



Science Activity Annual Report

2024

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1 DEFENDED DOCTORAL THESES

In 2024, a total of 48 theses were defended: 14 at the Faculty of Technology, 12 at the Faculty of Management and Economics, 6 at the Faculty of Applied Informatics, 8 at the Faculty of Multimedia Communications, and 8 at the University Institute.

1.1 Faculty of Technology

Degree Program: CHEMISTRY AND MATERIALS TECHNOLOGY

Degree Course: Technology of Macromolecular Compounds

Fayyaz Bakhsh Ahmad, Ph.D.

Date of defence: 15. 11. 2024

Supervisor: prof. Mgr. Marek Koutný, Ph.D.

Investigating the influence of different additives on the mechanical properties and biodegradation of PHB and PBS

Abstract

In the current doctoral thesis, two well-known biodegradable polymers, polybutylene succinate (PBS) and polyhydroxybutyrate (PHB), are examined for their complex interactions with diverse additives. The study focuses on the effects of two different kinds of lignin antioxidants and essential oils on the biodegradability and mechanical characteristics of these polymers. The first step in the research is to examine how antioxidants from lignin and essential oils may be added to the PBS and PHB matrices. This meant carefully examining how well these additives worked with the polymers and adjusting their concentrations to provide improved qualities. Advanced characterisation techniques were used to evaluate the thermal stability, morphology, and chemical interactions of the composite materials. The modified PBS and PHB specimens exposed to simulated environmental conditions in order to assess the effect on biodegradability. The study also thoroughly studies the mechanical characteristics of the modified PBS and PHB materials. A thorough knowledge of the additive impacts on the overall performance and structural integrity of the polymers was possible

after the determination of storage modulus, loss modulus, and other critical mechanical characteristics. The results of this study showed that alkali lignin, organosolv lignin, and the chosen essential oils (eucalyptol, thymol, and limonene) could significantly retard biodegradation. However, the influence of neutralized alkali lignin was greater than that of the others in reducing PHB biodegradation (by around 50-60% with a 12% addition). Another outcome was that the influence of lignin was evident even with the addition of 1%, while essential oils had a completely different effect. Adding a high percentage of essential oils made the polymer more flexible than required by reducing the T_g. For PBS, the influence of both neutralized alkali lignin and organosolv lignin was almost the same, retarding biodegradation from 10 to almost 55% with an addition of 1 to 12%, respectively. Mechanical and thermal analyses were performed using DSC and DMA. The results showed that the two types of lignin used had a positive influence on the mechanical and thermal properties of the matrix. Moreover, by adding the optimum amount of essential oil, these properties can be controlled while also having a significant influence on biodegradation as antimicrobial agents.

Kateryna Filatova, Ph.D.

Date of defence: 27. 3. 2024

Supervisor: prof. Ing. Vladimír Sedlářík, Ph.D.

Nanocomposites for Medical Application

Abstract

This thesis is focused on fabrication of hybrid (organic-inorganic) nanocomposites using Silica-based particles for their application in medicine. For that purpose, a detailed overview of the current state of art in the field of nanocomposite materials, with a particular attention to the preparation, characterization, biocompatibility of Silica-based nanocomposites, and conventional issues related to that matter was performed. Besides that the main objectives have been addressed as follows: first, fabrication of Si-based carriers modified with CS and chitosan grafted polylactic acid (CS-g-PLA) as controlled drug delivery systems (DDS) was performed. After, preparation of Si particles doped with Aluminium for as DDS for poor

water soluble drugs was accomplished and potential of Si-PLA nanofibers for sustained release of bioactive compounds was described. During the realization of this thesis, Silica-based nanostructured materials were synthesized, characterized, tested on the biocompatibility issues, loaded with a model drug, physical and chemically modified on their surface, and preliminarily studied as potential medical tools analysing their interactions with biological objects for their further medical application.

Ing. Petr Janovský, Ph.D.

Date of defence: 27. 6. 2024

Supervisor: doc. Mgr. Robert Vícha, Ph.D.

Risk Analysis in the Selected Organization

Abstract

The bachelor thesis deals with the analysis of economic and production risks in a selected real organization. The work is divided into two parts. The theoretical part describes the basic terms of risk, risk management principles and methods. The practical part describes the organization itself and analyzes it. The purpose is to identify production and economic risks and to propose improvement measures. The data obtained from the structured interviews and the questionnaire are evaluated using SWOT analysis. Then measures are proposed to reduce the risks.

Matta Ashish, Ph.D.

Date of defence: 29. 8. 2024

Supervisor: prof. Ing. Tomáš Sedláček, Ph.D.

Improving the mechanical performance of multicomponent injection moulded products

Abstract

The application of multicomponent injection moulded products is increasing due to emerging manufacturing trends like light weight, improved performance, cost efficiency, etc

which creates the requirement for combining different materials. The performance of a product is achieved by combining the properties of different materials. However, joining is the major challenge in making multi-material structuring workable. Joining could be challenging because of the different properties of the two materials. Therefore, it is crucial to understand the various connecting techniques that are available for multi-material, metal-to-metal, polymer-to-polymer, and metal-to-polymer hybrid systems. It is generally known that the bond strength of multi-component injection moulded components is significantly influenced by the material combination, process variables, and contact area structures. Research studies with polymer-to-polymer, and metal-to-polymer hybrid systems were primarily studied in presented doctoral thesis. Namely, three different polymeric material combination with their respective inserts were chosen, Polyketone-aluminium, Poly(phenylene)-aluminium and Arkema's Elum(R) thermoplastic resin- polybutylene terephthalate. Polyketone studies analysed the possibility of joining Polyketone (PK) and aluminium insert into one structure by the means of injection insert moulding. This study investigated the relationship between joining strengths and moulding conditions, with a particular emphasis on holding pressure, injection speed, and mould temperature. Tensile shear tests were performed to determine the bonding strength under various moulding conditions. Furthermore, joining strength results were assessed with each distinct moulding condition to determine how it affected the joining strength. Poly(phenylene) sulphide studies investigated the influences of various surface treatments on the adhesion between glass-reinforced poly(phenylene) sulphide (PPS) and aluminium alloy during the injection over-moulding process. Adhesion strength was evaluated via the shear test. Correlations for the shear strength of the polymer-metal with different metal-substrate treatments were studied. Three-dimensional (3D) topographic images characterized with a 3D optical microscope were also examined to explore interface topologies of the aluminium substrates used for the over-moulding process. Arkema's Elum(R) thermoplastic resin insert moulding studied the detailed procedure of using injection moulding to join two different materials to produce goods with improved utility properties. The polybutylene terephthalate (PBT) homopolymer of 20 % glass fibre reinforced is moulded onto the modified Resin Transfer Moulding samples of the Arkema's Elum(R) thermoplastic resin composite sample by employing the injection moulding technique and using Arkema's Elum(R) thermoplastic resin composite as an insert. Influence of various surface treatments was investigated, and the moulded samples were examined for mechanical characteristics such as tensile shear strength test to analyse the adhesion. In summary, all of these studies

explore the possibility of joining two dissimilar materials by inspecting the optimum moulding parameters and definite surface treatments and their association with attained bond shear strength.

Ing. Aneta Prokopová, Ph.D.

Date of defence: 10. 6. 2024

Supervisor: prof. Ing. Pavel Mokrejš, Ph.D.

Preparation of gelatins and hydrolysates from chicken collagen and possibilities of their applications

Abstract

With the growing consumption of poultry meat in the world, there are opportunities to use chicken stomachs for collagen products. These wastes are generated in slaughterhouses in large quantities and, due to their biological nature, it is necessary to handle them in such a way that they do not pollute the environment. Collagen from poultry stomachs is a promising raw material source for the production of gelatins and hydrolysates. High-quality collagen products can be prepared by a biotechnological method using proteolytic enzymes produced by submerged fermentation of genetically modified microorganisms. Poultry gelatins have a similar amino acid composition to commercial collagens, but different rheological and gel properties. By choosing the appropriate process conditions, such changes can be achieved at the molecular level of collagen, which will make it possible to prepare products with targeted properties for advanced cosmetic, pharmaceutical, medical or food applications. The dissertation deals with the innovative preparation of collagen products from non-traditional raw deals material (chicken stomach) by enzymatic hydrolysis. The literature review evaluates the current state of the problem and the application possibilities of collagen products. Based on the research, the research objectives were set i) to extract gelatins under the chosen process conditions of multi-stage extraction; ii) prepare gelatins with a gel strength of around 150 Bloom; iii) collagen products will be suitable for application in the food and cosmetic industry. First, it was necessary to extract model samples of collagen products and characterize their properties, as well as to propose optimal processing conditions. Experiments were modeled using a Taguchi design, 2 factors at 3 levels. Factor A the amount of enzyme added

(0.10; 0.15 and 0.20%) and factor B the extraction temperature (55.0; 62.5 and 70.0 °C). The data were statistically processed and analyzed at a significance level of 95%. On model samples of chicken collagen products, i) antioxidant activity was determined (using DPPH and ABTS); ii) distribution of molecular weights by the GPC-RID analysis method; iii) functional groups and configuration of polypeptide chains related to properties at the molecular level using the FTIR method; iv) the MALDI method to evaluate the microbiological properties of SDA, PCA, TSA and VRBL microbial populations. The biophysical effectiveness of the obtained collagen products was verified in the prepared cosmetic model formulations in vivo in a group of female volunteers in the periorbital area of the face. Using non-invasive diagnostic methods, the effect on skin hydration, the functioning of the skin barrier, elasticity and relief of the skin was monitored. Research has shown that enzyme pretreatment of the starting raw material is an environmentally suitable alternative to the acidic or alkaline production method that is traditionally used in the production of gelatin. Collagen products prepared from poultry by-products may be a suitable alternative to land animal collagen tissues. The results of the sub-studies carried out indicate the potential for advanced applications. Collagen hydrolyzate verified by an in vivo study can be evaluated as biocompatible with the skin. No irritation or allergic reaction was recorded during the experiment.

Degree Program: FOOD CHEMISTRY AND TECHNOLOGY

Degree Course: Food Technology

Ing. Monika Augustová, Ph.D.

Date of defence: 4. 6. 2024

Supervisor: doc. RNDr. Iva Burešová, