SMART HUNGARY

2024-2025

This exhibition showcases products by Hungarian innovators and entrepreneurs. Answers to global challenges often come from local needs and perspectives. Hungary is a small country with one of the most open and outward facing economies in Europe. It is also catching up with the continent's level of development after decades of communist rule. This makes designers and businesses uniquely positioned to have both an insider understanding of the most advanced part of the world, and in-depth knowledge of contexts where resources are scarce and innovation requires a different approach.

The selected products represent this breadth of approaches to what "smart" means in today's world. Some use cutting edge data science and design for the most advanced applications, while many use the same tools to upgrade or retrofit older technologies. Other projects combine low-tech and resource efficient methods to provide cheap solutions at scale to critical environmental or social challenges.

However, all projects share at least two factors. One is high added value, whether driven by design, process or service; and the other is a large scale approach that tackles key questions of our age, expanding beyond one country, industry or social group.

The exhibition explores four key areas. Buildings and homes focuses on the built environment, its production and operation. Cities and mobility showcases solutions at a systemic scale. Agriculture and industry highlights how new, data driven approaches can improve the oldest human trades. Health and lifestyle projects range from medicine to sports, from social to the most personal.

We are excited to present this selection and hope it inspires new ideas and collaborations.

Commissioner:	Ministry of Foreign Affairs and Trade
Curators:	Barbara Bozsik, Samu Szemerey (DANU)
Assistant:	Katalin Csala (DANU)
Installation:	Sporaarchitects
Graphic Design:	Kósa Tamás, DE_FORM
Videos:	Attila Varga Koritár

SMART HUNGARY

BUILDINGS AND HOMES

Our environment is undergoing multiple major transformations. Buildings and construction must change to reduce emissions and to enhance climate resilience. This requires new or rediscovered technologies applied at scale, which in Europe often means retrofitting existing structures.

Changing work patterns, lifestyles, and social events such as the recent pandemic have shifted the functions and services expected of the home, the workplace, and public spaces.

Finally, this is also one of the key frontiers where new technologies bring digital and online services to the real world. The section represents products that aim to shift our approach to the built environment.

CHAMELEON SMART HOME

System independent smart home integrator

Company: Chameleon Smart Home Nyrt.
Developer: Péter Szarvas, Róbert Bíró (Chameleon Smart Home Nyrt.)
Website: chameleon-smarthome.com

Chameleon is a system-independent smart home integrator. Its offer is a future-proof smart home system that provides a durable and flexible basic infrastructure to which users can connect the products of any manufacturer. This allows a much larger freedom for selecting smart home brands and services without the risk of vendor limitations.

The system is adaptable and expandable, from the scale of individual homes to larger residential complexes. It helps reduce energy, water and heating costs and avoid unnecessary consumption. Its customization options can integrate many safety and utility features as well as appliances and technologies for smart gardening.

HELIO HEATING GLASS

Solar powered heating glass

Company: Rákosy-Glass Kft.
Developer: Eszter Rákosy, dr. Lídia Rákosy, Tamás Gál (Rákosy-Glass Kft.)
Website: rakosyuveg.hu/en/helio-heating-glass

Helio Heating, the heating glass by Rákosy Glass has been on the market for many years, reliably serving customer needs. The changes in the world around us such as rising energy prices and the increasing demand for renewable energy sources inspired further development of the product to increase energy efficiency and enable isolated operation. Transparency allows the solar cells to produce energy even when placed between layers of glass, using a lamination process. The heating glass combined with solar cells meets the highest energy requirements, offering a durable and environmentally friendly solution that can be operated economically. Its versatile appearance can also support a wide variety of aesthetic preferences.

