

HUNGARIAN SPACE KALEIDOSCOPE 2023/2024

2023/24 HUNGARIAN
SPACE KALEIDOSCOPE

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2023/2024

IMPRESSUM

Hungarian Space Kaleidoscope 2023/2024

Editorial board:

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Balázs Heilig, Ferenc Horvai,
András Ferenc Horváth, László Pap, Balázs Székely

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as chair of the editorial board

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Disclaimer. The data and pictures published in the book were submitted by the organisations listed in the book. The organisations are responsible for the accuracy of the information they provided as well as for the technical content which do not necessarily represent the opinion of the publisher. The text has been edited only stylistically by the editorial board. Manuscript has been closed on 31 October 2023.

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WELCOME FROM THE MINISTER



The space industry will certainly be one of the most dynamically developing industries of the 21st century, which is indicated not only by analyst forecasts, but also by the fact that the recent global recession has clearly shown: the space sector is one of the most crisis-resistant sectors of the world economy, in which it is worth investing.

In order for Hungary to take part in this extremely dynamically developing industry, the Hungarian Space Strategy was adopted in 2021. Its flagship project is the HUNOR Hungarian Astronaut Program. As part of this, Hungary will once again send a research astronaut to space, to the International Space Station, to carry out various tests and domestically developed scientific experiments there for 30 days. The representatives of the Hungarian space sector – our universities, research institutes, companies – will thus have a huge opportunity and will be able to

exploit the opportunities of the global space industry better than ever before.

It is true that Hungary is not one of the largest countries, but in recent decades more than 140 Hungarian devices have reached outer space, all of which have fulfilled their missions. Within the framework of the HUNOR Astronaut Program, this number will soon grow radically, and probably the most innovative segment of Hungarian research and development, Hungarian space research, will receive more impetus than ever from our achievements in outer space.

Péter Szijjártó

Minister of Foreign Affairs and Trade

WELCOME FROM THE MINISTERIAL COMMISSIONER FOR SPACE RESEARCH



Since the beginning of space research, Hungary has played an important role in global space activities. In recent years, the domestic space sector worked hard to carry on the valuable heritage of Hungarian specialists. We can be proud of many significant new results. While not exhaustive, I would like to highlight some of these accomplishments.

The JUICE spacecraft embarked on a journey towards Jupiter, with contributions from engineers and researchers in the Hungarian space industry and research institutes shaping its scientific program. The ambitious, partially European project, the development and production of the Ariel space telescope, also receives special attention from the public, with Hungarian space industry and scientific institutions playing a crucial role in this project. Additionally, new Hungarian-developed picosatellites collect important data about our planet.

Our sector's development aligns with jointly defined goals, in accordance with the national space strategy adopted by the Government of

Hungary. The HUNOR Hungarian astronaut program reached an important milestone this year with the selection of four young men as astronaut candidates. They have started their training, and one of them will be able to "step" aboard the International Space Station as a Hungarian research astronaut, a historic moment eagerly anticipated for 2024–25.

In cooperation with the Hungarian Astronautical Society (MANT), the book "Hungary and Space" was published by MCC Press, presenting the values and successes of Hungary in the field of space research. We believe that all this can serve as inspiration for future generations. It is crucial for young people to learn about our achievements so far and the opportunities that lie ahead, since they are the ones who will continue to write the already remarkable history of Hungarian space research.

The interdisciplinary UniSpace Program, launched in cooperation with seventeen domestic universities, facilitates the entry of interested young people into the space sector. It offers

professional development in the field of natural and social sciences related to space activities over the course of three semesters. The accredited master's program in space engineering, started at the Budapest University of Technology and Economics, plays an important role in educating the next generation of space professionals.

Our primary goal remains the development of international relations. Our foreign partners worldwide are open to the establishment of collaborations and cooperations. In recent years, we have signed Memorandum of Understanding agreements in the field of space activities with nearly twenty governmental, space agency and corporate partners.

Since the first publication of the Hungarian Space Kaleidoscope in 2019, the number of com-

panies, research institutes and higher education institutions included in the publication has been continuously increasing, proving the dynamic development of the sector. The Kaleidoscope published by MANT and financed by the Ministry of Foreign Affairs and Trade consistently garners interest from both domestic entities and our foreign partners.

I cordially recommend the 2023/2024 edition of the Hungarian Space Kaleidoscope to the attention of all those who are interested.

Orsolya Ferencz
*Ministerial Commissioner
for Space Research*

WELCOME FROM THE EDITORIAL BOARD



On request of the Department for Space Activities of the Hungarian 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 university research groups.

The members of the editorial board, Sándor Frey, Ferenc Horvai, András Ferenc Horváth, László Pap and Balázs Székely were responsible for the selection of the content for this publica-

tion. I am really thankful for their contribution. I would like to thank for 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 2022 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 ESA Technology Competence List, and overview tables.

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. Our chapter for poten-

tial space suppliers sees increasing number of entities as well.

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 2023/2024 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

 Further RESEARCH competences

 Primary TECHNOLOGICAL competence

 Further TECHNOLOGICAL competences

POINT OF CONTACT


 Name

 Phone

 E-mail

ORGANISATION DETAILS

 YEAR OF FOUNDING

 HEADCOUNT (2023)
Space department employees / all employees


 YEARLY REVENUES (2022)
space department revenues / all revenues
M HUF = million Hungarian forint
na: not available

 SPACE RESEARCH TENDERS
number between 2018 and 2022

ORGANISATION DETAILS (Suppliers to Space Industry)

 ADDRESS


 WEB

 EMAIL

Cluster



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
2.5 Earth observation payload data exploitation


 **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-11 Space Debris**
11.1 Ground- and space-based debris and meteoroid measurements
11.3 Debris mitigation, debris environment remediation and protection


 **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**
15.1 Mechanism core technologies
15.4 Control electronics technologies
15.5 MEMS Technologies
15.6 Tribology Technologies
15.7 Mechanism Engineering


 **TD-16 Optics**
16.1 Optical system Engineering
16.2 Optical component technology and materials
16.3 Optical equipment and instrument technology

 **TD-17 Optoelectronics**
17.1 Laser Technologies
17.2 Detector Technologies
17.3 Photonics


 **TD-18 Aerothermodynamics**
18.1 Numerical methods
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
20.2 High-stability and high-precision S/C structures
20.4 Hot structures
20.5 Active/adaptive structures
20.6 Damage Tolerance and Health Monitoring
20.9 Meteoroid and debris shield design and analysis
20.10 Advanced Structural Concepts and Materials

 **TD-21 Thermal**
21.1 Heat Transport Technology
21.2 Cryogenics and refrigeration
21.3 Thermal protection
21.4 Heat storage and rejection
21.5 Thermal Analysis Tools

 **TD-23 EEE Components and Quality**
23.1 Methods and processes for product assurance of EEE components, including radiation hardness assurance
23.2 EEE component technologies

 **TD-24 Materials and Processes**
24.1 Novel Materials
24.2 Materials Processes
24.3 Cleanliness and Sterilisation
24.4 Space environmental effects on materials and processes
24.5 Modelling of materials behaviour and properties
24.6 Non-destructive inspection (NDI)
24.8 Materials for electronic assembly
24.9 Advanced Manufacturing Technologies

 **TD-25 Quality, Dependability and Safety**
25.1 System Dependability and Safety
25.2 Software quality
25.3 Product and quality assurance

 **TD-26 Earth Observation / Remote Sensing**

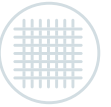


**HUNGARIAN
ORGANISATIONS**



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

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



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- TD-20
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- 21.3
- TD-25
- 25.1

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, thermo-optical 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

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

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

SINCE : 2000
👥 : 31 / 38 persons
🏠 : 642 / 661 M Ft

MAIN PROJECTS

- ARIEL - Flight Radiator & MGSEs
- CO2M - Thermal Guard Assembly, Passive & Active Thermal Control, Radiators, Composite Blades
- Comet Interceptor - Comet Camera full Thermal Subsystem
- Mars Sample Return - Earth Return Orbiter - Space Dosimetry System Thermal and Structural subsystem
- LSTM & CRISTAL - Markers for navigation

REFERENCES

- Sentinel-2 A/B/C/D - Thermal & Structural equipment
- CHEOPS - Radiators
- JUICE - PEP MLI blanket
- FOCUS on ISS - Scientific equipment and science background

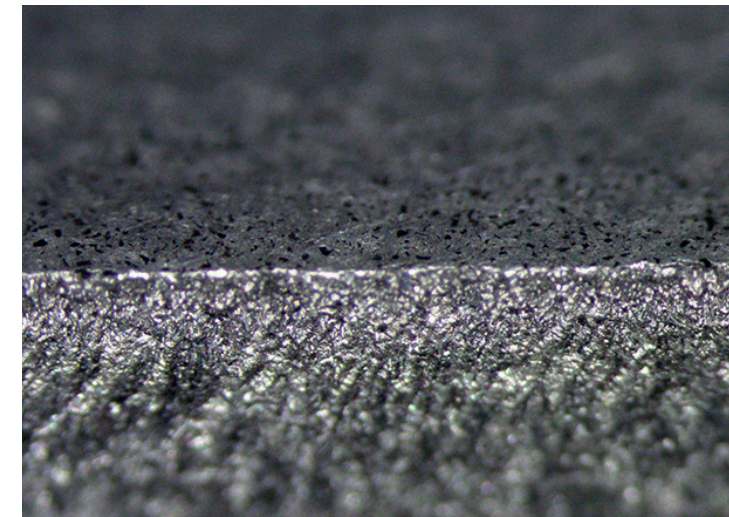
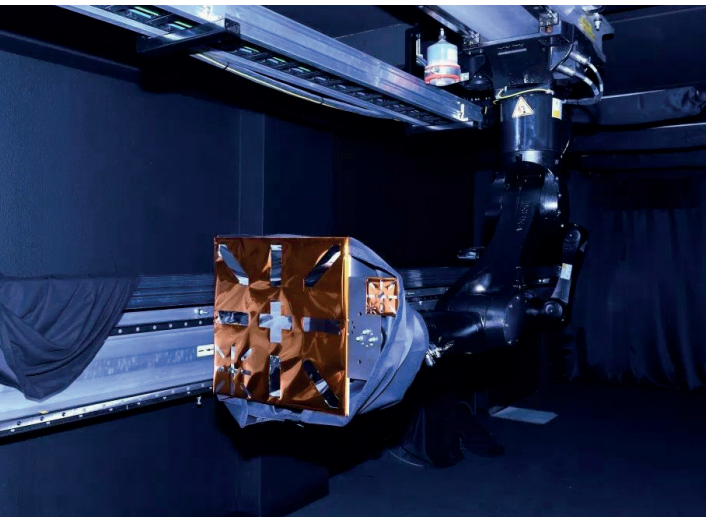
LABS, CERTIFICATES

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



👤 : Szabolcs Bella
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@ : szabolcs.bella@aeduspace.com

SINCE : 2014
👥 : 8 / 14 persons
🏠 : 59 / 186 M Ft





TD-4
4.3



TD-11
11.1

TD-26



address: 1095 Budapest, Soroksári út 44., MillPark irodaház
web: www.intelligence-airbusds.com

address: 6500 Baja, Czirfusz Ferenc utca 28.
postal address: 6501 Baja, Pf.116
web: www.astrotech.hu

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.

Our company is the Hungarian leading supplier of digital planetarium and astronomical observatory equipments, including domes, large telescopes, projectors, audio and light systems, seats – with many references. We manufacture D=3.4 m astrodomes and moving roof containers (different sizes), developed by us. We can create thematic scientific and space exhibitions, special installations (scaled or 1:1 space mock-ups, movable models, original meteorites, large inflatable planets, etc.). We started near-space ballooning in 2014, and

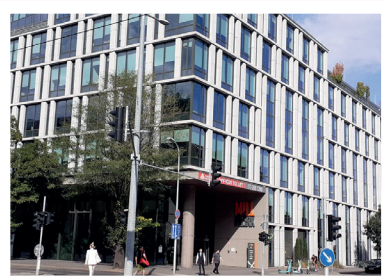
carry on researches with local and foreign partners. We offer orderable flights for testing instruments destined for space, or for scientific measurements as well as making public relation photos and films. Since 2021 we installed and operate 10 all-sky cameras in Hungary, for fireball observations and sky quality monitoring. We developed and produce remote-controlled all-sky stations. Since 2022 we carry optical tracking of space objects for ESA (EON project).

👤 : György Domokos
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@ : gyorgy.domokos@airbusds.hu

📅 : 2000
👥 : 45 / 45 persons
🏠 : 590 / 590 M Ft

MAIN PROJECTS

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



MAIN PROJECTS

- EON project (ESA No. 4000136665/21/D/MR)
- MMT TÉH (Fireball Observing Network) project

LABS

- designer and manufacturer workshop of composite elements
- 11" f/2,2 RASA astrograph+QHY268M Pro satellite tracker instrument (fully automated, dedicated software: ABOT, WebPlan)
- high-altitude ballooning (triple redundancy telemetry, payload limit for tests of space-related equipment: 30x30x20 cm volume, max. 1 kg), GRAW DFM-09 meteorological sounding packages + GS-E ground receiver

👤 : Tibor Hegedűs
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📅 : 2012
👥 : 3 / 5 persons
🏠 : 5 / 86 M Ft



TD-6
6.1
6.2;6.3
6.4;6.5
TD-12
12.1



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).

