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TECHNORAMA 2019

FROM VISION TO INNOVATION!

Innovation
catalogue

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KTU „**Santaka**“ Valley

introduction

Technorama is the most exciting junior researchers' exhibition in Lithuania. It is an international event that invites representatives of science and business to gather at Kaunas University of Technology.

The event includes an exhibition of the inventions and projects of young researchers, B2B meetings with innovators and companies also take place. Each year the exhibition invites more than 2000 visitors and more than 60 researchers from different universities.

Established in 2001, the event celebrates its 18th birthday this year and has introduced more than a 100 products and new ideas. The selection of innovations in 2019 range from products and technologies for health monitoring to vertical farming technologies, from virtual reality solutions to solar-powered wildlife warning systems and many more.

Technorama encourages young scientists to convert their competencies and knowledge into solutions, to develop their critical thinking and entrepreneurship spirit.

Technorama: from vision to innovation!

technorama-en.ktu.edu

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prize fund

1 PLACE ▸ KTU RECTOR PRIZE ▸ 1500 EUR

EIT Health	▸ 2×500 EUR
EIT Food	▸ 2×500 EUR
Centric	▸ 1500 EUR
Danske Bank	▸ 1500 EUR
R1 RCM	▸ 4×500 EUR
BCT	▸ 750 EUR
Dematic	▸ 500 EUR
Practica Capital	▸ 500 EUR
TransUnion	▸ 500 EUR
KTU Alumni	▸ 500 EUR
Ar žinai.lt	▸ 3×100 EUR
Malsena	▸ 2×400 EUR
	1×200 EUR

*Prize values are shown before obligotary taxation

content

project no. 1

Can cranberry pomace extract mitigate the carcinogenicity of processed meat?

Laura Tamkutė, Petras Rimantas Venskutonis, Rūta Liepuoniūtė

Meat is one of the most important nutritional products, an important source of protein, iron, vitamins and minerals. However, recently The International Agency for Research on Cancer (IARC) recognised processed meat products as causing (group 1) cancer. In addition, meat products are an excellent media for the development of harmful microorganisms, which significantly reduce the shelf life of products and can cause food poisoning. Nevertheless, according to the Food and Agriculture Organization (FAO), consumption of meat and meat products in the world, as well as in Lithuania, is increasing. Another important problem is food waste. For instance, huge amounts of pomace remain after juice pressing. The pomace is rich in bioactive (including anticancer) phytochemicals, however nowadays they are used very inefficiently or even discarded as a waste. The idea of this work is to biorefine cranberry pomace into high-value ingredients and test them in meat products for improve their quality, safety and health benefits. Cranberries, which were selected for this purpose, have been known not only as a good preservative, but also for their health benefits. In this work, 3 high-value products have been obtained from cranberry pomace using high-pressure techniques: oil rich in polyunsaturated fatty acids, vitamin E and carotenoids; polyphenol antioxidant "cocktail" and dietary fibre. The addition of polyphenol antioxidant to meat products significantly reduced their oxidation and inhibited pathogenic bacteria such as listeria, Campylobacter and others. Preliminary studies performed in cooperation with biomedicine researchers demonstrated that cranberry extract inhibited the proliferation of cancer cells both applied directly and after in vitro gastrointestinal digestion of meat product. These results provide preliminary information that the addition of cranberry polyphenol antioxidants to processed meat might mitigate its carcinogenicity.

What are the benefits and value to the potential users: opportunities for businesses to develop and commercialize new valuable functional ingredients from cheap by-products, to reduce waste and supply the society with new healthy foods.

project no. 2

Aroma profile, total phenolics and antimicrobial activity of spearmint and peppermint essential oils and water extracts

A. Banytė, R. Baranauskienė, R. Žvirdauskienė, P. R. Venskutonis

Many aromatic herbs and spices, including spearmint (Mentha spicata) and peppermint (Mentha×piperita), are used as natural flavourings and a source of bioactive phytochemicals such as antioxidants and antimicrobials.

The aim of the present study was to evaluate chemical composition and aroma constituents of spearmint (S) and peppermint (P) headspace and essential oil (EO), to determine the total phenolic content (TPC) and antimicrobial activity of EOs and water extracts (WE). Headspace of volatile compounds was analysed by solid phase microextraction and gas chromatography with time-of-flight mass spectrometry detector (HS-SPME-GC-TOFMS). The EOs were isolated in a Clevenger apparatus and analysed by GC-TOFMS. TPC was determined by Folin–Ciocalteu method and expressed in gallic acid equivalents in extract dry weight (mg GAE/g edw). The antimicrobial activity of oils against six foodborne pathogenic bacteria strains was analysed by the agar disk diffusion method, which measures inhibition zones (mm) in the plate count agar.

This study revealed that spearmint and peppermint herbs are a good source of bioactive secondary metabolites, volatile essential oil and non-volatile phenolic compounds, and could be used as natural antioxidants, antimicrobials and flavourings in food and beverage industries.

Benefits and value to the potential users: it could significantly increase economic effectiveness of EO production. This kind of products may find application as natural food grade additive.

project no. 3

Flour Mix for Muffins with Hemp Seeds and Turmeric

Viktorija Donelaitytė, Gintaras Jusius

During this project, we developed a flour mix for muffin production. This product is for people who are in a hurry and can't spend much time in the kitchen. The ready-made mix for making this type of muffins makes it easier to make them at home because you just have to mix the mixture with water and butter and you can bake it.

We have enriched the flour mixture with hemp seeds. Hemp seed flour is rich in vitamins, fiber, proteins. An enriched product becomes not only healthier to eat but also gives a nice greenish tint. The product recipe was refined to meet the needs of users, indicators – color (when added turmeric – green) taste and smell (acceptable to the consumer), texture (picked, top of muffin – cracked) became acceptable.

The parameters needed for the production of the product were also selected: the production temperature and the time needed to process the product. These parameters were particularly important for product quality. By selecting the right amount of moisture and temperature, the steam evoked the product and flushed it up – what is typical of the muffin texture.

Benefits and value to the potential users: it's simple to use for people that are always in a big rush but still want to eat fresh baked muffins at home. Also the ingredients in this flour has a lot of health benefits for humans.

project no. 4

Gluten free cupcakes

**Marius Užupis, Karolina Šlionytė,
Klaudija Liudžiūtė, Justė Kazakauskaitė**

In modern society, more and more people are allergic to gluten. Unfortunately, the taste and texture of cupcakes was often disappointing for consumers. Gluten imparts unique and hard-to-replicate properties in baked goods, such as crumb texture, and helps retain moisture. There is no simple replacement for this unique protein. Therefore, as Master of Science (MSc) in Food Technology, we decided to make cupcakes without gluten and obtain very similar textures and sensory qualities as standard cupcakes.

Benefits and value to the potential users: the customer can eat cupcakes and not be afraid of an allergic reaction.

project no. 5

Fermented acorn coffee "Gile"

Agnė Zemblytė, Jonas Damašius

Most people believe that coffee is made exclusively from coffee beans. But that's not true! One of the more traditional sources of organic coffee comes from an oak trees acorn. An Innovative solution is brought to life by reviving forgotten Lithuanian traditions and pairing them with modern technological methods!

An innovative product has been developed by the Food Science and Technology Laboratory of KTU, utilising 3 different kinds of fermentation, we have been able to rediscover the benefits of acorn coffee, some of these benefits include anti-inflammatory, antimicrobial, antioxidant, anticancer & Anti – Diabetic Properties! The sustainable & tightly controlled production method developed by our team, using the most advanced biotechnology solutions, adds a whole range of useful features.

The taste and aroma of this coffee is so delicate that you will want to taste it time and time again! The produced coffee is completely decaffeinated, so it is suitable for the whole family and at any time of the day. "Drops" of organic, centuries - old Lithuanian oak have been hand selected and picked, husked, fermented and researched in the scientific laboratory, delivered in the form of a tonic coffee.

The strength of the Lithuanian oak lies in the cup of your acorn coffee!

project no. 6

Naphthyl substituted triphenylamine derivatives as hole transporting materials for efficient red phosphorescent OLEDs

Gintare Krucaitė

Naphthyl substituted triphenylamine and its derivatives with bromine atoms were synthesized and investigated. The respective glass transition temperatures of the materials were estimated to be in a range 65–137 °C, which can provide morphologically-stable amorphous films for applications in organic light emitting diodes. The compounds possess adequate ionization potentials (5.5–5.75 eV), high hole drift mobilities (>10^{-3} cm^2/ V·s) and suitable triplet energies (~ 2.4 eV), which make them suitable hole transporting materials for use in red phosphorescent organic light-emitting diodes.

A superior peak efficiency of 17.9% (31.4 cd/A and 26.9 lm/W) was achieved in a device having hole transporting layer of tris[4-(1-naphthyl)phenyl]amine. Furthermore, the device gave efficiencies of 17.7% and 16.6% recorded at luminance levels of 102 and 103 cd/m^2. The efficiency drop from the maximum to the value recorded at the luminance of 103 cd/m^2 for the device was only 7%.

Benefits and value to the potential users: more effective and cheaper OLED devices.

project no. 7

New (bi)phenyl substituted 9-(2,2-diphenylvinyl) carbazoles as hole transporting materials for efficient red pholeds

Daiva Tavgenienė

Phosphorescent organic light emitting diodes (PhOLEDs) have attracted much attention because they use both singlet and triplet excitons for generation of light, making 100% internal quantum efficiency possible.

Achieving the high level internal quantum efficiency depends on several factors, including high quantum yield emitters, exothermic energy transfer from host to emitter, effective exciton confinement as well as balanced carrier transport. It is well known that carrier transporting materials are crucial to enable a balance carrier transport from cathode and anode. Considerable exertion is needed for the development of efficient red PhOLED devices, because the lower gap of red phosphors usually induces serious carrier trapping, leading to higher operation voltages and carrier imbalance. Accordingly, it is desirable to exploit new hole transport materials to create red PhOLEDs with reduced power consumption and improved efficiency.

In this study, the new low cost 9-(2,2-diphenylvinyl)carbazole-based derivatives with aryl substitutions were synthesized and investigated. Our previous study found that introducing the diphenylvinyl fragment in carbazole ring could increase spatial hindrance of the moiety and the derivatives could be used for the preparation of thin and stable amorphous layers on substrates.

Benefits and value to the potential users: OLED technology is used in commercial applications, as well as well as lighting. New devices will be cheaper and more effective.

project no. 8

Nonspiro, Fluorene-Based, Amorphous Hole Transporting Materials for Efficient and Stable Perovskite Solar Cells

Šarūnė Daškevičiūtė

Solid-state organic hole transporting materials (HTMs) are one of the important components of the perovskite solar cells (PSCs), ensuring stability of the perovskite absorber layer, good charge separation, and as a consequence high performance of the devices. Currently, Spiro-OMeTAD is the most popular choice for the HTM layer, and is used for the majority of the state-of-the-art PSC devices. However, due to the complicated multi-step synthetic procedure, price of the Spiro-OMeTAD remains at a very high level.