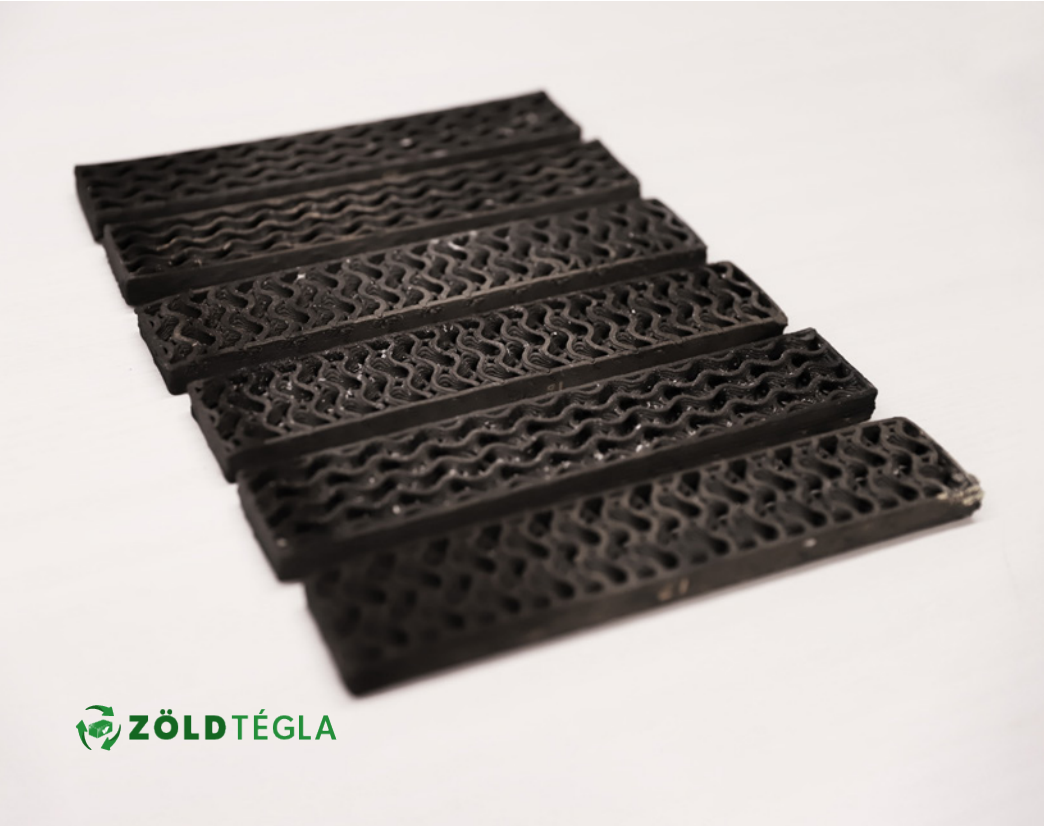
CATALYTIC BRICK

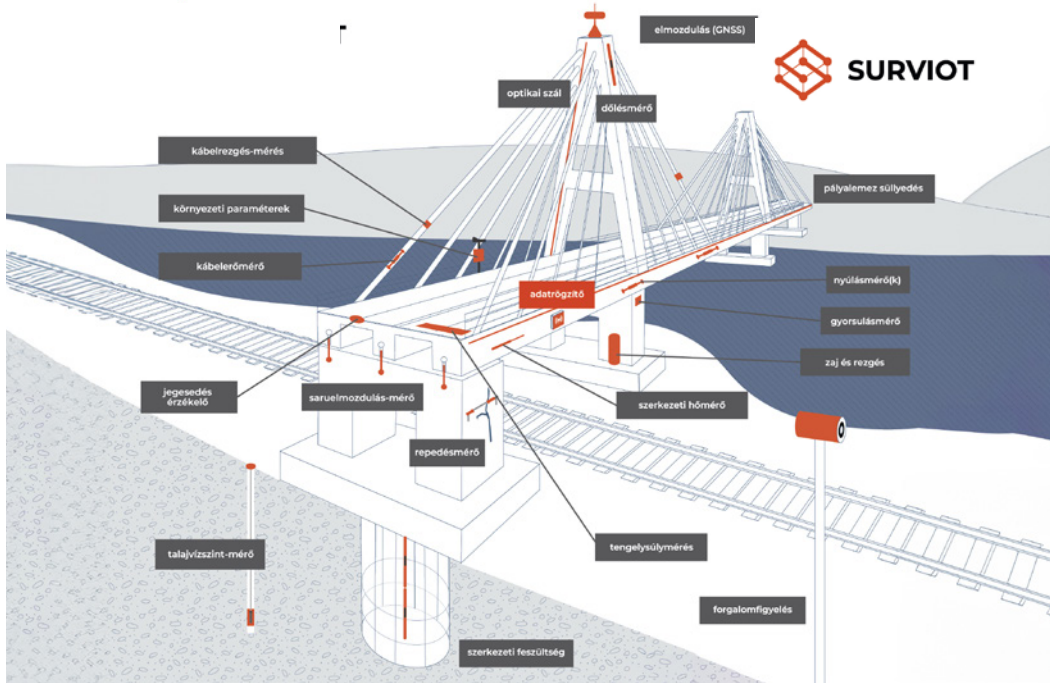
Emission reducing fire brick

Company: University of Szeged
Developer: András Sápi (University of Szeged)
Website: zoldtegla.hu

The catalytic brick is a fire brick developed to be used in wood burning or multi fuel stoves. It can reduce carbon monoxide emissions by up to 50% and increase combustion efficiency by 5%, thus saving lives as well as up to 100 kgs of wood during a family's heating season. During testing, retrofitting a stove updated it to meet EU, Austrian and German market expectations. The catalytic bricks are cheap to produce and can be molded or 3D printed into any shape, making them compatible with most products.

The brick was developed at the University of Szeged and has won multiple innovation awards.





SURVIOT MONITORING

Construction industry structural integrity monitoring platform

Company: SURVIOT Monitoring Kft.
Developer: Attila Berényi, Csaba Sándor (SURVIOT Monitoring Kft.)
Website: surviot.com/en

SURVIOT is a modern software and sensor integration platform for construction projects where structural integrity monitoring is required. It offers intelligent motion and deformation monitoring solutions for high-rise and civil engineering projects such as bridge, tunnel and dam constructions, for monitoring slope stability or other geotechnical and environmental parameters. The platform supports operators and contractors in complying with professional standards by replacing labor-intensive, manual regular measurements with automated data collection, processing, analysis, and reporting.

SURVIOT provides a complete solution from data collection to evaluation. It is sensor and manufacturer independent, provides 3D digital twin support and an open, AI-supported engineering platform. It uses space technology in communication and data collection.

VIAPLANT

Plant based creative material for interior design

Company:	Viaplant Kft.
Developer:	Viaplant Kft.
Website:	viaplant.com

Viaplant is a new plant-based material for creative applications in architecture, interiors and design, using recycled plant parts such as petals, leaves or grasses.

The dried plant materials are processed with various surface carriers and shaped by gluing and pressing to fit the final application. Recent research and development focused on sustainability, expanding the scope of carrier materials from glass and resin to wallpapers, textiles, paper and felt.

Plants and the places where they come from often evoke personal memories. Viaplant materials and textures, in addition to their aesthetic quality, can also convey stories by turning plants such as wedding bouquets into unique and personal objects.

GREENDROPS FARM

Vertical hydroponic system for home grown plants

Company:	Green Drops Farm Kft.
Developer:	Sándor Rácz, Gréta Ildikó Rácz (Green Drops Farm Kft.)
Website:	rotower.greendropsfarm.com/en/

Geen Drops Farm is an automated vertical hydroponic system for home grown edible plants. Its specialty lies in the innovative tower-like design, which reduces lighting requirements, thus both the initial investment and the maintenance costs. The water consumption of a tower is an average 5 L per day. Up to 5760 kg of lettuce can be grown annually using 34.6 m3 of water on just 40 m2. Since production takes place under closed and controlled conditions, only a minimal amount of pesticides is required. This is further helped by the accompanying Rotower iSupport software platform, which continuously collects production data and controls the operations of the farms with the help of IoT devices.

MOON COLLECTION

Aluminum foam furniture and production system

Company: DBE.FURNITURE
Developer: Bence Ádám Kiss (DBE.FURNITURE)
Website: dbe.furniture

The world's first storage furniture line made of aluminum foam, which is a recycled, eco-conscious material. Sustainability was the foundation not only for the product but also for designing the entire production and logistics process to minimize CO_2 emissions and support local manufacturing.

The design DNA enables using the same joints and structural solutions to manufacture products with different functions at different locations. Furthermore, the profit from the production of the product stays with the manufacturers.

This solution results in high end furniture based on a sustainable manufacturing process, made from recycled and recyclable materials benefiting everyone involved in its creation.

DBE·FURNITURE

CITIES AND MOBILITY

Our cities can only be as smart as we are. It is time therefore to look at how we live together and how the systems that keep our cities running can be improved to make them more resilient and sustainable.

Often that leads to mobility. Hungary is one of the forerunners of the current automotive transformation with a significant ecosystem of engineering and production, inspiring new, home-grown projects as well.

The future of cities however does not only come from data and new technologies. Sometimes the most promising projects combine new science with the wisdom of nature and time.

