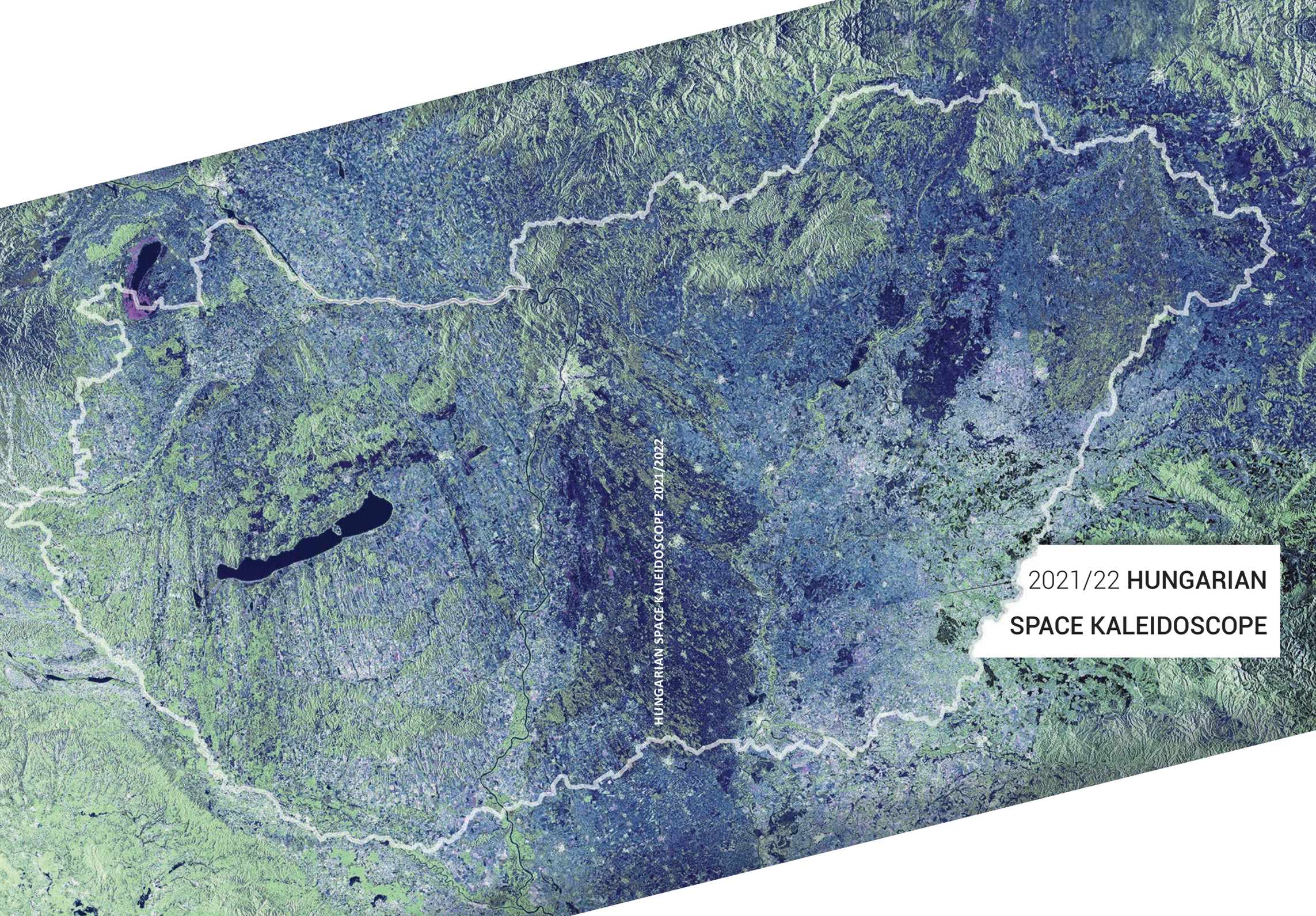

2021/22 **HUNGARIAN SPACE KALEIDOSCOPE**

HUNGARIAN SPACE KALEIDOSCOPE

2021/2022

IMPRESSUM

Hungarian Space Kaleidoscope 2021/2022

Editorial board:
László Bacsárdi, Előd Both,
Sándor Frey, Balázs Heilig, Ferenc Horvai,
András Ferenc Horváth, László Pap, Balázs Székely

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as chair of the editorial board

Layout, graphics:
Tímea Blidár

Publisher:
Hungarian Astronautical Society (MANT)
1044 Budapest, Ipari park u. 10.
www.mant.hu
Budapest, 2021
Responsible publisher: István Arnócz, Secretary General

The publication was supported by the Ministry of Foreign Affairs and Trade.

Manuscript has been closed on 15 October 2021.

HU *ISSN 2732-2289*

WELCOME FROM THE MINISTER

In the wake of the extraordinary depth, impact, and speed of change in recent years, it is no overstatement that the world economy has entered an entirely new era. A new competition has begun, where innovation, research and development have become a prerequisite for economic development for all successful countries. Strengthening the role of sectors providing high added value is now an essential government task, especially if an industry has such a serious and well-functioning foundation as the Hungarian space industry.

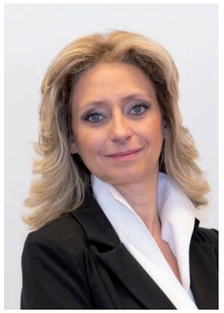
To some at first glance, this may seem like science fiction, but in reality Hungary has a much bigger role to play in space activities as many of us would think. In recent times, our universities and companies have shown extraordinary performance, contributing to the success of many international collaborations in space. The Hungarian achievements in the field not only gain the recognition of the scientific community, but also provide an opportunity to implement a complex industrial development programme, which is significant milestone in the Hungarian space activities.

The Space Strategy adopted in 2021 sets clear, ambitious, yet realistic goals for the Hungarian space industry and space research. According to our most notable commitment, Hungary will once again send a research astronaut to Earth orbit, to contribute to the success of the research on the International Space Station with experiments developed in Hungary. The opportunity is also unique in terms of its economic significance and scientific value, thus contributing to the development of the Hungarian space industry to an unprecedented extent.

Nowadays space exploration is not just the privilege of the largest countries. In the increasing international competition, there are also many opportunities for smaller players, which, in addition to serving science and humanity, offer excellent economic opportunities. Hungary is ready to play its role in the development of the industry of the future and to exploit the economic potential of space technology.

Péter Szijjártó
Minister of Foreign Affairs and Trade

WELCOME FROM THE MINISTERIAL COMMISSIONER FOR SPACE RESEARCH



In 2021, Hungarian space research can look back on its 75-year history: in 1946, physicist Zoltán Bay conducted the famous lunar radar experiment, during which the Earth–Moon distance was measured using radio waves. This was among the first successful attempts in the world. We are proud that in the past decades of Hungarian space research, more than a hundred Hungarian devices have been operating and still operate in outer space, which praises the knowledge of Hungarian engineers.

The domestic space sector has achieved a number of successes over the past year as well, some of which I would like to highlight here. Two Hungarian nanosatellites have been successfully operating since their launch into orbit. The mission of one of them is to study electromagnetic pollution around the Earth, while the other's primary payload is an instrument for measuring cosmic radiation, also developed in Hungary. In addition, the last year's achievements include the successful completion of a space chemistry drug experiment on board the International Space Station, and the development of an internal radiation measurement system for the Lunar Gateway space station planned for orbit around the Moon.

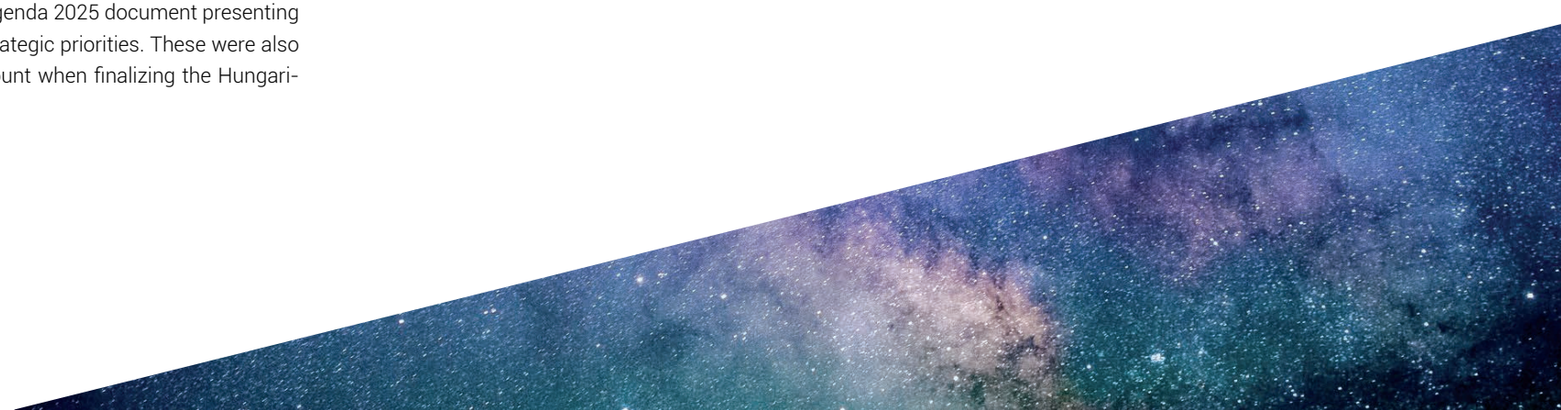
Remarkable developments are taking place in the field of space in the international arena as well, in which Hungary is actively involved. This year saw the establishment of the European Union Agency for the Space Programme (EUSPA) to implement the Union's space programme. EUSPA is responsible for coordinating the Galileo satellite navigation and Copernicus Earth observation programmes, and for implementing the Governmental Satellite Communications (GovSatCom) and the Space Situational Awareness (SSA) programmes. The new Director General of the European Space Agency (ESA), with the involvement of the Member States including Hungary, prepared the Agenda 2025 document presenting ESA's future strategic priorities. These were also taken into account when finalizing the Hungarian space strategy. In addition to the EU and ESA, NATO is placing increasing emphasis on the role of space: NATO is now treating threats in space and from space similarly to traditional attacks.
Two recent important governmental decisions were the adoption of Hungary's first space strategy, as well as the support of a new Hungarian astronaut mission and the related research and industrial development programme. In addition, to expand the international cooperation opportunities available for the domestic space sector, we continued the development of relations with foreign partners. We concluded a space research cooperation agreement with the Space Agencies of the Republic of South Africa and Egypt, as well as with the Ministry responsible for Space issues in Finland. Cooperation agreements are being prepared with a number of European and non-European countries, and strategic agreements are being reached with leading international space companies.

Last year, the establishment and activity of the Space and Defense Industry Committee of the Hungarian Chamber of Commerce and Industry (MKIK) were a welcome development for bringing together the domestic actors of the space industry.

Another novelty is that we have launched a governmental space website (space.kormany.hu), with the aim of creating an information platform for those interested in space activities, related projects and tender opportunities, as well as developments in the Hungarian space sector in general.

We hope that our new on-line interface can effectively complement the activities of other Hungarian bodies presenting the Hungarian space achievements. One of the most significant of such sources of information is the Hungarian Space Caleidoscope published by the Hungarian Astronautical Society (MANT) with the support of the Ministry of Foreign Affairs and Trade (KKM). This provides a reference for domestic and foreign actors interested in the Hungarian space sector, by presenting Hungarian entities related to the space industry, including companies, higher education institutions and research institutes.

Orsolya Ferencz
Ministerial Commissioner for Space Research



WELCOME FROM THE EDITORIAL BOARD

On request of the Department for Space Research and Space Activities of the Ministry of Foreign Affairs and Trade, we created the first edition of the Hungarian Space Kaleidoscope in 2019. In the Hungarian Astronautical Society (MANT), the publisher of the book, we are pleased to see the positive feedback on the printed and electronic versions.

Following the success of previous years' editions, we provide an actual insight into the diverse activities of the Hungarian space sector which includes small and medium-sized enterprises, research centres and research groups at different universities.

The members of the editorial board, Előd Both, Sándor Frey, Ferenc Horvai, András Ferenc Horváth, László Pap and Balázs Székely were responsible for the selection of the content for this publication. I am really thankful for their contribution. I would like to thank the work of the enthusiastic secretary of the editorial board, Balázs Heilig – we could not have collected the data without him. The nice layout and the useful pictograms were designed by Tímea Blidár.

The data in this publication refer to the financial year of 2020 and are provided by the organisations appearing in the publication. They provided their introductory text as well which has only been modified for stylistic reasons or editorial purposes.

This book identifies the key research areas and technological competencies of the organisations, the latter follow the classification scheme used by the European Space Agency (ESA). Although many organisations are engaged both in research and development, we decided to highlight the most representative areas of their activity. To help our readers, we provided pictograms, code classification following the standard ESA Technology Competence List, and overview tables both for technological and research competences.

We could not aim at completeness during the preparation of this publication. It was not our intention to introduce each and every Hungarian space research organisation in detail, and to highlight all of their technological competencies.

However, it is great to see a steady increase in the number of entities in the publication since its first release in 2019. I hope this expansion will continue in the future. This year we also cooperated with the Space and Defense Industry Committee of the Hungarian Chamber of Commerce and Industry (MKIK), and we opened a new chapter for potential space suppliers in the publication. I hope that this chapter will welcome more and more entities in the coming years.

We asked the organisations to mention only their most important projects, but there is a lot of information available on their websites about their achievements and their plans for the future. I hope that the reader will find the 2021/2022 edition of the Hungarian Space Kaleidoscope interesting and will be amazed by the diversity of Hungarian space activities.

László Bacsárdi
Chair of the Editorial Board

SPACE ACTIVITY OF HUNGARY

Maybe surprising, but the Hungarian space activity has its roots immediately after World War II. In 1946, a small group of Hungarian physicists and engineers led by Zoltán Bay received an echo from the Lunar surface with their radar equipment. Our systematic space research began more than a decade later, with the visual and later photographic observation of the pioneering artificial satellites. As part of this activity, some groups joined the research of the Earth's upper atmosphere. In the meantime, enthusiastic young engineers and students tried to build small rockets and a satellite receiving station, but their work was forced to stop due to political reasons.

The first boom in our space activity happened in the 1960s, when Hungary joined the Intercosmos cooperation. The organisation provided the opportunity to send passive instruments first, then more and more elaborated electronic ones into Earth orbit. A turning point was the one-week spaceflight of the first Hungarian cosmonaut, also in the framework of the Intercosmos programme, on board of the Soviet Salyut-6 space station. This event temporarily raised a great public interest towards the space activity. Moreover, the Hungarian experts prepared a rich scientific programme for our cosmonaut, which determined the main fields of our space activity for decades. Among others our expertise in space dosimetry, space life sciences, remote sensing and material sciences have their roots in the background of the Hungarian cosmonaut's scientific programme. As a further culmination of our participation in the Intercosmos programme Hungarian experts built some scientific instruments for the Vega missions, reaching their targets well beyond Earth orbit.

After the termination of the Intercosmos cooperation, in the 1990s we took our first steps towards the European Space Agency (ESA), in the meantime widening our international cooperation in other directions, too. Thanks to this, dozens of Hungarian instruments could be sent into outer space, and later, as a European cooperating state of ESA, we could join several different ESA projects and missions. Hungarian experiments and instruments could be sent to the International Space Station, and in 2012 a European rocket launched the first Hungarian satellite. While earlier the Hungarian space equipment was built mainly in research institutes and at universities, an important achievement of these decades was the establishment of the independent Hungarian space industry based on private companies.

A recent upswing came in 2015, when Hungary joined ESA as a full member of the organisation. As a consequence, the Government provided a greater and more solid financial background to our space-related activities. With the administrative and technical help of ESA we are reaching a higher and higher level of participation in a wide range of ESA programmes. Parallel with this, our strategic goal is to widen our international cooperation. In the meantime we continue to strengthen and widen our ESA cooperation, with the participation in further optional programmes of ESA, mainly in the fields where the societal impact is the highest.