To overcome this drawback, novel small-molecule HTMs V1050 and V1061 were designed and synthesized. Synthesis was performed using a facile three-step synthetic route, starting from simple fluorene molecules. Coplanar central core were previously shown to have positive effect on the efficiency of HTM [1]. As a hole transporting fragment, 4,4'¬-dimethoxydiphenylamine 3,6-¬disubstituted carbazole was used, due to its good performance in PSCs [2]. PSCs of planar configuration, employing V1050 HTM showed a high power conversion efficiency of 18.3%, which is comparable to the 18.9% efficiency, obtained in the same device configuration, only using Spiro-OMeTAD as a HTM. In addition, devices with V1050 and V1061 showed better stability in comparison to Spiro-OMeTAD based devices. Aging test was performed on a non-encapsulated devices under uncontrolled humidity conditions (relative humidity around 60%) in the dark and under continuous full sun illumination.

Overall, we believe that V1050 can became a cheaper alternative to the Spiro-OMeTAD, thus contributing to the faster translation of the PSC technology from laboratories to the market. Where synthesized new hole transporting materials for solar cells.

Benefits and value to the potential users: use of renewable energy sources.

project no. 9

Novel utilization of berry pomace into value added ingredients

Lijana Dienaitė, Audrius Pukalskas, Milda Pukalskienė, Ana Matias, Carolina Pereira, P. R. Venskutonis

Considering increasing demand for sustainability of food processing and concern for the environment, as well as consumers' consciousness of functional and healthy foods it is important and necessary to develop more novel and value-added utilizations of berry pomace in the food segment.

Berries are important part of the human diet and contain many valuable nutrients, such as dietary fiber, vitamins, minerals, fatty acids and antioxidants. Various berry pomaces remaining after juice pressing are valuable row material for development new products for foods and other application. In addition, effective pomace utilization would reduce waste treatment and disposal costs.

Consequently, developing bio-refining processes for berry pomace well fitting into the concept of circular economy. Several berry pomaces (eg. sea buckthorn, guelder-rose) were chosen for detailed research of their determination of chemical composition, antioxidant and bio activities and application possibilities. After comprehensive evaluation of various berry pomaces we determined that still remains a lot of valuable compounds such as flavonoids, flavonols, fenolic acids (quercetine, kampferol derivatives, catechins, chlorogenic, quinic acids ect.), while in lipophilic fractions there are rich in polyunsaturated fatty acids such as linolenic, linoleic, oleic. Bio activity results showed high content of antioxidant activity constituents and potential anti-cancer activity. The application of berry pomace extracts and powder give nice organoleptic properties of ice creams, curd cheese and extend shelf-life of butter. Juice industries wastes are reused as potential substances or ingredients for high value added products with potential healthy properties (high amount in fiber/anticancer properties).

Benefits and value to the potential users: products enriched with high value and natural origin derived ingredients. Natural colorants, natural oils, polyphenols, antioxidants or anti-cancer ingredients which can be used for protein cocktails, dairy and bakery products or even as condiments.

project no. 10

Phenoxazines having various aromatic substituents as new host materials for green phosphorescent OLEDs

Dovydas Blaževičius

At first, fluorescent materials were used as emitting materials of organic light emitting diodes (OLEDs), but the intrinsic low internal quantum efficiency of 25% of the fluorescent emitting materials limited the application of fluorescent OLEDs. It is known that the ratio of singlet excitons to triplet excitons is 1:3 and the triplet excitons cannot be utilized for light emission in common organic emitting materials because of non-radiative decay of triplet excitons via internal conversion process. The radiative transition from the triplet excited state to the singlet ground state is a forbidden transition, but the transition can be allowed in organometallic complexes with heavy metals, which are used in phosphorescent OLEDs.

We report on the synthesis and characterization of a new series of bipolar phenoxazine-based compounds. The derivatives are thermally stable materials as it was demonstrated by thermogravimetric analysis. Electron photoemission spectra of thin layers of the materials show ionization potentials in the range of 5.24-5.56 eV. Some of the developed materials form homogenous amorphous layers with high glass transition temperatures and were used as hosts for bis[2-(2-pyridinyl-N)phenyl C](acetylacetonato)iridium(III), Ir(ppy)2(acac), guest in green phosphorescent organic light-emitting diodes.

Results indicated that a device with 3-[bis(9-ethylcarbazol-3-yl)methyl)-10-hexylphenoxazine host exhibited superior performance with maximum current efficiency of 18.3 cd/A, maximum brightness of 5366 cd/m^2 and low turn on voltage of 3.1 V. New materials for organic light-emitting diodes for improved overall efficiency of devices.

Benefits and value to the potential users: flexible lighting devices that can significantly lower energy consumption.

project no. 11

Aroma profile and total phenolics in lemon balm and white horehound essential oils and water extracts

G. Aleliūnaitė, R. Baranauskienė, E. Dambrauskienė, P. R. Venskutonis

Aromatic and spicy herbs due to their flavouring properties, antimicrobial activity and health benefits have been used in culinary and folk medicine applications since ancient times. Lemon balm (Melissa officinalis) and white horehound (Marrubium vulgare) essential oils (EO) and water extracts (WE) are known as a good source of important biologically active plant metabolites possessing antioxidative, antimicrobial, anticancer, antiinflammatory, antidepressant, antihypertensive and hypoglycemic activities. The aim of this study was to evaluate chemical composition and aroma profile of lemon balm leaves (MO), horehound leaves (MV-L) and stems (MV-S), and to determine the total phenolic content (TPC) in EOs and WEs. The aroma profile of leaves (L) and stems (S) was analysed by static headspace solid phase microextraction and gas chromatography time-of-flight mass spectrometry (GC-TOFMS). The EOs were hydrodistilled (HD) in a Clevenger type apparatus and further analysed by GC-TOFMS. The residues after HD were separated into liquid and solid fractions by filtration. The liquid fractions were lyophilized and spray dried into WEL and WES. TPC was determined by Folin–Ciocalteu method and expressed in gallic acid equivalents in dry extract weight (mg GAE/g edw). This study revealed that analysed herb are a good source of bioactive secondary metabolites, essential oil (volatile fraction) and phenolic (non-volatile fraction) compounds, and could be used as natural flavourings and antioxidants in beverage and food industries. It provides additional information on chemical diversity of Lemon balm and White horehound genus. Also, this study evaluate the possibilities to obtain non-volatile fractions from the essential oil (EO) distillation residues and very strong antioxidant fractions of water-soluble substances were recovered.

Benefits and value to the potential users: such new products may find application as natural food grade additive and also the concept applied would increase economic feasibility of essential oil production.

project no. 12

Encapsulation of probiotics, prebiotics and plant extracts in multi-components polysaccharide capsules

Greta Šlimaitė, Sigita Jeznienė, Aušra Šipailienė

Health benefits provided by probiotics encourage wide usage of it in sectors such as: food industry, pharmacy, cosmetics and all agricultural sectors. Generally, probiotics are sensitive to external conditions, such as acidic pH in human digestive system or bile salts, surfactants and preservatives in cosmetic products and others. In order to increase their viability and resistance to those conditions, probiotic bacteria are often encapsulated by various methods and materials.

Capsules were prepared using combined methods: emulsification and extrusion. Firstly, stable double emulsion (Alginate in Oil in Water) with the cells, prebiotics and plant extracts was formed. Then the double emulsion was extruded to ionic cross-linking agent solution. The resulted capsules contains liquid core with the droplets of the water with prebiotics and probiotics mixture dispersed in the oil with the plant extract and surrounded by polysaccharide membrane. The viability of encapsulated probiotics was evaluated in vitro in simulated gastrointestinal conditions. It was determined, that probiotics could be successfully delivered to target site.

Benefits and value to the potential users: it is known, that therapeutic effect (e.g. Immune system modulation or possible protective mechanisms against pathogens through competition for binding sites and nutrients) of good bacteria appears when the number of viable microorganism is from 107 CFU g/ml^{-1} to 109 CFU g/ml^{-1}. Thus, the encapsulation of the cells by this method, ensures the adequate amount of viable microorganisms at the time of consumption and delivery to a target site in the gastrointestinal tract.

project no. 13

Tempura dry mix

Shruthi Surendran, Selin Gulec, Nadiia Khakimova

Tempura dry mix is a mix based on flour, corn starch and spices, which diluted in water forms special dough that could be used for cooking.

Benefits and value to the potential users: our product is highly functional, based on buckwheat flour, with adding spices, without any preservatives. It is universally applicable as could be used with vegetables, meat or shrimps. It is free from trans-fat and cholesterol.

project no. 14

The strategies for the utilization of rice processing by-products to reuse as value-added additives

Žydrūnė Gaižauskaitė, Daiva Žadeikė, Rūta Vaitkevičienė, Gražina Juodeikienė, Elena Bartkienė, V. Lele, C. Glasner

Food industry by-products due to their composition can be valorised by innovative technologies leading to environmental advantages.
In this work, a dual ultrasound-retrogradation technology was designed for utilization of rice polish fiber fraction to produce resistant starch (RS).

RS is a small starch fraction resistant to digestion, and being from a natural source, it is considered as a valuable supplement in the formulation of various types of functional food. In our study, low and high frequency ultrasound techniques were used for treatment of rice processing by-products to produce the RS under low temperature conditions. Usage of low temperature conditions to produce resistant starch from rice polish by-products to use as a valuable supplement in the formulation of various types of functional food.

Benefits and value to the potential users: this research leads to the formulation of various types of functional food.

project no. 15

Waste to cotton: sustainable solution for refused textile

Samy Yousef, Maksym Tatariants

Cotton is one of the primary resources in many modern industries and with increasing demand rates the current challenge is to find other sources of cotton production with lower prices and higher quality whereas cotton produced only by agriculture is not sufficient for these needs. This is focused on developing a new strategy to make the textile waste a new sustainable source of recovered cotton to face this shortage. This strategy is summarized as development of a chemical technology using sustainable and commercial chemicals to recover cotton from waste textile.

The technology consists of three sequential processes: a) textile dye leaching using Nitric Acid as a pretreatment of the original waste, b) dissolution process using Dimethyl Sulfoxide (DMSO) as the main treatment to dissolve the organic materials from the treated fabric, including polyester and remaining organic part from textile dyes, and c) bleaching process using sodium hypochlorite and diluted hydrochloric acid for final recovered cotton purification.

project no. 34

Enzyme inhibitory activity and total phenolic content of yam extracts

Aušra Adomėnienė, Renata Baranauskienė, Petras Rimantas Venskutonis

The concept of food as a medicine is one of the main trends in modern nutrition, particularly in the age of increasing role of functional foods and nutraceuticals. Therefore, plant bioactive compounds are considered as important nutrients with health beneficial and therapeutic potential for preventing and treating various ailments, including chronic hyperglycemia.

Chronic hyperglycemia is rather dangerous for human health, particularly because it is asymptomatic during the initial periods of development, while over several years it may result in long-term damage or dysfunction of multiple organs, including kidneys, eyes, nervous and cardiovascular systems. It also increases the risk of the development of diabetes mellitus and microvascular complications and may reduce life expectancy. Therefore, the foods with effective pancreatic α-amylase inhibitors are considered as an effective strategy to lower the levels of postprandial hyperglycemia via control of starch breakdown. This study aimed at evaluating enzyme inhibitory activity of yam leaf extracts.