BIOMAKERY

Ecologically engineered urban wastewater treatment facilities

Company:	Biopolus Intézet Nonprofit Zrt.
Developer:	István Kenyeres, Márton Kenyeres (Biopolus Intézet Nonprofit Zrt.)
Website:	biopolus.org

The BIOPOLUS BioMakery is a unique palm-house-like facility that harnesses nature-based design and state-of-the-art ecological engineering for maximum efficiency wastewater treatment in dense urban environments. The essence of a BioMakery is the Metabolic Network Reactor (MNR) technology, which uses 2,000 to 3,000 species ranging from bacteria to plants to clean contaminated water to the highest standard.

A unique feature of the technology is the innovative use of natural aquatic plant roots in combination with artificial roots to provide biodiverse habitats for attached microbial biofilm. The technology uses cascading multi-reactor design, where the water is flowing from one bioreactor compartment to the next, each compartment representing a sub-ecosystem with maximum robustness, resiliency and treatment efficiency.

BioMakeries are extremely compact, odorless and scalable, thanks to their modular design. Architecturally they can be easily integrated into any urban environment.

CITYAI

City data aggregator and analytical platform

Company:	GAMAX Kft.
Developer:	GAMAX Kft.
Website:	www.gamax.hu/en

City AI is a website-accessible AI data aggregator interface for municipalities that integrates, analyzes and visualizes generally isolated data, databases and registers in a single platform, regardless of source. It provides strategic decision-making support for city management and city operations in planning and prevention through statistics and BI, in increasing the efficiency of public services, as well as identifying savings and income opportunities and carbon footprint reduction.

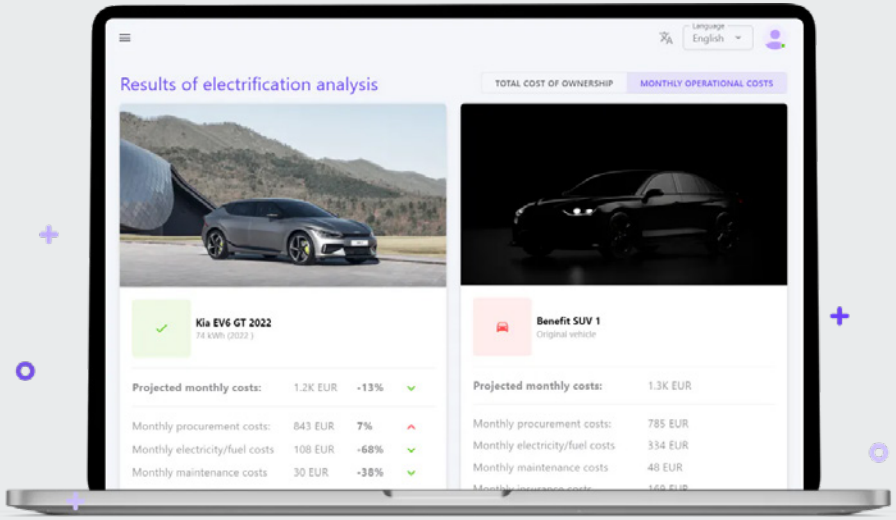
City AI saves municipalities time and money while making cities more transparent and livable. The platform runs with an unlimited number of users at certain data levels, making sharing information easy and cost-effective. It rationalizes the communication and data sharing of different institutions.