COMPETENCES

Primary RESEARCH competence

Futher RESEARCH competences

Primary TECHNOLOGICAL competence

Further TECHNOLOGICAL competences

POINT OF CONTACT

Name

Phone

E-mail

ORGANISATION DETAILS

SINCE YEAR OF FOUNDING

HEADCOUNT (*2020*)
Space department employees / all employees
2020

YEARLY REVENUES (2020)
space department revenues / all revenues
M HUF = million Hungarian forint
na: not available
2020

SPACE RESEARCH TENDERS
number between 2016 and 2020
16-20

ORGANISATION DETAILS (Suppliers to Space Industry)

ADDRESS

WEB

EMAIL

Cluster

HATP

HUNAGI

HUNSPAC

MKIK

RESEARCH COMPETENCES

- Astronomy and Astrophysics
- Biological, Medical, Life Sciences
- Geodesy
- Geophysics
- Material Sciences
- Meteorology
- Physics of Near Earth Space
- Space Physics
- Solar Physics and Solar System Exploration
- Space Communications and Navigation
- Space Chemistry
- Space Law and Economy

TECHNOLOGICAL COMPETENCES

TD-1 On-Board Data Systems
- 1.1 Payload Data Processing
- 1.2 On Board Data Management
- 1.3 Microelectronics for Digital and Analogue Applications

TD-2 Space System Software
- 2.1 Advanced Software Technologies
- 2.2 Space Segment Software
- 2.3 Ground Segment Software
- 2.4 Ground Data Processing

TD-3 Spacecraft Electrical Power
- 3.1 Power System Architecture
- 3.2 Power Generation Technologies
- 3.3 Energy Storage Technologies
- 3.4 Power Conditioning and Distribution

TD-4 Spacecraft Environment and Effects
- 4.1 Space Environment
- 4.2 Environment Effects
- 4.3 Space Weather

TD-6 RF Payload and System
- 6.1 Telecommunication (sub-)Systems
- 6.2 Radio Navigation (sub-)Systems
- 6.3 TT&C (sub-)Systems
- 6.4 RF Payloads
- 6.5 Microwave and Millimetre Wave Technologies and Equipment

TD-7 Electromagnetic technologies and techniques
- 7.1 Antennas
- 7.2 Wave Interaction and Propagation
- 7.3 EMC/RFC/ESD

TD-8 System Design and Verification
- 8.1 Mission and System Specification
- 8.2 Collaborative and Concurrent Engineering
- 8.3 System Analysis and Design
- 8.4 Verification and AIT

TD-9 Mission Operation and Ground Data Systems
- 9.1 Advanced System Concepts
- 9.2 Mission Operations
- 9.3 Ground Data Systems (MCS)

TD-10 Flight Dynamics and GNSS
- 10.1 Flight Dynamics
- 10.2 GNSS Systems and Ground-related Technologies

TD-12 Ground Station System and Networks
- 12.1 Ground Station System
- 12.2 Ground Communications Networks

TD-13 Automation, Telepresence & Robotics
- 13.2 Automation & Robotics Systems

TD-14 Life and Physical Sciences
- 14.1 Instrumentation in support of Life Sciences
- 14.2 Instrumentation in support of Physical Sciences
- 14.3 Applied Life Science Technology
- 14.4 Applied Physical Science Technology

TD-15 Mechanisms and Tribology
- 15.5 MEMS Technologies
- 15.6 Tribology Technologies
- 15.7 Mechanism Engineering

TD-16 Optics
- 16.1 Optical system Engineering

TD-17 Optoelectronics
- 17.1 Laser Technologies
- 17.2 Detector Technologies

TD-18 Aerothermodynamics
- 18.2 Ground Based Facilities
- 18.3 Flight Testing

TD-19 Propulsion
- 19.1 Chemical Propulsion Technologies

TD-20 Structures and Pyrotechnics
- 20.1 Structural Design and Verification Methods and Tools
- 20.6 Damage Tolerance and Health Monitoring
- 20.10 Advanced Structural Concepts and Materials

TD-21 Thermal
- 21.1 Heat Transport Technology
- 21.5 Thermal Analysis Tools

TD-23 EEE Components and Quality

TD-24 Materials and Processes
- 24.1 Novel Materials
- 24.2 Materials Processes
- 24.3 Cleanliness and Sterilisation

TD-25 Quality, Dependability and Safety
- 25.1 System Dependability and Safety

TD-26 Earth Observation / Remote Sensing

HUNGARIAN ORGANISATIONS

ADMATIS LTD.

address: 3535 Miskolc, Partos u. 16.
postal address: 3534 Miskolc, Kandó Kálmán u. 5.
web: *www.admatis.com*

Admatis Ltd. coordinates, manages space industry related projects from the mechanical-thermal design and analysis to the manufacturing and test phase under ECSS.CAD design, structural and thermal FEA modelling. The product line covers the satellite radiators, structural and thermal panels, MLI, other thermal hardware, ISO 7 cleanrooms, bake-out, TVC and thermal balance test, conversion coating line, painting booth.

Main profile: structural and thermal hardware for satellites.

Main products and space qualified technologies:
- metallic, sandwich, SSM, thermooptical type radiators
- satellite structural parts
- internal and outer multilayer insulation
- special gluing technologies
- thermal vacuum treatment
- ground segment equipment (adapters, trolleys)
- environment-friendly surface treatment
- special markers

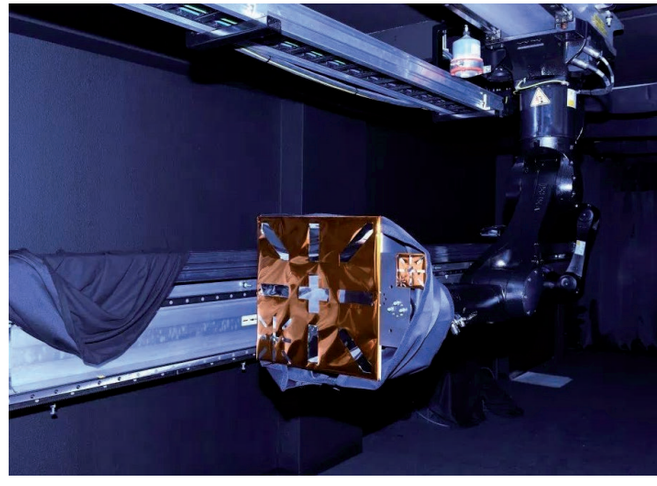
TD-24
24.1
24.2
TD-20
20.1
20.2
TD-21
21.1
21.3
21.4
21.5

MAIN PROJECTS

- Sentinel-2 A/B/C/D
- CHEOPS
- JUICE
- ARIEL
- CO2M

: Tamás Bárczy
: +36 70 218 3068
: tamas.barczy@admatis.com

SINCE: 2000
2020: 18 / 22 persons
2020: 400 / 430 M Ft



TD-24 24.1
TD-4 4.2
TD-14 14.3
TD-19 19.1
TD-20 20.9
TD-21 21.3
TD-25 25.1
TD-26

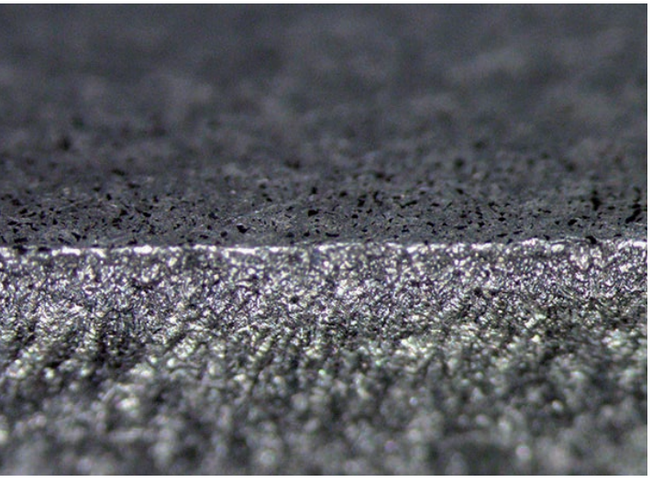
address: 1025 Budapest, Józsefhegyi utca 28-30/A II. em 22.
web: *www.aedusspace.com*

Aedus Space Ltd. was founded in 2014. The company has experience in laser technology design and process development, as well as in material science. It is present in energy, aerospace, defence, and medical industries with a special focus on the development and manufacturing of radiation protection materials and applications. Its activities include:

- Light composite armour material development
- Basic research (ceramic- and metal-based composites, grain size optimisation)
- In-situ nanomaterial reinforcement of MMCs
- Radiation shielding material research
- Radiation types: neutron, proton, and gamma
- Automated soldering and de-soldering of space electronics
- Design and manufacturing of microfluidics for medical application
- Product development and manufacturing with laser, 2D-3D structures of superalloys and composite materials for energy industry

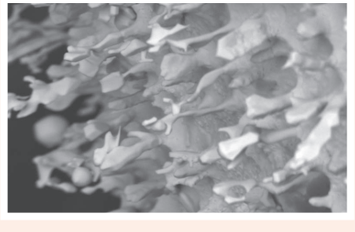
: Szabolcs Bella
: +36 1 794 2070
: szabolcs.bella@aedusspace.com

SINCE : 2014
2020 : 4 / 9 persons
2020 : 0 / 104,4 M Ft



LABS, CERTIFICATES

- EN ISO 9001:2015
- Laser technology laboratory for plastic welding
- Laser technology laboratory for electronics soldering
- Materials technology laboratory, furnace technology development



address: 1095 Budapest, Soroksári út 48. Hungária malomudvar, 7. épület
web: *www.intelligence-airbusds.com*

Our company serves production of remote sensing data (satellite imagery), extensive image processing, utilisation and creation of value-added products based on imagery. We are equipped with high capacity server park and efficient image processing systems. In addition to image processing, we also provide GIS services solving unique tasks for specific demands.

The remote sensing data produced and processed by our company provide invaluable support, among many others in environmental, agricultural, forestry, natural resource research, disaster prevention, water management, defense, environmental change monitoring, urban planning, and other thematic mapping (in 3D as well) activities.

MAIN PROJECTS

- SPOTmap
- Google-map
- OneAtlas
- DUSIREF (ESA PECS)
- OWETIS (ESA)

: György Domokos
: +36 1 323 3750
: gyorgy.domokos@airbusds.hu

SINCE : 2000
2019 : 31 / 36 persons
15/19 : 487,3 / 487,3 M Ft

TD-14
14.1

AQUANAUTA RESEARCH CENTER FOR HUMAN FACTORS IN SPACE EXPLORATION LTD.

address: 1039 Budapest, Garay utca 12.
postal address: 4001 Debrecen, Pf. 51.
web: *www.aquanauta.space*

Aquanauta CE is an ESA BIC HU funded R&D start-up specialising in studying the human factors (medical and behavioural health aspects) relevant in long-duration space flight and extreme environments with the purpose to facilitate human adaptation and contribute towards mission preparation and astronaut training.

Aquanauta CE designs and delivers high-fidelity analogue space missions and simulation campaigns performed in submerged cave systems and flooded environments. Our missions serve as a platform to test and develop technology, tools and procedures.

Design, test and evaluate interventions and solutions to aid the training of astronauts.

Research factors central to human space exploration.

Human adaptation in extreme, isolated and confined environments and contexts; addressing COVID-19 related challenges.

Preparations for exploration and extreme missions.

: Károly Schlosser
: +36 20 919 1786
@ : info@aquanauta.space

SINCE : 2019
2020 : 1 / 1 person
16/20 : 0 / 0 Ft

MAIN PROJECT

• First Aquanauta mission

INSTITUTE FOR NUCLEAR RESEARCH

address: 4026 Debrecen, Bem tér 18/C.
postal address: 4001 Debrecen, Pf. 51.
web: *www.atomki.hu*

ELKH Eötvös Loránd Kutatási Hálózat

The mission of Atomki is performing fundamental research in the field of atomic, molecular, nuclear, and particle physics, and strongly promote their applications in its state of the art laboratories in ion beam analytics, environmental physics and surface physics. The majority of the Hungarian ion accelerators (covering the 500 eV–22 MeV range) is concentrated in its Accelerator Centre.

Main fields of the space related R&D at Atomki are radiation tolerance studies, material science research, development of instrumentation and methods as well as crio- and vacuum technics services. The Institute (with its accelerators) is a member of the Europlanet Society, and participates in the Europlanet H2020 integrated activities. Other infrastructures: a chamber for irradiating astrophysically relevant ices at Tandetron, four more facilities at different beamlines for irradiating meteorites and other materials of space origin or relevance (e.g. materials for satellites) under vacuum or atmospheric conditions.

MAIN PROJECTS

• Hugin, Monin (ESA)
• SMART-1 (ESA)
• FOCUS, COLUMBUS, ISS (ESA)

LABS

• Ionaccelerators, irradiation facilities
• Spectroscopy and surface physics laboratories, crio- and vacuumtechnics facilities

: Zsolt Fülöp
: +36 30 539 7154
@ : fulop@atomki.hu

SINCE : 1954
2020 : 6 / 210 persons
2020 : 4 projects

BHE BONN HUNGARY ELECTRONICS LTD.

address: 1044 Budapest, Ipari park utca 10.
postal address: 1325 Budapest, Pf. 164
web: *www.bhe-mw.eu*

The company was founded in 1991 to develop and manufacture RF and microwave systems for the aerospace, defence, and telecommunication industry. BHE has significant heritage in space technology; onboard and ground-based space communication subsystems and equipment from UHF to Ka-band. SDR based de-/encoders, de-/modulators, up- /downconverters, GaN based SSPAs, command receivers, transmitters.

BHE's space activities are concentrated around SATCOM, focusing both on ground and space segment. Main competencies covered are RF/microwave design and in-house manufacturing of SATCOM equipment, such as SDR based de-/encoder, de-/modulator, up-/downconverter, GaN based SSPA, command receiver, transmitter, synthetic aperture radar up to Ka-band, RF and environmental testing and validation according to ISO AS and ECSS standards. Our competencies are constantly enhanced towards higher frequency bands (Q/V-band), higher power levels (1...5 kW), and higher data rates (500Mbps...1Gbps).

: János Solymosi
: +36 1 233 2138
@ : solymosi@bhe-mw.eu

SINCE : 1991
2020 : 26 / 120 persons
2020 : 1141 / 2939 M Ft

MAIN PROJECTS

- Vesselsat, Mangalyaan (India Mars Orbiter),
- Chandrayaan I & II (India Moon Missions),
- International Space Station - Zvezda S-band power amplifier

LABS, CERTIFICATES

- ISO 9001:2015
- AS9100D (EN 9100:2018)
- AQAP 2110:2009
- Assembly line, RF lab, cleanroom, EMC chamber, sweep table, thermal chamber

BL-ELECTRONICS LTD.

address: 2167 Vácduka, Pálya u. 1.
web: *www.bl-electronics.hu*

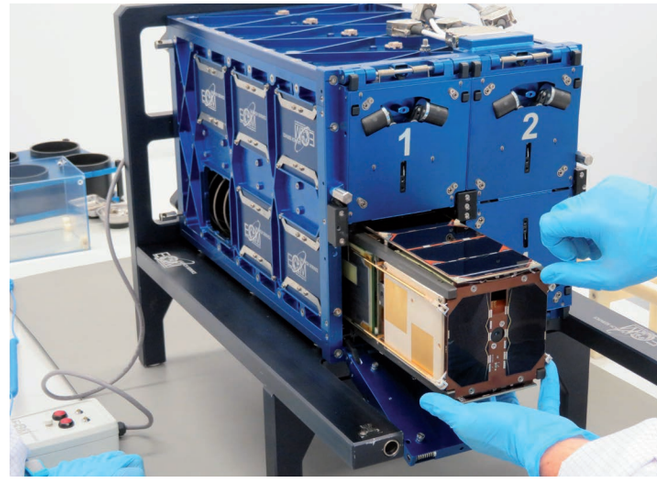
The instruments needed for space weather monitoring are of key importance in our development of satellite-based equipment, especially for electromagnetic wave measurements, typically in the VLF range. Our main product is the SAS satellite (and space probe) on-board instrument family. SAS is closely related to the development and production of sensors (electrical potential and induction magnetometer), preamplifiers and digitizing VR2 units for the global AWDANet observation network, which provides simultaneous terrestrial VLF measurements. We work closely with the Space Research Group of Eötvös Loránd University in these areas.

: Terézia Szél
: +36 1 950 5476
@ : info@bl-electronics.hu

SINCE : 1992
2020 : 2 / 2 persons
2020 : 0 / 2,5 M Ft

MAIN PROJECTS

- SEAM; DPU; ELF-VLF wave instrument, cooperation with KTH (Sweden)
- BepiColombo PWI instrument package; ISDM module , ELTE, Kanazawa University (Japan)
- Vernov/Relec; SAS3-R; ELF-VLF wave instrument, ELTE, IKI (Russia)
- Chibis-M; SAS3-Ch; ELF-VLF wave instrument, ELTE, IKI (Russia)
- TriTel-SURE; TriTel; 3-axis silicon detector dosimeter, MTA-EK



BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS

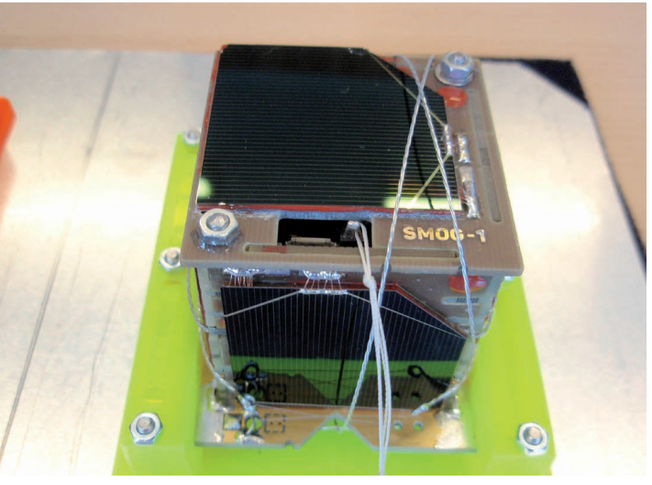
address: 1111 Budapest, Műegyetem rkp. 3.
web: *www.bme.hu*

The Budapest University of Technology and Economics (BME) is a prestigious higher education institution in Hungary. Its main mission is to educate professionals for the industry, to perform scientific research, which encompasses fundamental and applied research, technological product and service development, and exploitation of results making up the innovation chain.

For decades, various research groups have been performing space research related activities, from basic research to technology development through the actual implementation of diverse devices and services, as well as various forms of education and trainings. Our staff members contributed to many space missions and space services in various fields. The first Hungarian CubeSat has been built at the university and it is the home of the first Hungarian picosatellite as well.

: Kálmán Kovács
: +36 30 441 1669
@ : kovacs.kalman@eit.bme.hu

SINCE : 1782
2020 : 75 / 2680 persons
16/20 : 17 projects



MAIN PROJECTS

- SMOG-P & SMOG–1,
- ESEO,
- Masat–1,
- Rosetta,
- Vega

LABS

• BME Ground station
• Surface Mount Technology (SMT) Lab

BME FACULTY OF CIVIL ENGINEERING

address: 1111 Budapest, Műegyetem rkp. 3.
web: *www.epito.bme.hu*

The Civil Engineering Faculty of the Technical University is an active member of the space community since the 1970s. Earth Observation has been playing a key role in their research activities for mapping, geodetic applications, positioning systems and deformation monitoring. We offer education of remote sensing in environmental, engineering and geodesy domain on basic and advanced level. Our GNSS (Global Navigation Satellite Systems) reference station is in operation since 2000, which observes GPS, GLONASS and Galileo satellites.

Our main research domains include the modelling of the gravity field of the Earth with space gravimetry and space gradiometry, crustal motion and deformations with satellite navigation systems. We focus on Earth Observation in the domain of complex environmental modelling, disaster management, climate change effects and surface mapping. We support intelligent transportation systems with the latest navigation technology and applications.