Benefits and value to the potential users: the foods with effective pancreatic α-amylase inhibitors are considered as an effective strategy to lower the levels of postprandial hyperglycemia via control of starch breakdown.

project no. 60

Potato croquettes flour mix with insect proteins

Birutė Lekstutytė, Laura Vaičikauskaitė, Enrika Petravičiūtė, Ieva Sidaravičiūtė

Potato croquettes flour mix recipe was invented. The influence of all ingredients was tested adding different amounts to the mixture. After obtaining optimal amounts of all ingredients, final batch was fried and tasting experiments were arranged. Participants filled surveys about taste, odor and appearance of ready-to-eat product. Results concluded that this product would be desirable for customers who like easy and quick cooking.

Benefits and value to the potential users: this product saves time for customers who like cooking home-made food. It is an interesting form of side dish made prom potatoes. It contains insect proteins which are beneficial for human nutrition.

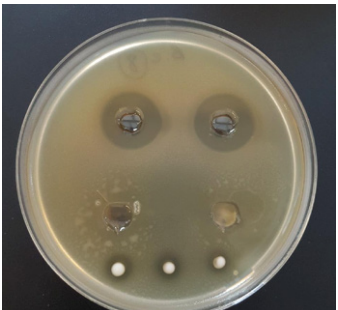
project no. 69

Lactobacilli inhibition activity against pathogens

Laura Prakopavičiute, Eglė Ragauskaitė, Dalia Cižeikienė

In the last century, antibiotics had revolutionized many industries as effective antibacterial drug against bacterial diseases. However, the increased application of antibiotics led to the bacterial antibiotic resistance over time. This require the necessity of the search of alternative agents without harmful effects. As an option, supplementing probiotics gained interest in recent years. Lactobacilli are the major type of lactic acid bacteria (LAB), which have been shown to act as a preservative as well as a probiotic agent.

The aim of this study was to evaluate antibacterial activity of LAB strains, previously isolated from rye and wheat sourdough against pathogenic bacterium belonging to Salmonella, Escherichia, Staphylococcus and Bacillus genera. Fourteen strains belonging to Lactobacillus genus and fourteen new LAB isolates, isolated from three different sourdoughs previously made from wholemeal rye and wheat flours were tested for antimicrobial activity.



The antimicrobial activity of LAB metabolites (supernatants), supernatants that was neutralized to pH 6.5 (for bacteriocin like inhibitory substances analyse BLIS), LAB cells and intracellular metabolites were evaluated using agar well diffusion assay method. Antimicrobial activity was expressed by measuring the inhibition zones diameter (mm).

The results suggest that the strains isolated from sourdough and belonging to Lactobacillus genus could be useful for the production of antibacterial agents against humans and animals diseases.

project no. 71

Innovative microbial fuel cells

**Arminas Ilginis, Egidijus Griškonis,
Kristina Kantminienė, Nerita Žmuidzinavičienė**

Microbial fuel cells (MFCs) have been attracting much attention as an emerging technology that exploits microbial electrochemical activity for energy production from renewable biomass and organic wastes.

In a microbial fuel cell, electricity-generating bacteria – exoelectrogens – transfer electrons from oxidised organic compounds to an anode as the electron acceptor, and these electrons then pass through an electrical circuit and combine with a terminal electron acceptor at the cathode. However, it is necessary to improve the performance of MFCs before they can be scaled up. The power output of MFCs is limited by the processes on the surface of electrodes, their rate and stability. Surface modification of graphite based anode materials could enhance bacterial cell adhesion, cell viability and facilitate extracellular electron transfer. The MFC independence from the external power sources is also very crucial.

As a result of the modification of anode surface and cathode construction, enhanced efficiency of MFC has been achieved. An improved MFC with specially designed and treated graphite felt anode and self-breathing cathode is presented. Such a MFC does not need cathode aeration, thus no external energy input is required.“

project no. 72

Algae and Ash as Plant Food in Granulated Fertilizers

Mikolaitienė Austėja,
Griškaitis Evaldas, Šlinkšienė Rasa

Over many years of intensive farming, the soil has been damaged. Therefore, the use of bioactive components as granulated fertilizers was attempted to restore soil balance, quality and composition. Various chemical elements have been found in the study of bioactive substances - Chlorella Vulgaris algae and Buckwheat hull ashes. It was then tried to granulate them using different binding materials.

All components that are being used in this research are organic or by-products from production that are not harmful and will not be used in further production. The resulting granules were analysed and evaluated according to the requirements (particle distribution, particle strength, bulk density, hygroscopicity, humidity, chemical composition) of granular fertilizers.

project no. 73

Formation and Investigation of Silver-Indium Selenide Layers on Architectural Textile

L. Jatautė, V. Krylova

Polymers modified with the inorganic materials combine the functionalities of polymer matrices, such as a low weight and easy formability, with the unique features of inorganic materials. The inorganic materials improve its optical, mechanical, electrical, magnetic and rheological properties.

Polyester (PES) fabric coated polyvinylchloride (PVC) is one of the most commonly used materials in many modern architecture projects because of its excellent synergy of functionality and aesthetics. $CaCO_3$ is the dominant filler in the PVC based architectural textile (AT) production because decrease slightly tensile strength, helps increase impact strength, lowers the particle's adhesion to the polymer. TiO_2 used as a white pigment and UV stabilizer.

In recent years, $A^{I}B^{III}C^{VI}_2$ semiconductor have found wide use in micro- and optoelectronics as red and green semiconductor diodes, nuclear emission detectors, and microwave shielding due to their unique electrophysical properties. Thin films of three component compounds based on $AgInSe_2$ are in high demand as materials for converters of solar radiation.

Chemical precipitation is of particular interest as a simple and profitable method for their synthesis and allows us to obtain layers on substrates of various materials, including those of complex configuration, and is intrinsic to the low temperature regime of precipitation. The nanostructured character of the metal chalcogenide films obtained according to this method shifts the range of photosensibility to the shorter wavelengths of the spectrum.

The aim of this work was formation of silver-indium selenide layers on PES/PVC AT.

project no. 74

The synthesis of multifunctional MexOyCazSiq nano sized adsorbents/catalysts

Kęstutis Baltakys, Anatolijus Eisinas, Tadas Dambrauskas, Domantė Niūniavaitė, Inga Knabikaitė

An eco-friendly technology for obtaining multifunctional MexOyCazSiq nano sized compounds, which combine the hydrothermal/ microwave synthesis of precursors and solid-state sintering at lower than 950 ºC temperature was created.

The proposed technology allowed to achieve a complex effect: 1) to synthesize controlled structure MexOyCazSiq-H2O nano sized compounds and apply them in the production of chemosorbents and catalysts; 2) during production of controlled structure nano sized compounds the energy-saving (low energy) technologies can be used which allows reduce the energy consumption by 25-30 %.

Benefits and value to the potential users: the offered technology requires 25-30 % lower energy consumptions.

project no. 16

Early 21st Century inventory of Kaunas

Huriye Armagan Dogan

Recording historical buildings with their contemporary status can provide necessary documentation for the artefacts, and furthermore, these records can be used in the future during the restoration process. Even though recording can be achieved easily by the help of photography today, technical drawings have the ability to demonstrate more information rather than the photographs since they contain measurements. Moreover, they can help to track the changes which appeared over time, and they can help to mark the interventions. Especially for the heritage objects which are not monumental and actively being used as residential or commercial buildings, the documentation can be crucial. Additionally, they can also assist in archiving the current image of the city for its residences in a specific period of time.

In that regard, the establishment of an inventory which can be stored in a database would help the future generation of architects and historians to access the required information easily. Therefore, this project aims to generate a database for the status of Kaunas in the early 21st century. The database contains 150 buildings for now, however, the process of measuring and drawing is still ongoing.

Benefits and value to the potential users: it aims to generate a database for the status of Kaunas in the early 21st century and these documents can be used in the future in restoration projects.

project no. 17

Environment-friendly way to transfer picture on textile fabrics

Brigita Kalendraitė

Benefits and value to the potential users: customer, when acquiring a shirt with knitted image, can rest assured, that he purchased quality long-term product. Picture will not deteriorate and will not lose shape after numerous washing procedures, making it last more than a single season.

Using latest jacquard knitting machines, it's possible to knit a picture on the fabric. Selected illustration is uploaded to USB drive and loaded to computer devices, which are able to read the file and knit desired bitmap.

Modern knitting machines are able to use up to 8 colour yarns. This allows to create high resolution image. This method can be used either for mass production or individual design creation. For example, everyone can transfer their family picture on the fabric without worrying for loss of quality or shape. In addition, this method is one of the most eco-friendly way to print image on the fabric, since it uses less water or human resources.

project no. 18

Green vertical mini textile wall

Vaida Buzaitė, Artūras Beleckis

Green Vertical Mini Textile Wall – textile-based product for small, various types of plants growing in a vertical position, it also performs decorating function. The base of the product is knitted textile material with pockets of different size that were knitted in the same technological seamless knitting process. This innovative computer controlled knitting method significantly speeds-up the manufacturing process, also extra minimizes amount of waste.

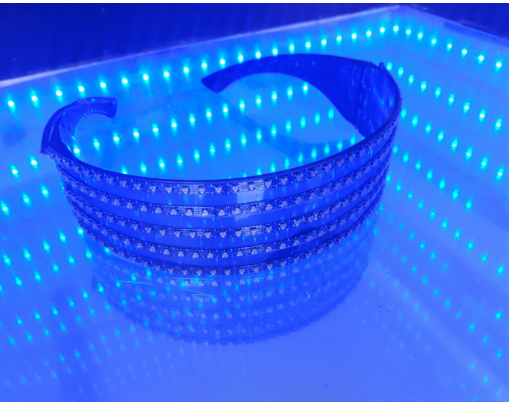
Knitted textile base frame is made of aluminium. The bottom of the frame is designed for collecting excess of water. Plant roots, placed in non-woven textile bags, are placed in knitted pockets, then the plant zone and the entire base are sprayed with water. The specific structure of the knit helps to maintain moisture for quite a long time. It is a practical, unusual, sustainable and functional outdoor or indoor decoration product that makes it easy to grow a variety of selected plants.

Benefits and value to the potential users: it is an eye-catching interior/exterior design detail to grow plants saving place and with an additional feature – customers have possibility to choose their own design and colours.

project no. 19

Applications of addressable LEDs

Simas Bašinskas



Benefits and value to the potential users: the value for an individual is in the ability to stand out from the crowd and individualise his apparel or property.

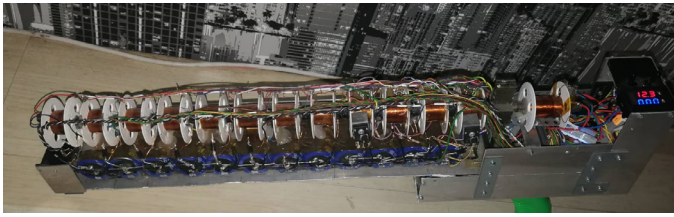
My idea and practical examples are based on the workings of APA102 and WS2812b addressable LEDs in conjunction with Espressif line of microcontrollers like ESP8266 and ESP32.

LEDs can be sequenced and converted to arrays or matrixes of pixels which can provide illumination, contain information, be used as indicators for various processes, display color animations or video. These LEDs would are applied to various objects and controlled with mobile APP, motion or other environmental variables. The systems power supply could also be used as a USB power bank and charged back with a regular USB phone charger.

project no. 20

Multi-stage electromagnetic launcher

Vaidotas Aleksa



An electromagnetic launcher (EML) is a device used to propel and accelerate a projectile by converting electrical energy into kinetic energy. A coil gun, which is a type of EML, can propel a projectile without any mechanical friction so that there is no theoretical limit to the velocity.