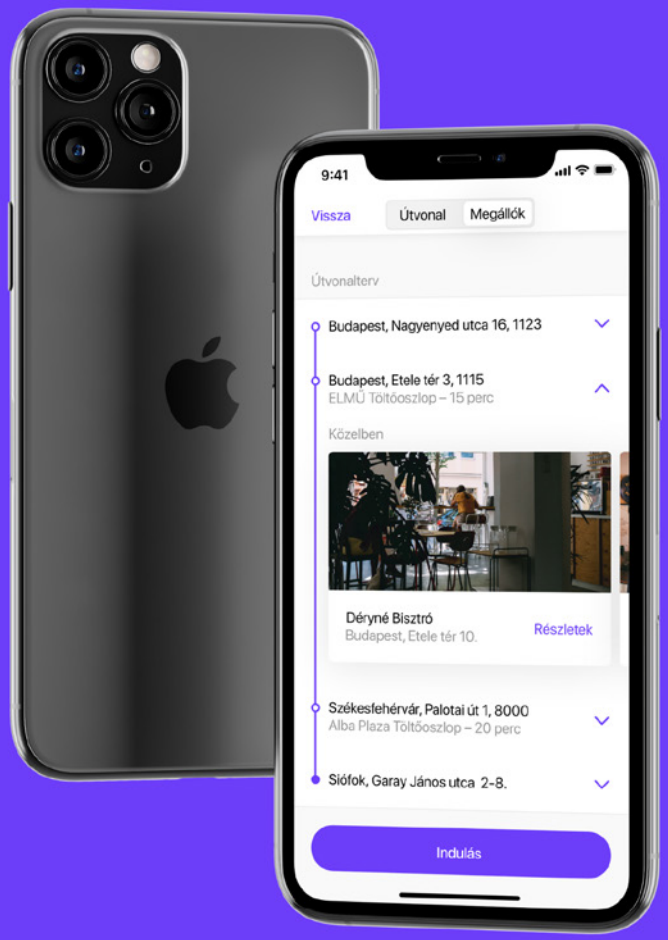
VOLTEUM

Electric vehicle fleet management software

Company: Volteum Kft.
Developer: Dávid Kertész, Kornél Kálmán (Volteum Kft.)
Website: www.volteum.io

Volteum offers the world's leading electrification and electric vehicle fleet management software. The platform uniquely integrates complex electrification processes into user-friendly, efficient tools, from selecting the perfect electric vehicles to route planning and creating optimal charging sessions to detailed reports on the fleet's operational data. The goal of the developers was to make the transition easier and beneficial for companies electrifying their fleets. Volteum responds to the need for sustainable transport by reducing the complexity and costs of electrification, enabling well-grounded decision-making, optimizing operations and significantly reducing environmental impacts.





Volteum

AGRICULTURE AND INDUSTRY

Production, whether mechanical or organic, is again becoming important in developed economies as well. Efficiency, digitization, automation, and customization all point to new goals and tools for industries to become environmentally sustainable while staying competitive.

Agriculture has been on a similar path, exploring shorter supply chains and technologically enhanced cultivation processes that are often closer to laboratories than the fields. Some of these methods can also be applied to restore natural environments.

In both sectors the durability of methods and tools require new technologies to be available not only in new products but often also as updates or extensions to older systems.

AXIS PRO

Automated mid-production measuring device

Company: Losonczi Innovation Kft.
Developer: Losonczi Innovation Kft.
Website: losonczi.hu/en

The rise of industry 4.0 and robotization increased the demand from vehicle manufacturers for the automated measurement of parts during production and the automatic correction of CNC machines. This prompted Losonczi Innovation's engineering team to create the PRO family of measuring devices.

AXIS PRO, the flagship measuring device, is a computer-controlled device suitable for the mid-production measurement of axle-type components, which can check and document up to 20-30 dimensions on each component in accordance with the vehicle manufacturers' specifications within 25 seconds. The machine is fully automated, suitable for both manual and robotic service. The METRIX program that controls the machine is also an in-house development of Losonczi Innovation. AXIS PRO has won 6 national and 2 international awards in the last three years, including mechanical industry, innovation and design awards.

MACHINERYGUIDE AUTOSTEER

Robotic steering system for agricultural tractors

Company: Afflield Kft.
Developer: Zoltán Bertók, Barnabás Benkő, Dániel Dely, Jonatán Gosztola (Afflield Kft.)
Website: machineryguide.hu

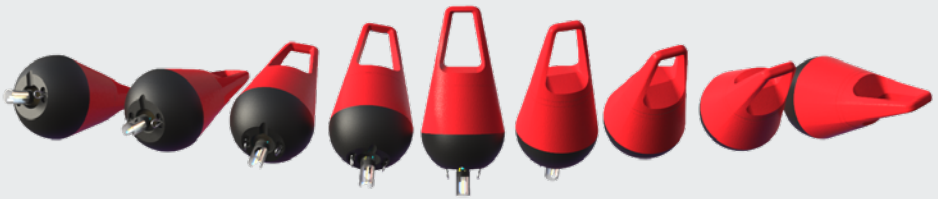
AutoSteer is a retrofittable robotic steering system for agricultural tractors. The automation guides the machine along the routes calculated by the line manager with centimeter precision, in a wide speed range up to 20 km/h. Its accuracy is within 3 cm in good soil conditions for sowing and within 5 cm for other tasks. The system supports several routing patterns including straight and curved modes, and the individual workflows can all be saved and continued at any time with centimeter accuracy. The display of the product is an Android tablet, which, in addition to easy handling, also provides a high quality user experience. The number of plots that can be saved is unlimited, and after reloading the automatic steering system can drive the tractor all the way along the border of the field.