MAIN PROJECTS

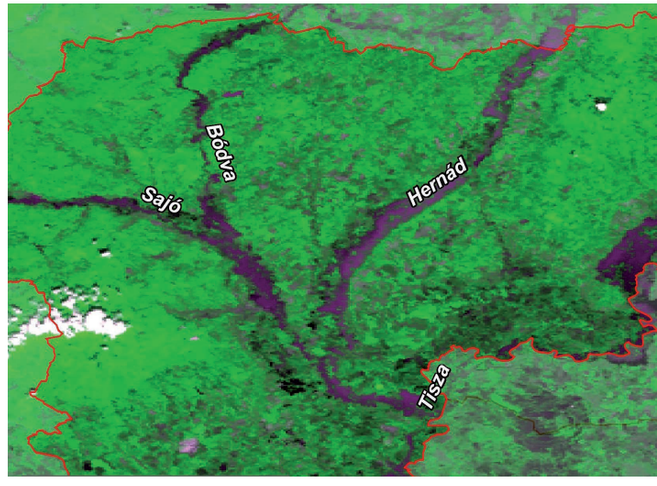
• EGNOS monitoring SBAS project – Integricom, EuroControl
• GALILEA Project – Space Engineering S.p.A (leader), NavPos System GmbH, CISAS Univ. Padova, BKG
• TROPSY Project – Teleconsult Austria (leader), TU Wien, ZAMG
• INTRO Project – BME (leader), National Meteorological Service, Integricom.NL
• GOCE AO Level-1b/2 – ESA

LABS

• Laboratories: Photogrammetry Lab
• Laboratories: GIS and Remote Sensing Lab (40 computers)
• GNSS permanent receiving station

: Zsófia Kugler
: +36 1 463 3086
@ : kugler.zsofia@emk.bme.hu

SINCE : 1782
2019 : 30 / 180 persons
15/19 : 4 projects



BME DEPARTMENT OF MECHATRONICS, OPTICS AND MECHANICAL ENGINEERING INFORMATICS

address: 1111 Budapest, Bertalan Lajos u. 4.-6.
web: *www.mogi.bme.hu*

The research areas of the Department include: mechatronics, control technology, robotics, optical instrumentation, measurement technology, informatics. We participated in the ground calibration of the Dawn spacecraft cameras, and the development of the calibration pipeline. We have carried out optical component tests of the Rosetta OSIRIS cameras and development tasks of the processing pipeline.

The optical laboratories of our department cooperated in the testing of the optical systems of ESA/NASA research missions. The established optical calibration procedures have been successfully implemented at the Rosetta/OSIRIS and the Dawn/FC instruments. In cooperation with other institutes, our staff members developed the image processing and calibration pipeline of the OSIRIS and Dawn cameras.

: Gábor Kovács
: +36 1 463 2602
@ : kovgab@mogi.bme.hu

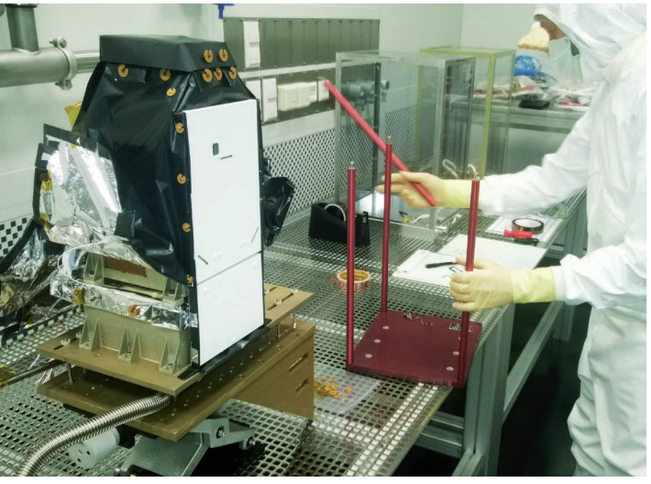
SINCE : 1957
2020 : 5 / 50 persons
16/20 : 1 project

MAIN PROJECTS

- 1984 Vega: camera optical alignment, measurement
- 2004-2018 Rosetta: OSIRIS optical components, image processing
- 2007-2020 Dawn: Framing Camera calibration, image processing

LABS

- Optical calibration laboratory
- Spectral optical measurements laboratory



BME DEPARTMENT OF BROADBAND INFOCOMMUNICATIONS AND ELECTROMAGNETIC THEORY

address: 1111 Budapest, Egry József u. 18.
web: *hvt.bme.hu*

On-board hardware elements we developed for space applications have been launched more than 20 times. Major research and development directions: power management/distribution systems, radio communications, data collection, ground stations, construction and thermal problems, radio propagation and communication research. Within the Rosetta cometary program, we developed the power subsystem of the Philae lander. In 2019, after coordinating and performing developments for the Masat-1 CubeSat program, the SMOG-P picosatellite was placed into orbit as the first operational picosatellite ever built, later followed by the SMOG-1 picosatellite in 2021. In the ESA's Alphasat program, we participate with wave propagation and communication experiments. Our students are working on ESA educational programs such as Rexus/Bexus and the ESEO satellite, launched in 2018, for which the power distribution unit and a payload for plasma diagnostic measurements were developed. Furthermore, our department is actively participating in the space-related education of the university.

: Szabolcs Gyimóthy
: +36 1 463 1559
@ : gyimothy.szabolcs@vik.bme.hu

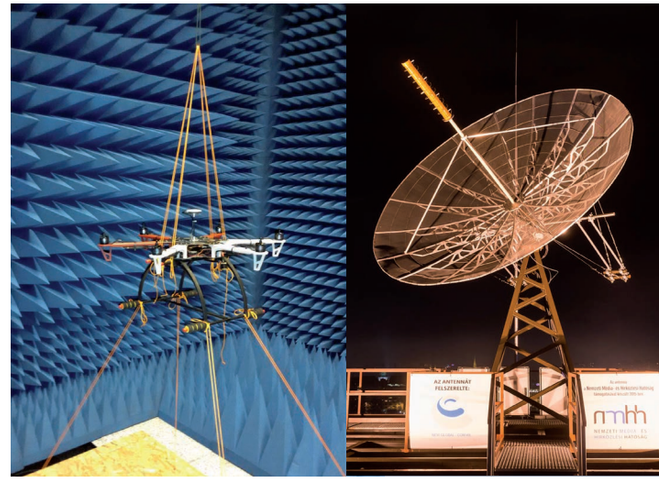
SINCE : 1951
2020 : 18 / 45 persons
16/20 : 9 projects

MAIN PROJECTS

- Rosetta Philae (ESA, 2004-16)
- Masat–1 (2012-15)
- Alphasat (ESA, 2013-)
- ESEO (ESA, 2018-19)
- SMOG-P and SMOG-1 (2019-)

LABS

- anechoic chamber (0.1–80 GHz)
- thermal and climatic chamber (–75/+150°C and 10–98% rel. humidity)
- signal generators and measurement devices (DC–40 GHz)



BORSODI MŰHELY LTD

address: 9027 Győr, Juharfa utca 8.
web: *www.borsodimuhely.hu*

Our company is a second generation, 100% Hungarian family business. Our work philosophy is to be precise, fair and honest. The company serves its clients with the highest quality, in the following segments: automotive industry, aerospace industry, military industry, healthcare, food industry, electronics.

We are present in the development of world-shaping innovations with our unique solutions, such as aircraft tooling, maintenance tools, customized tools, engine tooling, ground support equipment, tool repair, heat treatment.

: Mónika Horváthné Borsodi
: +36 96 529 071
@ : monika.borsodi@borsodimuhely.hu

SINCE : 1981
2019 : 8 / 144 persons
2019 : 0 / 1891 M Ft

MAIN PROJECT

• ESA Sentinel-2 MSI MMTH project

LABS

• ISO 9001:2015
• accreditated measurement laboratory
• material test laboratory

C3S ELECTRONICS DEVELOPMENT LLC.

address: 1097 Budapest, Könyves Kálmán krt. 12-14.
web: *www.c3s.hu*

C3S LLC is a determining player in the international nanosatellite industry, supporting both scientific payloads and industrial demands by their solutions. Our activity encompasses 3-16U, high-reliability platform and subsystem design, as well as prelaunch simulation software and hardware and mission operation environment services. In large satellite projects, we participate as the designer of power distribution systems and payload synchronization. Long lifecycle and high availability characterise our in-house developed, redundant subsystems.

We develop our scalable platform for constellation purposes focusing on Earth Observation and IoT. By providing tailored space and technology for payloads of different sizes, we can foster diverse segments from crop growth monitoring through disaster damage mitigation to IOD demands. Our solutions contribute to the protection of our planet, agricultural improvement, and the better involvement of socially and economically isolated regions.

: Alexandra Széll
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@ : alexandra.szell@c3s.hu

SINCE : 2012
2020 : 31 / 32 persons
2020 : 245 / 294 M Ft

MAIN PROJECTS

• RADCUBE – 3U platform and mission operation environment development
• PLATO 2.0 – AEU development
• SMILE – SXI PSU development
• S-band SatCOMM system
• HERMES – ground station and communication network

LABS

ESA certified soldering operators, trained at ESA accredited courses. Our manufacturing processes comply with ECSS-Q-ST-70-08C, ECSS-Q-ST-70-28C , ECSS-Q-ST-70-38C, ECSS-Q-ST-70-01C, ECSS-Q-ST-70-12C, ECSS-Q-ST-70-60C standards. Electronic laboratory equipped with calibrated instruments and a climate chamber suitable for thermal cycle tests supports our development and manufacturing activity.

COSIMA LTD.

TD-26

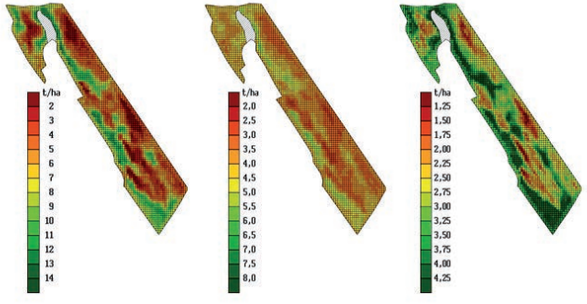
address: 1126 Budapest, Szendrő u. 49.

COSIMA Ltd. develops competitive solutions for Earth observation data applications in the agriculture. The centre of its know-how is the measurement of the parcels' crop production and its prediction. The applications range from precision to regional extent. Recent developments provide substantial support to the precision farming efficiency. The activity is recognised in the EU and the US.

The innovative solutions of COSIMA based on the quantitative evaluation techniques of Earth observation satellite data provide extra benefits for their users. The developed new methods are internationally unique and competitive too. These solutions add benefits for the users (farms, grain buyers, seed producers, integrators and national administration) through the complex crop yield measurement, yield-prediction and quantitative vegetation assessment and also the unique analysis of the cultivation data. The improved efficiency applies at the precision level to national, regional extent.

: Gábor Csornai
: +36 30 475 8018
@ : gabor.csornai@cosima.hu

SINCE : 2011
2020 : 5 / 5 persons
2020 : 31 / 31 M Ft



Precision yield maps derived from satellite data
(2013:maize, 2014:barley, 2017:sunflower)

MAIN PROJECTS

- Development novel solutions for crop monitoring and yield assessment for farm fields and at precision detail
plus the application of COSIMA crop cells yield measurement
- Development and validation of COSIMA crop production forecast methodology for farms and also for precision farming
- COSIMA services to many farms and knowledge centres, cooperation with universities and consultancy in special projects

RESEARCH CENTRE FOR ASTRONOMY AND EARTH SCIENCES, INSTITUTE FOR GEOLOGICAL AND GEOCHEMICAL RESEARCH

address: 1112 Budapest, Budaörsi út 45.
web: *www.geochem.hu*

ELKH Eötvös Loránd Kutatási Hálózat

TD-14
14.2
TD-26

The institute was originally established to carry out geochemical analysis, and in the last decades it has been developed into a unique national laboratory. The instrumental developments and the related research activity support the testing of space probe detectors and provide Earth-based laboratory references, currently working for the ExoMars rover, the Hera-, the Comet Interception and MMX space missions.

Activities: Development of a borehole-wall imager instrument to support the field test of the ExoMars rover. Peak-identification in infrared spectra of meteorite powders under space-relevant temperatures for the planned infrared detetor of the Hera mission. The laboratories of our institute are able to test analogue materials and observational capabilities of detectors for Solar System missions targeting solid surfaces. We contribute with science-technology synergy activity to the design and realization of the Digital Processing Module of the Comet Camera on-board the Comet Interceptor ESA mission.

MAIN PROJECTS

- ExoMars rover
- Comet Interceptor
- HERA
- Luna-27
- MMX

INSTRUMENTS

- Vertex 70 FTIR spectrometer and Hyperion 2000 microscope
- Praying Mantis DRIFT
- Shimadzu 3600UV-VIS-NIR spectrometer
- Rigaku DMax Rapid II
- Malvern Morphologi 3G ID

: Ákos Kereszturi
: +36 30 343 7876
@ : kereszturi.akos@csfk.org

SINCE : 1955
2020 : 3 / 28 persons
16/20 : 4 projects

RESEARCH CENTRE FOR ASTRONOMY AND EARTH SCIENCES, KONKOLY OBSERVATORY

address: 1121 Budapest, Konkoly Thege Miklós út 15-17.
web: *www.konkoly.hu*

ELKH Eötvös Loránd Kutatási Hálózat

Konkoly Observatory is a dynamically expanding research institute with two ERC, two GINOP, 5 Lendület grants. The main focus is top quality fundamental research in astronomy and astrophysics with a strong dominance of space astronomy. The institute has been scientific collaborator in the following ESA and NASA missions: ISO, Rosetta, CoRoT, Herschel, Gaia, CHEOPS, PLATO, ARIEL, Kepler/K2, TESS, and JWST.

Among the space competences of the institute one has to mention the scientific preparatory work for space astronomy projects and in-situ Solar System probes (ISO, Rosetta, Gaia, CoRoT, CHEOPS, PLATO, ARIEL, Kepler/K2, TESS). Scientists have also contributed to mission operation activities and calibration of instruments of infrared space telescopes (Herschel). Last but not least, the design and manufacturing of a fleet of nanosatellite probes (Camelot) that will monitor the full sky to search for high-energy astrophysical transient events is a new addition to the institute's space competence portfolio. The first satellite – GRBAlpha – was launched in 2021 March. It has been operating successfully since then.

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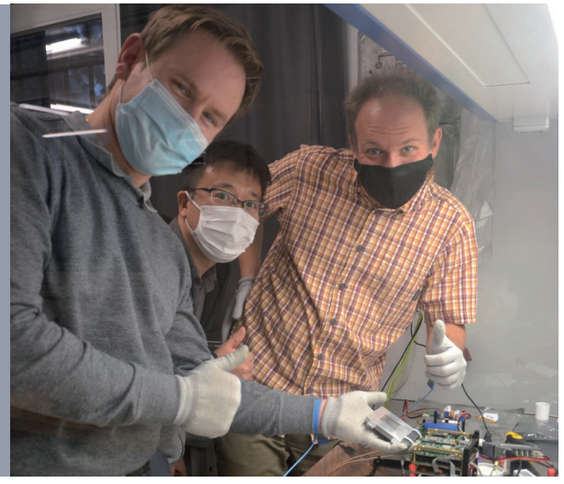
SINCE : 1899
2020 : 25 / 85 persons
16/20 : 10 projects



MAIN PROJECTS

- Herschel, ESA's infrared space telescope (2009-2013)
- Kepler/K2, NASA's most successful exoplanet finder mission (2009-2018)
- Gaia, ESA's ongoing cornerstone astrometric space mission (2013-)
- CHEOPS, ESA's first (exoplanet finder) S-class mission
- Camelot, fleet of nanosatellite probes to search for high-energy astrophysical transients (currently in design phase)

INSTRUMENTS

- Small cryostat in which small (approx. 2×5 cm) electronics can be tested at 4 K temperature
- Design and manufacturing of high-energy particle detector payload for CubeSat platforms
- Ground-based imaging, photometry and spectroscopy at the Piszkés-tető Mountain Station Observatory, all-sky monitoring with the Fly's Eye camera system, digitalised photo plate archive spanning many decades

DARK CUBE CONSULTING LTD.

address: 1024 Budapest, Keleti Károly utca 31. félemelet 2.
web: *www.darkcube.hu*

Dark Cube Consulting Ltd. was established in 2017 with the purpose of colligating, helping and developing the regional and particularly the Hungarian space sector as well as the telecommunications industry. By doing so, we aim to conduct and organize space and telecommunications related projects in the most efficient way, and also to coordinate the activity of the participants of these projects.

Owing to our space strategic consultancy services, we were able to participate in numerous Hungarian and international space related projects. Our professional achievements include the conceptualization of the foundational study for the Hungarian National Space Strategy. Furthermore, we are proud to work on ESA's ARTES programme's RILDOS-based operations for Telecom missions project, where we are tasked with conducting a comprehensive market research of the small satellite industry and map the commercial viability of RILDOS-based operations in small satellite telecommunication missions.

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@ : izagoni@darkcube.hu

SINCE : 2017
2019 : 5 / 5 persons
15/19 : 0 / 0 M Ft

MAIN PROJECTS

- Constructing the strategic basis of Herius Space Fund
- Foundational study for the Hungarian National Space Strategy
- Feasibility study on several ESA projects
- IAC 2024 BUDAPEST BID – member of Local Organizing Committee

UD-SPACE – UNIVERSITY OF DEBRECEN SPACE RESEARCH PROGRAM

address: 4032 Debrecen, Egyetem tér 1.
postal address: 4002 Debrecen, Pf. 400
web: *www.unideb.hu*

TD-26

The University of Debrecen is a prominent institution of higher education in Hungary. The UD-SPACE program integrated the researchers working in the space domain in the past 50 years at the university. The six research groups focus on the different aspects of the human spaceflight including life science, medical and diagnostical aspects as well as on climate change.

Besides the difficulties of technical feasibility space travel implies another important aspect, the long-term maintenance of the physical and mental health of the astronauts. In order to establish the optimal travel conditions, first we have to explore those mechanisms in the body by which the lack of gravity, limited nutritional options and social isolation exert their effects. In addition to the above, the six research groups of the university (UD-SPACE) also investigate the effects of cosmic radiation on electronic devices and the human body in a multidisciplinary manner.

