)'s cornerstone initiative to bolster primary and secondary education in Europe, with its Czech Republic branch having been operational since 2015. In 2023, a collaborative transformation occurred with Planetum - Observatory and Planetarium Prague, Brno Observatory and Planetarium, Elixir to Schools and a partnership with the Czech Association of Science Centres steering the project to new heights.

#### Competences & Capabilities

The ESA-ESERO Czech Republic team is assembled from experts in science and space popularization, and specialists in physics and other natural sciences education, collaborating closely with the academic and industrial sectors. They are rooted in the Czech space ecosystem, and with substantial backing from their home institutions, they are adept at orchestrating extensive initiatives promoting space activities among the young generation.

#### **Products & Services**

Key offerings encompass organization and realization of workshops and courses for educators, creation of didactic materials, and fostering ESA projects and competitions. Moreover, they actively negotiate the enrichment of space education in the Czech curriculum, collaborating with industry and academia to mentor the young generation for futures in the space sector.

#### **Major Space Projects & References**

- Astro Pi Challenge: Program a microcomputer on the ISS
- Mission X: Train like an astronaut
- Moon Camp Challenge: Learn 3D modeling and design a base on the moon
- Climate Detectives: Learn to use Earth imaging satellites
- CanSat: Construct an atmospheric probe
- Hack an Exoplanet: Process real data from the CHEOPS telescope
- Czech Rocket Challenge: Reach the highest and the best flight
- Expedition Mars: Engage in a 100-hour simulated mission
- Next Stop: Space: Student conference about space careers opportunities

ESERO Czech Republic thus stands as a beacon in space education, guiding the next generation to reach for the stars through an impressive repertoire of projects and initiatives.





#### Contacts:

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146 ESA INITIATIVES IN THE CZECH REPUBLIC

### **EUMETSAT**

### THE EUROPEAN ORGANISATION FOR THE EXPLOITATION OF METEOROLOGICAL SATELLITES

EUMETSAT, Europe's meteorological satellite agency, monitors the weather and climate from space. Based in Darmstadt, Germany, EUMETSAT provides its 30 member states šity meteorological imagery and data that are essential for keeping their communities safe and for the benefit of critical sectors of their economies.

Three Meteosat satellites in geostationary orbit deliver continuous observations of fast developing severe weather events over Europe, Africa and the Indian Ocean. Two polar-orbiting Metop satellites provide data of pivotal importance for forecasts up to 10 days ahead. The first of the next-generations satellites in these systems will be launched in 2022 and 2024, respectively.

EUMETSAT is a key partner in the European Union's Copernicus Earth observation programme. It operates the Copernicus Sentinel-3 and -6 ocean-monitoring missions, and will operate the upcoming CO2M mission, to monitor carbon dioxide emissions. Data from these, and EUMETSAT's own missions, are provided to the Copernicus climate, atmosphere monitoring and marine environment services. Along with European Space Agency and the European Centre for Medium-Range Weather Forecasts, EUMETSAT is a partner in the EU's DestinE initiative, creating digital twins of the entire Earth system.



### **United Nations**

The Committee on the Peaceful Uses of Outer Space (COPUOS)

The Committee on the Peaceful Uses of Outer Space (COPUOS) was set up by the General Assembly in 1959 to govern the exploration and use of space for the benefit of all humanity: for peace, security and development. The Committee was tasked with reviewing international cooperation in peaceful uses of outer space, studying space-related activities that could be undertaken by the United Nations, encouraging space research programmes, and studying legal problems arising from the exploration of outer space.

The Committee was instrumental in the creation of the five treaties and five principles of outer space. International cooperation in space exploration and the use of space technology applications to meet global development goals are discussed in the Committee every year. Owing to rapid advances in space technology, the space agenda is constantly evolving. The Committee therefore provides a unique platform at the global level to monitor and discuss these developments.

The Committee has two subsidiary bodies: the Scientific and Technical Subcommittee, and the Legal Subcommittee, both established in 1961. The Committee reports to the Fourth Committee of the General Assembly, which adopts an annual resolution on international cooperation in the peaceful uses of outer space.



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# **Field of Activities**

### • INDUSTRY

COMPANY	✓ MANUFACTURING	■ SOFTWARE	× SERVICES	▲ R&D	T TESTING
5M	• • • •			• • • •	• • • •
Advacam	● ● ●	• • •	• • •	• • •	• • •
Aleego		•	•	•	
asphericon	• • •		• • •	• • •	•
ATC Space	• •			• •	• •
AŽD Praha	• •	• •	• • •	• • •	• • •
BBT-Materials Processing	• • •			• • •	• • •
BD Sensors, CSRC Space Division	• • •		•	• • •	• • •
Betrian Group	• • •	• • •		• • •	• •
Big Terra		• • •	• • •	• • •	• • •
BizGarden		•	•	•	
BST.COACH		• •	• •	• •	
CGIIT Czech Republic		• • •	•	•	• •
CleverFarm		•	•	•	
daiteq		• •	• •	• •	• •
Dronetag	•	•	•		
EGGO Space					• •
Eltvor Instruments	• • •	• • •	• • •	• • •	
esc Aerospace	• • •	• • • •	•	• • • •	• • •
Exact Control System	• • •	• • •	• • •	• • •	
Frentech Aerospace	• • • •			• • • •	• • •
G.L. Electronic			• • •	• •	• • •
GINA Software		• • •	• • •	• • •	• • •
Gisat		• •		• •	•
GNSS Centre of Excellence			•	• •	• •
GROUNDCOM.SPACE			•		•
Hikade Technologies					
Honeywell International					• • • •
Huld s.r.o.			• • •		
HVM PLASMA, spol.					
Iguassu Software Systems		• • •		• • •	
INPRAISE SYSTEMS	• •				• • •
KYOCERA AVX Components			• • •		• • •
LA composite	• • • •				
Mapradix		•	• • •		• • •
MCE Slaný	• •			• •	
Meopta – optika		• •			
Meteolnsight					
OHB Czechspace	• • • •			• • •	
OPTOKON					• • •
OteSpace					
PEKASAT SE		• • •		• • •	
PlasmaSolve					
ProjectSoft HK					
RHEA System CZ	• •	• • •	• • •	• • •	• • •