NIMUE SMART BUOY

Smart buoy for water quality monitoring

Company: WaterScope Zrt.
Developer: WaterScope Zrt.
Website: waterscope.eu/en/

The IoT smart buoy is suitable for continuous monitoring of the water quality parameters of lakes, rivers, surface waters, beaches, sea coasts, and aquaculture. If several products are placed, the buoys are connected to a system and can carry out comprehensive monitoring of several lakes or lake systems. The smart buoy is suitable for measuring the five most important parameters: temperature (T), chemistry (pH) and dissolved oxygen (DO), redox potential (ORP), and conductivity (EC). The main function of the product is long-term water quality measurement, which is ensured by energy management and the optimization of the measurement periods of the built-in sensors. The collected data is sent to a virtual server via LoRaWAN or Nb-IoT network and from there to the users. The data display can be fully customized, even on mobile devices. Through analyses of the collected data, valuable information can be obtained on the state of water bodies.



waterscope

PIGBROTHER

Agri-food industry automated measuring and decision support system

Company: PigBrother Kft.
Developer: András Kárpinszky, István Pógár, Gergely Dobsinszki, Domonkos Farkas, Noel Császár, Csaba Miklós Veres, Gábor Papp (PigBrother Kft., EN-CO Software Zrt.)
Website: pigbrother.hu/en

PigBrother has been developing its decision support service based on image recognition since 2017. This product combines software and hardware to support the agri-food industry, enabling the acquisition and automatic analysis of data without human intervention. This is achieved through machine vision solutions that provide stress free weight estimates of animals, rotation management software, real time animal counting and other data provisions.

The application offers continuous measurement and substantial reduction in the required human capacities, as well as highly accurate data streams on the entire livestock to support decision making.

TRUTINA

Plant activity monitoring and irrigation control

Company: Gremon Systems Zrt.
Developer: András Újszászi, János Lóczi (Gremon Systems Zrt.)
Website: gremonsystems.com

Trutina is a real-time plant activity monitoring solution that contributes to producing higher quality yield while also increasing production volume. Thanks to plant activity monitoring sensors and a dashboard accessible via smartphone, it promotes healthier root development and can achieve significant cost savings. By monitoring plant data in real-time, it allows for the fine-tuning of irrigation strategies, fully exploiting the potential of greenhouses.

ROBOCOLLECT RIVERSAVER

Waterflow plastic waste collecting boat

Company: Future Plastik Kft., Waterscope Zrt.
Developer: PET Kupa Egyesület
Website: riversaver.eu

PET Cup, an annual competition to build boats cleaning plastic waste from the river Tisza has been running for more than 10 years to great international success. This built significant expertise on the prevention, assessment, eradication and processing of plastic pollution in rivers that is also internationally relevant for keeping natural water flows clean.

The goal of Riversaver is to share this knowledge and the solutions for saving rivers with the cooperation of industrial and academic partners. Riversaver is a complete package of solutions against plastic pollution. It includes, for example, the GPS Bottle for waste flow monitoring developed jointly with Waterscope, the Robo-Collect waste collection vessel and the supporting river monitoring camera system by Future Plastik, as well as various objects made from recycling collected waste, from tiny carabiners to full-fledged kayaks. Riversaver is powered by the Plastic Cup Society in cooperation with academic and industrial partners.

WASTE TO FUEL

Recycling plastic waste to gasoline fuel

Company: University of Miskolc
Developer: Zsolt Dobó, Balázs Hegedüs, Árpád Bence Palotás (University of Miskolc)

The accumulation and processing of plastic waste is a growing environmental problem worldwide. By thermochemical decomposition of plastics, hydrocarbon-based oils can be produced, which can be refined and hydrogenated to produce standard quality gasoline. At the Institute of Energy, Ceramics and Polymer Technology of the University of Miskolc, a technology was developed that resulted in a gasoline product that meets or approaches the European Union's EN 228 standard. In addition to the production of gasoline from plastic waste, the so-called turquoise hydrogen is another important resulting product, which is an excellent alternative especially in the case of more polluted plastic waste that is not clean enough to achieve gasoline quality.