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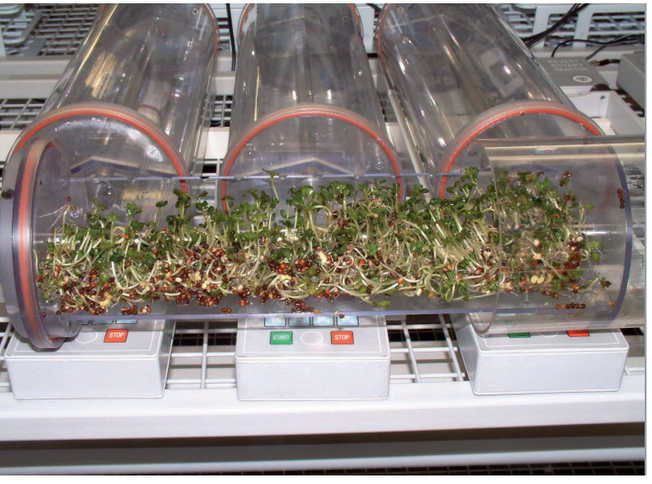
@ : science@unideb.hu

SINCE : 1978
2020 : 110 / 9000 persons
16/20 : 25 projects



LABS

- Laboratory for material sciences (TEM, SEM, AFM, RAMAN, SNMS, XPS, ALD, Thin layer technology)
- LSM 880 Airyscan confocal microscope with electrophysiological extension
- Nutrition Technology Innovation Centre with NÉBIH certificate (HU 1430)
- Vascular Biology Research Laboratory
- GIS Data Processing System
- Nuclear Medicine Radiochemistry and Preclinical Laboratory (cyclotron, complex radiochemical synthesis system, small animal PET camera)

DESIGN TERMINAL PUBLIC-BENEFIT NONPROFIT LTD

address: 2800 Tatabánya, Stúdium tér 1.
postal address: 1122 Budapest, Székács utca 29.
web: *designterminal.org/hu*

TD-26

Design Terminal is Central Europe's leading innovation agency, which builds 'Innovation Champions' through corporate partnerships and talent acceleration. Incubation programs are up and running in twelve countries, and since 2014 the organization has worked with more than 1000 startups and several leading corporations.

The core pillar of the centre is the Business Incubation Program (BIP) that aims to support aspiring entrepreneurs, ambitious startups and innovation-driven SMEs with a space-based business idea. Each pillar of the program portfolio is designed to serve a pipeline of aspiring applicants to successfully proceed to the Business Incubation Program.

: Jónás László
:
@ : contact@designterminal.org

SINCE : 2016
2020 : 2 / 25 persons
2020 : 50 / 116 M Ft

ESZTERHÁZY KÁROLY UNIVERSITY, RESEARCH GROUP OF PLANETOLOGY AND SATELLITE EARTH OBSERVATION

address: 3300 Eger, Eszterházy tér 1.
postal address: 3300 Eger, Leányka u. 6.
web: *www.uni-eszterhazy.hu*

The research group was formed in early 2019 with competencies in (i) astronomy, astrophysics and (ii) meteorology. There are nine experts working in the group, six of them are also involved in research, which is currently limited to area (i). At the same time, the group highlights the results of science in both areas in science teacher training and the doctoral school of education.

The scientific research fields in astronomy include two areas: studies of planetological aspects in terrestrial samples as well as laboratory experiments, and computer modelling of planetary motion. This basic research in the natural sciences, through knowledge of the behaviour of matter and life under extreme conditions, can later find industrial, agricultural, and environmental applications. Meteorological knowledge enhancement focuses on satellite observations and understanding of climate change, towns with fragmented relief, and natural vegetation processes.

: Arnold Gucsik
: +36 30 630 7297
: gucsik.arnold@uni-eszterhazy.hu

SINCE : 2019
2020 : 3 / 9 persons
16/20 : 0 projects

MAIN PROJECT

• ESA HERA Impact Simulation Working Group

LABS

• Meteorite samples
• Rock and mineral collection
• Mineralogical thin sections
• Hyperspectral camera
• Stereo microscope
• Optical microscope

RESEARCH CENTRE FOR NATURAL SCIENCES INSTITUTE OF COGNITIVE NEUROSCIENCE AND PSYCHOLOGY

address: 1117 Budapest, Magyar tudósok körútja 2.
web: *www.ttk.hu/kpi*

The Institute concentrates on psychology and related topics of cognitive neuroscience. The Environmental Adaptation and Space Research Group studies psychodynamics of isolated small groups in terrestrial space-analogue simulations, such as Antarctica or the SIRIUS space simulation. Our group specialises in multi-language psychological content analysis based on Natural Language Processing technology. With these methods, we detected the effect of isolation on emotional and cognitive processes and group dynamics in the Antarctic space analogues. We also investigate the physiological impact of spaceflight-related stressors on the ISS and space analogues. With our expertise in cognitive neuroscience techniques we have demonstrated the detrimental effect of spaceflight on cognitive performance and brain electrical correlates of attention. Our results are applicable to everyday situations such as isolation in the elderly population or performance monitoring in stressful working conditions.

: Bea Ehmann
: +36 1 382 6811
: ehmann.bea@ttk.hu

SINCE : 1902
2020 : 7 / 491 person
2020 : 3 projects

MAIN PROJECTS

• Neurospat ESA neuroscience experiment on ISS

• AGBRESA ESA neuroscience experiment in head-down tilt bed rest

• COALA/CAPA ESA psychological experiment in Antarctica

• MARS500 space analogue experiment in Moscow, Russia

• SIRIUS space analogue experiment series in Moscow, Russia

ELKH-UNIVERSITY OF MISKOLC MATERIALS SCIENCE RESEARCH GROUP

address: 3529 Miskolc, Egyetemváros
web: *www.matsci.uni-miskolc.hu*

The Research Group was established in 1996 as a part of Materials Science Institute of University of Miskolc. The main activities include the study of the phase transformation in the alloys, primarily the investigation and simulation of solidification. For the investigation, the Institute has modern equipment. The Research Group organises the international solidification (SG) conferences.

The Research Group established a laboratory for solidification, designed and built equipment. A piece of their equipment is able to stir the molten metal during solidification using rotating or travelling magnetic fields. The unique parameters of the equipment make it possible to carry out experiments as in no other laboratory. They developed a solidification technology which was later taken over by other teams, as well, and applied at space experiments. The SGMU team organised the SOLGRAV (Solidification & Gravity) international solidification conference in Miskolc-Lillafüred.

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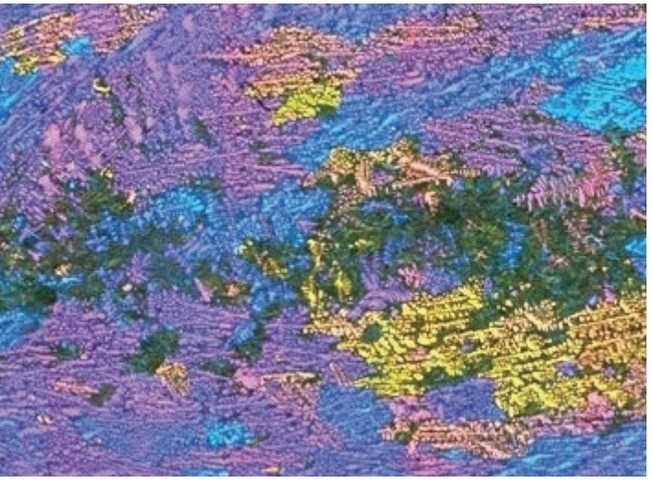
: +36 45 565 201
@ : femroosz@uni-miskolc.hu

SINCE : 1996
2020 : 6 / 6 persons
16/20 : 3 projects



MAIN PROJECTS

- Columnar-to-Equiaxed Transition in SOLidification Processing (CETSOL)
- Microstructure Formation in CASTing of Technical Alloys under Diffusive and Magnetically Controlled Convective Conditions (MICAST)

LABS

- Solidification equipment with rotating magnetic field
- Computer tomograph
- Transmission electron microscope
- Scanning electron microscopes, X-ray diffractometer

EÖTVÖS LORÁND UNIVERSITY, DEPARTMENT OF ASTRONOMY

address: 1117 Budapest, Pázmány Péter sétány 1/A.
web: *astro.elte.hu*

The Department of Astronomy of the ELTE Eötvös Loránd University Budapest is the prime institute of the university education of astronomy in Hungary, with internationally recognised competences in solar physics, space weather, space astronomy, dynamical astronomy. We contribute to the work of the Scientific Council on Space Research as well as other national and international organizations (eg. ESA, IAU, CRAF).

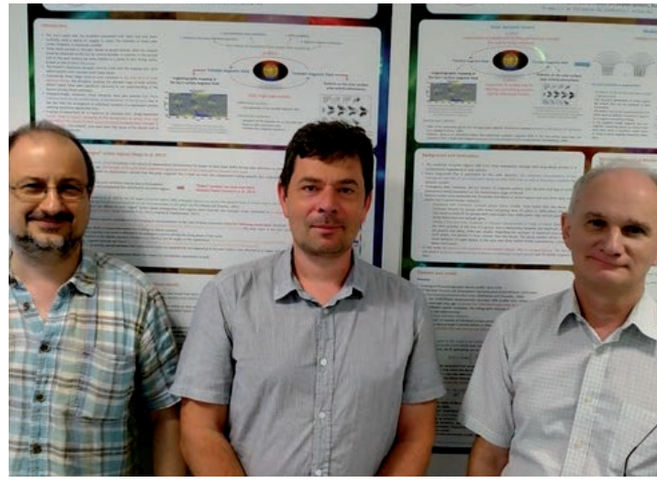
The staff, the students and PhD students of our department participated in several space astronomy missions working on the scientific program (see e.g. Solar Orbiter as a recent example), and/or analysing the scientific results. However, few of us also contributed to the calibration and building the ISOPHOT archive, building the Herschel Point Source Catalogue, and to the concept of the planned THALES ESA M5, and the Indian Aditya missions.

: Kristóf Petrovay
: +36 1 372 2500 ext. 6621
@ : K.Petrovay@astro.elte.hu

SINCE : 1755
2019 : 10 / 11 persons
15/19 : 3 projects

KIEMELT PROJEKTEK

- ISO
- AKARI
- Herschel
- SDO
- Solar Orbiter



EÖTVÖS LORÁND UNIVERSITY SPACE RESEARCH GROUP

address: 1117 Budapest, Pázmány Péter sétány 1/A.
web: *sas2.elte.hu*

Our group at the Department of Geophysics and Space Sciences was established in the 1960s. Our main research topics are space physics, the investigation of wave propagation in magneto-ionic medium, space weather (ionosphere, plasmasphere and radiation belts) using very low frequency (VLF) waves. Our other main area is satellite remote sensing: crop yield estimation and forecasting using optical and radar data.

We developed a family of wave instruments for ULF-VLF band measurements (SAS instruments) with the BL Electronics Ltd. The SAS's successfully flew on several satellites and on ISS.

We established and operate the global Automatic Whistler Detector and Analyzer Network (AWDANet), that is capable to monitor the electron density of the plasmasphere in near real-time – a key parameter for wave-particle interaction.

We developed an ultra-wide band solution of Maxwell's equations, valid also for relativistic case also.

We developed a robust yield forecasting method for major crops that does not require ground truth data.

: János Lichtenberger
: +36 1 372 2934
@ : spacerg@sas.elte.hu

SINCE : 1970
2020 : 12 / 12 persons
16/20 : 6 projects

MAIN PROJECTS

- Active-Intercosmos 24: SAS1
- Chibis-M: SAS3
- EU FP7-Space: PLASMON - AWDANet
- Trabant: SAS3
- ESA: PLASMA

LABS

Automatic Whistler Detector and Analyzer Network

CENTRE FOR ENERGY RESEARCH

address: 1121 Budapest, Konkoly-Thege Miklós út 29-33.
postal address: 1525 Budapest, Pf. 49
web: *www.ek-cer.hu* *www. spacedosimetry.com*

ELKH Eötvös Loránd Kutatási Hálózat

Centre for Energy Research (EK) is a member of the Eötvös Loránd Research Network. EK provides technical support for the Paks Nuclear Power Plant and the Hungarian Atomic Energy Authority. It operates the 10 MW Budapest Research Reactor and the Budapest Neutron Centre. The main fields of activities are R+D+I in the field of nuclear techniques, renewable energy research, technical physics and materials science. EK has five decades of experience in developing scientific payloads (active and passive detector systems) and service instruments, esp. for space weather and dosimetry. Activities with TRL higher than 4 are conducted by its spin-off company REMRED Ltd. EK provides radiation analysis services including radiation environment description for different missions/orbits using SPENVIS, OLTARIS and CREME96 tools, radiation transport calculations with the GRAS Monte Carlo tool using Geant4 to provide estimation of TID and LET spectra, and technical support for TID tests at its campus.

: Attila Hirn
: +36 1 392 2291
@ : spacelab@ek-cer.hu

SINCE : 1991
2020 : 7 / 386 persons
16/20 : 13 projects

MAIN PROJECTS

- ISS Russian Segment service dosimetry system
- IDA instrument suite for the Lunar Gateway
- RadMag-L space weather instrument development
- Vega–1, –2, Rosetta/Philae,

LABS, CERTIFICATION

- ISO 9001:2015
- Irradiation Facility (neutron, alpha and gamma radiation sources)

ENVIROSENSE HUNGARY LTD.

TD-26

address: 4281 Létavértes, Bem J. u. 6/A
web: *www.envirosense.hu*

Envirosense Hungary Ltd. is a remote sensing specialist – focusing on the use of various remote sensing technologies (aerial, UAV, satellite) for several applications and target groups. The services of the company include data acquisition, data processing, product development and development and operation of automated map services based on remote sensing data.

The company's activities connected to EO focuses on the development of web-based information services to various fields of applications e.g. agriculture, environmental monitoring or insurance sector. These R&D activities include the upgrade of automated downloading, automated geotransformation process development, automated algorithm developments for vector and raster products as well as change detection and developments of alarm services. These map services can be expanded with other data sources (e.g., databases or sheets) and merged with aerial remote sensing data products.

: Gyöngyi Varga Orsolya
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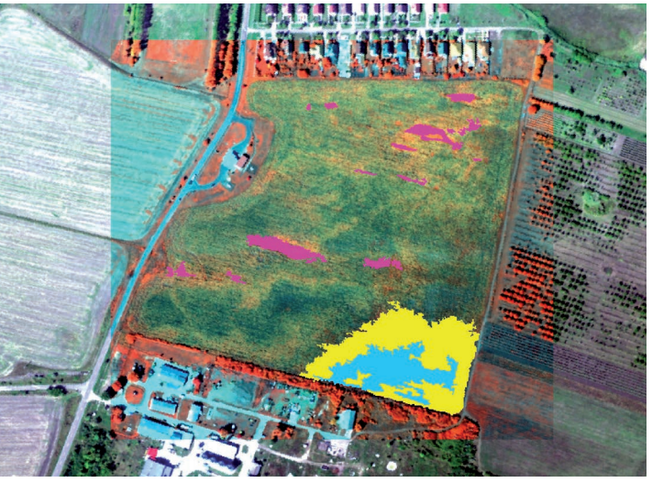
SINCE : 2009
2020 : 5 / 21 persons
2020 : 140 / 453 M Ft



MAIN PROJECTS

• Upgrading of automated downstream systems, preprocess, data registry and categorisation
• Development of automated vegetation index map generating algorithms
• Development of an information service system for the agricultural insurance business based on multispectral satellite data
• Automated land-use classification based on multispectral satellite data

PLATFORMS

• Aerial platforms to collect additional remote sensing and reference data
• Full spectrum of supercomputing hardware and software

INSTITUTE OF EARTH PHYSICS AND SPACE SCIENCE

TD-26

address: 9400 Sopron, Csatkai E. u. 6-8.
web: *epss.hu*

The leading profile of the institute, besides geophysics and geodetic research, is the study of the near-Earth environment and Space Weather. The research is based on the measurements at the Széchenyi István Geophysical Observatory, the data provided by various spacecraft and international networks. Data processing and interpretation goes back decades at the Institute.

Space Weather represents an increasing danger on critical infrastructure and on digital technology, therefore the research focusing on these phenomena is of strategic value. The research is focusing on five key topics: ionosphere (communication), magnetotellurics (geomagnetically induced currents, power network, and critical infrastructure safety), processes at the Earth's magnetosphere boundary (effect of solar eruption, solar-terrestrial relationship, particle acceleration processes), disturbances of the Earth's magnetic field (geomagnetic storm) and space geodesy.

: Árpád Kis
: +36 99 508 350
@ : kis.arpad@epss.hu

SINCE : 1957
2020 : 10 / 60 persons
16/20 : 10 projects

MAIN PROJECTS

• ESA Space Situation Awareness/Space Weather and related COST actions
• EURISGIC (European Risk on Geomagnetically Induced Currents)
• Cluster és MMS mission
• Dayside Transient Phenomena and Their Impact on the Magnetosphere-Ionosphere (ISSI research group)
• Integrated Sentinel-PSI and GNSS technical facilities and procedures for the determination of 3D structure deformations caused by environmental processes
• (ESA PECS)

LABS

• DPS4D ionosonde
• INTERMAGNET and geoelectric measurements (GIC)
• ULF, ELF, VLF range EM measurements (AWDAnet)
• ZERO MAGNETIC FIELD LABORATORY (under constr.)
• Sentinel–1 national and international networks for movement detection

GEO-SENTINEL RESEARCH, SERVICE AND CONSULTING LTD.

address: 2132 Göd, Kacsóh P. u. 13.
postal address: 1775 Budapest, Pf. 29
web: *www.geo-sentinel.hu*

TD-26

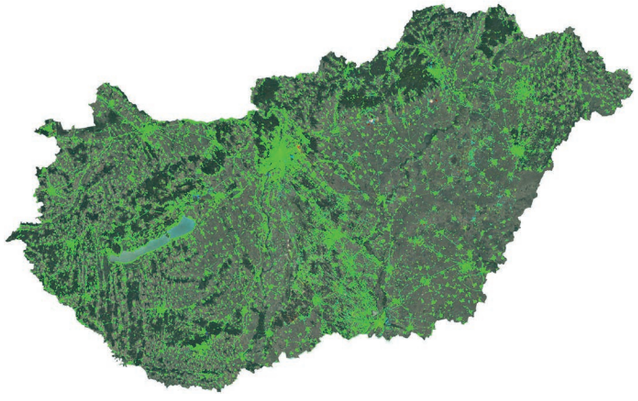
TD-10

10.2

The company is a leading provider of precise deformation monitoring services. We apply state-of-the-art techniques including satellite- and ground-based synthetic aperture radar interferometry and global navigation satellite systems. Team members have two decades of experience in leading scientific research and development projects and have space geodetic work contracts with industrial customers and ESA. The high-precision deformation studies are essential to understand natural hazards and the effects of anthropogenic activities. In 2020, Geo-Sentinel has developed a national ground motion monitoring system, created Hungary's first high-resolution ground motion map. The database contains 6-year movement history of more than 14 million points, with an average of 100 independent observations in each. To emphasize the importance of space science for society and economy, we manage the space-related news portal Űrvilág, and represent Hungary in the EU Copernicus Academy Network.