COMPANY	✓ MANUFACTURING	■ SOFTWARE	× SERVICES	▲ R&D	T TESTING
Rigaku Innovative Technologies Europe	•	• •	• •	• •	• •
S.A.B. Aerospace			• • •	• • •	• • •
SAZ Aerospace	• • •			• • •	• • •
Serco		• •	• •		
SERENUM		•	• • •	• • •	• • •
SPACEKNOW		•	•	•	•
SPACEMANIC CZ	• • •	• • •	• • •	• • •	
Stellar Exploration EU	• •	• •		• •	• •
STRATOSYST			• • •	• • • •	• • • •
SYNP0	•			•	•
TOSEDA	•			•	•
TRL Space Systems		• • •	• • • •	• • • •	• • •
TTS	•		•	•	
Uneeqly s. r. o.		• •	• •	• •	
UNEX	• •		• •		• •
UNITES Systems	•	• • •	• • •	• • •	• • •
UpVision		• • •	• • •	• • •	• • • •
VZLU – Czech Aerospace Research Centre	• • •	• •	• • • •	• • •	• • • •
World from Space		•	•	•	•
Zaitra		•	•	• •	

### INDUSTRY

Parts and materials	•
Subsystems and equipment	•
Instruments and Payloads	•
Ground Segment	•
Downstream, applications	•
Education and Capacity Development	•

150

# **Field of Activities**

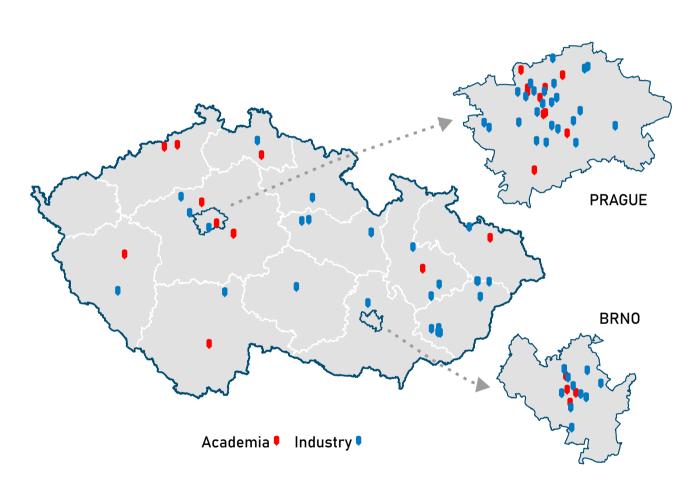
### **⊼ ACADEMIA**

ENTITY	▲ R&D	) DESIGN	T TESTING
Astronomical Institute, CAS	•	•	•
Brno Observatory and Planetarium	• •		
Brno University of Technology	• • • • •	• • • •	• • • •
CESNET z. s. p. o.	•	•	
Czech Hydrometeorological Institute (CHMI)	• ●	• •	• •
Department of Geoinformatics, J. E. Purkyně University	000	• •	• • • •
Department of Physical Electronics, CTU	• • • •	• • • •	• • • •
Department of Soil Science and Soil Protection	● ●	• • •	• • •
Faculty of Applied Sciences, University of West Bohemia in Pilsen	•		
Faculty of Electrical Engineering, CTU	•	•	•
Faculty of Mathematics and Physics Charles University	• • • •	• • • •	• • • •
Faculty of Mechanical Engineering, CTU	• • •	• • •	• • • •
Faculty of Science, Palacký University Olomouc	•		
Global Change Research Institute CAS	•	•	• •
Institute of Botany, CAS	● ●	• • • •	• • • •
Institute of Experimental and Applied Physics, CTU	• • • •	• • •	• • •
IT4Innovations National Supercomputing Center	•		•
JIC	• • • •	• • • •	• • • •
Klet Observatory	● ●		
Nuclear Physics Institute, CAS	•	•	
Planetum – Observatory and Planetarium of capital city Prague	• •		
Research Institute of Geodesy, Topography and Cartography	• •	• •	• •
Teplice Observatory	•		
The Institute of Atmospheric Physics, CAS	• • • •	• • • •	• • • •
TOPTEC, Institute of Plasma Physics, CAS	• • •	• • •	• •

### ACADEMIA



# **Czech Space Industry and Academia**



153

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