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

BL-Electronics provides technology and development background support to scientific institutes and laboratories for the development and implementation of instruments and equipment related to their research. We are primarily involved in space activities, but also in other areas. The company's most important area of activity is the development of satellite on-board instruments.

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 digitising 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.



TD-1
1.1, 1.2
1.3
TD-2
2.2
2.3
TD-14
14.2

👤 : János Solymosi
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SINCE : 1991
👥 : 9 / 121 persons
🏢 : 64 / 3383 M Ft



MAIN PROJECTS

- Participation in EnVision, ESA's scientific satellite to Venus
- Developing Earth Link transponder for mission around the Moon
- 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, ISO6 cleanroom, EMC chamber, sweep table, Thermal chamber, Thermal-vacuum chamber

MAIN PROJECTS

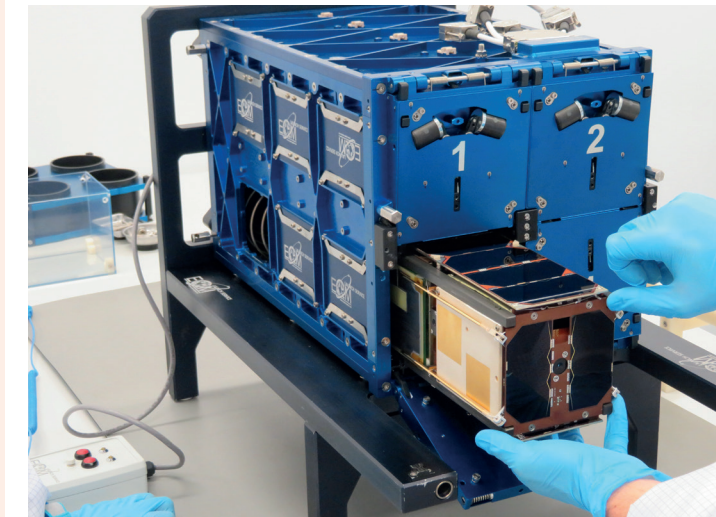
- SEAM; DPU; ELF-VLF wave instrument, cooperation with KTH (Sweden)
- BepiColombo PWI instrument package; ISDM module, ELTE, Kanazawa University (Japan)
- Vernov/Relec; SAS3-R; ELF-VLF wave instrument, ELTE, IKI (Russia)
- Chibis-M; SAS3-Ch; ELF-VLF wave instrument, ELTE, IKI (Russia)
- TriTel-SURE;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

LABS

- ZG-212 zero gauss chamber (internal dimensions 0.3 x 0.9 m)

👤 : Terézia Szél
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SINCE : 1992
👥 : 2 / 2 persons
🏢 : 4 / 5 M Ft





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web: www.bme.hu

address: 1111 Budapest, Műegyetem rkp. 3.
web: www.epito.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 (Masat-1) has been built at the university and it is the home of the first Hungarian picosatellite (SMOG-P) as well. In 2022, the space engineering master program was launched by BME Faculty of Electrical Engineering and Informatics. In cooperation with MANT, BME organises the H-SPACE International Conference on Research, Technology and Education of Space every two years. The university hosts two student rocket building teams (BME Aerospace Team, BME Suborbitals) as well.

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.

TD-1
1.2

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2.4,2.5

TD-3
3.1,3.4

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TD-9
9.3

TD-10
10.1,10.2

TD-15
15.5

TD-16
16.1

TD-21
21.5

TD-26

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SINCE : 1782
 : 75 / 2680 persons
 : 20 projects

MAIN PROJECTS

- Picosatellites (SMOG-P, SMOG-1, MRC-100)
- Masat-1
- Rosetta
- H-SPACE International Conference (from 2015)
- Space Age Seminar (from 2021)

LABS

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



MAIN PROJECTS

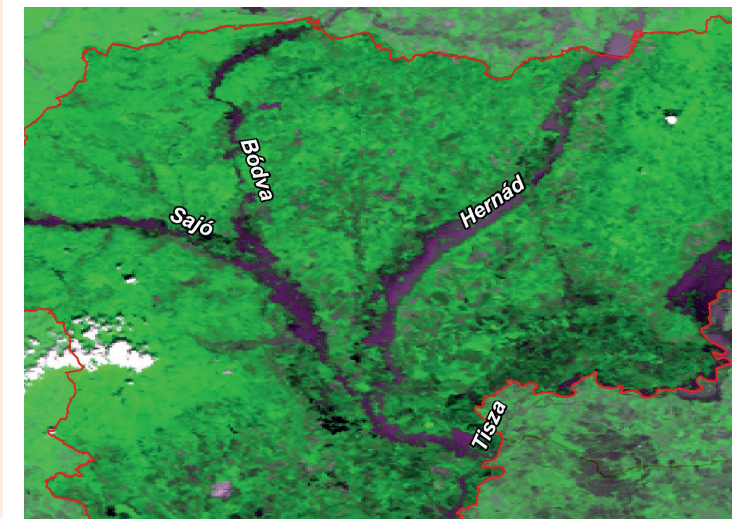
- EGNOS monitoring SBAS project – Integricom, EuroControl
- GALILEA Project – Space Engineering S.p.A (leader), NavPos System GmbH, CISAS Univ. Padova, BKG
- TROPSY Project – Teleconsult Austria (leader), TU Wien, ZAMG
- INTRO Project – BME (leader), National Meteorological Service, Integricom.NL
- GOCE 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
 : 8 / 30 persons
 : 2 projects



TD-26

TD-10
10.2

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

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

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 oper-

ational 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.

TD-1
1.1

TD-2
2.3
2.4

TD-8
8.1

TD-16
16.1

16.2-3

TD-17

17.1

17.2-3

TD-26

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

SINCE : 1957
👥 : 5 / 50 persons
📅 : 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
- 2023 ESA HERA mission: cross-calibration of the Hera optical remote sensing instruments (AFC, Hyperscout, Aspect, Milani and Juventas navigation cameras)

LABS

- Optical calibration laboratory
- Spectral optical measurements laboratory

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)

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

SINCE : 1951
👥 : 18 / 47 persons
📅 : 7 projects

TD-3
3.1

TD-1
1.2

TD-2
2.4

TD-6
6.5

TD-7
7.1

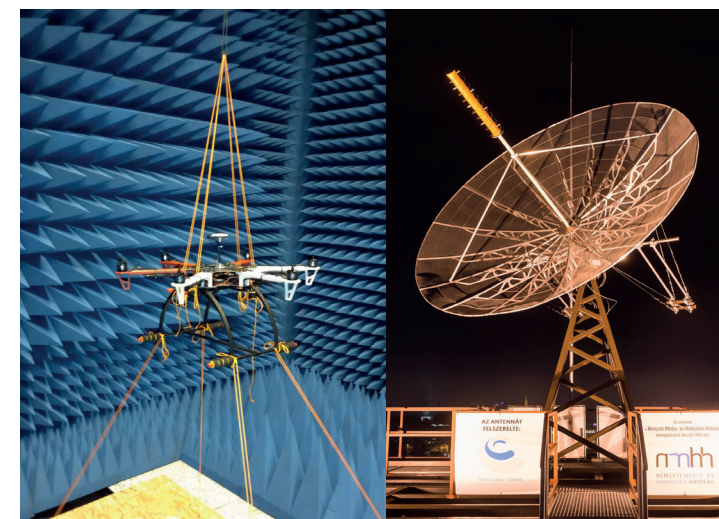
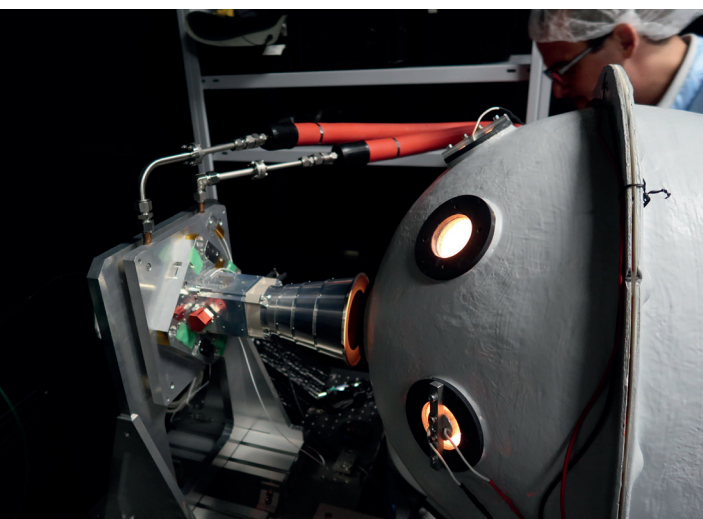
7.2;7.3

TD-9
9.3

TD-12
12.1

TD-15
15.1

TD-17
17.3





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

address: 1126 Budapest, Szendrő u. 49.

C3S LLC is a Hungarian space industry company, specialising in designing and manufacturing high-reliability 3–16U platforms and robust and redundant subsystems that meet the requirements of scientific and industrial IoT constellations or Earth observation missions. The company's Mission Operation Centre tracks and manages the entire life cycle of missions, from launch to deorbiting. C3S has gained a prominent position

among nanosatellite companies by implementing large-satellite solutions and technologies in nano size, which grants long life cycles and high reliability for spacecraft. In addition to CubeSats, the company also designs electrical power systems and payload control systems for large satellites. Its first mission, the 3U RadCube, was launched in 2021, and its second mission is the 3U VIREO demonstration, which caters to industry demands.

The experts of COSIMA Ltd. have 4 decades of internationally recognised experience in various fields of agricultural applications. During its consulting activities, innovative, in-house developed solutions are applied in the measurement of the parcel's crop production and prediction. Spatially from the precision (100–400 m² units) to regional level. The company's services bring additional profit to the users based on the quantitative evaluation of Earth observation ESA Sentinel satellite data series through the complex crop yield measurement, yield prediction, quantitative vegetation

assessment, and the unique expert analyses of the cultivation data on 0.5 Mha in crop production. End users are mainly small and large farms. The service is provided in cooperation with large agro-machine vendors and input production companies. Other potential users are grain buyers, seed producers, integrators and national administration. The improved efficiency as the result from the services appears on a growing arable land through the optimisation of plant nutrition and the reduction of environmental impact.

👤 : Alexandra Széll
☎️ : +36 20 278 1223
@ : alexandra.szell@c3s.hu

📅 : 2012
👥 : 44 / 44 persons
🏠 : 404 / 425 M Ft

MAIN PROJECTS

- GRASSHOPPER and further 6 types of energy distribution systems from 1.5 to 750 W output
- OWL – development of a satellite tracking system
- CubeSat platforms, operation system and ground station development, RadCube and VIREO in-orbit operation
- ESA-qualified complete MAIT process for large satellites based on ECSS standards

LABS

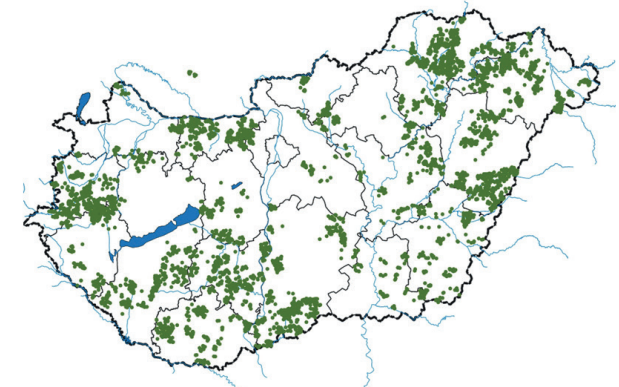
- ESA certified soldering operators, trained at ESA-accredited courses.
- Electronic laboratory equipped with calibrated instruments and a climate chamber suitable for thermal cycle tests support our development and manufacturing activity.

MAIN PROJECTS

- Development and validation of methods for quantitative crop yield measurement, vegetation assessment and yield prediction for farm fields and precision farming
- The application of the efficient COSIMA cells yield measurement for 100-400 m² units in agricultural fields
- COSIMA services to approximately 300 farms, knowledge centres, cooperation with universities and consulting in special R+D projects

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

📅 : 2011
👥 : 6 / 6 persons
🏠 : 390 / 390 M Ft



The areas of COSIMA's precision services for the 2022 - Oct 2023 period. The 3–6 year analysis covered a total of 35,000 fields of approximately 500,000 ha of COSIMA precision crop cells yield measurement in different years.

- TD-3.1-4
- TD-1.1-3
- TD-2.1-4
- TD-4.3
- TD-6.1,3
- TD-8.1-4
- TD-9.1-3
- TD-10.2
- TD-12.1-2
- TD-14.3-4
- TD-15.4,7
- TD-18.1,2,4
- TD-20.1-2
- TD-20.10
- TD-21.5
- TD-23
- TD-24.2-3
- TD-25.1
- TD-26
- OTHER





address: 2100 Gödöllő, Király utca 16.
web: www.cropom.com

address: 1046 Budapest, Mikszáth Kálmán utca 48.
web: www.datakart.hu



CropOM builds software and platform for integrating data, decision processes, and action mechanisms. With the help of our Data Cube technology, we provide easy access to spatial data. Our Information Factory solution makes environmental and economic processes to interpret and model. Based on these, we provide the opportunity to train AI algorithms to automate decision-making and execution processes.