: Péter Farkas
: +36 30 785 4075
@ : info@geo-sentinel.hu

SINCE : 2015
2020 : 2 / 2 persons
2020 : 33 / 33 M Ft



MAIN PROJECTS

- Investigation of Sentinel-1 potential in effective, sustainable and safe development and management of geothermal resources, European Space Agency
- Sentinels for Floodplain Hydrology, European Space Agency
- Sentinel-1 for Large-Scale Linear Infrastructure Systems, European Space Agency
- Operation of space geodetic monitoring systems of nuclear industrial establishments
- Demonstration and introduction of new infrastructure health assessment technology in the Balkans, HEPA Nzrt.

GEOADAT LTD.

address: 1077 Budapest, Wesselényi utca 16.
web: *www.geoadat.hu*

TD-26

GeoData Services offers high-quality solutions for customers with geoinformation database requirements in the following areas: utilities, agriculture, land-use and territorial planning, and other professions, quality management and process control, Earth observation. Our purpose is to develop advanced technologies for our customers so that they can use their data in a more efficient way. GeoData Services has been offering remote sensing services since 1997. According to our experience, remote sensing and Earth observation data can support tasks efficiently in the following areas:

- State administration (examples are agriculture subsidy control, disaster recovery, environmental protection, land-use and areal planning)
- Agriculture (examples are precision farming, yield estimation, eco and bio production)
- Industry (examples are transportation, navigation, building construction, insurance).

: Péter Hargitai
: +36 30 602 1020
@ : geoadat@geoadat.hu

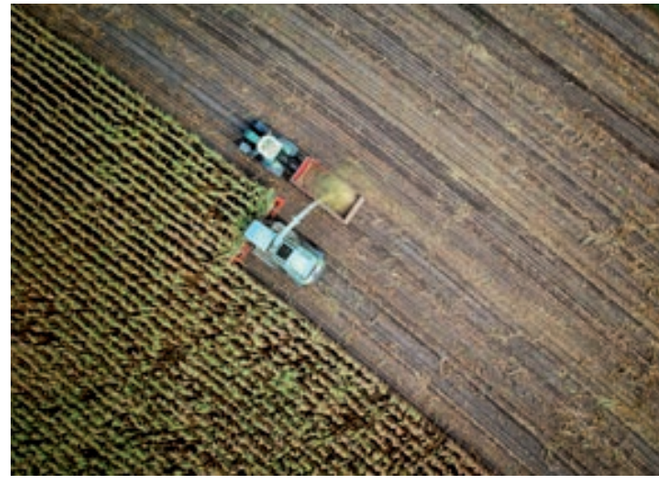
SINCE : 1997
2020 : 11 / 15 persons
2020 : 254 / 312 M Ft

MAIN PROJECTS

- Control with Remote Sensing (CwRS) in Germany for federal states
- Update of the German Land Parcel Identification System (LPIS)
- Agricultural Biomass Monitoring (EUREKA applied research)
- Recycling resource management with Earth observation decision-support information (REMEDI)
- Demonstrating EO image information mining solutions in mobile imaging domain (EO.TAG)

CERTIFICATES

- TÜV ISO-9001, ISO-27000
- TÜV ISO-9001, ISO-27000



GEOIQ IMAGINE LTD.

TD-26

TD-2
2.5

address: 2098 Pilisszentkereszt, Kakashegy utca 56.
web: *www.geoiq.hu*

The founder of GeoIQ Imaging has started selling image processing software packages back in 1990. We are also reselling satellite images representing in Hungary several large international image providers. To complement in-house expertise, GeoIQ Ltd. maintains a large roster of associate consultants who are available for short term assignments.

We have 31 years of experience selling satellite image processing packages. We have more than 16 years of experience selling satellite imagery. Most of the large projects involving satellite imagery in Hungary using software and imagery delivered by GeoIQ Ltd. We have close relationships with universities and research institutes around Hungary and they are among our regular clients.

: Gábor Kákonyi
: +36 30 931 0626
@ : kakonyi@geoiq.hu

SINCE : 1992
2020 : 1 / 1 persons
2020 : 59 / 59 M Ft

MAIN PROJECTS

- Earth Observation Information System, (FIR in Hungarian)
- Land Parcel Identification System (MEPAR in Hungarian)

LABS

- Exclusive Hungarian reseller of Planet Inc.
- The Hungarian reseller of EU Space Imaging
- Member of the MAXAR DigitalGlobe Alliance
- Reseller of MAXAR MDA Geospatial
- Reseller of Capella Space in Hungary

GOODWILL-TRADE LTD.

TD-23

TD-14
14.2

TD-18
18.2
18.3

TD-20
20.10

TD-24
24.2

address: 4220 Hajdúböszörmény, Külső-Hadházi u. 24.
web: *www.goodwilltrade.hu*

Our company is dealing with design and construction of special machines and the production of precision milled and turned parts.

Our space related activity concerns flight testing as we designed and developed vacuum chambers for space simulation, testing the spare parts which will be sent to the space.

We also developed the production technology of structural parts used in flying hardware and ground based facilities. We can produce thin wall structural parts made from high strength aluminium alloys. We can also produce spare parts from several special alloys like Inconel, Invar, Titanium alloys, Molybdenum and Tungsten alloys.

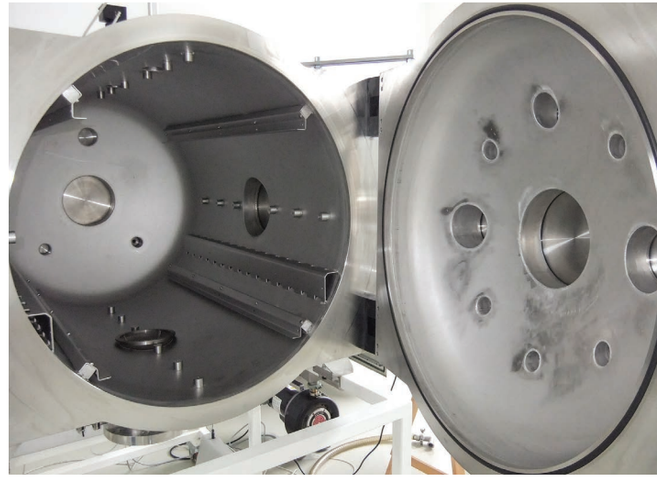
We are in cooperation with some research and development institutes in Hungary, and involved in projects concerning the instrumentation in support of physical sciences. We are experts in the development of those equipment that need vacuum conditions and gas handling during their operation. We designed and constructed a Super critical extractor equipment.

: Nóra Oláhné Szekeres
: +36 70 252 7293
@ : olahne.nora@goodwilltrade.hu

SINCE : 1993
2020 : 20 / 20 persons
2020 : 18 / 300 M Ft

MAIN PROJECTS

- Producer and supplier of cartridges for foaming the FOCUS experiment in ISS Columbus modul (2006-2010)
- Structural part producer and supplier of Sentinel-2A and Sentinel-2B (MSI) MMTH-Metallic Mechanical and Thermal Hardware (2010-2013)
- Producer and supplier of CHEOPS FPA radiator + FEE radiator (2016-2016)
- Helium leak test
- Design and construction of a vacuum system for laser remote sensing of planetary atmospheric research



H-ION RESEARCH, DEVELOPMENT AND INNOVATION LTD.

address: 1121 Budapest, Konkoly-Thege Miklós út 29-33.
web: *www.hion.hu*

TD-21
21.3

TD-24
24.1

H-ION Ltd. has started its first space industry related materials sciences projects 4 years ago. Currently we have one running project and three in preparation.

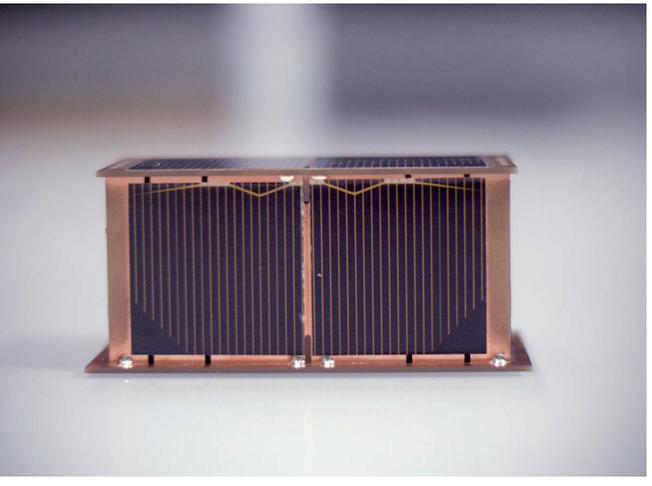
Our activity covers two main areas:

- materials science research and development – the creation of innovative materials with new structures and properties
- development and production of flow chemistry equipment and systems

Providing materials science research and development services for high temperature functional and structural applications of thermal insulators and alloys. Development of thermal insulators for applications above 1500 °C. Design of material testing solutions in 1PQ-1U satellite size. Reactor design, construction, microfluidical experiments, and implementation of 1U size microgravity experiments. Research and development of geometry-independent electrical shielding insulators which can be applied as coated surface layers. Nanosatellite trajectory modification methodology research.

: Attila Komáromy
: +36 70 506 7911
@ : attila.komaromy@hion.hu

SINCE : 2011
2020 : 5 / 30 persons
2020 : 34 / 771 M Ft



MAIN PROJECT

- ATL-1 2PQ nanosatellite

LABS

- Zeiss Sigma-300 type electron microscope
- FOUNDRY-MASTER Optimum type spectrometer
- Metallurgy laboratory
- Vacuum operational melting furnace
- Microreactors

HUNGARO DIGITEL PLC.

TD-12
12.2

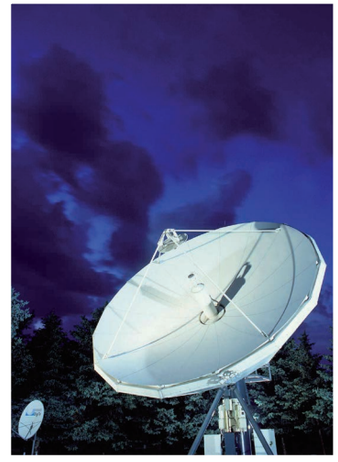
address: 2310 Szigetszentmiklós-Lakihegy, Komp u. 2.
web: *www.hdt.hu*

Hungaro DigiTel Plc. is Hungary's leading satellite telecommunications service provider offering state-of-the-art telecommunications solutions for both public and private clients.

Hungaro DigiTel offers its partners high reliability, fully managed satellite data transmission (VSAT), Internet, satellite uplink and a variety of value-added services, implemented and monitored according to strict quality standards. The VSAT service is provided exclusively by Hungaro DigiTel using its own satellite centre.The VSAT technique has various advantages such as flexible network configuration and modification, quick installation, global availability and independence from terrestrial networks.

MAIN PROJECTS

- VSAT



: Ferenc Tóth
:
@ : info@hdt.hu

SINCE : 1990
2020 : 44 / 48 persons
2020 : 3299 / 4896 M Ft

INFOBEX IT AND SERVICE PROVIDER LTD.

TD-12
12.1

address: 6000 Kecskemét, Kisfái tanya 207/A.
postal address: 6500 Baja, Szegedi út 121. fsz. 2.
web: *infobex.hu*

The main activity of our company is IT developments and IT operation. Thanks to our customer-centric approach, we have become a direct user and provider of satellite terrestrial navigation in the last 7 years. We treat individual needs as a challenge, which is why we can operate the largest RTK network in Hungary.

In 2014, our company built a network capable of receiving terrestrial navigation satellite signals for the RTK correction signal service, which it also operates and has been providing under its own brand name since 2016. Knowing the needs, we have started a modern terrestrial reference network that can detect the satellite navigation signals of the 4 satellite systems (GPS, Glonass, Galileo, BeiDou). Thanks to the financial support of ESA, we are the first to make the 4GNSS RTK signal service available for agricultural, geodetic applications and autonomous vehicles throughout Hungary from August 2021.

: Zoltán Németh
: +36 30 454 7646
@ : zoltan.nemeth@infobex.hu

SINCE : 2011
2020 : 5 / 53 persons
2020 : 20 / 963 M Ft

MAIN PROJECT

• 4GNSS RTK

INNOBAY HUNGARY LTD.

TD-24
24.1

address: 3519 Miskolc, Trencséni u. 24.
web: *www.innobay.hu*

Our goal is to provide companies and government organisations with innovationbusiness development and economic development services. The company has a back-ground in engineering and physics, led by Norbert Babcsán. The company's professional back-ground covers the fields of material, energy and space industry, supplemented with living material systems and processes.

Previous space activities of Norbert Babcsán, the founder of Innobay Hungary Ltd.: microgravity experiments in the Bremen drop tower, participation in the establishment of the Space Generation Advisory Council, semiconductor single-crystal research with NASA, the first Hungarian parabolic flight, aluminum foams and technology innovations (Metal-Minipore, Aluhab) and aluminium foam diagnostic method development (UMFA) projects for ESA.

Our company's space research competency serves the better understanding of the impact of weightlessness. Space technology competence help to create Hungarian start-up companies.

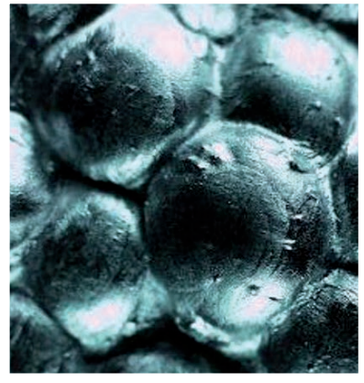
: Norbert Babcsán
: +36 30 415 0001
@ : info@innobay.hu

SINCE : 2011
2020 : 1 / 2 persons
2020 : 2 / 28 M Ft

MAIN PROJECTS

• Metal foam and equipment development by the melt route for low gravity test (Metal-Minipore)

• Aluhab- Metal minipore 2: Characterisation of bulk and shaped Aluhab for space applications



INNOSTUDIO INC.

address: 1031 Budapest, Záhony u. 7.
web: *www.innostudio.org*

InnoStudio Inc. is a member of the ThalesNano/Darholding Group, being one of the largest upstream technology networks in the CE region in Europe. It is a high-risk, high-gain corporation focusing on the development of flow chemical reactors for space, chemical and pharmaceutical applications, nanotechnology, agrochemical AI and drug discovery supported by IT technology.

Our research and core activities serve the development of innovative technologies for sustainability both on Earth and in space and ensure human well-being at long-term:

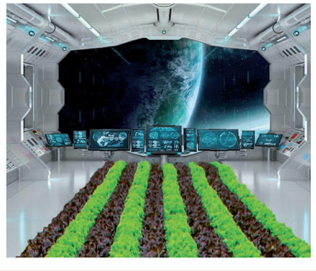
- flow chemical reactors for space applications and on-demand pharmaceuticals production for space applications
- application of nanotechnology for space plants production
- CO2 sequestration and optimisation of its utilisation
- space mining via innovative flow technology method
- launch and management of the international Space Chemistry Consortium
- organisation of the regularly held international Space Chemistry Symposium

: Ferenc Darvas
: +36 1 880 8500
@ : ferenc.darvas@innostudio.org

SINCE : 2013
2020 : 7 / 10 persons
2020 : 55 / 115 M Ft

MAIN PROJECTS

- Development of modular flow chemistry reactor and miniaturized autonomous laboratory for microgravity and space applications (HU-ISR bilateral project)
- Chemical formulation experiments on ISS (SpaceX, CRS-19)
- COVID-19 drug research on ISS (SpaceX, CRS-21)



ISOTOPTECH INC.

address: 4025 Debrecen, Piac utca 53. II. em. 9.
postal address: 4001 Debrecen, Pf. 390
web: *www.isotoptech.com/hu/*

Our main profile is engineering research and development. Our basic activity is the monitoring of nuclear power plants and radioactive waste disposal facilities. Most of our customers require special methods and measurement techniques to solve their problems. This necessitates the up-to-date expertise of our researchers, as well as the continuous development of our analytical instruments.

Our activities and analyses require special methods and measurement techniques. In addition, many of our partners have unique requests which can't be fulfilled using only the methods described in literature. In some cases, we have to adapt the existing methods to the task, but most of the time we have to develop new and unique methods, equipment. Our well-equipped electronic and mechanical workshop can support our activities in this field.