A multi-stage system is a way to raise the effectiveness of the coil gun. It accelerates the projectile by controlling the relations between each stage of the solenoid and projectile. Since a multi-stage system controls the time needed to apply electric current to the coil depending on the position of the projectile, the switching time is extremely important.

This product is incredible versatile, because it is possible to change firing frequency and projectile output speed. Product can be widely used in different spheres from toys to veterinary, military or even to launch a small satellites to space. In final stage product will be cheap to make and easy to maintain. Product is relatively small in size and also lightweight, so operator can work without exhaustion.

Benefits and value to the potential users: device is lightweight and silent to propel and accelerate a projectile.

Vertical Farming Technologies

project no. 21

Gediminas Kudirka, Robertas Katinas, Salvijus Vykertas, Vilmantas Raštutis

Baltic Freya is an agritech Start Up focused on developing large-scale vertical farming technologies for various farmers and agro-companies. We are based in Lithuania, but we are aiming to operate all across the world.

Our team is working on fogoponics – the most advanced vertical farming technology so far. This innovative agriculture technology doesn't use any soil, circular system doesn't waste any resources and it uses up to 95% less water than industrial farming. Since vertical farming is done indoors, your produce are safe from harm. There's no need for nasty pest control chemicals, there's no fear of bad weather, floods and droughts. Innovations we are creating will allow you to grow leafy greens a lot faster and all year long! That means fast returns on the investment for our clients.

For those who wonder, why we are doing this, we would like to remind you that one of the greatest challenges of near future is the increasing demand of food. United Nations declare that food requirement will rise by 50 % in 2050. Another closely related problem is rapidly increasing urbanization across the world. We are facing a shortage of workers in food producing agro industry and an increasing demand for food. Baltic Freya will be a key part of the solution for these challenges. Vertical farming attracts bright young educated people. Vertical farming is the sustainable and environment friendly way of growing fresh and local produce.

Benefits and value to the potential users: with the vertical growth technology we are developing, our clients will be able to grow produce all year long, wherever they are, independently from season. They will not fear the weather, floods, droughts, etc. Neither will they have to fear pests. The system is isolated from the environment, so there's no need for pesticides. Produce grown with our vertical growth technology will be local, fresh and healthy – which is what consumers want nowadays. But most importantly, with fogoponics plants grow the fastest! It uses up to 95% less water than conventional farming methods and minimal amount of fertilizer, because there is no runoff.

project no. 23

Electronic developer

Vytautas Janušonis

Multi-functional „POWER SHIELD 6+6 T800" is revolutionary add-on for any type of Arduino developing board. It amplifies (Arduino) controller's digital outputs power and enables to control any R, L or C loads. It can easily drive LEDs (strips and others), DC Motors, Steppers*, peltier, heaters, lamps.

It has dozens of protections and includes many useful functions such: internal 5V DC/DC converter to power up itself and Arduino board; the shield shows (with 4 integrated LEDs) and sends feedback signals to Arduino analog inputs (one of them is precise current monitor). Target clients: R&D departments; robotics/programming/ electronic schools; makers or DIY enthusiasts.

project no. 24

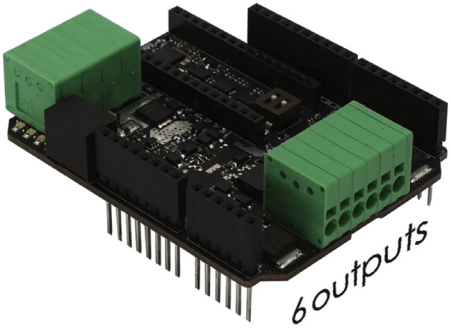
Multifunctional Power Shields 6+6 T800 for Arduino

Valdas Mikėnas, Vytautas Janušonis

POWER SHIELD 6+6 T800 is an accessory for Arduino-type boards. One POWER SHIELD can control 6 loads of different types and voltages. Each power output can also be used as a simple DC mode or a dynamic output, i.e. with the PWM mode.

By stacking two boards, you can get more power and more channels. Four integrated LED indicators show performance quality and error statuses. FeedBack connections lead to the Arduino analog inputs (one for measuring current).

Benefits and value to the potential users: high power outputs, lots of protections, compatible with many Arduino type boards.



project no. 25

System for testing temperature and mechanical stress sensors

Mindaugas Viskupaitis

In most applications measurement accuracy is crucial. For this reason, scientists all over the world are developing calibration and testing systems to prevent errors. Here we are presenting fully automated equipment for testing temperature and mechanical stress sensors. The system is able to effect sensor with temperature, mechanical stress or magnetic field stimulus and captures the response from it.

Our system uses high resolution "PicoScope 5243B" data logger which is able to record sensor's induced electromagnetic interference noises up to 125 MHz sample rate and up to 16 bit amplitude resolution. Furthermore, built-in arbitrary waveform generator allows user to create any type of magnetic field stimulus and test sensor's response to it.

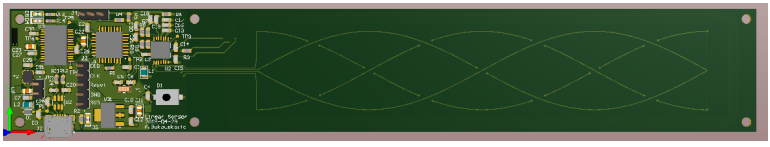
The system also uses high precision T type thermocouples and strain gauge sensors. These sensors are used as a reference for temperature and stress measurements comparison and validation. For easy access to the management of the system user-friendly graphical interface was also implemented. Processed data is stored in the computer, so it can be analysed after the experiment.

Benefits and value to the potential users: our system creates a platform for testing many types of temperature and mechanical stress sensors, including sensors based on magnetic field.

project no. 26

Linear position sensor

Aušrinė Bukauskaitė



The aim of this project was to create vehicle seat position sensor and to design its functional prototype. There was a purpose to get an accuracy of 1%. There is used an inductive sensor that can convert a linear displacement into a proportional electrical signal.

In this prototype I have used Microsemi Inductive sensor which consist of a primary coil that sustains the oscillation and two secondary coils that receive the information about position. I believe that this technology could be really widely used in many fields, not only in a vehicle position measuring, but also in pedals position sensing. It could also be adapted in totally different fields, such as fluid position sensing when other important parameters will be evaluated. To my mind, this technology would be useful in air bags release power control, because depending on seat position (distance to the front window) it could be calculated, how heavily air bags should be expanded.

Benefits and value to the potential users: it is different technology to measure position in many different fields.

project no. 27

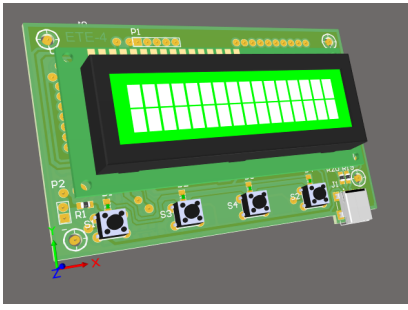
Vehicle Drift Meter

Juozas Balamutas, Povilas Bendinskas,
Kristis Balčiūnas, Lukas Gadeikis

This is device for measuring angle during vehicle drift. During last decade drifting motorsport became very popular. Unlike traditional motorsport events, drifting evaluation is very subjective. Winners are declared based on points from arbiter. Where is no accurate numerical evaluation of driver performance.

This device allows racers see measured values in real time and after driving. It measures vehicle slip angle, vehicle speed, calculates drift points. Device can be easily fitted in car cabin – front window or dashboard. Power supply is on board 12 V. Four buttons let user switch menu content. Before driving user enters his name or selects from earlier entered. Device remembers five last entered names. User selects which two parameters he wants to see and starts driving. Maximum drift points value recorded during session is saved in record menu.

Benefits and value to potential users: drift performance can be numerically evaluated. This device is not supposed to replace arbiters but help them make correct decision. Also, this device can help drifters using training to improve their performance.



Benefits and value to the potential users: numerical evaluation of driver performance during drift competitions or training.

project no. 28

Autonomic drone deactivation system

Rokas Stankus, Juozas Balamutas

Autonomic drone deactivation system is system who can recognize drone, track and deactivate drone who flies in prohibited area. This device is fully autonomic, no need human integration, this system can recognize, track and deactivate flying drones.

Benefits and value to the potential users: no need human integration, no labor costs.

project no. 29

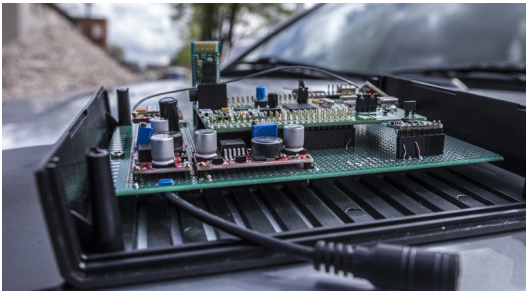
Transport control system

Martynas Siautilas

Transport control, administration, is currently a problem for the employers, also for people who ensure the safety of traffic, and the drivers themselves. Our primary goal is to allow people to track their vehicle position and state in real time.

The following main tasks are envisaged for the successful operation of the system:

1. Vehicle positioning. Knowing the exact position, the system administrator can keep track of employee productivity, security, and cargo security.
2. By knowing the exact starting and ending coordinates of the route, the system will automatically set arrival and departure times. This will automate some work processes that will improve your productivity.
3. Observing distance travelled, fuel consumption. The administrator will be able to make strategic decisions to reduce the cost to the company.
4. Driving style tracking. Based on acceleration (sudden acceleration, braking) changes, manoeuvring (turn), speeding, engine revolutions per minute, sudden increase in fuel consumption. In Lithuania in 2018 it was found that about 71% of the accidents were caused by drivers, therefore it is very important to ensure safe traffic.
5. Transport administration is done through an internet site that can be accessed from anywhere.



Automated 2D echocardiography

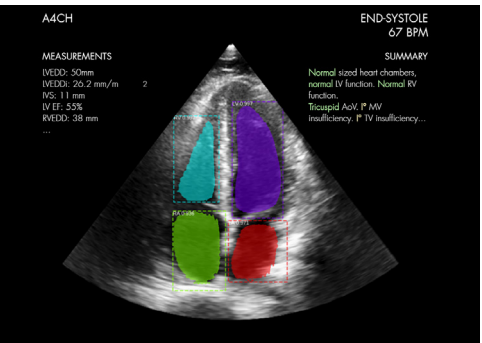
project no. 30

Justinas Mileris, Karolis Šablauskas, Arnas Karužas, Dovydas Matuliauskas, Eligija Teleišytė, Dovydas Verikas, Laurynas Skrodenis

Our team is developing software to automate cardiac measurements during routine 2D echocardiography. As the cardiovascular disease (CVD) remains a leading health concern in Europe and the US and there are established protocols for the specific measurements that need to be performed on each patient and that take a significant amount of the procedure time.

During our in-house study the percentage of time spent on measurements ranged from 50 to 85%. So the main benefits of our system are time saving for cardiac measurements, increased accuracy, decreased inter-operator variability, reduced echocardiography learning curve for junior physicians, ability to integrate into different ultrasound machines or PACS.