Our Information Factory provides help for insurance companies, consultancy firms, and the government to accelerate decision-making processes by modelling future outcomes of present environmental and economic activities. Our platform also efficiently solves optimisation problems at companies producing food and consumer goods.

The activities of Datakart Ltd. cover all areas of geomatics, for example the application of space remote sensing procedures and data integration. We provide GIS solutions for data management, including data analysis, planning, design, development, implementation, and operation. Our company is a reseller of the EUSI and SkyWatch companies' space remote sensing data and service portfolio.

During the development of the Earth Observation Information System (FIR), we performed GIS, quality assurance and project management tasks. The FIR supports the activities of the national defence, environmental protection, forestry, disaster prevention and water management sectors. On the FIR website, citizens can search for, download and view satellite images taken in different periods.

👤 : Márton Tolnai
☎ : +36 30 374 0988
@ : marton.tolnai@cropom.com

📅 : 2022
👥 : 3 / 3 persons
🏠 : 10 / 10 M Ft

MAIN PROJECTS

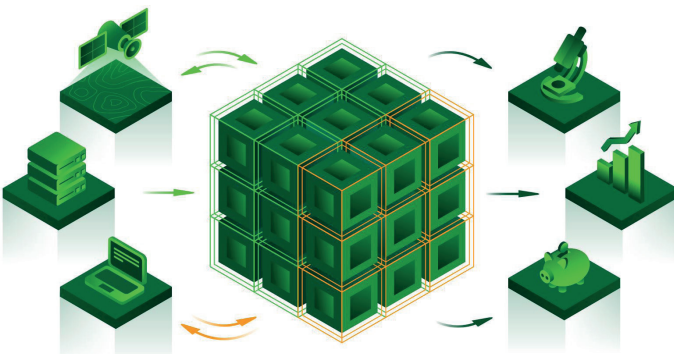
- Euro Data Cube / Danube Data Cube

MAIN PROJECTS

- Participation in the development of the Earth Observation Information System (FIR - <https://fir.gov.hu>)
- Our company is a reseller of the space remote sensing data and service portfolio of the European Space Imaging and SkyWatch companies. (<https://www.europeimaging.com>, <https://skywatch.com>)

👤 : Zsolt Szabady
☎ : +36 30 977 3567
@ : szabady@datakart.hu

📅 : 1996
👥 : 1 / 3 persons
🏠 : 20 / 135 M Ft





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

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

Design Terminal is Central Europe's leading innovation agency, which builds 'Innovation Champions' through corporate partnerships and talent acceleration. Their incubation programs are up and running in fifteen countries, and since 2014, the organisation has worked with more than 2500 startups and several leading corporations. Design Terminal launched its first space project in 2021, becoming the coordinator of the European Space Agency's Business Incubation Centres (ESA BIC) program in Hungary. The incubation program

provides professional guidance, networking opportunities and €50,000 financial support to help Hungarian companies develop their projects that have a strong space connection. Moreover, Design Terminal extended its space program portfolio in 2023, when the ESA Technology Broker program was launched to bridge the gap between space technology and market needs, facilitating the technology transfer of space solutions to traditional industries.

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 diagnostic 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.

👤 : László Jónás
☎ :
@ : contact@designterminal.org

📅 : 2016
👥 : 5 / 34 persons
📅 : 2023
📅 : 2022
📅 : 6 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)

👤 : Zsolt Varga
☎ : +36 52 512 900
@ : science@unideb.hu

📅 : 1978
👥 : 110 / 9000 persons
📅 : 2023
📅 : 18/22
📅 : 25 projects



- TD-20
- 20.1
- 20.5-6
- 20.10
- TD-16
- 16.1
- TD-18
- 18.1
- TD-21
- 21.1
- 21.3-5



address: 1116 Budapest, Kondorosi út 3. IV. emelet
web: www.econengineering.com

Econ Engineering (offices: HUN, GER, USA) with over 100 engineers offers Computer Aided Engineering and Industrial Automation services, having a wide range of expertise in Automotive, Aerospace, Space, Composite, Defence, Healthcare, Energy, and Agriculture industries. CAE services cover all elements of virtual development: simulation, model building, testing, optimisation, consulting. Econ holds certificates in AS9100, ISO9001, ISO27001, TISAX Level 3, and GE IT-Security, and is a certified partner of simulation

software houses like Ansys, Moldex3D, CFTurbo. Axiom Space Cast-Designer, a NASA supplier, has selected Econ for several finite element tasks in the development of new space station modules for the ISS: multi-objective structural topology optimisation, mass minimisation, lifetime maximisation for a service module, and also a composite closeout panel feasibility study and a lightweight composite redesign of the metal parts of a docking adaptor tunnel were carried out.

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) climatology. There are nine experts working in the group, and six of them are also involved in research, which is mostly focused on the area (i). At the same time, the group tries to highlight the results of science in both areas of science teacher training and the doctoral school of education.

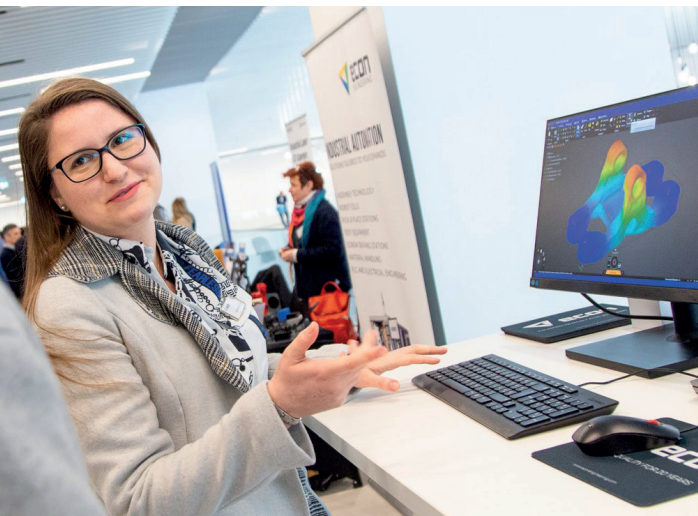
The research group's scientific fields in astronomy and astrophysics include two areas: the study of planetological aspects in terrestrial sam-

ples as well as laboratory conditions, 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. Climatological knowledge enhancement focuses on satellite observations and understanding of climate change, towns with fragmented relief, and natural vegetation processes.



: Gábor Kiglics
 : +36 1 279 0320
 : info@econengineering.com

: SINCE : 2002
 : 6 / 102 persons
 : 150 / 3000 M Ft



MAIN PROJECTS

- Axiom Space: Service Module
 - Multi-objective Structural Topological Optimization
 - Mass Minimisation, Lifetime Maximisation
- Axiom Space: Docking Adaptor Tunnel
 - Composite Closeout Panel Feasibility Study
 - Lightweight Composite Redesign of Metal Parts

CERTIFICATES

- AS9100, ISO9001, ISO27001
- TISAX Level 3
- GE IT-Security,

LABS

- Mechanical testing lab

MAIN PROJECT

- ESA HERA Impact Simulation Working Group

LABS

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

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

: SINCE : 2019
 : 3 / 9 persons
 : 18/22 : 1 project





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

address: 1117 Budapest, Pázmány Péter sétány 1/A
web: sas2.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 organisations (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.

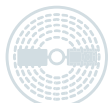
Our group at the Department of Geophysics and Space Sciences was established in the 1960s. Our main research topics are space physics, the investigation of wave propagation in magneto-ionic medium, space weather (ionosphere, plasmasphere and radiation belts) using very low frequency (VLF) waves. Our 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. We developed a robust yield forecasting method for major crops that does not require ground truth data.

TD-4
4.3



TD-4
4.1
4.3
TD-1
1.1

TD-7
7.2

TD-14
14.2
14.4

TD-26

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

📅 : 1755
👥 : 10 / 11 persons
📅 : 12 projects

MAIN PROJECTS

- ISO
- AKARI
- Herschel
- SDO
- Solar Orbiter

MAIN PROJECTS

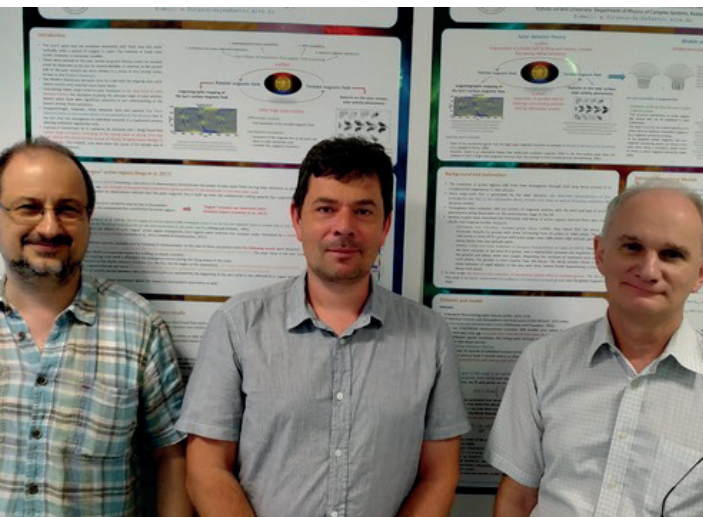
- Horizon Europe: FARBES
- Active-Intercosmos 24: SAS1
- Chibis-M: SAS3
- EU FP7-Space: PLASMON - AWDANet
- ESA: PLASMA

LABS

Automatic Whistler Detector and Analyzer Network

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

📅 : 1970
👥 : 11 / 12 persons
📅 : 10 projects



TD-26



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

address: 2100 Gödöllő, Páter Károly utca 1.
web: www.gatenonprofit.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.

GATE performs educational and research activities in the R&D sector, utilising broad domestic and international relations. We consider priority for technical progress and implementation of modern high-tech industrial production technologies. Priority is devoted also to the support of innovative activities, seeking solutions to technological problems, and continuous research.

Space structural materials (shafts and sealings)

- Space tribology
- Lubricants technology
- Space plant closed nutrition systems
- Vertical farms
- Sensors and sensor systems



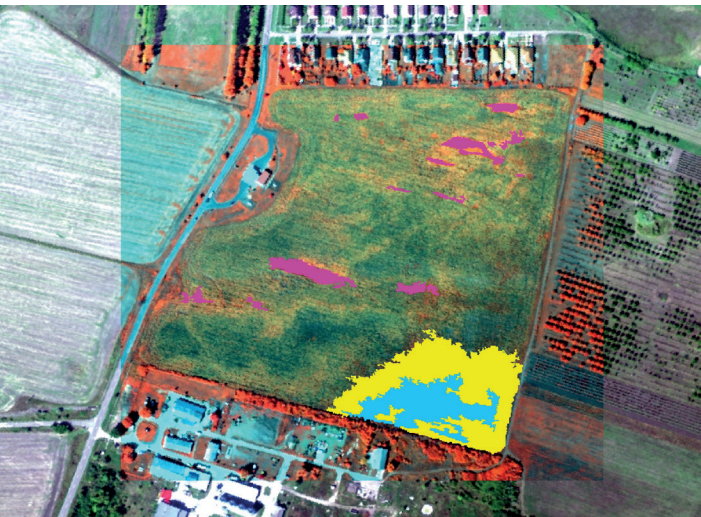
TD-15

15.1

15.6-7

👤 : Gyöngyi Varga Orsolya
☎ : +36 30 169 2353
@ : orsolya.varga@envirosense.hu

SINCE : 2009
👥 : 5 / 31 persons
🏠 : 152 / 501 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

MAIN PROJECTS

- ESA „HU_100 – Abrasion evaluation of artificial Moon and Mars soil samples on rotating shaft/sealing materials”



👤 : Balázs Bojszko
☎ : +36 30 948 3330
@ : bojszko.balazs@gatenonprofit.hu

SINCE : 2003
👥 : 5 / 13 persons
🏠 : 42 / 129 M Ft





GEODATA SERVICES LTD.



GEOIQ IMAGING LTD.



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

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

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 experi-

ence, 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).

In 1990, the founder of the company started the domestic distribution of image processing software packages. We were among the first companies to start distributing satellite imagery in 2005. We are the only domestic representative of the company Planet Labs, and we are a reseller of EU Space Imaging. We are a member of MAXAR, the WorldView Alliance. We also distribute radar images, representing the companies MDA Geospatial and Synspecive. We have more than 30 years

of experience in the distribution of image processing software packages. The satellite images and processing software we sell are used in many large domestic projects. The Hungarian Earth Observation Information System (FIR) is based on the ENVI and SARscape software we represent. The National Land Centre uses the Planet Labs satellite images we sell in connection with agricultural subsidies. The very-high-resolution (30 cm) satellite images are already used in road planning in Hungary.