MAIN PROJECTS

- Europlanet 2024 Research Infrastructure

LABS

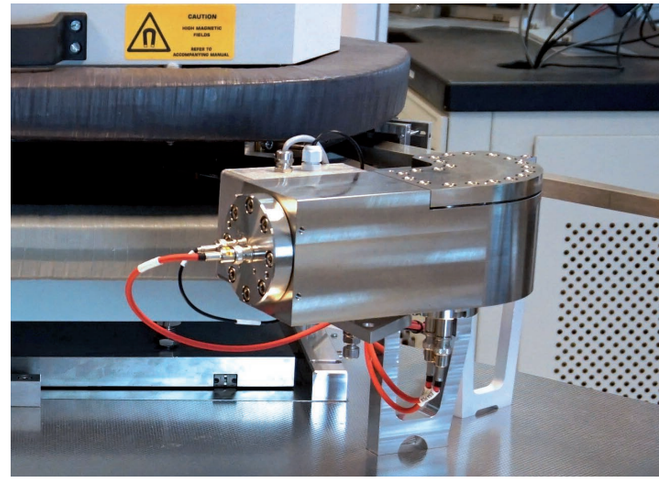
- Elemental and isotope-ratio analytical laboratory
- Radiochemical and radioanalytical laboratory
- Electronic and mechanical laboratory

CERTIFICATES

- MSZ EN ISO/IEC 17025: 2018
- MSZ EN ISO 9001: 2015
- MSZ EN ISO 14001: 2015

: Mihály Veres
: +36 52 509 280
@ : veresmihaly@isotoptech.hu

SINCE : 1997
2020 : 6 / 45 persons
2020 : 45 / 927 M Ft



TD-15
15.7
TD-20
20.1
20.10

address: 9081 Győrújbarát, István utca 176.
web: *www.jglobe.hu*

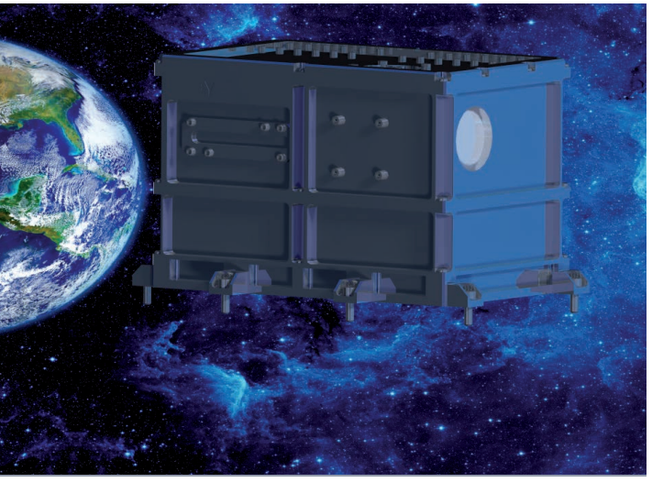
Radcube IOD 3U CubeSat mission: in the framework of which we manufactured the whole mechanics of the RadMag radiometer for the Centre for Energy Research (CER) for both the engineering development and the aviation units, then we made the frame structure of the Radcube satellite, the antenna opening unit and the related PCB holders.

D3S-RadMag space Radiation and Magnetic field measuring instrument: in the framework of the development concept of the distributed space weather sensor system of the European Space Agency (ESA), we have developed a combined space radiation and magnetic field measuring instrument jointly with the researchers of REMRED and CER, by means of which the ESA will perform measurements in a mission of a constellation of small satellites intended for space weather measurements in the near future. The development of the instrument was accepted by the ESA.

Conceptual mechanical design of the IDA (Internal Dosimeter Array) Payload (experimental unit) on board the US HALO module of the space station around the Lunar Gateway.

: Erika Rácz
: +36 96 543 286
@ : erika.racz@jglobe.hu

SINCE : 1998
2020 : 5 / 41 persons
2020 : 11 / 988 M Ft

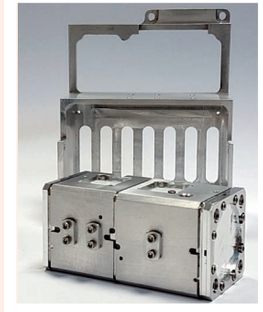


MAIN PROJECTS

- Radcube IOD 3U CubeSat,
- D3S-RadMag,
- INTERNAL DOSIMETER ARRAYON BOARD THE THE LUNAR GATEWAY

CERTIFICATES

- ISO 9001:2015



address: 2614 Penc, Sügyipuszta, Obszervatórium
postal address: 1592 Budapest, Pf. 585
web: *www.sgo-penc.hu*

The Satellite Geodetic Observatory (SGO) is a department of the Lechner Nonprofit Ltd. SGO has a separate premise at 50 km North of Budapest and well distinguished scope of duties. Our dedicated task is to perform basic and applied research in the field of space geodesy and also to understand and implement those technologies in the Hungarian geodetic practice.

The two main RDI fields within the SGO are the GNSS positioning and satellite radar interferometry. We are developing geodetic reference infrastructures like GNSSnet.hu, INGA, MGGA, and SENGA. Based on these infrastructures, we provide services for RTK positioning and GNSS calibration. SGO has a broad international cooperation network and participates in European scale projects as EPOS ERIC and EGMS. The main research field is the modernisation of the Hungarian height reference and its infrastructure based on space geodetic technologies.

TD-10
10.2

: Ambrus Kenyeres
: +36 27 200 801
@ : ambrus.kenyeres@lechnerkozpont.hu

SINCE : 1976
2020 : 10 / 17 persons
16/20 : 2 projects

MAIN PROJECTS

- EUREF Permanent Network Densification
- European Plate Observing Sytem ERIC – GNSS Thematic Core Service
- European Ground Motion Service
- Earth Observation Information System InSAR validation

LABS

- K-GEO Accredited Calibration Laboratory
- Acticve GNSS network (GNSSnet.hu) with 35 stations
- GNSS Geokinematic Reference Network (MGGA) with 23 stations
- Sentinel–1 InSAR reference network (SENGA) with 8 stations
- Bernese and GAMMA software for scientific and commercial applications
- GNSS Analysis Centre for geokinematic and meteorology processing capacities
- set of field GPS measuring units

LECHNER KNOWLEDGE CENTRE NON-PROFIT LTD.
REMOTE SENSING DIVISION

TD-26

address: 1111 Budapest, Budafoki út 59. E/3. épület
postal address: 1592 Budapest, Pf. 585
web: *www.lechnerkozpont.hu/en/oldal/remote-sensing*

In 2019, Lechner Non-profit Ltd., a professional background institution of the Prime Minister's Office, has become the organization managing the largest asset of spatial data and covering the widest field of geospatial expertise in Hungary. By reorganizing activities related to geodesy, remote sensing and GIS as well as duties of land registry and cartography from the former Institute of Geodesy, Cartography and Remote Sensing into the Knowledge Centre, it is now one single professional background institution that concentrates geospatial data sets and resources in Hungary.

The Remote Sensing Division of Lechner Knowledge Centre focuses its activities on collecting, acquiring, processing and analysing remotely sensed data and country-wide thematic mapping, along with research and development related to the above. We create thematic products in a variety of application fields, based primarily on the analysis of optical and radar satellite image time series. We play central role in the coordination and quality control of European land cover mapping activities, provide training for experts from the 39 participating states and contribute to strategic developments shaping the future of this field.

: Gábor Mikus
: +36 1 460 4229
@ : gabor.mikus@lechnerkozpont.hu

SINCE : 1976
2020 34 / 34 persons
16/20 3 projects

MAIN PROJECTS

- Land cover mapping since 1990
- National Ecosystem Base Map
- Establishing the Earth Observation Information System
- Operational remote sensing, drought and excess water mapping in the frame of the Agricultural Risk Management System
- Agricultural applications, mapping of crops and grasslands

HUNGARIAN ASTRONAUTICAL SOCIETY

address: 1044 Budapest, Ipari park u. 10.
web: *www.mant.hu*

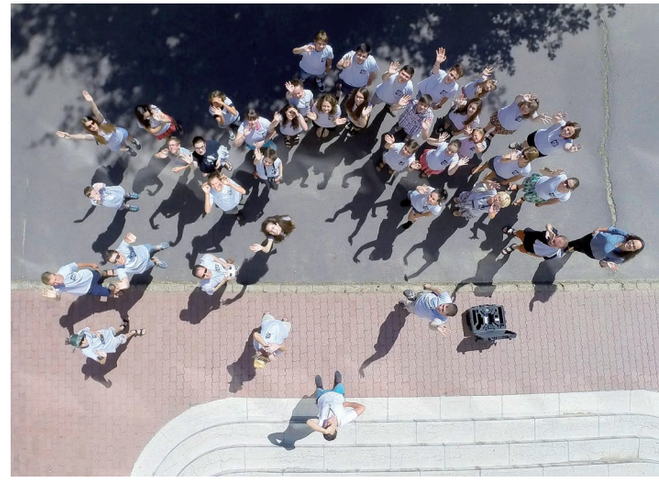
The main aim of our non-profit civil organisation is to raise public awareness about space exploration and applications, with special emphasis on the younger generations. We promote the interdisciplinary and state-of-the-art exploitation and research of outer space, facilitate professional collaborations, by means of providing an opportunity for space enthusiasts to meet, exchange ideas and work together. We represent Hungary in the International Astronautical Federation (IAF) since 1959. We collaborate with other international organisations, e.g. the Space Generation Advisory Council, and host domestic and international conferences. We publish books and newsletters, organise annual student competitions, summer space camps (since 1994) and space academy events (since 2015). We regularly participate in major public science popularisation events. The Society has a rich history and considerable know-how in space-related education and outreach.

MAIN PROJECTS

- Student space contest (since 1991) and „Towards Space" competition (since 2020)
- MANT Space Camp (since 1994)
- MANT Space Academy and Space Academy Club (since 2015)
- Space Day (since 1992)
- Hungarian Space Forum (since 1972)
- IAC 2024 Budapest Bid - leading the bid for hosting the IAC in Hungary

: Anna Krisztina Székely
: +36 30 928 4286
@ : iroda@mant.hu

SINCE : 1956



MINING AND GEOLOGICAL SURVEY OF HUNGARY, DEPARTMENT OF GEOPHYSICAL OBSERVATORIES AND BASIC RESEARCH

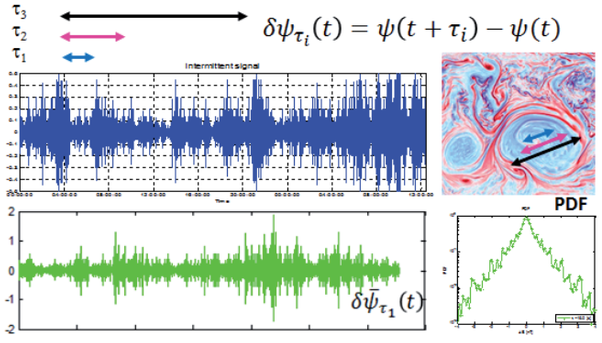
address: 1145 Budapest, Columbus u. 17-23.
postal address: 1590 Budapest, Pf. 95
web: *www.mbfsz.gov.hu*

MBFSZ was established in 2017 by the successive fusions of Eötvös Loránd Geophysical Institute, Geological Institute of Hungary and Hungarian Mining Office. In Hungary, the survey is the prime authority for performing mining-related official tasks. Besides, the survey also conducts applied and fundamental research in several fields of geological and geophysical studies. MBFSZ maintains Hungary's geoscience database.

MBFSZ's space activity concerns fundamental research in the field of plasma dynamics in the terrestrial magnetosphere/ ionosphere, as well as in the solar wind. The main focus is on the investigation of ULF plasma wave phenomena and on the monitoring and modelling of plasmasphere dynamics. We also concern nonlinear (incl. turbulent) plasma fluctuations in the space plasma. The studies rely both on field and spaceborn (Swarm, VAP, Cluster, Ulysses) observations. MBFSZ participates in projects devoted to the development of magnetometers and data acquisition systems for observatory use.

: Balázs Heilig
: +36 87 448 501
@ : heilig.balazs@mbfsz.gov.hu

SINCE : 1954
2020 : 3 / 12 persons
16/20 : 6 projects



MAIN PROJECTS

- EU FP7 PLASMON, STORM
- ESA PECS: Swarm for Space Weather
- ESA: EPHEMERIS
- ESA Swarm DISC: PRISM
- ESA SSA: SUA, PLASMA

LABS

- Tihany Geophysical Observatory
- Coordinator of EMMA (European quasi-Meridional Magnetometer Array, 25 stations)
- Geomagnetic repeat-station network

CERTIFICATIONS

ISO 9001:2015

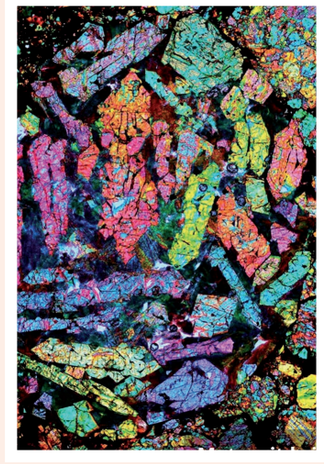
HUNGARIAN ASTRONOMICAL NON-PROFIT LTD.

address: 9400 Sopron, Csatkai Endre u. 6-8.
web: *www.mcsnkft.hu* *www.svabhegyicsillagvizsgalo.hu*

The MCSN Ltd. is a non-profit company that works on the technological, scientific and outreach aspects of space. It has developed the technological facilities of the Svábhegy Observatory Interactive Astronomical Science Centre. Participated in the CAMELOT astrophysical nanosatellite project to investigate the research potential of the CubeSat fleet. Organised the 13th International Olympiad of Astronomy and Astrophysics in Hungary. Scientific and technological improvements: investigation of the research potential of the CAMELOT astrophysical nanosatellite fleet, development of polarisation, fluorescence and interferometric microscopic system for meteorite analysis linked to multimedia projection system; planet observing system for UV, IR and CH_4 bands; development of interactive laser, spectroscopic and fluorescence instruments for demonstration.

MAIN PROJECTS

- CAMELOT
- GRBAlpha



: Áron Keve Kiss
: +36 30 358 5120
@ : magyarcsillagaszat@gmail.com

SINCE : 2017
2020 : 0 / 0 persons
2020 : 0 / 14 M Ft

HUNGARIAN SOLAR PHYSICS FOUNDATION

address: 5700 Gyula, Petőfi tér 3.
web: *hspf.eu*

TD-4
4.3
TD-12
12.1
12.2
TD-16
16.1
TD-17
17.2

We create an environment for Hungarian observations for scientific research in astronomy, space physics, and environmental physics, solar and heliophysical scientific research and education, process and publish the obtained data via professional and educational forums. We support and promote research, making research data accessible for a wider public in Hungary and abroad.

The interaction of solar activity with the Earth's upper atmosphere occurs through a complex series of abrupt events often referred to as Space Weather (SW). The Sun plays an important role in determining SW, because it emits not just a constant stream of particles in the form of solar wind but also is the wiring of the most energetic explosions – solar flares and fast Coronal Mass Ejections (CMEs) – in our Solar System. We have developed a Space Weather warning network (SAMNet) that aids to protect our technosphere, i.e. assets in space and on the ground.

: Róbert Erdélyi
: +36 70 296 3158
@ : solarphysicsfoundation@gmail.com

SINCE : 2016
2020 : 6 / 7 persons
16/20 : 5 projects

MAIN PROJECTS

- Solar Orbiter mission (SPICE camera)
- Aditya (first Indian solar mission)
- Solar Activity Monitor Network (SAMNet - http://hspf.eu/samnet.html)
- Sheffield Solar Catalogue (aiding Space Weather forecasting)

LABS

- SSC (Sheffield Solar Catalogue for our market-leading WG_M Space Weather forecasting sunspot-based tool)

MATMOD LTD.

address: 3534 Miskolc, Kandó Kálmán u. 5.
web: *www.matmod.eu*

TD-24
24.2

MATMOD provides environment friendly surface treatment technologies for satellite hardware. The substitution of Alodine system is on focus. The SURTEC 650 chemical family is used to provide a corrosion resistant layer. The company has qualified processes for the treatment recognised by ESA and Airbus. The treatment is offered as a service with a combination of space quality paintings.

Conversion coating development as a substitution of Alodine. SURTEC650 is used in the development in a cooperation with ESA and Admatis. The new environment friendly conversion coating is qualified for the following aluminum alloys:1xxx, 2xxx, 5xxx, 6xxx, 7xxx.

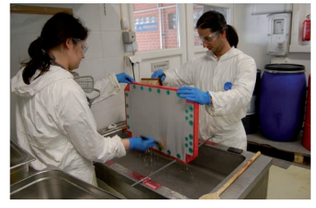
The treatment can be applied selective using special masking technology. The repair technology is also qualified. The coating can be top-coated internally with the following thermo-optical black or white paints: MAP PU1, MAP PUK, MAP SG121FD, Aeroglaze Z306. The conversion coating application and paintings are offered as a service for customers.

MAIN PROJECTS

- As a support entity of Admatis the materials science activities are in the focus that were used in Sentinel-2 and CHEOPS missions.

LABS

- The production line is available internally for SURTEC 650 treatment with all the required test facilities.
Space qualified painting booth is also available at the site in cleanroom environment to allow the paint application within a couple of hours.



: Tamás Bárczy
: +36 70 218 3068
@ : barczy.tamas@admatis.hu

SINCE : 2008
2020 : 2 / 2 persons
2020 : 30 / 42 M Ft

UPS RESEARCH GROUP FOR SPACE ECONOMY AND NATIONAL ECONOMY COMPETITIVENESS

address: 1083 Budapest, Ludovika tér 2. Stratégiai-Fejlesztési Iroda
web: *www.unvk.uni-nke.hu*

The Research Group for Space Economy and National Economy Competitiveness of the University of Public Service (UPS) is promoting the development of the Hungarian space sector and space industry – as the future branch of industry – by its scientific-technical research work and activities.

By incorporating the latest research findings the Research Group participates

- in the scientific-professional elaboration of the coordination tasks of the state,

- in establishing the system of effective and efficient cooperation of the public and private sectors in order to exploit, as fully as possible,

- the advantages presented by technological development and knowledge-based economy and thus, the possibilities to generate higher domestic added value.

The Research Group is investigating and teaching the impacts of targeted economy development and economy incentive in space industry.

: Bianka Parragh
: +36 70 318 7777
@ : parragh.bianka@uni-nke.hu

SINCE : 2020
2020 : 5 / 5 persons
16/20 : 0 projects

MAIN PROJECTS

• Economy Implication of the Hungarian Space Strategy,

• State Involvement and Space Industry Policy University Course (NUPS),

• Space Industry and Economic Policy Handbook,

• Conception of the Economic Policies Promoting the Development of the Space Sector – Space Economy and Institutional System

UPS OUTER SPACE AND SOCIAL SCIENCES RESEARCH CENTRE

address: 1083 Budapest, Ludovika tér 2.
web: *vtkm.uni-nke.hu*

The Research Centre is the only Hungarian dedicated academic institution that deals specifically with space law and space policy. The University of Public Service is appointed as the National Point of Contact of the European Center for Space Law (ESA). Our goal is to provide the necessary legal and policy competencies for the developing Hungarian space industry and space diplomacy.

A strong space industry, effective diplomacy is inconceivable without adequate legal, regulatory, security and defense policy knowledge. Our goal is to research space law and policy and to introduce it to higher education. Our book entitled "Space Law" will be published in 2022, we organize several professional workshops and conferences, we teach space law and space policy in English, French and Hungarian at the University Public Service, and it is possible to write a doctoral dissertation on the subject since 2021. We seek to establish further international collaborations.