HEALTH AND LIFESTYLE

Smart solutions in health and wellbeing tend to focus either on premium quality solutions offering higher complexity, better tools and sophisticated data, or on the ability to improve lives and provide access to treatment at an unprecedented scale.

On the other hand, design can address the most personal dimensions of our lives when addressing how our bodies are treated and trained or how we interact with technologies around us.

Design here is as much about the psyche as about physical wellbeing.

HUPLE

Medical device supporting balance therapy

Company: Huple Trade Kft.
Developer: Huple Trade Kft.
Website: huple.hu

HUPLE is a medical device supporting balance therapy in children's rehabilitation. Its spherical shape provides a revolutionary, safe method for the differential diagnosis and rehabilitation of developmental differences, and also contributes to the development of children raised in a sedentary lifestyle.

Its complex mechanism makes it suitable for the treatment and development of infants and children who were born prematurely, have nervous system injuries or motor development problems.

Huple is uniquely applicable in water, which is an important medium for rehabilitation. The newly developed accessories provide special functions, broadening its usability. Through the integrated digital inserts, treatment data can be accessed remotely as objective feedback between professionals and users, which enables Huple to be used in new areas.

NORT COMPLEX

Sports technology device supporting focus and skill development

Company: NORTComplex Development Kft.
Developer: Roland Németh (NORTComplex Development Kft.) József Széles (Hungarian University of Sports Science)
Website: nortcomplex.com

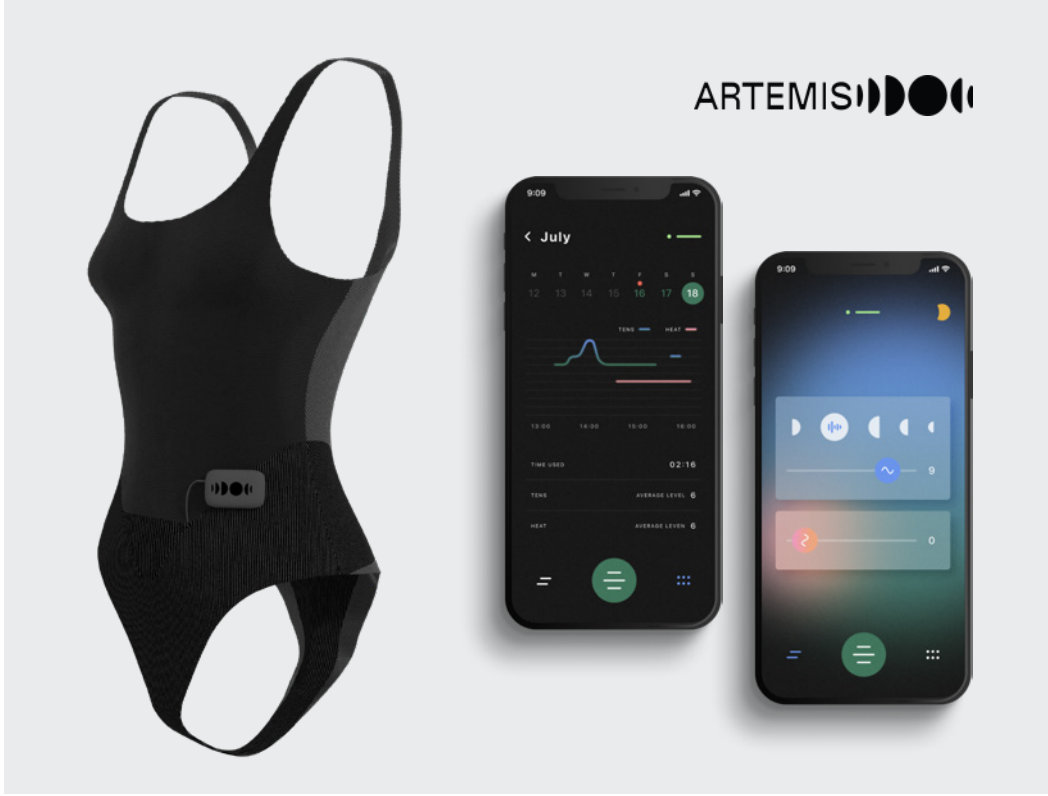
The NORT Trainer system is a training tool suitable for the coordinated development of the skill system. It aims to improve brain function with the help of colors and shapes, which creates an effective and interesting learning exercise. It is currently used in football training in Hungary, but can be adapted to all sports. The device consists of displays placed around the track, which are controlled by an easy-to-use tablet application. The displays are located at head height, so the players' eyes remain high. The coach's attention can be directed from instruction to error correction and the number of ball touches during training can increase significantly. Signals keep the players' attention constantly alert, focused and reactive. This high-level presence develops skills that are useful in everyday life but essential in a professional sports career.