Benefits and value to the potential users: the main benefits of our system are time saving for cardiac measurements, increased accuracy, decreased inter-operator variability, reduced echocardiography learning curve for junior physicians, ability to integrate into different ultrasound machines or PACS.



project no. 31

MARCH+

Julija Kravčenko, Kristė Skaudaitė, Andrius Juozokas, Rytis Stasiūnas, Auksė Paškevičiūtė, Ainius Obolevičius

While consulting with multiple combat paramedics, our team has been informed about the problem they are currently facing: after the contact with enemy, the process of checking the main vital signs (respiration rate, blood pressure, temperature, heart rate and blood oxygenation (SpO2)) of the injured soldiers takes precious time.

After the initial examination, it is difficult to give a longer-term care for the injured. After assessing the situations, we have created a complex solution – "MARCH+". The system consists of a portable wearable mini-computer and a compact sensor device, enabling efficient and accurate measurement of essential human vital parameters for multiple wounded soldiers.

The device consists of photopletismogram (PPG) sensor, which measures heart rate, and a temperature sensor, which measures body temperature. Furthermore, we are developing an algorithm for respiratory rate, blood pressure detection, acquired from the PPG signal. Device is available in two types: a hand-held neck area – the sensor is easily glued to the skin and is supported by light, breathable material around the neck or attached to the ear. Both types of device are lightweight and ergonomic. The devices continuously measure human vital functions, can store the data for further use.

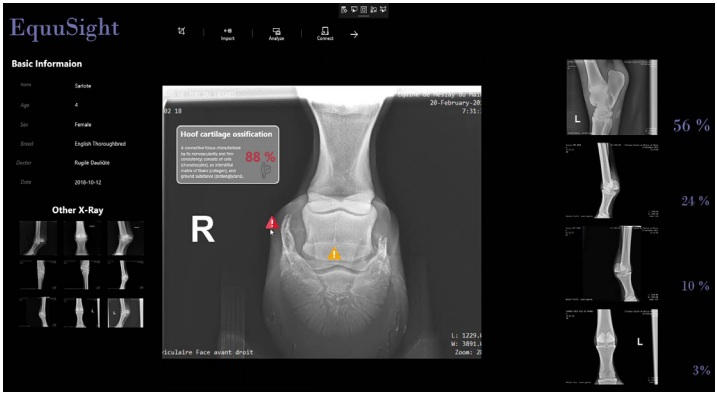
Collected data is transmitted from the device to the paramedic's mini-computer, which allows the paramedic to see changing human vital signs. In addition, it evaluates the results obtained and determines the person's condition – normal or critical. The system will also allow combat medic to record the most important information about the wounded with voice commands.

Benefits and value to the potential users: the collected data could be passed to further medical facilities, for more efficient treatment and quicker recovery. Since the medical evacuation of the wounded may take up to 36 hours, measuring vital parameters in real time and immediately alerting paramedics in case of critical condition will increase the chances of survival of the wounded soldiers.

project no. 32

Augmented Interpretation based software for horses X-ray analysis

Rugilė Dauliutė, Lukas Jokubauskas, Eimantas Noreika, Vilius Valantinas



Growing industry of horses pressure doctors to spend less time on X-ray image analysation. Many diseases are left unnoticed and later cause lameness and pain. To eradicate this, we make helping hand in one of the daily diagnostical field – radiology.

We are developing a software system for automated horses X-ray analysis. Newly made images are scanned using artificial intelligence and alerted of any visible pathologies. It helps veterinarians to increase their workflow and do not miss any important diseases. As well, it makes easier to explain owners of animal what kind of disease their horse have and where is it located.

project no. 33

Iontophoresis machine for hyperhidrosis treatment

Rimvydas Eitminavičius, Karolina Jančiulevičiūtė

An estimated 2%–3% of americans suffer from excessive sweating called "Hyperhidrosis". This excessive sweating can interfere with everyday activities and make you feel uncomfortable. Iontophoresis has been used to treat excessive sweating on the hands and feet since the 1940s. But only now we can start seeing user friendly and ergonomic Iontophoresis machines.

Our main goal was to create affordable, robust and portable device for all people that suffer from excessive sweating. Iontophoresis is often recommended for people who've tried clinical strength antiperspirants, but need a stronger treatment. One study found that iontophoresis helped 91% of patients with excessive palmoplantar (hands and feet) sweating. Another study showed that iontophoresis reduced palmoplantar sweating by 81%. During iontophoresis, a medical device is used to pass a mild electrical current through water and through the skin's surface. One of the best things is that there are no significant or serious side effects compared to botox injections, moreover the benefits of iontophoresis are long-term. So we have created what we believe user friendly, fully automatic and ergonomic as well as compact iontophoresis device.

project no. 70

Bio-impedance scanner

**(KTU, Gruppo FOS) Mantas Mikulėnas
(Gruppo FOS) Giorgio Allasia, Rosita Makauskienė,
Federico Boero, Andrea Sansalone
(KTU) Darius Jegelevičius, Saulius Daukantas,
Vaidotas Marozas, Arūnas Lukoševičius,
Andrius Petrėnas, Monika Šimaitytė
(LSMU) Daiva Rastenytė, Vaidotas Matijošaitis,
Kristina Laučkaitė.**

This device purpose is to detect structural changes in tissue by using harmless and non-invasive bio-impedance tomography technique. The operation of the device is based on the low-amplitude alternating current passing through the tissue and potential difference measured between the electrodes disposed around the subject. Received data is pre-processed and recalculated into the impedance.

Tomographic measurements are reconstructed into a 2D image. The device is designed to be used as a tracker for changes in necrotic tissue for stroke-experienced individuals during the critical observation period.

project no. 35

Real-time Generated Animation of the Battle of Saulė

Vilma Ringytė

The purpose of this solution is to show the benefits of real-time animation generation while depicting a battle that is important to the Lithuanian history – The Battle of Saulė.

The Battle of Saulė was fought between the Livonian Brothers of the Sword and pagans (Lithuanians). Between 48 and 60 knights were killed, including the Livonian Master, Volkwin. It was the earliest large-scale defeat suffered by the orders in Baltic lands. The Sword-Brothers, the first Catholic military order established in the Baltic lands, was soundly defeated and its remnants accepted incorporation into the Teutonic Order.

The implemented animation is generated in real-time. It not only shows off the ability to play the animation on the fly but provides glimpse of possible interactivity. The animation plays only when it has any observers.

Benefits and value to the potential users: potential users can benefit with lower cost and more rapid implementation of animation. The cheaper cost can also make such animation accessible to clients who could not afford it. Additionally, the animations can be made interactive as they‘re not a set of pre-rendered frames.

project no. 35

KTU ice

Andrius Bankauskas

KTU is a large university – not only does it have numerous facilities, but simply the throughput of people is astonishing. To help students in their daily lives we developed a mobile application, basically a new face for the KTU Academic informational system.

Core functionality could be summarised as having quick access to all the grades and the time table. Notifications allow students to stay up to date with test results and the time table provides guidance while traveling to a new facility via maps and pictures.

Benefits and value to the potential users: less time wasted trying to lookup basic information about day to day life at KTU.

project no. 38

StaffVR

Martynas Diedonis

StaffVR is a virtual reality game that uses spacial gesture recognition in order to cast spells, change weapons and in turn defeat hostile orcs. This game uses an actual stick/rod with an attached sensor as the controller for additional immersion.

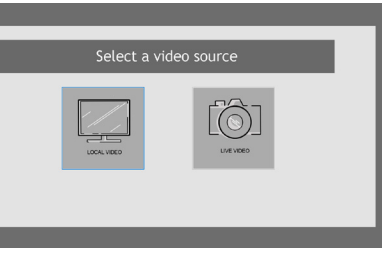
Currently the game has 2 fully featured levels. The first one takes place in a forest where the player needs to defend his home from incoming enemies by using magic, so far the player has the ability to cast 2 spells which are bind to gestures. The second level takes place in a volcano, where the player finds himself surrounded between enemy orcs and has to defeat them in order to survive. To pass this level the player can either use a hammer or a blade which you can switch by using your controller stick.

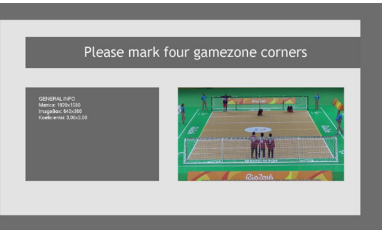
This game also features a mode where the player can play for an unlimited time until they are defeated by the orcs. This feature is available on both maps.

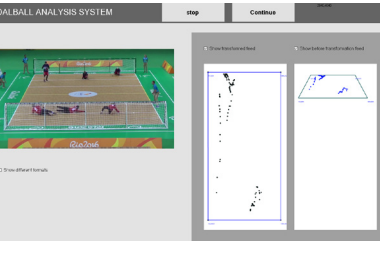
project no. 39

Goalball Analysis System (GAS)

Julius Gudauskas, Žygimantas Matusevičius







In the 21st century when athletes are approaching to their limits, IT innovations have more and more impact on results of sport. Despite of increasing interest for sport innovations, sport for disabled people have it not as much as necessary.

IT innovations are important especially for professionals to keep or increase results. In this context we thought about Lithuanian goalball team which is feeling shortage of IT innovations in workout process. If we want to keep results of our goalball team, we must implement IT solutions which could help in workouts, for example gives statistic information not only about Lithuanian team, but also about their opponents.

Because of statistical information need, we are planning to create system, which will be tracking the ball real-time or from other source and will be giving statistical information about ball movement. In this project we are using C# Windows Forms and EmguCV (Open CV wrapper). These technologies help to keep track of the ball and present output data in user-friendly GUI. First of all, our product Goalball Analysis System will be used by Lithuanian goalball team. In the future the project could be extended and adapted for other sports.

project no. 40

Inveso

Aidas Jankauskas

Inveso is an investment game available for Android smartphones. This game creates a virtual investment world and gives user the opportunity to increase an initial amount of money and expand in various ways, without losing sight of changes in the economy. Player may review events in the game world and speculate in stock market, build oil extraction facilities and sell this resource in various regions of the world, or buy companies, expand them and receive profit. A rich investor can change the appearance of his avatar, buy a dream car, house or other property, or even compete with the richest people in the world, trying to make more money than they have ever did and be the best.

In the game, as in the real world, there is an abundance of ways to get rich but smart investor needs to be perspicacious and able to distribute resources properly, as various events may cause some areas of the economy to thrive or to collapse. The game environment is realistic, names, logos and descriptions of virtual companies and organizations help player to really feel the world which is in his smartphone. Realism, detail, variety of this investment game, and the ability to choose the gameplay methods for users themselves, are the main features that distinguish it from similar products.

Benefits and value to the potential users:
the game is intended to familiarize potential user with investment strategies in a fun, acceptable and interactive way. The user can learn various basics of investment and business strategies without any risk. Also the game can be used just to have fun and compete with friends as it offers many challenges and various ways to succeed.

project no. 41

Bomberman VR

Karolis Butkus, Tautvydas Čeponis

Bomberman VR is a game port of the retro classic Bomberman. It incorporates the main mechanics of a playable grid with destructible terrain and power ups. The inclusions are a first-person perspective, free movement in two dimensional axes and a throwing mechanic tied to real life hand motion.