TD-26

TD-26

TD-2

2.5

👤 : Péter Hargitai
☎ : +36 30 602 1020
@ : geodat@geodat.hu

📅 : 1997
👥 : 5 / 20 persons
🏠 : 170 / 426 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

MAIN PROJECTS

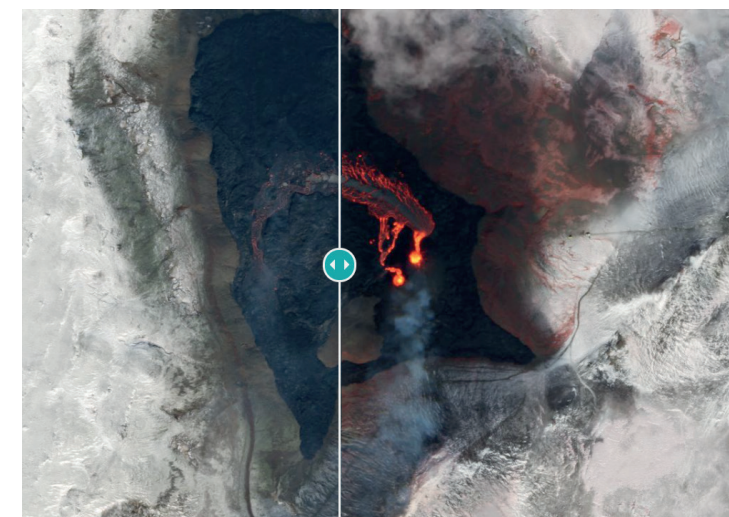
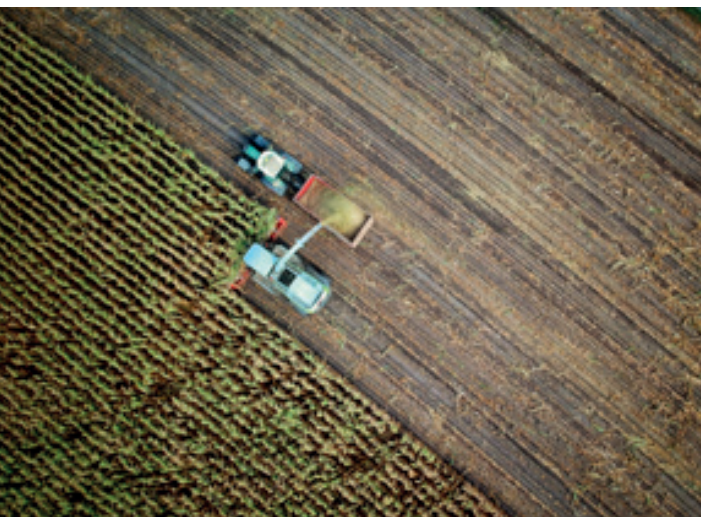
- Earth Observation Information System, (FIR in Hungarian)
- Land Parcel Identification System (MEPAR in Hungarian)

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

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

📅 : 1992
👥 : 1 / 3 persons
🏠 : 105 / 105 M Ft



address: 2132 Göd, Kacsóh P. u. 13.
web: www.geo-sentinel.hu

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

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 emphasise the importance of space science for society and economy, we manage the space-related news portal Úrvilág, and represent Hungary in the EU Copernicus Academy Network.

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 alumin-

ium 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.



TD-23



TD-14

14.2



TD-18

18.2

18.3



TD-20

20.10



TD-24

24.2

TD-26

TD-10

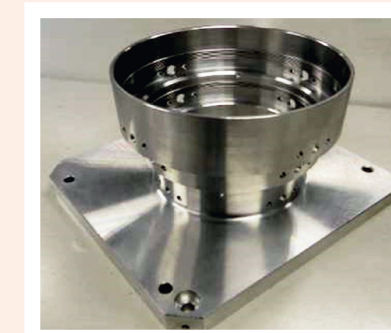
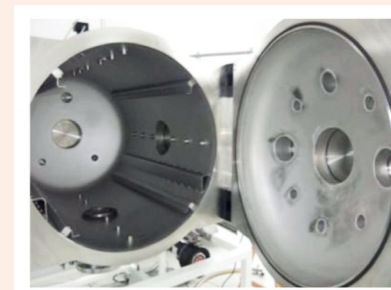
10.2

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

: SINCE : 2015
 : 2023 : 2 / 2 persons
 : 2022 : 24 / 24 M Ft

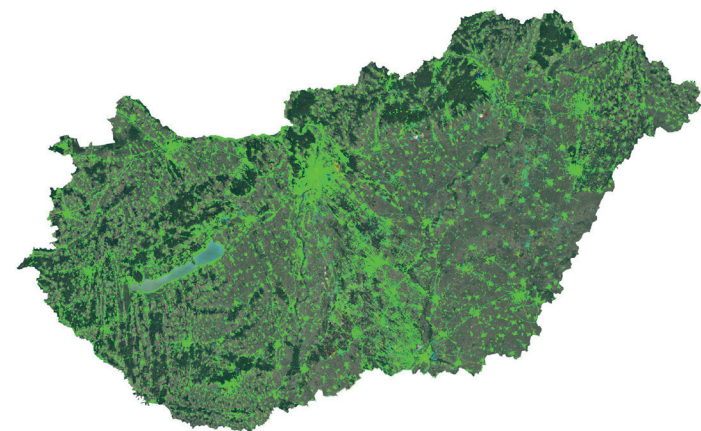
MAIN PROJECTS

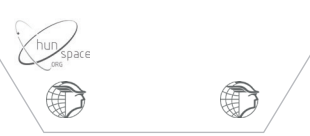
- Investigation of Sentinel-1 potential in effective, sustainable and safe development and management of geothermal resources, European Space Agency
- Sentinel-1 for Large-Scale Linear Infrastructure Systems, European Space Agency
- Operation of space geodetic monitoring systems of nuclear industrial establishments
- Demonstration and introduction of new infrastructure health assessment technology in the Balkans, HEPA Nzrt.
- Innovative expansion of the infrastructure health assessment toolkit of Geo-Sentinel Ltd and development of related marketable services (NRDI Fund)



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 : olahne.nora@goodwilltrade.hu

: SINCE : 1993
 : 2023 : 9 / 18 persons
 : 2022 : 55 / 393 M Ft





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web: www.hion.hu

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



TD-12
12.2

TD-21
21.4



H-ION Ltd. has been working on space applications of materials sciences since 2017. Our five main areas of activity are:

- Materials science R&D: materials with new structures and properties. Research and development of new generation superalloys and their application in metal 3D printing. Property design and estimation methodology for alloys (heat dissipation systems, heat storage, hydrogen storage, thermoelectric materials, radiation shielding systems).
- Development and production of flow chemistry equipment and technologies.

- Development of a new family of nanoporous alumina insulating materials. Successful testing in real space functional environments on ATL-1 and MRC-100 picosatellites.
- Design of custom engineering solutions at PQ picosatellite scale, materials testing for high temperature functional and structural applications.
- Development of new metal-ion (Li-ion, Na-ion, etc.) batteries with increased energy density for space applications.

TD-3
3.3



TD-24
24.1-2
24.4-5
24.9



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), satellite-based TV, radio and video broadcasting, and a variety of value-added services, implemented and moni-

tored according to strict quality standards. The satellite-based service is provided exclusively by Hungaro DigiTel using its own satellite centre. The satellite-based services have various advantages such as flexible network configuration and modification, quick installation, global availability, and independence from terrestrial networks.

👤 : Annamária Holló
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@ : annamaria.hollo@h-ion.hu

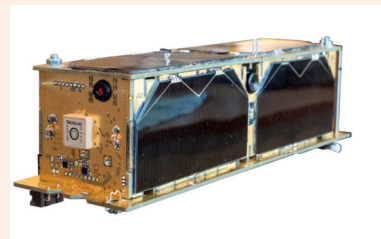
📅 : 2011
👥 : 8 / 31 persons
🏠 : 41 / 741 M Ft

MAIN PROJECT

- ATL-1 2PQ nanosatellite
- MRC-100

LABS

- Zeiss Sigma-300 type electron microscope
- FOUNDRY-MASTER Optimum type spectrometer
- Metallurgy laboratory
- Vacuum operational melting furnace
- Microreactors
- Bruker D8 XRD
- Battery lab

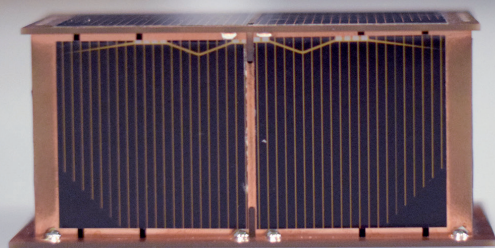


MAIN PROJECTS

- Data, voice communication (mainly VSAT)
- Satellite-based content uplink, distribution
- SNG
- IT security

👤 : Sándor Molnár
☎ : +36 1 488 8555
@ : info@hdt.hu

📅 : 1990
👥 : 39 / 41 persons
🏠 : 4821 / 6233 M Ft



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postal address: 4001 Debrecen, Pf. 51
web: www.atomki.hu

HUN-REN
Hungarian Research Network

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

HUN-REN
Hungarian Research Network

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 cryo- 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.

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 the CP-22 NASA–ESA 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 detector of the Hera mission. Our laboratories are able to test analogue materials and observational capabilities of detectors for missions to solid-surface bodies. We contribute with science-technology synergy activity to the design and realisation of the Digital Processing Module of the Comet Camera on-board the Comet Interceptor ESA mission.



TD-14
14.2

TD-26

👤 : Zsolt Fülöp
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SINCE : 1954
👥 : 6 / 219 persons
📅 : 4 projects



MAIN PROJECTS

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

LABS

- Ionaccelerators, irradiation facilities
- Spectroscopy and surface physics laboratories, cryo- and vacuumtechnics facilities



MAIN PROJECTS

- ExoMars rover
- Comet Interceptor
- HERA
- CP-22 (CLPS, ARTEMIS)

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
- Planetary GIS tools

👤 : Ákos Kereszturi
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SINCE : 1955
👥 : 4 / 28 persons
📅 : 5 projects





HUN-REN CSFK KONKOLY OBSERVATORY

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



HUN-REN CENTRE FOR ENERGY RESEARCH SPACE RESEARCH DEPARTMENT



address: 1121 Budapest, Konkoly-Thege Miklós út 29-33.
web: www.ek.hun-ren.hu



Konkoly Observatory is a dynamically expanding research institute with two ERC, two GINOP, 7 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 a scientific collaborator in the following ESA and NASA missions: ISO, Rosetta, CoRoT, Herschel, Gaia, CHEOPS, PLATO, ARIEL, Kepler/K2, TESS, Euclid, and JWST. Among the space competencies of the institute, one has to mention the scientific preparatory work for space astronomy projects and in-situ Solar System probes as well as planetary defence ac-

tivity (the discovery of two impacting asteroids in 2022 and 2023). 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 March 2021. It has been operating successfully since then.

Centre for Energy Research (EK) is a member of the Hungarian Research Network (HUN-REN). 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.

- TD-9
- 9.2
- TD-1
- 1.1-2
- TD-2
- 2.2-4
- TD-8
- 8.1
- 8.3
- TD-14
- 14.2
- 14.4
- TD-17
- 17.2



- TD-14
- 14.1
- 14.2
- TD-1
- 1.1
- TD-4
- 4.1,4.2
- 4.3

👤 : Róbert Szabó
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@ : szabo.robert@csfk.hun-ren.hu

SINCE : 1899
👥 : 40 / 100 persons
📅 : 25 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 (2019 –)
- GRBAlpha, the first successful technology demonstration CubeSat of the CSFK for high-energy astrophysics
- Ariel M4, ESA's M4 exoplanet atmosphere characterising space telescope (2018 –)
- Discovery of near-Earth and impactor asteroids (2020 –)

INSTRUMENTS

- Design and manufacturing of high-energy particle detector payload for CubeSat platforms
- Ground-based imaging, photometry and spectroscopy at the Piszkes-tető Mountain Station Observatory, all-sky monitoring with the Fly's Eye camera system, digitalised photo plate archive spanning many decades
- 60/90 cm Schmidt telescope with a 3x3 degree FoV, 10kx10k pixel CCD detector dedicated to near-Earth asteroid search

MAIN PROJECTS

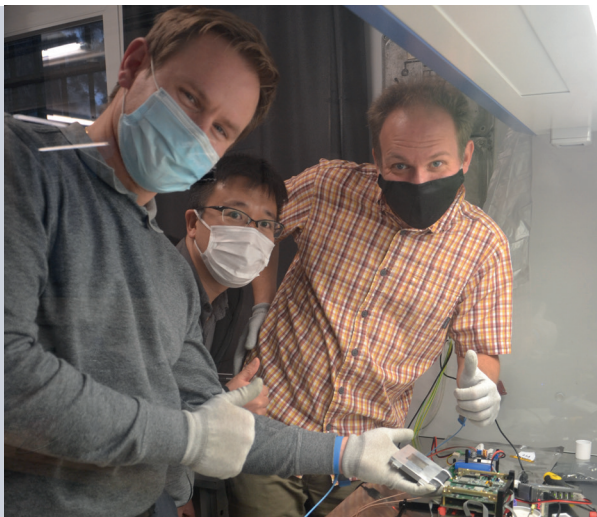
- ISS Russian Segment service dosimetry system
- IDA instrument suite for the Lunar Gateway
- RadMag-L space weather instrument development
- Vega-1, -2, Rosetta/Philae,

LABS, CERTIFICATION

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

👤 : Attila Hirn
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@ : spacelab@ek.hun-ren.hu

SINCE : 1991
👥 : 7 / 7 persons
📅 : 12 projects





HUN-REN CENTRE FOR ENERGY RESEARCH SPACE TECHNOLOGY TEAM

address: 1121 Budapest, Konkoly-Thege Miklós út 29-33.
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web: deepspace.ek-cer.hu



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



HUN-REN INSTITUTE OF EARTH PHYSICS AND SPACE SCIENCE



TD-26

TD-1

1.1-2

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21.5

TD-25

25.2



We are experts on space-qualified hardware and software development of highly reliable on-board instruments, systems and Electrical Ground Support Equipment. These activities are supported by domestic and foreign cooperation and tenders. Our developments have been used in several successful Solar System missions.

We contributed to the NASA–ESA Cassini–Huygens CAPS and MAG experiments with the ground support equipment. In the ESA Rosetta-Philae comet programme we have participated in the development of the plasma instrument (RPC) for orbiter and for the lander we have developed the

fault tolerant central data acquisition and control computer (CDMS). We contributed in the development of planetary Ion camera (PICAM), with it is one of the four detector of SERENA system for The Jupiter Icy Moons Explorer interplanetary spacecraft was launched in 2023 and it will arrive at Jupiter in 2031 and will make detailed observation the planet and three moons (Ganymede, Callisto, and Europa). We developed power supply units for the European four detectors, which are parts of the in situ particle environment package (PEP) contains six detectors.

Besides geophysics and geodetic research, EPSS has focused on the study of the Geospace and space weather for decades. EPSS operates two complementary geophysical observatories (Nagyecenk and Tihany), where magnetic, electromagnetic wave and ionosonde measurements are carried out. The research is to a large extent based on the data provided by various spacecraft and international ground networks. EPSS provides data for several international networks (e.g., INTERMAGNET, SuperMAG, GIRO, AWDANet, WWLLN, NICT), and coordinates EMMA.

Space Weather poses an increasing risk on critical ground and space infrastructure, therefore its investigation is of strategic value. The research covers solar physics, solar–terrestrial relations, magnetosphere, plasmasphere, ionosphere, thermosphere, coupling between these subsystems, particle acceleration and waves, geomagnetic storms and substorms, magnetotellurics, ground effects (geomagnetically induced currents, power network), and space geodesy.

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 : vizi.pal.gabor@ek.hun-ren.hu

SINCE : 1981
 : 9 / 400 persons
 : 5 projects

MAIN PROJECTS

- NASA–ESA Cassini to Saturn
- ESA Rosetta to comet 67P
- Venus Express Aspera
- BepiColombo to Mercury
- International Space Station Plasma Wave Complex (PWC-Obstanovka) for the study of the magnetosphere and ionosphere
- JUICE PEP to Jupiter icy moons mission

CERTIFICATES

- ISO 9001, ECSS expert, TRL-9

MAIN PROJECTS

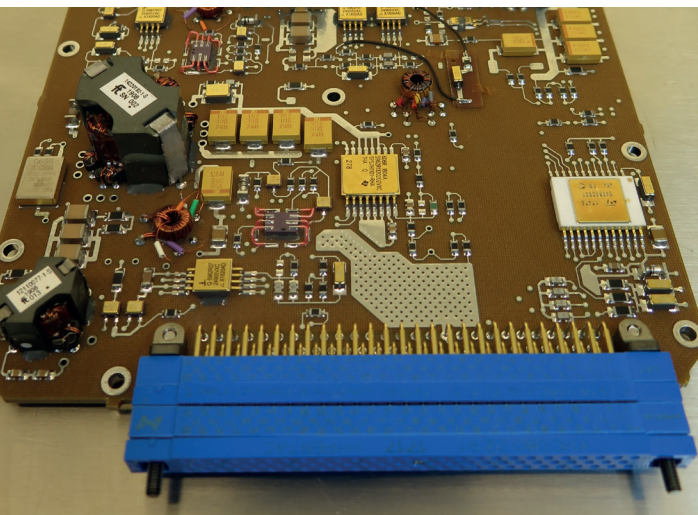
- EU Horizon 2022 T-FORS (2023-)
- ESA Swarm DISC PRISM (2020-2021)
- ESA S2P PLASMA (2021-)
- ESA Swarm DISC ULF (2022-)
- ELECTRONET COST Action: CA15211

INSTRUMENTS , LABS

- DPS4D ionosphere radar/ionosonde
- geomagnetic and geoelectric observations (including GIC)
- ULF-, ELF-, VLF-band wave monitoring
- EMMA, coordinator of the European quasi-Meridional Magnetometer Array
- GIRO, INTERMAGNET, SuperMAG, AWDANet, NICT data provision
- Zero B-field Laboratory
- Sentinel–1 geodynamic networks
- Debrecen sunspot catalogue

: Árpád Kis
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 : kis.arpad@epss.hu

SINCE : 1957
 : 14 / 64 persons
 : 10 projects





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web: www.ttk.hu/kpi



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



TD-4

4.1,3

TD-9

TD-14

TD-14



The main function of the HUN-REN Research Centre for Natural Sciences, ICNP, is basic research in psychology and related neurosciences. The Environmental Adaptation and Space Research Group is organised around two main themes. Psychodynamic processes in isolated small groups are studied in ground-based space analogue sites and simulations. The impact of isolation on emotional and cognitive processes and group dynamics has been demonstrated through psychological content analysis of the diaries of overwintering crews in

Antarctica. The results of isolation research are useful in the health field to mitigate the adverse effects of social isolation, especially in elderly populations. The effects of space travel stressors on cognitive performance and brain electrical activity on the International Space Station and space analogue missions are being investigated. They have demonstrated deficits in brain electrical correlates of cognitive performance and attention during spaceflight. Their results and methods are applicable to other high-stress work environments.

The space scientists of Wigner RMI are engaged in scientific research of the physical processes of space and in professional support for space missions. We have a wide range of expertise, with a particular focus on solar system research, including the study of the plasma environment of celestial bodies, the study of space weather, and the development of methods for space weather prediction. Our research is funded by national and international grants. Our participation in sev-

eral successful space programmes in the past provides the strong basis for our involvement in current and future space missions. Our colleagues and our institute cooperate with numerous space research institutions in Hungary and abroad. Through our researchers' teaching and outreach activities, new knowledge is directly applied in higher education and helps stimulate young people's interest in science.

: Bea Ehmann László Balázs
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@ : ehmann.bea@ttk.hu

SINCE : 1902
: 6 / 492 persons
: 4 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
• AstroSpeech ESA Development of an autonomous speech analysis system for psychological monitoring of astronauts.

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
• Solar Orbiter space mission
• BepiColombo space mission

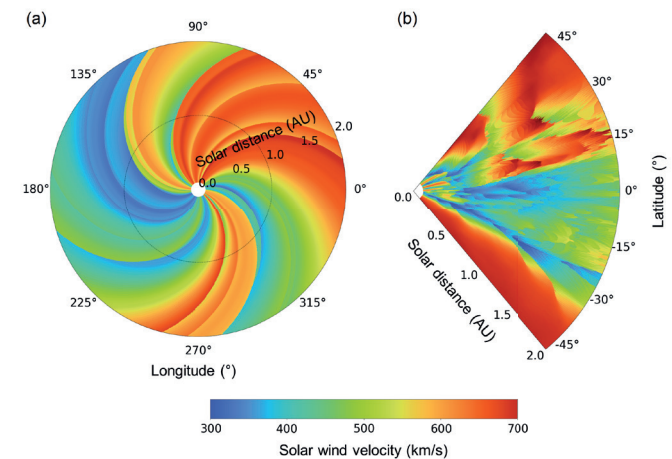
LABS

- CNC mechanical workshop
• Magnetically shielded laboratory

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

SINCE : 1992
: 14 / 171 persons
: 7 projects

Space Weather Prediction





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postal address: 1525 Budapest, Pf. 49
web: www.wigner.mta.hu/szillardtestfizikai-es-optikai-intezet



cím: 1111 Budapest, Műegyetem rakpart 3.
web: www.morph.bme.hu



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 phase-field models applicable on the mezo scale. Within ESA collaboration, the research group provided/provides theoretical and computational support to fundamental and application-oriented research projects aimed at developing new materials in microgravity environment. The knowledge generated is expected to contribute to the development of new materials/technologies.

Within ESA collaboration, the research group provided/provides theoretical and 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.

The HUN-REN-BME Morphodynamics Research Group engages in the geometric modelling of shape evolution of eroding or growing solid particles, rock surfaces, crack and convection patterns. Our goal is to use photos and satellite images to analyse shapes and, based on this analysis, determine their provenance.

In cooperation with NASA scientists, we were able to determine the length of ancient rivers on Mars, based solely on photos of abraded pebbles, taken by the Curiosity rover. We were also able to provide a rather simple geometric theory for the elongated shape of the asteroid 'Oumuamua.

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

: 1999
 : 5 / 169 persons
 : 1 project

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)
- ESA PRODEX project "METCOMP-HU" (2020-2023) (in-situ composites from coupled metastable peritectic structures; ISS experiments)

LABS

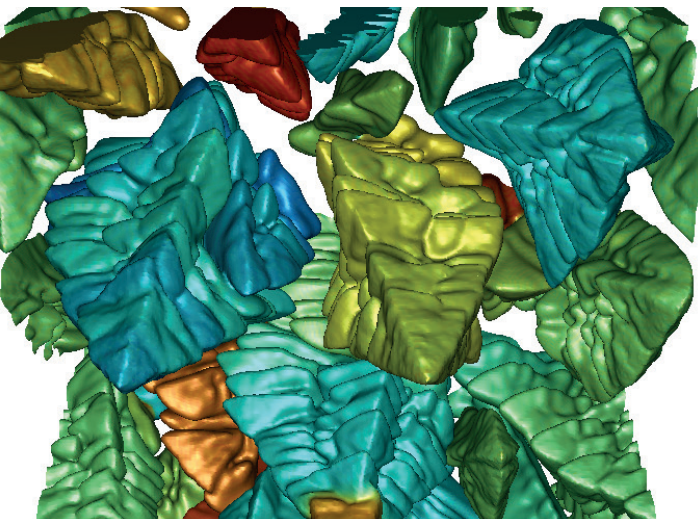
- CPU and GPU clusters

MAIN PROJECTS

- NASA Mars Science Laboratory

: Gábor Domokos
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: 2016
 : 3 / 6 persons
 : 1 project





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address: 4002 Debrecen, Balmazújvárosi út 10.
web: www.inmpartner.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.

INM Partner Ltd. is an advanced CNC machining and engineering subcontractor with 30 years of experience. We provide our customers with built-to-print parts from materials such as aluminium, stainless steel, technical plastics, titanium alloys, and other exotic steels. We are suppliers to organisations in different sectors such as aerospace, defence, automotive and food. Space references:

satellite parts, MGSE parts.

Some parts made by us will be assembled into a satellite which will measure and analyse the carbon dioxide emission on Earth. At the end of the year 2023, we want to apply to ESA for support for a feasibility study, the subject is optimisation of lightweight structures for mass reduction.

👤 : Zoltán Németh
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SINCE : 2011
👥 : 4 / 55 persons
🏠 : 140 / 1564 M Ft

MAIN PROJECT

- 4GNSS RTK

CERTIFICATES

- EN/AS 9100, ISO 9001



👤 : Tamás Polonkai
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@ : tpolonkai@inmpartner.hu

SINCE : 1990
👥 : 8 / 14 persons
🏠 : 58 / 211 M Ft



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web: www.innobay.hu

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

Innobay Hungary Ltd. is an independent, integrated innovation service provider. Our goal is to offer innovation, business development, and economic development services to companies and government organisations. The company has a background in engineering and physics, covering materials, energy, and aerospace, complemented by living material systems and processes. Previous activities carried out by the founder of Innobay Hungary Ltd. include microgravity experiments at the Bremen Drop Tower, participation in

the founding of SGAC, single-crystal research at NASA, the first Hungarian parabolic flight, innovation of aluminium foams (Metal-Minipore) and products made of them (ALUHAB, AMULET) for ESA and EU. The company's space research competence contributes to a better understanding of the effects of microgravity on materials technologies. The competence in space material technology supports the establishment of Hungarian start-up companies.

InnoStudio Inc. is a member of the ThalesNano 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 and pharmaceutical applications, also for educational purposes, chemical formulation methods in microgravity, and nanotechnology for agrochemical innovation.

Our space chemistry-related activities serve the development of innovative technologies for

sustainability both in space and on Earth and ensure human well-being on a long term. We are committed to realise syntheses of important pharmaceutical ingredients and other chemicals in space by our novel and miniaturised flow chemical tool. Our company, first worldwide, initiated COVID-19 drug research in space in order to improve drug efficacy. We take the role of coordinating both the national and international space chemistry community, so as to organise related scientific symposia (USA, 2017-2021).

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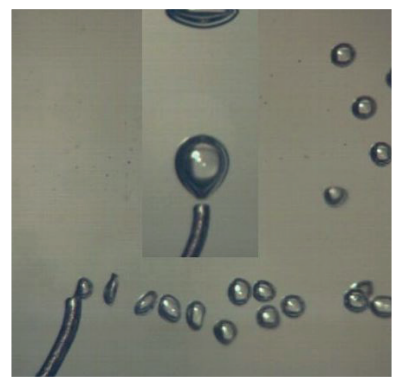


👤 : Norbert Babcsán
☎ : +36 30 415 0001
@ : info@innobay.hu

SINCE : 2011
👥 : 1 / 2 persons
🏠 : 3 / 37 M Ft

MAIN PROJECTS

- Metal foam and equipment development by the melt route for low gravity test (ESA)
- Characterisation of bulk and shaped ALUHAB for space applications (ESA)
- Aluminium Foam Structures for Aero&Space (EU)



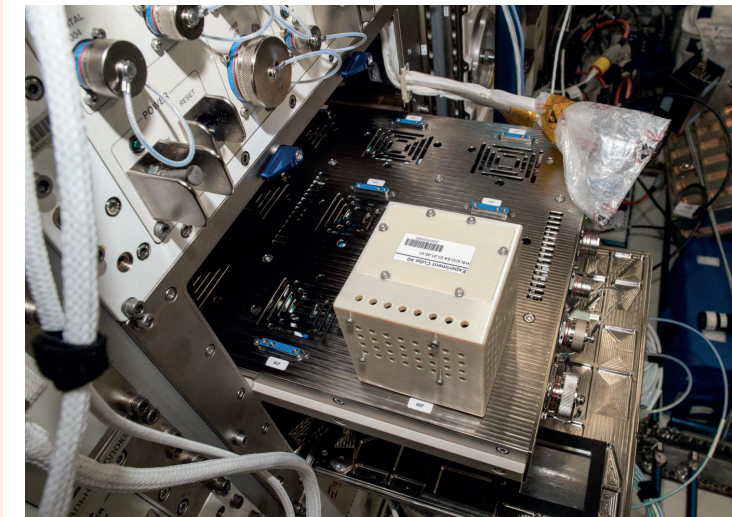
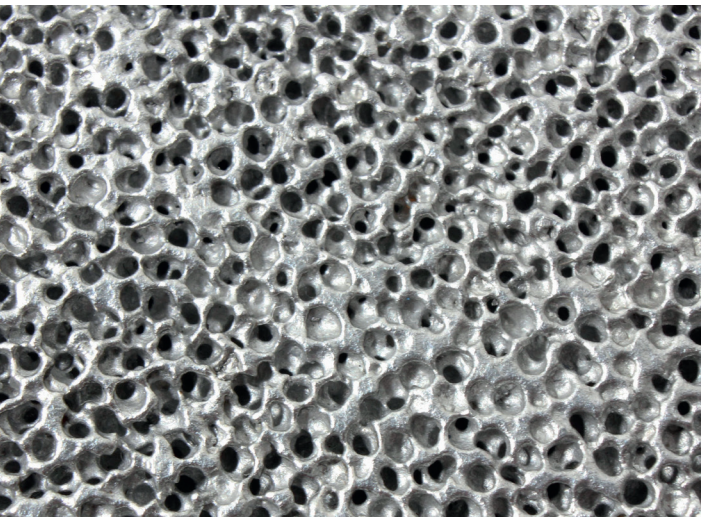
MAIN PROJECTS

- Development of modular flow chemistry reactor and miniaturised 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)
- COVID-19 drug research on ISS (SpaceX, CRS-24)
- COVID-19 drug research on ISS (SpaceX, CRS-27)



👤 : Balázs Buchholcz
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@ : balazs.buchholcz@innostudio.org

SINCE : 2013
👥 : 2 / 5 persons
🏠 : 27 / 103 M Ft





TD-14
14.1-2
14.3-4
TD-4
4.2



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 postal address: 4001 Debrecen, Pf. 390
 web: www.isotoptech.eu/en

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.

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 in-

strument 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.

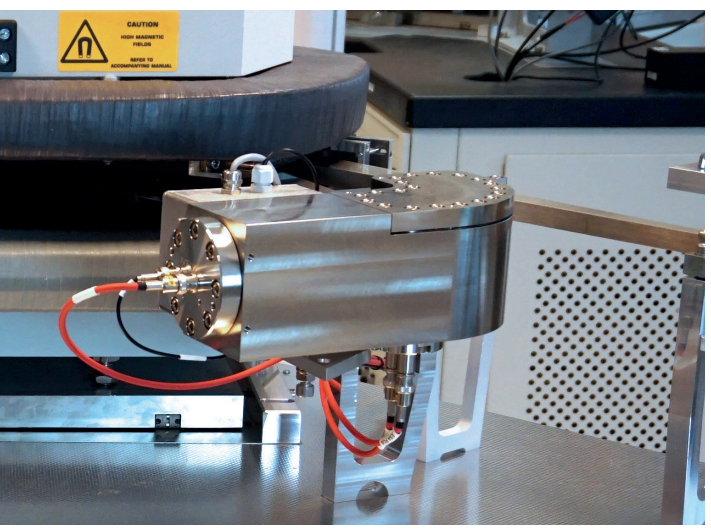
Conceptual mechanical design of the IDA (Internal Dosimeter Array) Payload (experimental unit) on board the US HALO module of the space station around the Lunar Gateway. We manufactured the external structural unit and 5-axis CNC-machined cardlocks for the VIREO (Virtual Intelligence Realisation for Earth Observation) 3-Unit satellite platform for C3S LLC.



TD-15
15.7
TD-20
20.1
20.10

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

📅 SINCE : 1997
 👥 2023 : 6 / 45 persons
 🏢 2022 : 20 / 568 M Ft



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



MAIN PROJECTS

- VIREO
- Radcube IOD 3U CubeSat,
- D3S-RadMag,
- LUNAR GATEWAY: INTERNAL DOSIMETER ARRAY

CERTIFICATES

- ISO 9001:2015



👤 : Erika Rácz
 ☎️ : +36 96 543 286
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📅 SINCE : 1998
 👥 2023 : 2 / 43 persons
 🏢 18/22 : 5 / 1780 M Ft





LECHNER KNOWLEDGE CENTRE NON-PROFIT LTD, EARTH OBSERVATION OPERATIONS CENTRE

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 background institution to the Prime Minister's Office, has become the organisation possessing the most complete coverage of geospatial data sets and geospatial know-how in Hungary. With a reorganisation and integration of activities from the former Institute of Geodesy, Cartography and Remote Sensing (FÖMI), Hungarian national geospatial data sets and services have been centralised here.

The Earth Observation Operations Centre is in charge of activities related to aerial remote sensing and Earth observation, including R&D and the

maintenance and improvement of the governmental Earth Observation Information System. Primarily, we provide operational thematic results for multiple governmental domains by processing and analysing data from the Sentinel satellites, such as regular mapping of flood and inundation, drought, crop types and grasslands, or country-wide crop condition maps created during the severe drought period in 2022. We play a key role in the coordination and quality control of European land cover mapping, including strategic planning and the training of contributing professionals.



LECHNER KNOWLEDGE CENTRE NON-PROFIT LTD, SATELLITE GEODETIC OBSERVATORY

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

The Satellite Geodetic Observatory (SGO) as a department of the Lechner Nonprofit Ltd. is the centre of satellite geodetic R&D in Hungary. SGO's main tasks are related to deformation monitoring and reference frame maintenance using GNSS and InSAR, and comprising the implementation of new satellite geodetic technologies, the design and build of geodetic infrastructures, and providing related services. SGO performs its activities in a broad international cooperation network and participates in European-scale projects as EPND,

EPOS ERIC, and EGMS. We developed geodetic reference infrastructures as GNSSnet.hu, INGA, MGGA, and IMMA, and based on these infrastructures, we provide services for multi-GNSS RTK positioning and GNSS calibration. The ongoing research field is the modernisation of the Hungarian height reference and its infrastructure based on space geodetic technologies. We are also preparing a national-scale InSAR-based ground motion service.



TD-10
10.2

TD-26



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

: 1967
 : 34 / 34 persons
 : 4 projects

MAIN PROJECTS

- Land Cover monitoring since 1990
- National Ecosystem Base Map (KE-HOP-4.3.0-VEKOP-15-2016-00001)
- Development of the Earth Observation Information System (KÖFOP-1.0.0-VEKOP-15-2017-00050)
- Remote sensing activities in the frame of the Agricultural Risk Management System, mapping of drought and flood / inland excess water
- Danube Data Cube, financed by the European Space Agency (ESA)

MAIN PROJECTS

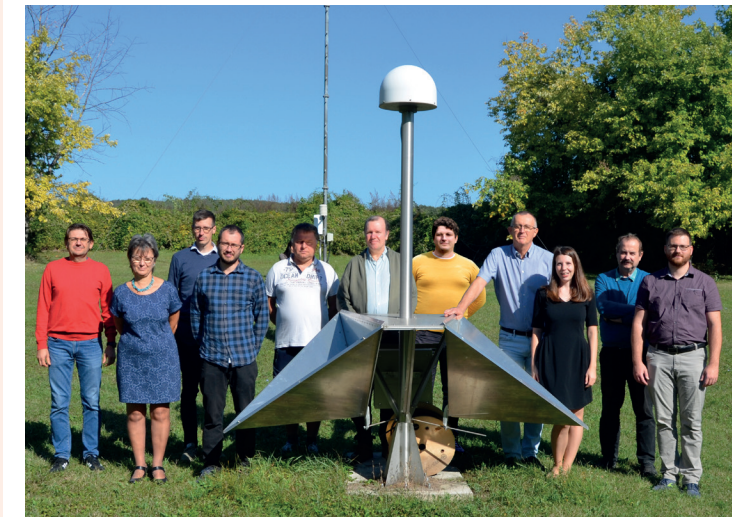
- EUREF Permanent Network Densification
- European Plate Observing System ERIC – GNSS Thematic Core Service - service provider
- European Ground Motion Service – providing continental scale GNSS reference velocity field
- IMMA: Integrated Satellite-based Height Reference Network development to renew the traditional EOMA network
- INGRIM ESA project – GNSS / InSAR integration

LABS

- Active GNSS network (GNSSnet.hu) - RTK service, based on 40+ stations;
- GNSS Geokinematic Reference Network (MGGA) with 23 stations;
- K-GEO Accredited Calibration Laboratory;
- Bernese and GAMMA software for scientific and commercial applications;
- GNSS Analysis Centre for geodetic and geokinematic processing capacities.

: Ambrus Kenyeres
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 : ambrus.kenyeres@lechnerkozpont.hu

: 1967
 : 10 / 17 persons
 : 2 projects





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 Adviso-

ry 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. Our featured events are the Hungarian Space Forum, and in cooperation with BME, the H-SPACE International Conference on Research, Technology and Education of Space. The Society has a rich history and considerable know-how in space-related education and outreach.

address: 1121 Budapest, Konkoly-Thege Miklós u. 15-17.
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 CH₄ bands; development of interactive laser, spectroscopic and fluorescence instruments for demonstration.



TD-14
14.2

👤 : István Arnócz
☎ : +36 20 294 7278
@ : fotitkar@mant.hu

📅 : 1956

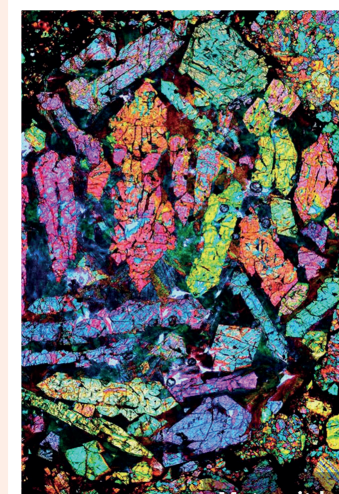
MAIN PROJECTS

- Competitions: „Towards Space!” (since 2020) and CanSat Hungary (since 2022)
- MANT Space Camp (since 1994)
- Hungarian Space Forum (since 1972)
- Space Day (since 1992)
- H-SPACE International Conference (since 2015)
- Space Age Seminar (since 2021)
- MANT Workshop (since 2021)
- IAC 2024 Budapest Bid



MAIN PROJECTS

- CAMELOT
- GRBAlpha



👤 : Áron Keve Kiss
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@ : magyarocsillagaszat@gmail.com

📅 : 2017

👥 : 0 / 6 persons
🏠 : 0 / 61 M Ft





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

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



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 com-

plex 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.

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.



TD-4
4.3

TD-12

12.1

12.2

TD-16

16.1

TD-17

17.2

TD-24

24.2

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

SINCE : 2016
👥 : 5 / 6 persons
📅 : 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

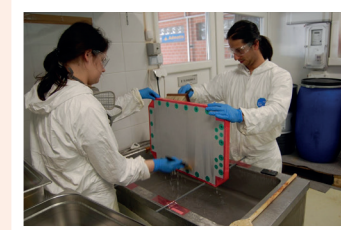
- SSC (Sheffield Solar Catalogue for our market-leading WG_M Space Weather forecasting sunspot-based tool)

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
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@ : barczy.tamas@admatis.hu

SINCE : 2008
👥 : 2 / 4 persons
📅 : 6 / 59 M Ft





address: 3529 Miskolc, Egyetemváros
web: avk.uni-miskolc.hu



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



The research group was established in 2023 to unify the work of the HUN-REN–ME Materials Science Research Group (established in 1996) and the industrial material science research activity of the University of Miskolc. The main activities include the study of the phase transformation in the alloys, primarily the investigation and simulation of solidification. As a participant in the MICAST and the CETSOL research projects of the ESA MAP program, the research group has been dealing with

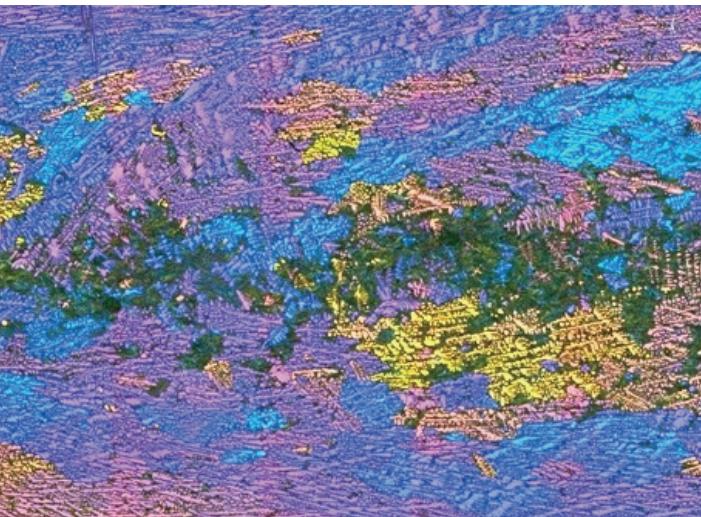
the effect of melt flow on the microstructure of solidified materials during space environment and on the ground since 2000. The Research Group established a laboratory for solidification with its own designed and built types of equipment, which are able to stir the molten metal during solidification using rotating or travelling magnetic fields. Besides scientific research, the group is performing investigations on the topics of material science, material planning and material production.

The Ludovika University of Public Service of Hungary created an independent research institute with the aim of researching and teaching space law and policy. The institute focuses on legal and security issues related to outer space and aims to reinforce regional and international cooperation. We are the national point of contact of the ESA's European Centre for Space Law (ECSL). We regularly organise scientific events, conferences. In October 2022, we organised a major international conference on European Space Policy in cooperation with Université Paris Saclay, and in 2023 we

organised an international conference on the topic 'space and defence'. Our researchers offer courses on space law and space economy for MA students. We have published a space law textbook in 2022, for the first time since 1964. Moreover, our university is the coordinator of the UNISPACE program, allying 17 Hungarian universities, offering trainings on space policy, space sciences, space engineering, and space medicine. ECSL has selected our university as the host of the European Space Law and Policy Summer School 2023.

: Zsolt Veres
 : +36 46 565 201
 : zsolt.veres@uni-miskolc.hu

SINCE : 1996
 2023 : 6 / 6 persons
 18/22 : 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



: Balázs Bartóki-Gönczy
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 : bartoki-gonczy.balazs@uni-nke.hu

SINCE : 2020
 2023 : 5 / 5 persons
 18/22 : 0 project





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

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



TD-26

The Research Group for Space Economy and National Economy Competitiveness of the Ludovika 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.

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 Centre (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 and GNSS, as well. Several domestic and international projects are conducted in the Institute, most of them focusing on the educational aspects of Earth observation, application of remote sensing and methodological developments. Several international projects are conducted in the Institute, most of them focusing on educational aspects of Earth observation, application of remote sensing and methodological developments. The Institute organises the annual GISopen conference, which has a thematic space research section in the most recent years.

👤 : Gergely Tóth
☎ : +36 30 742 2526
@ : toth.gergely@uni-nke.hu

📅 : 2020
👥 : 5 / 5 persons
📅 : 0 project

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

KIEMELT PROJEKTEK

- WREN (Water Resources in Efficient Networks).
- IRSEL (Innovation on Remote Sensing Education and Learning)
- DSinGIS (Doctoral studies in Geoinformation Sciences)
- GE-UZ (Geoinformatics: enabling sustainable development in Uzbekistan)
- WAREMA (Water resources management in protected areas)

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

📅 : 1972
👥 : 2 / 11 persons
📅 : 3 project





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



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.



address: 1117 Budapest, Infopark sétány 3/B 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.

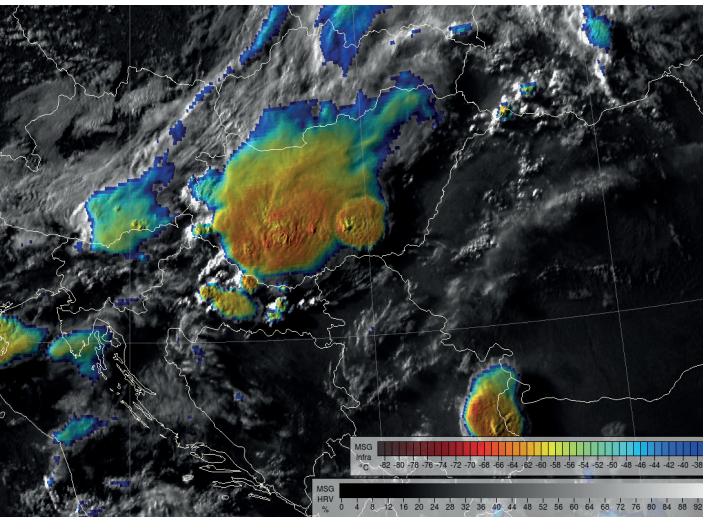


TD-12
12.1
12.2
TD-1
1.1
1.2;1.3
TD-2
2.3
2.4

TD-26

👤 : Eszter Lábó-Szapponas
☎ : +36 1 346 4664
@ : labo.e@met.hu

📅 : SINCE : 1870
👥 : 5 / 196 persons
🏢 : 5 projects



MAIN PROJECTS

- EUMETTrain: 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)
- Danube Data Cube (DDC): ESA supported project gathering satellite (MODIS, Sentinel) and gridded meteorological data supporting drought monitoring and irrigation planning. (2021-2023)

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

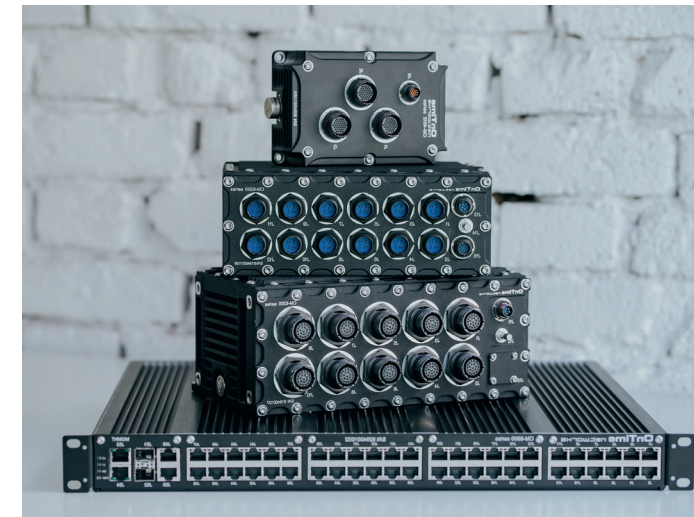
- Thermal chamber
- High-speed oscilloscope, signal generator, other instruments
- Experience in MILSTD and DO certification measurements

CERTIFICATES

- ISO9001:2015
- AS 9100D (EN9100:2018)

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

📅 : SINCE : 2014
👥 : 9 / 30 persons
🏢 : 32 / 719 M Ft





TD-13
13.2
TD-2
2.2
2.3
TD-4
4.1
4.2



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), an exceptional technological incentive competition. Puli is developing a range of lunar exploration technologies, including the NASA award-winning Puli Lunar Water Snooper (PLWS), a rugged, micro-sized, lightweight neutron spectrometer instrument for exploring lunar water resources in support of In-Situ Resource Utilisation (ISRU) and our low-cost, lightweight, planetary ro-

ver platform with unique mobility capabilities. Our first lunar payload, the Puli SpaceTime Plaque, will be delivered to the Moon on the Peregrine lander of Astrobotic. Two PLWS will fly on the IM-2 Mission of Intuitive Machines to the Lunar South Pole region: one will go into a permanently shadowed region on board the South Pole Hopper and a second one will collect data en route on Lunar Outpost's MAPP rover. Puli also keeps an eye on down-to-Earth applications.

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

REMRED Ltd. is a 100% privately owned Hungarian space engineering spin-off company. As part of the international value chain, REMRED specialises in the design, manufacturing, assembly, integration, and testing of small space equipment and subsystems according to the European space standards (ECSS) and ISO 9001, and also offers space specific products in the domains of space weather monitoring and spacedosimetry.

REMRED's objective is to become a key player in the European space systems market, including small satellites in the 100–300 kg asset class by expanding its capabilities on a much wider scale through the development of its 4,000 m² MAIT Space Technology Centre in Hungary. Through this modular facility, REMRED is going to have the capabilities to manufacture, assemble, integrate, and test complete space systems up to 400 kg.



TD-8
8.1-2
8.3-4



TD-1
1.1-3



TD-2
2.1-2,4



TD-3
3.1; 4



TD-4
4.1-3



TD-7
7.3



TD-14
14.1-3



TD-20
20.1



TD-21
21.5



TD-23
23.1-2



TD-24
24.3;6
24.8



TD-25
25.1-3

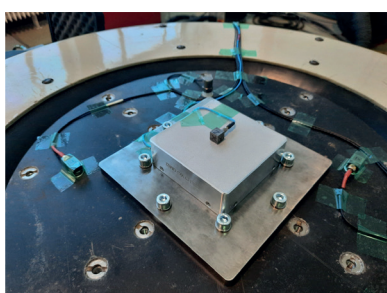


👤 : Tibor Pacher
 ☎️ : +36 70 772 1727
 @ : tibor.pacher@pulispace.com

📅 SINCE : 2010
 👥 2023 : 4 / 4 persons
 🏠 2022 : 30 / 33 M Ft

MAIN PROJECTS

- Puli Lunar Water Snooper Development for NASA
- SpaceTime Plaque aboard Peregrine Moon Lander



MAIN PROJECTS

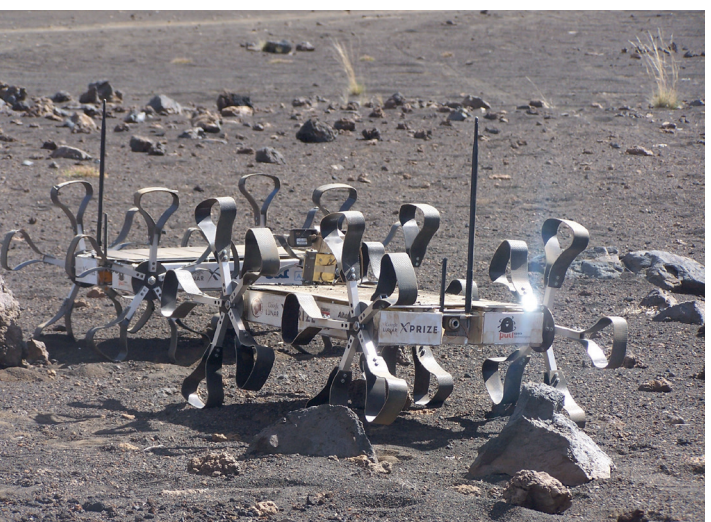
- Interface Electronics (E-Box) for IDA on the Lunar Gateway space station
- DPU of the Comet Camera for Comet Interceptor
- Development of RADTEL and TRITEL for the MSR ERO
- 3D Bioprinter system electronics and operating software development for the ISS
- Development of a Portable Personal Space Dosimetry System (PSDS) for EVAs

LABS

- ECSS-conform
- Space Research and Development Laboratories,
- Vibration & Shock Test Facility,
- Thermal-vacuum, Climate, Overpressure, Vacuum-Bakeout Test Facility,
- ISO8 and ISO7 Cleanrooms

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

📅 SINCE : 2016
 👥 2023 : 73 / 73 persons
 🏠 2022 : 740 / 740 M Ft





SAGAX LTD.



HATP



SGF TECHNOLOGY ASSOCIATED CO. LTD.



TD-6

6.1-2

6.3-4

TD-2

2.1-2

2.3-4

TD-7

7.1

7.2-3

TD-9

9.3

TD-10

10.2

TD-12

12.1

12.2



address: 1092 Budapest, Bakáts tér 8.
postal address: 1134 Budapest, Angyalföldi út 5/A
web: www.sagaxcommunications.com

Sagax is a dedicated community of professionals, who work tirelessly to invent and create affordable, cutting-edge radio electronics equipment and integrated systems. We deliver advanced radio electronic solutions with mature mainstream commercial technology. Together we have decades of hands-on experience delivering working solutions to the toughest missions and environments.

Sagax deals with the development and integration of radio frequency wireless equipment

and systems. This technology is now completely woven into our daily lives with the help of telecommunications and navigation systems. It also plays a very important role in maintaining contact with vehicles travelling in space. Within this, we deal with antennas, phase-controlled antenna systems, multi-channel phase-coherent radio platforms, digitisation and transmission primarily for ground service.

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 com-

puter 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).

TD-1

1.1

1.2

TD-2

2.2

2.3



👤 : Bertalan Eged
☎ : +36 30 172 0718
@ : bertalan.eged@sagaxcommunications.com

SINCE : 1990
👥 : 6 / 10 persons
🏢 : 65 / 291 M Ft

MAIN PROJECTS

- Dual-Polarised Compact Probe for Spherical Near-Field Antenna Measurements
- Cybersecure GNSS for Autonomous Mobility

LABS

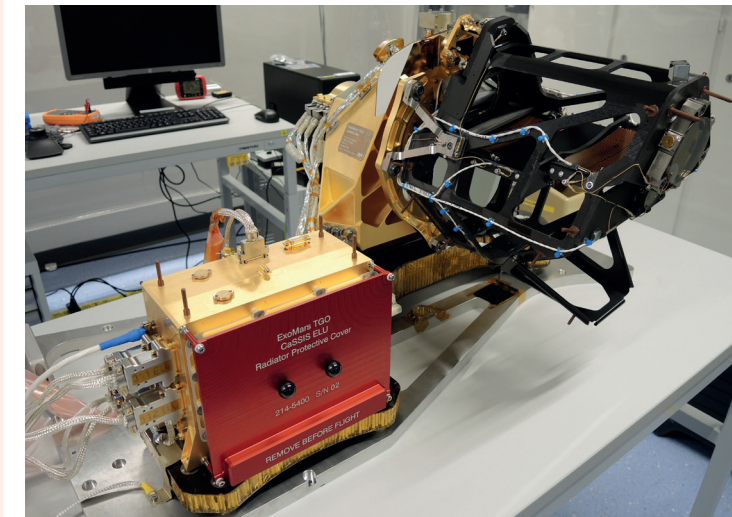
- outdoor antenna measuring field for measuring low-frequency and large antennas
- turning platform for turning around up to 4-ton complete vehicles for electromagnetic measurements

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
👥 : 5 / 5 persons
🏢 : 68 / 68 M Ft





TD-14
14.2

TD-26



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

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

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.