MINDROVE

Wearable, biosensor based human computer interface devices

Company: MindRove Kft.
Developer: Dr.Gergely Márton, János Csipor (MindRove Kft.)
Website: mindrove.com

In MindRove's human-machine interface devices, high-end biosensors meet ergonomic, easy-to-use designs. The product portfolio includes an electroencephalograph (EEG) that measures brain waves, an electromyograph (EMG) that measures muscle activity and muscle fatigue, modules that detect blood oxygen levels, pulse and sweating, as well as inertial measurement units (IMU) that register movements. Wearable, wireless devices created with combinations of these sensors will fundamentally change the way we interact with computers, robots, and other smart devices, as well as serve as the basis for many applications that help keep their users healthy, fit, and mentally and physically fresh.



ARTEMIS BODYSUIT

Bodysuit reducing menstrual pain

Company: Alpha Femtech Kft
Developer: Alpha Femtech Kft., MechatroMotive Kft., Maform Kft.
Website: allaboutartemis.com

The primary purpose of the ARTEMIS bodysuit is to reduce menstrual pain, with clinically proven and textile-integrated heat and micro-vibration functions. Part of the product is a mobile application, which enables controlling the functions of the product, and the user can also record the physiological symptoms experienced during the menstrual cycle in order to get an objective view of their experiences. We are dedicated to providing a revolutionary relief solution to those around the world who have physical and mental struggle with menstrual pain. Our goal is to change experiences and thoughts related to menstruation.

DUALSCOPE

Medtech device for mechanical and electrical heart measurements

Company:	Neato Fejlesztési Kft.
Developer:	Zoltán Szabó, Mihály Nádasdi, Balázs Alpár, Péter Ráfi, Szabolcs Hőgye (Neato Fejlesztési Kft.)
Website:	neato-development.com

It is a global problem that the healthcare system currently does not have an easy-to-use, simple device for performing mechanical and electrical heart measurements. DUALScope offers a solution to this and to the problem that family doctors who see many patients, but lack qualifications for making cardiology decisions, currently refer their patients to expensive and time-consuming cardiology examinations for safety reasons. This is very costly for the healthcare system. DUALScope places a device in this segment that can make decisions instead of the doctor and support the doctor's work, thereby saving time and money for the entire healthcare system.

RESPRAY

Refillable deodorant appliance and service

Company	Respray Solutions Kft.
Developer	Andor Réti, Gergely Zámbó (Respray Solutions Kft.)
Website	respraysolutions.com

Respay is a refillable deodorant service, consisting of a refillable bottle and a refilling machine. Machines are placed in pharmacies and supermarkets, where customers can refill their own bottles, so they don't have to deviate from their usual shopping routine. The refillable deodorant bottle is constructed in a similar way to traditional deodorant products. However, while traditional solutions use propane-butane gas as propellant, Respray works with compressed air, which allows recharging in a customer environment. The similar experience to other deodorant products is achieved with the help of a newly developed valve and nozzle technology. Each bottle can be refilled five times, so each bottle gets five times as long use than traditional deodorants.

DUNG DKAR CLOAK

Textile-based multisensory interface

Company: MOME Innovation Center
Developer: Judit Eszter Kárpáti PhD, Esteban de la Torre (EJTECH)
Website: ejtech.studio/DUNG-DKAR

Interactions with electronic devices are focused on flat display screens, requiring visual attention, inducing cognitive overload and blocking out the space around us. We envisioned bringing such interactions away from the screens and back into the physical world. Textiles with their sensory-rich qualities can create new methods of interaction, to perform and experience, thus creating novel possibilities of encountering, enhancing and experiencing multisensory conditions. The art-led multidisciplinary research project Dung Dkar Cloak is a series of interactive textiles which combine digital jacquard weaving, sound synthesis, fractal geometry and algorithmic thinking. The augmented textiles of hybrid materiality provide a rich multi sensorial experience. Delicate and complex haptic gestures on the jacquard woven fractal interface control a digital audio workstation creating music in real-time via intuitive interaction.

Ministry of
Foreign Affairs and Trade
of Hungary