The game is played from a standing position where camera control is dependent on the VR headset while positional movement is implemented using joysticks on the controllers. The single player game has a points based scoring system against computer controlled characters that roam around the play area laying bombs in their path. The game lasts up to 6 minutes due to the map shrinking over time. Two movement types are provided to compensate for possible motion sickness. The game is developed using the Unity game engine and is built on the Microsoft Mixed Reality headset and controllers.

Benefits and value to the potential users: having fun playing the game, bringing back nostalgia of retro Bomberman game in new format of Virtual Reality.

project no. 42

Escape the Lab

Airidas Janonis, Eligijus Kiudys, Martynas Girdžiūna, Dovydas Vėsa

"Escape the Lab" – virtual reality "Escape the Room" type video game which is available to play for players of all ages. The game focuses on realistic chemical experiments, which is like an educational tool for learning various experiments in virtual reality.

The main action of the game takes place in a laboratory. Goal is to escape from this laboratory in a certain amount of time. During the course of the game, the player has to look for various hints so that he would know what tasks to do to make progress during the game. After completing a certain task, the player will be rewarded with a part of a three digit code. When three different code parts are collected, the player has to enter these digits into the code lock on the EXIT door. After opening the door and entering the next room, the timer is stopped and the game is finished.

Benefits and value to the potential users: learn to make various chemical experiments in virtual reality and improve their personal skills such as critical thinking and reaction time.

project no. 43

Eye tracker enabled Puzzle game

Tautvydas Valašinas

This is a Puzzle game that uses Tobii Eye tracker to enable users to complete puzzles using only their eyes. As a whole, this is meant to be a tool for doctors and hospital staff to help patients when rehabilitating from eye treatments or encouraging eye movement.

This program allows doctors to specifically set what kind of eye movements they want their patients to do (left to right, up – down, diagonal or a mix), also by increasing the amount of puzzle pieces they can prolong the exercise. There will also be a built in analysis tool, to better see how the patient performed, what kind of movements his eyes did etc. and a convenient output for later analysis using other tools/software.

Benefits and value to the potential users: user attention is focused on task at hand, thus „hiding" the boring process of rehabilitation. Meaning that users will be more eager to partake in rehabilitation activities, resulting in faster healing rates.

project no. 44

Rise of the Dead Memes

**Gytis Zasčiurinskas, Aidas Motuzas,
Liudas Spangelevičius, Mindaugas Balamutas**

In the Internet world, new online phenomena called "memes" are born each day. Memes make good natured fun of the current events or trends. However, with the beginning of each new meme another meme disappears into void of Internet, the so-called death of the meme.

"Rise of the Dead Memes" is a 3rd person adventure game which revolves around the idea that those "dead" memes are making a comeback, and in their revenge, trying to take over the whole Internet. The game's main protagonist is PewDiePie, an online celebrity known for hosting YouTube's favorite show – "Meme review". Players will go on an adventure in which they will have to solve various puzzles and face History's most famous memes to save the Internet from its demise.

Lo-Fi open design 3D printer

project no. 45

Martynas Milinskas, Karolis Simaitis

3D printing is the production of a 3D image of any shape, material or object from a digital model. The operating principle of such a printer is very simple: the object model is created by laying down a number of layers of a particular material. It all starts with the digital model that we put on the computer with special software. Then such a model is automatically divided into hundreds or even thousands of layers. Following these initial steps, you can transfer the print job to the 3D printer, and then it can start printing the layer by layer.

Although the market for 3D printers has been around for some time now and their purchase price has fallen, these printers are now cost a lot of money. The price of the printer includes: the size of the printable object, the print quality and accuracy, the print speed, the quality of the parts used. The biggest impact on the price is the size of the printable part, as the print quality increases with the rapid increase in printing area. In this case, you need to use better printer parts, which will increase the value of the 3D printer. The benefits of technology depend on how children, parents and teachers choose to use it in the learning process. When technology is used properly it can provide opportunities for a more active and meaningful learning experience. However, learning institutions do not always get the information they need about today's technologies, more about their practical use.Manufacturers of 3D printers usually offer software layouts. But the layout of objects usually requires some experience. Or you can buy online projects already made. There is no unified system through which to manage the 3D printer and share models. Problem solving: Our Lo-Fi Open Design 3D printer solves these three problems. First of all, the price of 3D printers is significantly reduced. Secondly, everyone who wants to have a small programming knowledge and the necessary hardware will be able to easily produce a 3D printer at home in such a way as to gain useful practical knowledge. And thirdly, we will also use our own software that will make it easy and convenient to manage and share 3D projects and models without requiring much knowledge.

The ultimate personal benefit of Lo-Fi 3D printer: improvement of physics and informatics knowledge, saving money compared to factory printer, improvement of object modelling and management knowledge. Traditional factory-made production creates a lot of waste. The truth is that the necessary detail is expensive or does not exist on the market at all. That's why a 3D printer makes a person relatively low-cost and almost waste-free, because the plastic used for printing is usually already recycled plastic, creating the right detail or object.

project no. 46

Virtual reality for historical storytelling

Evelina Venckutė

The Virtual Reality Audiovisual Project is dedicated to the 100th years anniversary of Independent Lithuania. It shows the bat The Virtual Reality Audiovisual Project is dedicated to the 100th years anniversary of Independent Lithuania. It shows the battle of Radviliskis in 1919, against the army of Bermont-Avalov. Persons are given virtual reality glasses to wear which create a 3D depth of illusion. It is immersive way to tell a battle story because what happens inside that headset makes you feel something in your head, heart and gut. VR headsets are connected to a computer or a gaming console that generates high-quality virtual experience. Users can actually see 360-degree video showcase.

Benefits and value: Virtual reality for historical storytelling. The project allows squads to maintain battle experience or prepare for new missions. Virtual reality for military training in that they enable the participants, i.e. soldiers, to experience a particular situation. Due to the fact that VR is adventurous, people find them more enjoyable. Usually, it means a higher level of engagement and understanding. tle of Radviliskis in 1919, against the army of Bermont-Avalov.

project no. 47

Interactive Paintings Contest System for Kaunas National Puppet Theater

Deividas Bakanas, Eimantas Dumšė

Interactive Paintings Contest System for Kaunas National Puppet Theater enables the theater to inform their target audience (toddlers) in an interactive manner. Using this system, the theater can present images and descriptions of characters performing in puppet shows, toddlers can spend quality time painting these characters using their smartphones or tablets with an opportunity to win a prize – tickets to an actual puppet show in Kaunas National Puppet Theater. The wining painting is selected by the community in the web page provided by this system. The winner is informed about the prize using an email address provided by kid's parent.

The system consists of four components – a web page, a mobile application, a server-side application and a database. The mobile app allows user to see images and descriptions of the characters and to draw the painting. Web page enables system administrator to fill the system with characters information, and to confirm paintings made by the users. On the web page the community gets an opportunity to vote for their favorite painting. Server-side applications handles the communication between client programs and database, which stores all the necessary data for system operations.

Benefits and value to the potential users: potential users receive information presented in a way, which allows them to express their artistic skills and engage in a contest to win a prize.

project no. 48

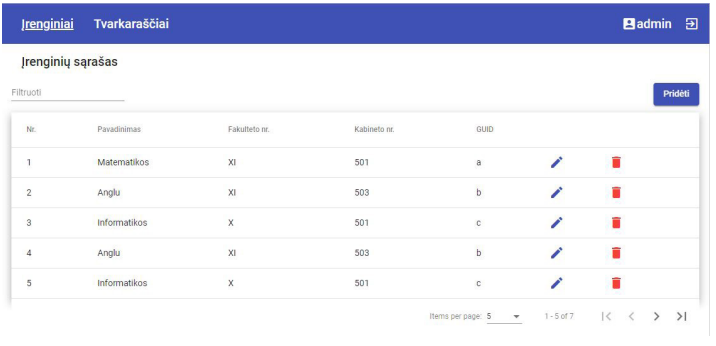
Student attendance automated management system

Džiugas Molis

Currently, there is no electronic system available to monitor student's attendance at universities in Lithuania. The lecturer has to print out an attendance list for every lecture and pass it on for students to sign. Alternatively, some lecturers' check who is present in the class by calling each student's last name. A lecturer then can mark the attendance status of a student as „Present". I believe this is a real time-consuming process which could be improved by using electronic card readers. All students would be asked to scan their student ID card at entry points into lecture rooms.

The electronic attendance list would be populated for each lecture and access to this data would be restricted for lecturers. Attendance reports could be filtered by date, module, lecture or students group name.

Benefits and value to the potential users: saves time and it safer to register student by its LSP card not signature.



project no. 49

Neural Impairment Test Suite mobile app

Rytis Maskeliūnas, Andrius Lauraitis

Neural impairment test suite is a mobile application (tool) to evaluate health state for patients, suffering from Huntington disease (HD), Parkinson disease (PD) or Alzheimer's disease (AD) in early stages.

Symptoms of the patient are evaluated by conducting simple tasks for detection of tremor, cognitive, speech and energy expenditure impairments.

Tremor impairment tasks: Sequential Touch and Rainbow Color Touch (using 1 finger), Multi-Touch (multiple fingers). Archimedean spiral contour following and drawing. Cognitive impairment tasks are based on SAGE methodology (https://wexnermedical.osu.edu/brain-spine-neuro/memory-disorders/sage): General Questions (Insights), Orientation (Current Day), Picture Naming, Similarities and Calculation, Construction (3D figure), Construction (Clock), Verbal Fluency, Executive (Modified Trials), Executive (Problem Solving), Memory.

Speech tasks: Voice Recorder (reading a poem).

Energy expenditure task: Total daily energy expenditure (TDEE) calculation with evaluation of patient gained and burned calories.

Extra features: Training and Testing modes, Multi-Language (English and Lithuanian), automatic evaluation of patient health state after test procedure by visually comparing results. Instrument is adaptable for patient self-assessment. App link in Google Play: https://play.google.com/store/apps/details?id=com.alauraitis.test_suite

Benefits and value to the potential users: for patient and family members: evaluation of HD, PD, AD patient health state without leaving home. Also, visiting hospital when prompted. For doctors: observation of patient health state with proposed additional measurement instrument and providing necessary treatment (e.g. drugs or extra therapy).

project no. 50

Image information extraction

Martynas Pocius

Retail is expanding, so the visual material you need to process is growing. The goal is to reduce time for product managers that work with furniture products in eCommerce by analyzing furniture images with Artificial intelligence solutions.

To achieve this goal created a system that extracts information from product furniture images. System testing and documentation are created to prove AI models accuracy. During the analysis the most important competitors are evaluated. System main functionality is to classify furniture taxonomy, what is the product dominant color and also detect if product image has a background. This system can automate product content validation and filtering capabilities.

Benefits and value to the potential users: no more complaining customers that get products with different color.

project no. 52

VR Game "Feel The KTU"

Lukas Drukteinis

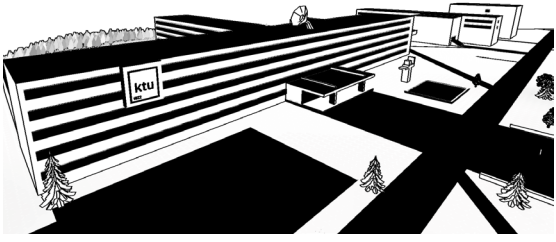
The game "Feel The KTU" lets you explore the grounds of KTU Campus in virtual reality by playing mini-games and collecting trophies. The goal of the game is to collect a certain number of trophies, to be called a true student.