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 launched in 2015. We were part of an international team participating in the 73rd parabolic flight campaign of ESA in 2020, followed by the TEXUS-57 sounding rocket launched in 2022 with the CDIC-4 module, where the flow-driven production of a complex mate-

rial was 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.

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

📅 : 2016
👥 : 1 / 1 persons
🏠 : 1 / 10 M Ft

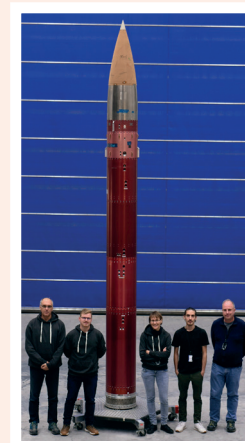
MAIN PROJECTS

- BeeBox
- Beeonosphere
- CropGuard



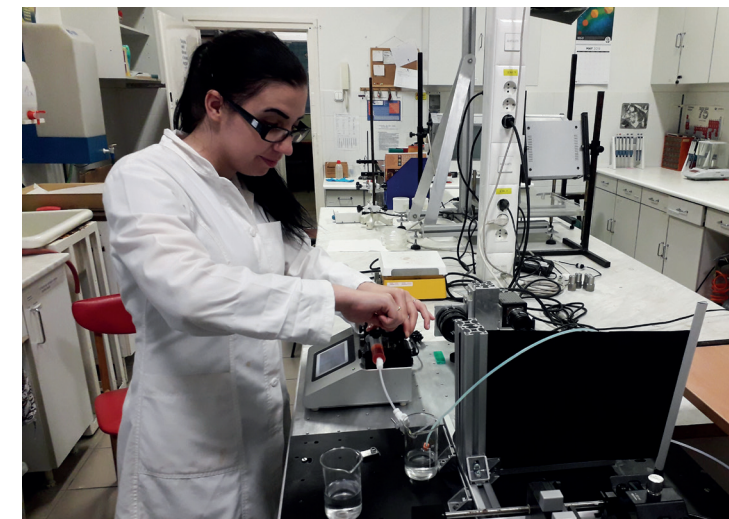
MAIN PROJECTS

- 56th ESA parabolic flight campaign (2012)
- MASER-13 (CDIC-3 module) sounding rocket campaign (2015)
- 73rd ESA parabolic flight campaign (2020)
- TEXUS-57 (CHIPY-Flower CDIC-4 module) sounding rocket campaign (2022)



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

📅 : 2008
👥 : 4 / 8 persons
🏠 : 4 projects





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

address: 3561 Felsőzsolca, Bódva út 7.
web: www.technoplast.hu



TD-15
15.1

TD-14
14.3



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.

The predecessor of Technoplast was founded in 1980. Our company has worked for space industry since 2009. Its activities include design, rapid prototyping, production of individual, small- and large-series plastic and metal parts with CNC machining, tool making. Our products are used by the automotive industry, the aerospace industry, and other industries that require development. Technoplast produced aluminium and plastic mechanical parts with CNC cutting technology for five different satellites. As part of the FOCUS project,

we made various mechanical parts for test equipment. The aim of the project was to investigate foam stability in a microgravity environment on the International Space Station. Using rapid prototyping technologies, we produced 28 plastic parts for a robot developed for the space industry. Our company conducts R&D activities in the production of aluminium foams and plastic composites for the purpose of weight reduction, energy absorption and vibration damping.

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

📅 : 2000
👥 : 2 / 5 persons
📄 : 3 projects

MAIN PROJECTS

- Active participation in UNISPACE post-gradual expert training session in Space Medicine subject
- ESA SPTC (Space Physician Training Course) accreditation for Head of Dept. AVMED, Szeged
- Active participation in aeromedical selection of "HUN Astronaut to Orbit (HUNOR)" program.
- Principal investigations for cerebral microcirculation in ground-based simulated space physiological stress settings by REG (rheoencephalography), supported by National Academy of Sciences DOMUS grant.
- REG device development in HUNOR Device program (approved by Centre for Energy Research)

LABS, CERTIFICATES

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

MAIN PROJECTS

- Sentinel-2 B/C/D Satellite M3 MIRROR MX ISM
- Marker Support Navigation (MSN)
- ARIEL PRODEX exoplanet research space telescope
- Comet Interceptor
- Copernicus CO2M carbon dioxide monitoring satellite

👤 : Péter Zai
☎ : +36 20 933 3563
@ : peter.zai@technoplast.hu

📅 : 1980
👥 : 3 / 48 persons
📄 : 6 / 556 M Ft





ULYSSYS LTD.

TD-26



address: 1024 Budapest, Lövház utca 39.
web: www.ulyssys.hu

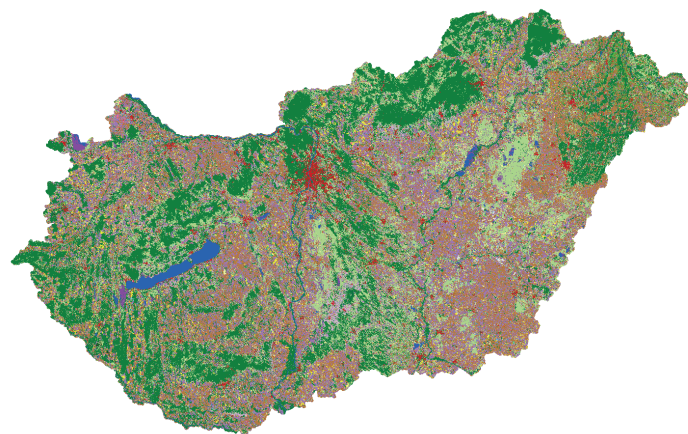
We have been a leading actor in the domestic IT market for 30 years. Our main area of expertise is the development of integrated workflow-based systems using up-to-date technologies. We have successfully carried out R&D projects in the fields of remote sensing and GIS, drone and NBloT technology, and medical image processing. Deep learning AI is also an important part of our profile.

The time-series Sentinel multispectral and

radar satellite images preprocessed by our company are analysed using empirical methods and AI. Our crop category maps, produced for the whole country on a monthly basis, form the basis for agricultural control checks. The data obtained are of great help to farmers in optimising their production and to applicants for area aid within the Common Agricultural Policy to ensure that the data in their applications are correct.

: Csaba Kuczy
 : +36 1 346 3400
 : kuczy.csaba@ulyssys.hu

: 1991
 : 20/300 persons
 : 300 / 6000 M Ft



MAIN PROJECTS

- Area Monitoring System: a monitoring system developed for the regular monitoring of agricultural areas subject to area payments under the Common Agricultural Policy
- Precision Yield Measurement with Remote Sensing Technology: Development of a cell-based yield measurement method that supports precision agriculture, even retrospectively
- Ulyssys Water Quality Viewer: Sentinel Hub Custom Script winner sediment and chlorophyll content visualisation"



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 division
- Earth Observation division



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 summarises and presents their needs to the government.



Founded: 2007

President: Péter Hargitai

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

web: www.hunspace.org

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

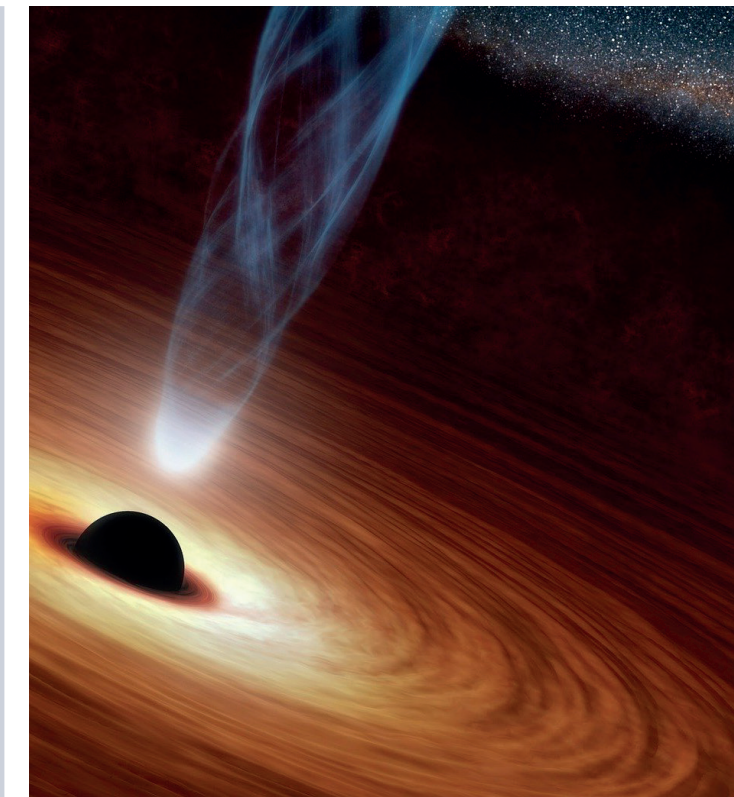
Founded: 2020

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.



SUPPLIERS TO SPACE INDUSTRY



HUNGAROFLOW

HF_{low} IT CONSULTING SERVICES

📍 cím: 1134 Budapest, Lehel utca 17/D
 🌐 www.hungaroflow.hu
 @ macsai.zsolt@hungaroflow.hu

At HungaroFlow, we believe that disruptive innovations and accelerating technologies open new dimensions for our partners in the space industry. We aim to bring decades of experience in business development, fundraising, global market entry, innovation and tendering to help them access these opportunities.

INSTITUTE OF ISOTOPES CO. LTD.

IZOTOP
INSTITUTE OF ISOTOPES CO. LTD.

📍 1121 Budapest, Konkoly-Thege M. út 29-33.
 🌐 www.izotop.hu
 @ commerce@izotop.hu / sute@izotop.hu

The Co-60 panoramic gamma irradiator, operated by the Radiation Technique Business Unit of Institute of Isotopes Co. Ltd., provides a wide range of doses and dose rates to meet the requirements of various ageing and radiation hardness assurance tests.



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.



ÓBUDA UNIVERSITY

📍 1034 Budapest, Bécsi út 96/B
🌐 www.uni-obuda.hu
@ aigner.gyorgy@uni-obuda.hu

Design, construction and dimensioning of simple and complex engineering systems, robotics, electronics and control systems. Space data processing, design and implementation of geoinformatics systems and models.



HCCI INSTITUTE FOR ECONOMIC AND ENTERPRISE RESEARCH

📍 1054 Budapest, Szabadság tér 7.
🌐 www.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.

PAULINYI&PARTNERS

Paulinyi & Partners

📍 1082 Budapest, Kisfaludy utca 38. 2.em.
🌐 paulinyiandpartners.com
@ nemeth.roland@paulinyiandpartners.com

Paulinyi & Partners Plc. was established 30 years ago. Our space-related activities extend to lunar habitat and analogue base design, city-scale energy simulations, which we synchronise with Earth observation data for architectural projects.



QTICS GROUP

📍 1134 Budapest, Váci út 49., 6. emelet
 🌐 www.qtics.group
 @ info@qtics.group

As a wide range industrial - including the automotive industry - certification organisation, our company supports the space industry strategy with quality, environmental, and safety standards, substantial expertise, and strict adherence to industry regulations, including cybersecurity. Our collaboration with space industry stakeholders extends to critical areas of quality, safety, and sustainability.



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.

Solvelectric
Technologies



SILVERIA ELECTRONICS LTD.

📍 6000 Kecskemét, Weber 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



TCT HUNGARY LTD.

📍 1118 Budapest, Rétköz utca 5.
 🌐 3dsteelprint.com
 @ 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.



VANNET TELECOMMUNICATIONS LTD.

📍 1117 Budapest, Prielle Kornélia u. 47-49.
🌐 vannet.hu
@ ver.gabriella@vannet.hu

VANNET Telecommunications Ltd. has been present in the telecommunications market since 2010 and, in addition to wired, mobile and microwave technologies, offers its customers satellite services, based both on GEO and LEO satellite systems.



ZALAZONE INNOTECH NONPROFIT LTD.

📍 8900 Zalaegerszeg ZalaZONE tér 1.
🌐 www.research-and-innovation.zalazone.hu
@ zalazone.innotech@zalazone.hu

The ZalaZONE Automotive Proving Ground is the largest car testing facility in Central Europe, a test track built on a 250-hectare near Zalaegerszeg, West Hungary. It also acts as a test and validation environment for GNSS systems, from automotive to agriculture including drones and UAV technologies.



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.



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