: Balázs Bartóki-Gönczy
: +36 30 152 3969
@ : bartoki-gonczy.balazs@uni-nke.hu

SINCE : 2020
2020 : 15 / 15 persons
16/20 : 0 projects

ÓBUDA UNIVERSITY
INSTITUTE OF GEOINFORMATICS

address: 8000 Székesfehérvár, Pirosalma u. 1-3.
web: *www.amk.uni-obuda.hu/index.php/hu/*

TD-26

The Óbuda University has been established as the successor of Budapest-based technical colleges. The curriculum contains several courses on different fields of electronic, mechanical, and light industry engineering, engineering informatics, economics, among others. The research activity of the University is coordinated by the University Research, Innovation and Service Center (EKIK).

Research in the field of Earth observation and Remote Sensing is performed at the Institute of Geoinformatics in Székesfehérvár. Space research activity covers fundamental and applied research levels as well. The institute is active in the fields of remote sensing, space gravimetry and GNSS, as well. Several international projects are conducted in the Institute, most of them focusing on educational aspects of Earth observation. The Institute organises the annual GISopen conference, which has a thematic space research section in the most recent years.

: Małgorzata Verőné Wojtaszek
: +36 22 200 414
: wojtaszek.malgorzata@amk.uni-obuda.hu

SINCE: 1972
2019: 2 / 12 persons
15/19: 1 project

MAIN PROJECTS

- IRSEL
- DSinGIS
- GE-UZ
- WAREMA
- VENUS

OMSZ
HUNGARIAN METEOROLOGICAL SERVICE

address: 1024 Budapest, Kitaibel Pál utca 1.
postal address: 1525 Budapest, Pf. 38
web: *www.met.hu*

TD-26

OMSZ is a state-run institution responsible for short- and long-range weather predictions, severe weather warnings, atmospheric environmental and climate information. It operates an extended ground-based and remote sensing measurement network and a complex ICT system. It maintains persistent research and development activities and operative co-operations with various international organisations, like EUMETSAT.

The main applications of satellite data at OMSZ are related to short-range weather forecasting, aviation meteorology and severe weather warnings, where especially imagery and products from geostationary Meteosat and polar orbiting NOAA and MetOp satellites are used. Satellite data are also applied in climatological and agrometeorological studies and are assimilated into our limited-area numerical weather prediction models.

: Eszter Lábó-Szappanos
: +36 1 346 4664
: labo.e@met.hu

SINCE: 1870
2020: 5 / 191 persons
16/20: 8 projects

MAIN PROJECTS

- EUMETrain: International training project sponsored by EUMETSAT to support and increase the use of meteorological satellite data (participation of OMSZ since 2014)
- H-SAF: EUMETSAT Satellite Application Facility on Support to Operational Hydrology and Water Management (participation of OMSZ since 2005)
- ImagineS: Implementation of Multi-scale Agricultural Indicators Exploiting Sentinels (2012-2016)
- INTRO (PECS): INTegrity of TROpospheric Models (2015-2016)

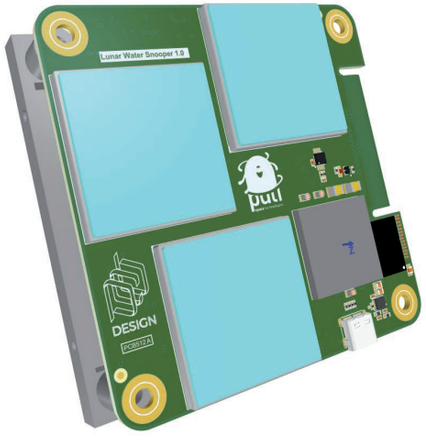
PCB DESIGN LTD.

address: 1117 Budapest, Infopark sétány 3. B.ép.6.em
web: *www.pcbdesign.hu*

PCB Design Ltd. is a professional engineering service provider. We provide system design, schematic capture, PCB layout, IBIS simulation, embedded software development and small series high-end prototyping services. Our key knowledge is designing rugged complex digital systems, with most advanced serial interfaces (10G+). We are proud to have customers from all over the world. Our company is involved in 30+ projects, where we design 150+ PCBs annually. With Safran/Zodiac Aerospace (DE), we have been involved in the development of a modular data acquisition system that transmits telemetry data – including video – from space. We have been designing the PCB for the NASA supported Puli Lunar Water Snooper instrument which is to in-situ identify and measure the subsurface hydrogen (including water ice) content of the lunar regolith. We design according to MIL-STD and DO standards frequently. The engineering team is also experienced in high reliability design and manufacturing techniques.

: János Lazányi
: +36 20 399 7184
@ : janos.lazanyi@pcbdesign.hu

SINCE : 2014
2020 : 9 / 27 persons
2020 : 0 / 391 M Ft



MAIN PROJECTS

• Designing the PCB for the NASA supported Puli Lunar Water Snooper instrument
• Air- and spacecraft development: modular data recorder and communication equipment

LABS, CERTIFICATES

• ISO9001:2015
• Thermal chamber
• High-speed oscilloscope, signal generator, other instruments
• Experience in MILSTD and DO certification measurements

PULI SPACE TECHNOLOGIES LTD

address: 1162 Budapest, Bekecs u. 3.
web: *pulispace.com*

Puli Space Technologies Ltd., based in Budapest, Hungary, was founded in 2010 to enter the Google Lunar XPRIZE (GLXP), the largest technological incentive competition, with the aim to catapult Hungary to the Moon and to become a recognized participant in the fast growing cislunar economy.

Puli's main focus is to develop a low cost, lightweight planetary rover platform with unique high mobility capabilities, which can survive in the harsh lunar environment. The customizable rover will provide transportation, control and communication of various measuring devices that will play an important role in the discovery and exploitation of lunar resources. Our small hydrogen detector, the NASA-awarded Puli Lunar Water Snooper might search for water ice on the Moon as early as 2023. Puli also keeps an eye on Down to Earth applications.

: Tibor Pacher
: +36 70 772 1727
@ : tibor.pacher@pulispace.com

SINCE : 2010
2020 : 4 / 4 persons
2020 : 9 / 9,4 M Ft

MAIN PROJECTS

• Puli Lunar Water Snooper Development for NASA

• SpaceTime Plaque aboard Peregrine Moon Lander

address: 1121 Budapest, Konkoly-Thege Miklós út 29-33.
web: *remred.space*

The primary mission of REMRED Technologies Ltd. is to develop, test and adopt technologies and techniques for space applications, particularly for space research instrumentation for national and foreign industrial users. The company provides specific space industrial services, like vibration and T-VAC testing of small space equipment according to ECSS, cleanroom (ISO7) soldering and assembly, space engineering consultancy and detailed design development of small space equipment in the fields of mechanics, electronics and related software. REMRED Ltd. offers some specific instrumentation as space market products in the field of space weather, cosmic radiation and space dosimetry monitoring. The company has the expertise in coordinating activities related to flight models of specific small equipment and space research instruments from manufacturing through assembly until the end of acceptance testing, including specific calibration campaigns.

: Zsuzsanna Kovács
: +36 20 222 0139
: info@remred.hu

SINCE : 2016
2020 : 9 / 9 persons
2020 : 140 / 140 M Ft

MAIN PROJECTS

- E-Box for IDA on Lunar Gateway
- DPU of the Comet Camera for Comet Interceptor
- Central Unit of HEPS for the Lagrange mission
- RadMag-L for SmallSat
- RADTEL and TRITEL for MSR-ERO

LABS

ECSS-conform

- Space Research and Development Laboratories,
- Vibration Test Facility,
- Thermal-Vacuum Test Facility,
- ISO7 Cleanroom for space equipment production and assembly

address: 1121 Budapest, Konkoly-Thege M. u. 29-33.
postal address 1525 Budapest, Pf. 49
web: *www.sgf.hu*

SGF Ltd.'s main activity covers the development of reliable on-board control and data acquisition systems and their electrical ground support equipment for on-board scientific instruments. The funding for successful participation in space missions was ensured by Hungarian and European tenders and contractual orders from international research institutes.

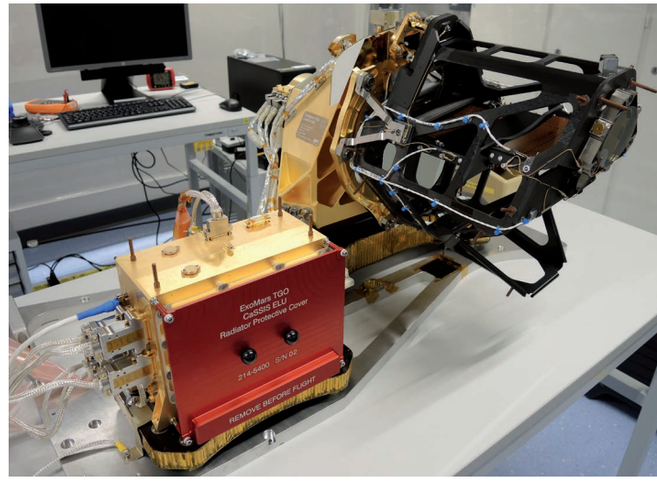
SGF has contributed to several space missions with on-board software and hardware development like the two processor control computer with fault tolerant multitasking real-time operating system for Rosetta-Philae lander, or on-board control software for CaSSIS instrument of ExoMars-TGO probe, or control computers for instruments in Plasma Wave Complex (PWC) experiment on ISS. SGF has also produced Electrical Ground Support Equipment (SW & HW) for different scientific instruments in missions as Philae (SW simulator), MarsExpress, VenusExpress, BepiColombo, Solar Orbiter, JUICE and PWC (ISS).

MAIN PROJECTS

- Significant participation in the hardware and software development of the Command and Data Management System (CDMS) on-board of Rosetta-Philae lander.
- Distributed computer system and software development and Electrical Ground Support Equipment (EGSE) production for the Obstanovka experiment operated on-board of ISS.
- EGSE development for SPICAM instrument of MarsExpress space probe.
- Automated calibration system (hardware and software) development for ASPERA experiment of VenusExpress space mission.
- On-board control and imaging software development for CaSSIS (Colour and Stereo Surface Imaging System) instrument of ExoMars space probe.

: Gábor Tróznai
: +36 30 267 6576
: info@sgf.hu

SINCE : 1996
2020 : 5 / 5 persons
2020 : 101 / 101 M Ft



SPACE APPS LTD.

TD-26

address: 6200 Kiskőrös, Batthyány u. 47.
web: *www.space-apps.net*

Remote sensing, IoT, machine learning and web-based technologies became accessible for every user. Space Apps is researching business perspectives in services based on the synergy of the four domains. In remote sensing, we started with automatic optical image processing, later turned to radar imagery. We use artificial intelligence methods to process data in our hybrid cloud. Additional local measurements are Supplied by our IoT devices.

Projects:

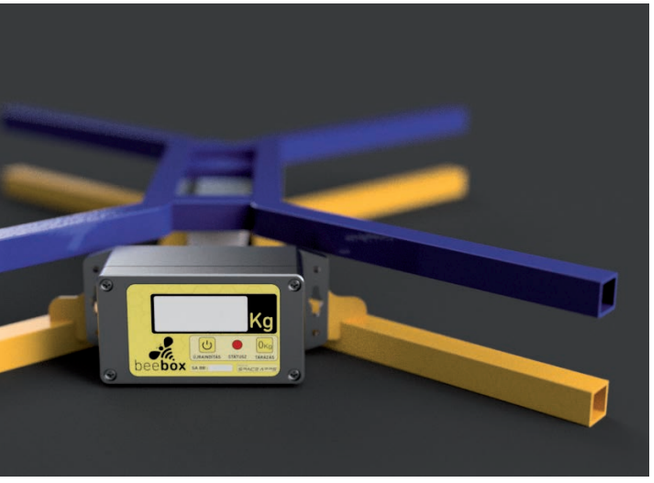
• BeeBox – ESA-BIC: The intelligent hive solution is benefiting from remote sensing, IoT, AI and web technologies, providing useful data for the beekeeper from his hive, and EO data from the surroundings. The first startup project selected by the ESA - BIC Budapest.

• Beeonosphere – GGI: Researching connections between bee behaviour and changes in the ionosphere.

• CropGuard – ESA: A platform developed for farmers to access fresh remotelysensed data of their fields.

: István Arnócz
: +36 20 294 7278
@ : istvan.arnocz@space-apps.net

SINCE : 2016
2020 : 2 / 5 persons
2020 : 16 / 16 M Ft



MAIN PROJECTS

• BeeBox
• Beeonosphere
• CropGuard

UNIVERSITY OF SZEGED
NONLINEAR DYNAMICS AND KINETICS GROUP

TD-14
14.2

address: 6720 Szeged, Rerrich Béla tér 1.
web: *www2.sci.u-szeged.hu/physchem/nld/*

Our team at the Department of Physical Chemistry and Materials Science is interested in chemo-hydrodynamic instabilities in reactive systems. We have successfully utilised our expertise in fluid dynamics to participate in the 56th parabolic flight campaign of ESA in 2012 followed by the MASER-13 sounding rocket in 2015. We are currently participating in the oncoming TEXUS 57 sounding rocket where the flow-driven production of a complex material will be investigated.

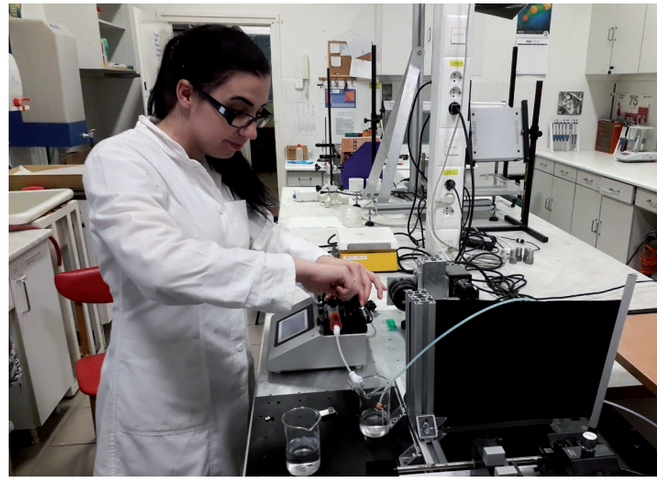
Our expertise, besides the characterisation of hydrodynamic flows of reactive systems, is the experimental investigation of flow-driven complexation and crystallisation, and the related numerical calculations in three spatial dimensions. The outreach of the results goes beyond basic science. Our students, who are interested in pursuing activity in R&D, are not only able to solve complex problems independently, but also become experienced in interdisciplinary fields and can work in international collaborations.

: Dezső Horváth
: +36 62 544 614
@ : horvathd@chem.u-szeged.hu

SINCE : 2008
2020 : 5 / 11 persons
16/20 : 3 projects

MAIN PROJECTS

• 56th ESA parabolic flight campaign
• MASER-13 (CDIC-3 module) sounding rocket campaign
• 73rd ESA parabolic flight campaign
• TEXUS 57 (CHIPY-Flower module) sounding rocket campaign (scheduled to November 2021)



UNIVERSITY OF SZEGED, DEPARTMENT OF AVIATION AND SPACE MEDICINE

address: 6000 Kecskemét, Balaton u. 17.
web: *www.klinikaikozpont.u-szeged.hu/repulo/index_hu.htm*

The Department of AvMed in the University of Szeged has a leading role in research and gradual/postgradual education in aviation and space medicine since 2000, focusing on space-related physiological and psychological problems and spreading scientific information in cooperation with the Aeromedical Institute of Hungarian Defence Forces, participating in grants from EU, ESA and the Hungarian Academy of Sciences.

The lecturers of Dept. of AvMed were formerly actively involved in the specific and successful process for selection of the first Hungarian cosmonaut, Bertalan Farkas, in the former Aeromedical Institute of the Medical Centre of Hungarian Defence Forces. The functional diagnostic test tools and instruments (esp. barochamber) provide venue for active research work even now, to evaluate the cerebral autonomous vasoregulation and oxygen utilisation integrated into Virtual Reality (space) flight settings (e.g. EVA), creating a photorealistic stressful situation for astronaut candidates.

: Sándor András Szabó
: +36 30 815 0179
@ : office.repurt@med.u-szeged.hu

SINCE : 2000
2020 : 2 / 3 persons
16/20 : 4 projects

MAIN PROJECTS

- VOLARE (GINOP-2.3.2-15)
- FIPOK (NKIH KFI 16)
- MTA DOMUS lab improvement

LABS, CERTIFICATES

- MSZ EN ISO 9001:2015
- MSZ EN 15224:2013
- barochamber
- excercise ECG
- tilting table
- pressure breathing test
- EASA (European Aviation Safety Agency) accreditation

WIGNER RESEARCH CENTRE FOR PHYSICS, INSTITUTE FOR PARTICLE AND NUCLEAR PHYSICS

address: 1121 Budapest, Konkoly Thege Miklós u. 29-33.
postal address: 1525 Budapest, Pf. 49
web: *www.wigner.hu/en/institute-particle-and-nuclear-physics*

ELKH Eötvös Loránd Kutatási Hálózat

In the field of space research we focus on space physics, as well as hardware and software development for high reliability onboard instruments, systems and ground support equipment. We had participated in several successful space missions, which substantiates our involvement in upcoming missions. The instrument development and scientific research is funded by national and international grants.

The closest approach phase of the retrograde comet was not possible for the Vega probes with ground control. Our onboard tracking system was used instead, which was the first ever such event in the history of space research. Owing to our firm references we were contracted to develop the critical error tolerant computer of the Philae lander long before Hungary's ESA membership. We used our decade-long experience of hardware and software development to construct dozens of space equipment, including Obstanovka, which contains 12 sensors and 3 computers and is currently on board of the ISS.

: Zoltán Németh
: +36 1 392 2222/1228
@ : nemeth.zoltan@wigner.hu

SINCE : 1992
2020 : 17 / 171 person
16/20 : 9 projects

MAIN PROJECTS

- Vega space probes: onboard tracking and imaging camera; plasma physics instruments
- Cluster mission: ground based data processing and data storage.
- Rosetta spacecraft and Philae lander: Plasma instrument package. Hardware and software development of the central computer, the Command and Data Management System (CDMS) onboard the Philae lander.
- Cassini spacecraft: participation in the construction of the Cassini Plasma Spectrometer (CAPS) and Magnetometer (MAG) instruments
- Obstanovka experiment onboard ISS: hardware and software development of the Command and Data Management System.

LABS

- Thermo-vacuum chamber
- Vibration stand
- EMC measurements, spectrum analysis
- Circuit development, simulation, analysis, PCB design (ORCAD 17.2)
- CNC mechanical workshop

WIGNER RESEARCH CENTRE FOR PHYSICS, INSTITUTE FOR SOLID STATE PHYSICS AND OPTICS

address: 1121 Budapest, Konkoly Thege Miklós u. 29-33.
postal address: 1525 Budapest, Pf. 49
web: *www.wigner.mta.hu/szilardtestfizikai-es-optikai-intezet*

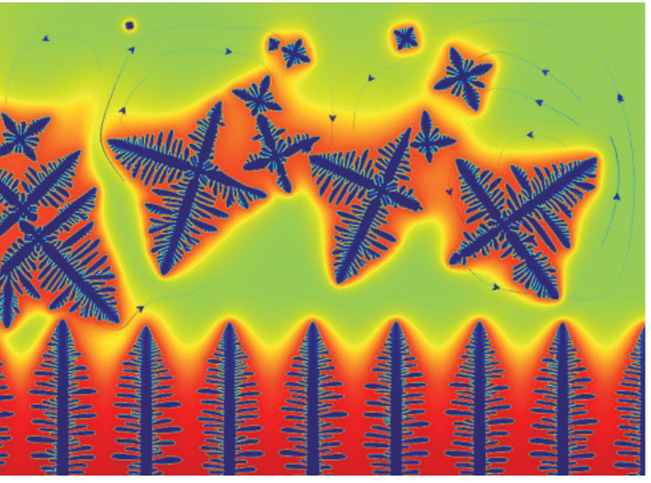
ELKH Eötvös Loránd Kutatási Hálózat

We provide computational materials science support for microgravity experiments. Its aim is to model the polycrystalline microstructure for the materials and conditions used in the experiments. The methods applied range from classical density functional theories working on the molecular scale to the phasefield models applicable on the mezo-scale.

Within ESA collaboration, the research group provided/provides theoreticaland computational support to fundamental and application oriented research projects aimed at developing new materials in microgravity environment. The projects were aimed at clarifying the role of crystal nucleation and growth in phase selection, the exploration of morphological transitions in TiAl alloys for aerospace applications, the development of materials for gas turbines working at elevated temperatures, etc. The knowledge generated so is expected to contribute to the development of new materials/ technologies.

: László Gránásy
: +36 1 392 2222/3371
: granasy.laszlo@wigner.mta.hu

SINCE : 1999
2020 : 5 / 152 persons
16/20 : 4 projects



MAIN PROJECTS

- ESA PECS project GRADECET (2014-2017) (Microgravity experiment: MAXUS-9 sounding rocket)
- ESA PECS project MAGNEPHAS III/PARSEC (2014-2016 (Microgravity experiment: ISS)
- ESA MAP project PARSEC (2017 -) (solidification experiments on ISS: in 2020/2021/2022)
- ESA MAP project METCOMP (2014 -) (solidification experiments on ISS: 2020)

LABS

- CPU and GPU clusters

HATP
HUNGARIAN AEROSPACE TECHNOLOGY PLATFORM

The HATP is a non-profit organisation established in 2007 by institutes and companies involved in the research, development and manufacture of space related technologies, components, subsystems, payloads, sensors, software and carries out scientific research in different areas such as space weather or electromagnetic wave propagation in the plasmasphere. HATP represents Hungarian organisations, institutes and companies involved in space related activities and that have space heritage.

Our main aims are:

- To build domestic and foreign cooperation in space product development
- To provide novel solutions and develop new satellite applications
- To develop, manufacture, test and operate small satellites and the related ground infrastructure for scientific, remote sensing and communications applications
- To launch integrated research projects, to establish new R&D relationships with other organisations from different countries

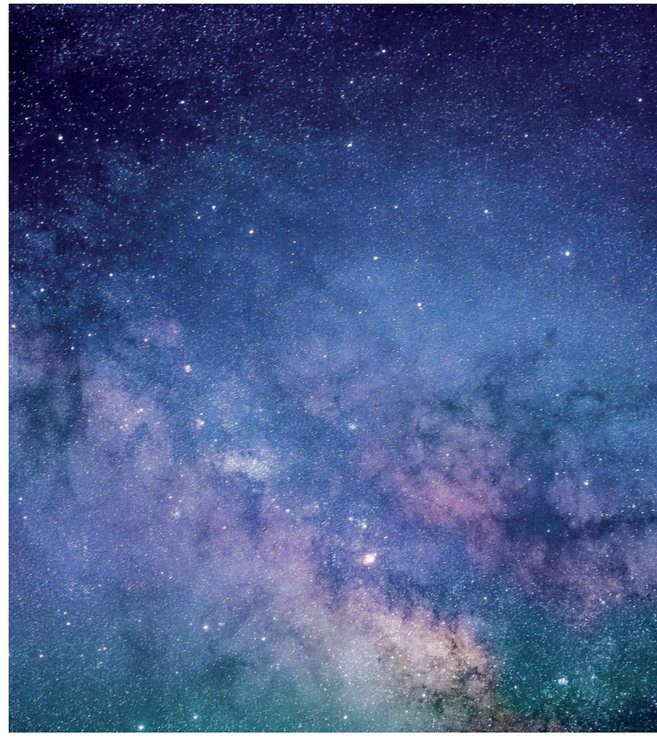
Founded: 2007

President: János Solymosi

Address: 1044 Budapest,
Ipari park u. 10.
e-mail: solymosi@hatp.eu

web: *www.haif.org/HATP.html*

The members of the platform are listed on the platform's website.



HUNSPACE
HUNGARIAN SPACE CLUSTER

Hungarian Space Cluster was established in 2007 with the purpose to incorporate most of the actors of the Hungarian space industry. HUNSPACE brings together Hungarian space-oriented organisations and represents their interests both domestically and abroad. It is committed to supporting the visibility and market access of domestic space players. They organise supplier networks to successfully execute major projects.

The long-term strategy of the Cluster was adopted in November 2018. This includes participation in ESA programmes, and international cooperation in space industry.

The Cluster has four divisions:

- Satellite components division
- Electronics and Small Satellite division
- Science and Research divison
- Earth Observation division

Founded: 2007

President: Péter Hargitai

Address: 3534 Miskolc,
Kandó Kálmán u. 5.
e-mail: hunspace@hunspace.org

web: *www.hunpsace.org*

The members of the cluster are listed on the cluster's website.

SPACE AND DEFENSE INDUSTRY COMMITTEE

The Space and Defense Industry Committee of the Hungarian Chamber of Commerce and Industry was established with the purpose to contribute to the development and strengthening of the Hungarian defence and space industry, serving as a professional forum which comprises the stakeholders of this sector. The Committee's goal is to increase opportunities for cooperation between Hungarian defence and space industry actors, especially SMEs. The Committee's further objective related to the space industry is to broaden the knowledge of the Hungarian public about the space sector, as well as to strengthen the competitiveness of the Hungarian space industry at international level and to promote its involvement in international projects. In order to achieve its long-term goals, the Committee is working on intensifying professional partnership between the government and Hungarian companies from the space industry, and by doing so, making bilateral communication and dialogue more efficient. While communicating government goals and projects towards the businesses involved in the sector, the Committee also summarizes and presents their needs to the government.

Founded: 2020

President: József Gaál, János Solymosi
Address:1054 Budapest,
Szabadság tér 7.
e-mail: mkik@mkik.hu

web: *www.mkik.hu*

The members of the committee are listed on the chamber's website.

MAGYARMET FINOMÖNTÖDE LTD.

2060 Bicske, Kanizsai u. 12.
www.magyarmet.com
info@magyarmet.hu

Precision investment casting - ready-to-install parts with complex geometries, high dimensional accuracy, excellent surface quality. Materials: corrosion-, heat- and wear-resistant steels, Ni- and Co-based alloys, bronze. Rapid prototyping, CNC machining, surface treatments.

SILVERIA ELECTRONICS LTD.

6000 Kecskemét, Wéber Ede út 37.
www.silveria.eu
sales@silveria.hu

Silveria Electronics Ltd. is a company which provides Electronic Manufacturing Services (EMS) as a contract manufacturer. Today Silveria is one of the leading Hungarian EMS companies.

Core activities:

- PCB Assembly (SMT and THT)
- PCB laser marking
- Selective coating
- Cable confectioning
- Programming & Testing
- 3D X-Ray services
- Semi or Final Assembly
- Complex solutions involving one or more of the activities listed above

HCCI INSTITUTE FOR ECONOMIC AND ENTERPRISE RESEARCH

1054 Budapest, Szabadság tér 7.
https://gvi.hu/
gvi@gvi.hu

The Institute for Economic and Enterprise Research (HCCI IEER) is a non-profit economic research institute. Its aim is to provide theoretically and empirically grounded information and analysis of several areas of the Hungarian economy and the business and social environment influencing the prospects of Hungarian enterprises. In 2020 and 2021, the IEER was the first to conduct surveys among the businesses operating in the Hungarian space industry.

SOLVELECTRIC TECHNOLOGIES LTD.

6728 Szeged, Budapesti út 8.
www.solvelectric.hu
office@solvelectric.hu

SolvElectric Technologies Ltd. has been working in the field of electronics for 30 years now and employs over 30 experts. We offer electronics design and prototype production. We also undertake small and large series production. In addition to our own RDI projects, we have experience in working with several consortia.

TUNGSRAM OPERATIONS LTD.

1044 Budapest, Váci út 77.
www.tungsram.com
laszlo.sabjan@tungsram.com

Tungsram, an iconic name returned to the global market in 2018 as an innovative, premium European brand. Tungsram wants to help tackle some of the pressing challenges of our time. The company builds systematically on both its innovative heritage and its technology and materials know-how in the heart of Europe to facilitate human well-being.

Z ELEKTRONIKA LTD.

7630 Pécs, Bajor u. 5.
www.zelektronika.eu
info@zelektronika.eu

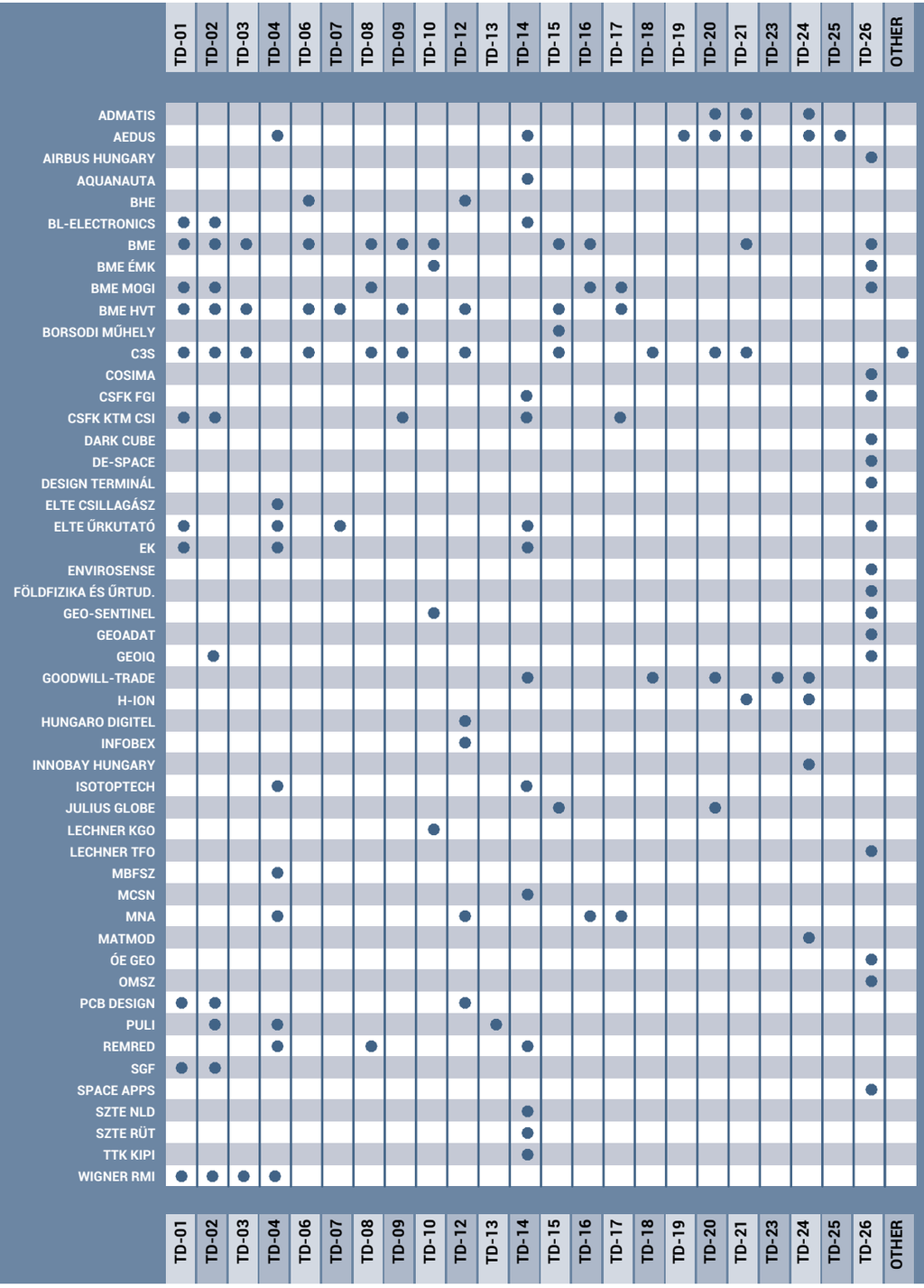
Z Elektronika Ltd. is a development and manufacturing company. Our main profile is small and medium electronics series production. We offer solutions from prototyping to series production, which include parts sourcing, project management and production development.

TCT HUNGARY LTD.

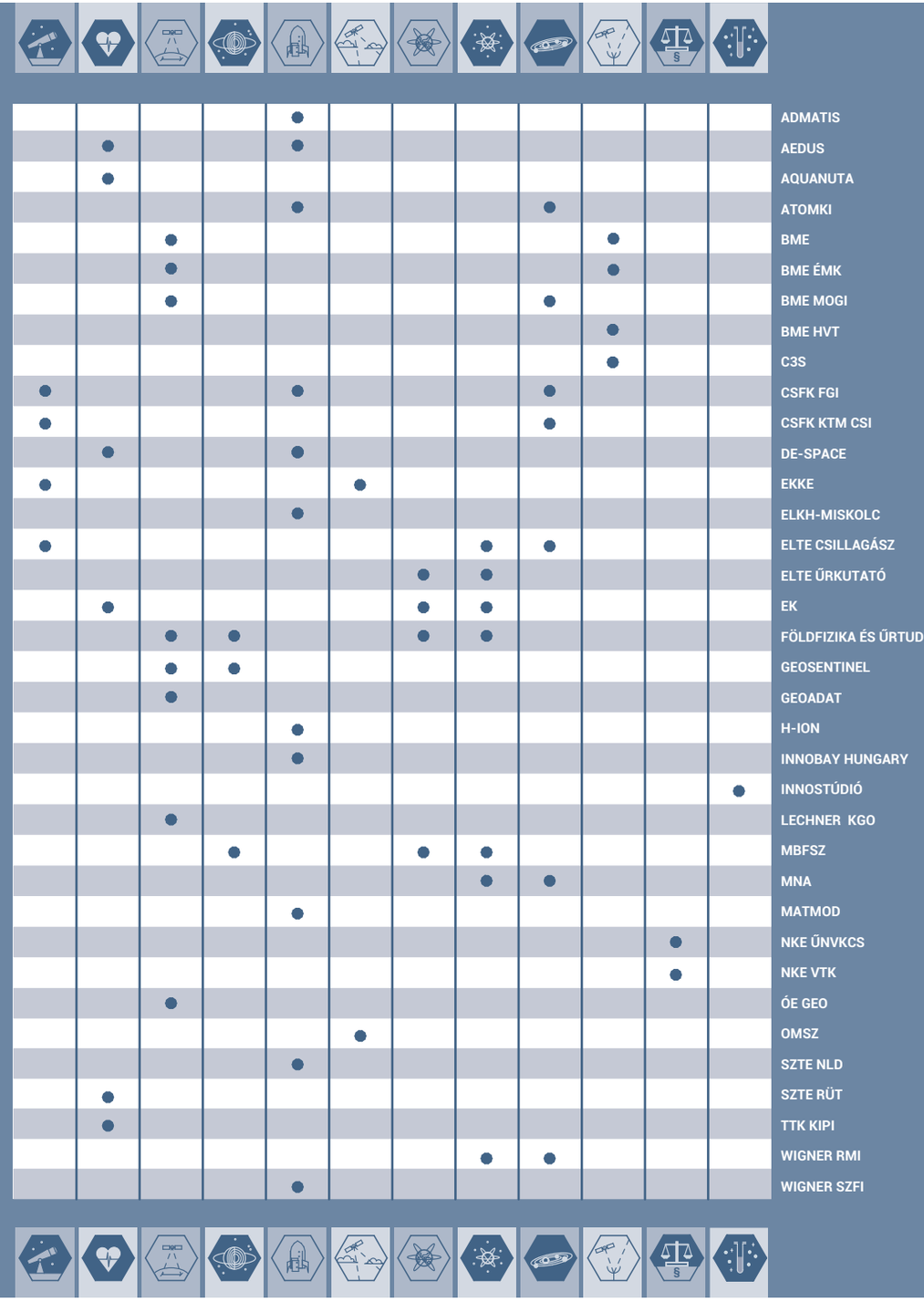
1118 Budapest, Rétköz utca 5.
http://steelprint.tct.hu/
sales@3dsteelprint.com

Our company provides 3D metal printing services utilizing titanium, aluminium and other alloys with the related manual and CNC finishing steps. Our fields of professional expertise include a range of innovative structural, mechanical, material science knowledge and software R&D activities.

MAIN SPACE TECHNOLOGICAL COMPETENCES OF HUNGARIAN ORGANISATIONS



MAIN SPACE RESEARCH AREAS OF HUNGARIAN ORGANISATIONS



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