The trophies are scattered all over the grounds of university campus - Santaka Valley, Faculty of Informatics, Faculty of Chemical Technology, stadium, etc. Some of the trophies can be found by exploring the area, others require to finish a mini-games, for example - score 4 points in basketball court, recycle the trash, build a tower from books, etc. The user needs to put head mounted display and take a controller in each hand to dive into the game. The graphics are minimalistic - black and white style. The environment is created by using map data.

The experience is created with Unity game engine, and implemented to work with SteamVR devices, such as Samsung Odyssey or Dell Visor.

Benefits and value to the potential users: the potential users would feel the proportions of KTU Campus and learn the location of various faculties by reaching for a game objective.

Feel The KTU



project no. 53

Airplane traction control system to monitor airplane thrust during take-off

Dovydas Vaškas, Rokas Stankus, Lukas Kučinskas

Air travel is, of course, one of the safest, fastest and most convenient ways to reach any place in the world, but accidents in this area are inevitable. Aircraft safety system manufacturers are investing heavily in the development of new security technologies and accident prevention. MB Setbitera cooperates with Kaunas University of Technology and develops an airplane safe take-off control system to help the airplane pilot make decisions about the state of the airplane take-off.

Solution: the product is an additional safety feature – a system that is able to determine whether the airplane will be able to rise to the end of the runway during the airplane take-off. The algorithm will use the accelerometers and speed (air) sensors on the aircraft, calculates whether the existing type and weight aircraft, with the current conditions, will quickly generate the acceleration needed for a successful aircraft take-off.

This algorithm will be installed on the aircraft's main computer system that monitors the operation of the aircraft systems. The essence of the algorithm is to warn the pilot about the slow acceleration of acceleration. If everything goes smoothly and without problems, this system will not require any additional pilot attention: neither before the flight nor after the flight. The only case when this system will draw the pilot's attention is when the algorithm calculates that there is a chance of not being able to ascend to the end of the runway.

Benefits and value to the potential users: increased safety of aircraft.

project no. 54

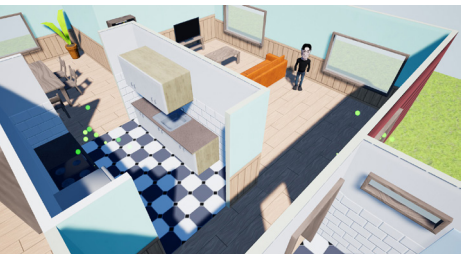
iDO

Andrius Paulauskas, Lukas Paulauskas, Rytis Maskeliūnas

I Do Care is an innovative game that is designed to work around the standard ineffectiveness of traditional training methodologies for direct care workers. The game runtime, complexity and intrusiveness are modelled and designed from the ground-up around the requirements and needs indicated by direct care workers, people with dementia, family carers and dementia experts.

The elements of innovation of the game are: a) continuous tracking of the user's abilities; b) determining an appropriate number of steps for the challenge to correctly train the abilities of the target user; c) keeping up and staying "half-a-step" in front of player performance; d) natural interaction and little-to-no learning curve; e) engagement with a learning-by-doing exercise; f) offering different levels of difficulty; g) taking into account social and cultural background and technical literacy, producing a most natural game model for target demographics. The game is made to be as accessible as possible by allowing the users to play from their browsers or their mobile devices.

Benefits and value to the potential users: the project provides an unusual education environment for direct care workers. They're provided with essential knowledge and information through an interactive and engaging medium. The game is also very accessible. It can be played in a browser or most of Android and iOS mobile devices.



project no. 55

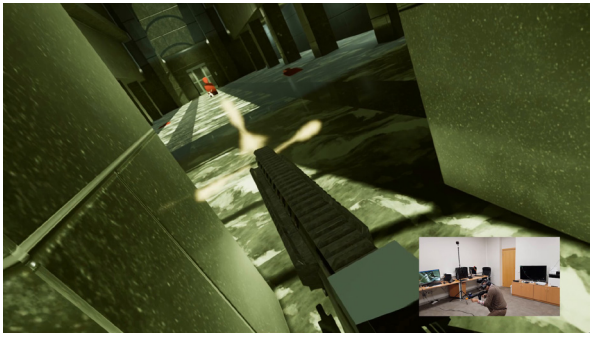
Gunplay VR

Andrius Paulauskas, Lukas Paulauskas, Romas Šleževicius

Shooter games for VR are no surprise by now. Typically, these games use standard virtual reality input devices – the motion controllers. The controllers allow to control the flow of the game, to pick up and shoots various weapons and to interact with the rest of the environment. But it lacks the feeling of holding a real weapon in your hands.

Gunplay VR was an attempt to bring a "real" gun into virtual reality. This required a replica of the desired gun and its' photo realistic 3D model, a Vive Tracker and some small tinkering. In the current implementation a Vive Tracker was fitted onto an airsoft replica of a SR-13 assault rifle with a 3D printed mount. The pogo pins on the Vive Tracker were wired to the weapon's trigger to sync it with the virtual rifle's trigger. Finally, a model was prepared to bring it all together in virtual reality.

The result was an amusing and highly immersive virtual reality experience. The real and the virtual rifles matched perfectly, the weight and the grip made users feel like they're really holding a gun and pressing the trigger really did do harm, but only in the virtual environment.



project no. 56

Printing the oils – soybean oil-based resin for optical 3D printing

Miglė Lebedevaitė, Edvinas Skliutas, Jolita Ostrauskaitė, Mangirdas Malinauskas, Saulius Lileikis, Matas Matukaitis

The idea of this work was to replace petroleum-based resins by substances derived from renewable resources for photocurable resins for optical 3D printing. In recent years, 3D printing, or rapid prototyping, emerged as a flexible additive manufacturing technique and became widespread because of its simplicity, relatively low cost and being a tool for materializing creativity. Optical 3D printing is a layer by layer photo-crosslinking method, where photosensitive resin is polymerized by UV/VIS light. The most of photosensitive resins for optical 3D printing are made from petroleum-derived acrylic oligomer, acrylic monomer and/or reactive diluent, photoinitiator and UV stabilizators/blockers. Natural oils are one of the best bio-based alternatives for petroleum-derived resins due to their richness in double carbon bonds which can be polymerized or converted to other functional groups, biodegradability and renewability. Acrylated epoxidized soybean oil (AESO) is used commercially in various plastics formulations, although its usage in optical 3D printing has not been reported yet. In this work, AESO photosensitivity and photopolymerization kinetics was investigated, as well as light penetration depth into the photosensitized AESO and minimal exposure energy dose to cure the resin was evaluated. The dependencies of mentioned parameters on the amount of photoinitiator and UV blocker were determined. It proved feasibility for successful optical 3D printing of AESO-based resins employing digital light processing machines with 385 nm and 405 nm wavelength light sources was demonstrated. The designed AESO-based resin was tested by JSC „3D Creative" and validated to be suitable for industrial applications.

Benefits and value to the potential users: companies using optical 3D printing technologies could obtain a new technology for production of novel sustainable polymeric materials from commercially available acrylated epoxydized soybean oil by combination of green chemistry and green engineering concepts.

project no. 57

Connecting the Dots

Sridhar Hariharaputran

Investment to Innovation project is aimed for global market environment to help clients keep abreast of value of money they are spending / investing on a daily basis. It aids to spend and invest wisely by connecting diverse information from multiple domains such as connecting healthcare with market share - spending / investing data using data analysis.

Clients from end customers will become investors for innovation projects from the least possible money they can save daily while also enjoying the perks for being part of the global project. Money saved is an investment for their future and treated as seed funds for new start-ups and spin-off companies.

project no. 58

Artificial Intelligence for Smart Cities

Domantas Didžiapetris

A lot of urban analysis methods still use paper-based or online surveys, yet they are not always reliable, and the results may not represent the actual situation.

Technologies are ever-changing and so are people. One glance at social media may provide more insight on actual situation than an in-depth questionnaire. Moreover, the opinions expressed on social media are far more expressive and impulsive, as we express joy or hate online the very moment we feel it. That is exactly the type of data which is needed for a proper research.

One of the best places to gather such data is Twitter. This platform has a limited amount of characters for a message and it is easy to depersonalize the message. Unfortunately, Twitter is rarely used in Lithuania, therefore it is impossible to gather enough data from here. Manhattan was chosen for the research because of the liveliness of the borough and the ease of gathering the data.

Combining social media data and artificial intelligence algorithms to determine the sentiment of the communities (or residents) in a certain area and further pinpointing problematic areas for urban development has never been used before.

Benefits and value to the potential users: speed, certainty, innovative use of public and social media data.

project no. 59

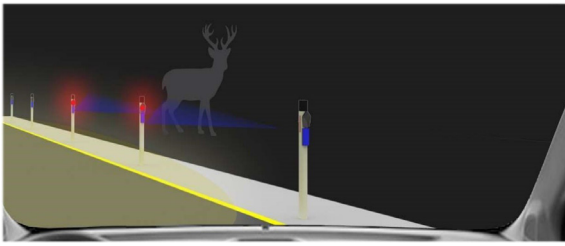
Solar-Powered Wildlife Warning System

Kristina Pratašienė, Darius Pratašius, Ona Samuchovienė

Roads cross through the habitat of many wildlife species. When these paths intersect, collision can occur, and in greater numbers than most people realize. Based on statistics, there are an estimated many collisions between cars and large animals every year in Lithuania. This presents a real danger to human safety as well as wildlife survival. Although collisions usually happen at night when wild animals are migrating and it's difficult to see until they are right in front of your headlights.

New technologies, let us to prevent animals being hit and reduce highway accidents, are created in Lithuania. Solar-powered poles are installed alongside roadways where wildlife often crosses. Infrared (IR) sensors inside the poles detect when animals are nearby and subtle LED lights start blinking to warn drivers that a danger is near the roadway. That is more, car headlights are reflected (blue reflector) out into the side of the road so animals get a heads up that cars are coming.

This warning system requires little maintenance, making it practical for back country roads and highways as well as more trafficked roads, animals migration corridors. Wildlife warning system could be like these also save money, because removing dead animals from roadways and cleaning up roadways after accidents costs taxpayer money.



project no. 61

Flight over the Atlantic

Aurimas Gečas, Ignas Lunys, Vadimas Kožukovskis, Viltė Gražulevičiūtė, Laimutė Varkalaitė, Erika Kisieliūtė, Laura Rimkutė-Šimaitė, Mindaugas Tamošiūnas, Justas Motijauskas

The purpose of the application is to present the legendary flight over the Atlantic Ocean. The game covers a story of two Lithuanian pilots – Steponas Darius and Stasys Girėnas. In 1933 they set out to fly over the Atlantic Ocean in a modified plane they called Lituanica. They took off in New York and sadly met their tragic fate right before reaching their final destination – landing in the city of Kaunas.

The game includes 10 mini games and 8 short historical video movies which connect the story and mini games. The video movies were taken from historical sources and were processed by increasing the quality and matching the style of the game. The game is dedicated for smart devices (smartphones, tablets) and runs on Android and iOS platforms. The game features recreated 3D model of Lituanica. The application also includes Augmented Reality functionality which makes use of magnetic badge depicting Lituanica airplane.

Benefits and value to the potential users: knowledge and fun for the end users. A tool to tell the story attractively for museums and other educational institutions.

project no. 62

#JUPLLA+

Arnas Undraitis, Lukas Paulikas, Lukas Jazokas, Kipras Jasiūnas, Tadas Rybelis, Pranas Kuzas

#JUPLLA+ started as a semester project and was initiated by the need of making PCB assemblies available to be developed in laboratories or small workshops quickly. The placement of modern small footprint components can no longer be reliably and precisely performed in manual. In turn, prototype assembly orders are in most cases refused by industrial enterprises, who own automatic placement (Pick and Place) machines which usually are meant for industrial high volume orders and take lots of space.

To make automated assembly of small batches or even single prototype available in a laboratory, we decided to make a completely new design of a desktop automatic pick and place (PnP) machine. The purpose of the design was to make the adjustable and extendable workspace including loose part recognition. The main part of our PnP machine is based on stepper motors which move the axis' and vacuum control from GRBL based microcontroller to initiate component picking. Also, two cameras are used for top and bottom vision to make precise placement corrections if necessary. Open source software Open-PNP is used to operate the axis, upload pick and place files or perform image processing tasks (quality checking, component identifying, etc.).

Precise assembly of small SMD components (up to 0201 size) is achievable by novel rigid construction of the machine. We find this flexible, configurable and extendable design, possible of using as coordinate machine with optical feedback, quality of assembly, reliable construction. The #JUPLLA+ solution may find application in laboratories, workshops, SMEs, RnD departments, etc., where electronic prototypes are developed.

Benefits and value to the potential users: flexible, configurable and extendable design, possibility of using as coordinate machine with optical feedback, quality of assembly, reliable construction.

project no. 64

Autonomous Feed pushing robot AF1

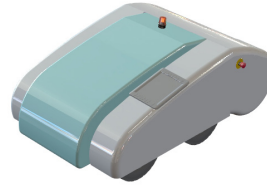
UAB Mundita: Domas Jezepčikas, Renaldas Urniežius, Linas Minkevičius, Aidas Gaška, Vaclovas Šedys

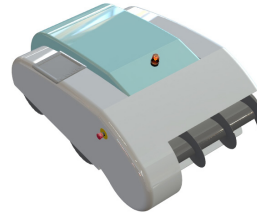
MECHANICS

Our team is developing autonomous feed pushing robot for dairy farms. As a whole, this is meant to be a tool for farmers to help them in a daily work.

There are plenty manufacturers in the world who can provide feed pushing robot but only for selected farms which has a proper feed table.

Our team found a solution how to adapt to any dairy farm in the world which has problems with feed table or narrow farms. We are using six wheel system which can go through any surface you like. Moreover AF1 remixes feed to increase scent and dry matter consumption. AF1 uses video surveillance systems, consisting of a limited number of cameras which can track and analyse the route.





Benefits and value to the potential users: the main benefits of our robot are time saving for farmers, the use of AF1 can improve significantly milk yield in dairy farms, the route tracking system uses cameras which AF1 won't get lost in the farm and it can send date exactly where its located, AF1 can work 24/7 whole year, ability to integrate AF1 into different farms, artificial intelligence- deep learning and analysis system.

project no. 65

Wood gas generator adapted to internal combustion engine

Arnas Varkalis, Klaudijus Masiulionis

A student designed wood gas generator for internal combustion engine. Generator is updraft, with water and sawing filters, mounted to engine. Gases are produced by simply burning the wood and some other chemical reactions in process. Generator is presented as an alternative biofuel producing gadget. Not exactly this generator, but the very essence of gasification process may enable some alternative choices for transport, heating problems.

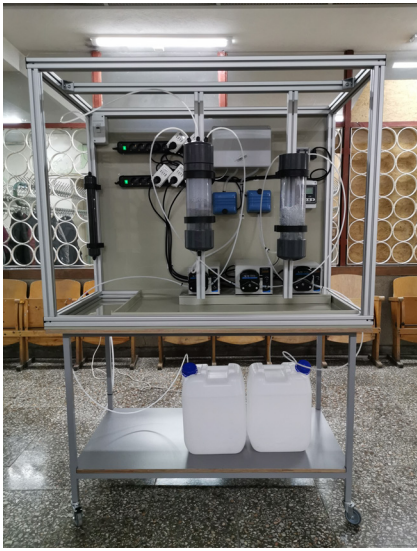
Benefits and value to the potential users: cheaper fuels, for countries and etc. who have a lot of biofuels.

project no. 66

Application of advanced oxidation and biotechnological process for treatment of polluted water

Vytautas Abromaitis

Coupled advanced oxidation and biological activated carbon system is being applied to remove resistant to biodegradation pharmaceutical from wastewater treatment plants secondary effluent. This system can be applied to treat various technological polluted water streams, where efficient removal of nutrients and organic matter is required. Therefore, treated effluent can be used for the further treatment in order to prepare technological grade water.



Benefits and value to the potential users: technology is easy to maintain, high removal rates of target compounds can be achieved.

project no. 67

Paintable sensors and solar cell coatings with multifunctional ZnO nanomaterials

Rasa Mardosaitė, Mindaugas Ilickas, Agne Šulčiūtė, Simas Račkauskas

Here, we demonstrate two novel ZnO nanomaterial application: 1) paintable light sensors, which can be painted on any surface and are specifically sensitive to violet light; 2) solar cell coating, which not only increases the efficiency of solar cells by 5%, but also protects from dust and dirt by a self-cleaning coating.

We synthesize novel ZnO nanomaterials, which have several advanced properties (transparent, superhydrophobic, enchanced sensing, etc.). Synthesis is scalable, method and materials are environmental friendly. ZnO nanomaterials can be dissolved in water or ethanol, therefore any surface can be coated by a simple spraying or printing methods. A combination of advanced ZnO nanomaterial properties and simple coating can also find a number of other applications.

Benefits and value to the potential users: 1st application: paintable sensors can be used for functional design on paper or other canvas. The user is not limited anymore to a rigid surface or electric circuitry boards. Classic design forms can be now enhanced with a paintable sensors, which can be realized as buttons, activated by violet light. 2nd application: higher efficiency is obtained, at the same time periodic cleaning of solar cells (or windows) is not needed.

partners

EIT Health is a network of best-in-class health innovators backed by the EU. **EIT Health** delivers solutions to enable European citizens to live longer, healthier lives by promoting innovation. Community of EIT Health connects the right people and the right topics across European borders, so that innovation can happen at the intersection of research, education and business – for the benefit of citizens.

EIT Food is a European Knowledge and Innovation Community (KIC), part of the EIT, which was set up to transform our food ecosystem. By connecting consumers with businesses, start-ups, researchers and students from around Europe, EIT Food supports innovative and economically sustainable initiatives which improve our health, our access to quality food, and our environment.

Danske Bank Group IT Lithuania (DGITL) was established in the end of 2014 and is a part of Group IT Danske Bank – organisation which delivers financial solutions to customers. It is the fastest growing IT organisation in Lithuanian market employing around 800 high class IT professionals.
As IT organisation DGITL structure is based on two blocks – IT infrastructure and Development. Organisation is aligned with Danske Bank's organisation in order to support the business units in offering innovative digital solutions: personal banking IT, business banking IT, corporates & institutions IT and others.

R1 RCM is a leading provider of technology-enabled revenue cycle management services across hospitals, health systems and physician groups. We implement a combination of industry leading technology, best practices and human capital across the entire revenue cycle continuum or in areas of specific need.
R1's proven and scalable operating model, the R1 Performance Stack℠, seamlessly complements a healthcare organization's infrastructure, quickly driving sustainable improvements to net patient revenue and cash flows while reducing operating costs and enhancing the patient experience. Our mission is to be the one trusted partner to manage revenue so providers and patients can focus on what matters most.

centric
connect.engage.succeed.

Centric is one of the largest IT companies in the Netherlands, with offices in 9 European countries. We know that today the world is governed by those who control the data and are able to understand it. That is why we build IT solutions in collaborative teams – from the cloud platform, DevOps engineers to Data engineering and Quantitative data analysts and scientists. These are professionals who are not only familiar with the technology but are also able to combine it with data science, focusing on cloud computing security. Our long-standing experience shows that the desire to deliver new products as quickly as possible, by circumventing the usual security procedures, a long and constantly expanding list of cloud services and a belief that Microsoft, Amazon or Google do not leave any room for nonoptimal client security solutions are the main reasons why data leakage and damage occurs. However, as cloud computing services become a part of many IT companies' everyday life, an increasing number of organizations are starting to look for ways to adapt their normal security procedures to the cloud. That is when Centric extends a helping hand.

DEMATIC

Dematic is a leading global supplier of integrated automated technology, software and services to optimise the supply chain. Dematic employs over 6,000 skilled logistics professionals to serve its customers globally, with engineering centres and manufacturing facilities located across the globe. Dematic is now integrated under the roof of KION Group, and has implemented more than 6,000 integrated systems for a customer base that includes small, medium and large companies doing business in a variety of market sectors. Headquartered in Grand Rapids, Michigan, Dematic is a member of KION Group, a global leader in industrial trucks, related services, and supply chain solutions. Across more than 100 countries worldwide, the KION Group designs, builds and supports logistics solutions that optimise material and information flow within factories, warehouses and distribution centres. The company is the largest manufacturer of industrial trucks in Europe, the second-largest producer of forklifts globally, and a leading provider of warehouse automation.

Practica Capital

Practica Capital: established in 2011, Practica Capital is one of the most active venture capital investment companies in the Baltics, focusing on investments in the Baltic and Baltic-origin seed, early stage and select growth stage technology ventures. The firm manages three venture capital funds, with total €46M under management. To date, Practica Capital has made over 40 investments in the Baltic region's ventures, of which 12 have already been realized.

Malsena is one of the biggest and most modern grain processing industrial group in Lithuania. Advanced technologies allow the group to adjust itself to the ongoing demands of the market and deliver the highest quality products to the consumers.

BCT is an innovative company manufacturing precision mechanical components. Our parts are used in automotive, various machine manufacture, medical rehabilitation devices and energy industries. The majority of our products are exported to the Western Europe: Germany, Sweden, Switzerland, Norway and the Netherlands. Our main customers are world-renowned and recognised companies. The main machining processes of the company include milling and turning on the modern programmable (CNC) machines. For full set production, the company performs additional operations on universal machines, gas billet cutting, welding, processing of sheet metal parts, painting and assembly operations. The production has been optimised for processing of single pieces and small batches of steel, aluminium, titanium and plastic parts. This result in an effective and growing company having strong positions among the Lithuanian engineering industry leaders.

TransUnion is a global risk and information solutions provider. Information is a powerful thing, and we believe in using Information for Good. And the right information-analyzed by experienced people-can help all of us learn from the past, navigate the present and predict the future.
TransUnion has been operating internationally for over 30 years in over 30 countries. We connect businesses and consumers through data, technology and analytics, to help build credit economies worldwide. We're a leader in risk and information solutions within the markets we serve.

The Alumni Association of Kaunas University of Technology is a voluntary, non-profit organization seeking to unite all generations of KTU graduates, to create and strengthen the traditions of communication and cooperation between alumni and the University. The main idea of the Association is to create Alumni network of graduates of KTU.

thank you

Thank you everyone who took part and made “Technorama 2019” happen.

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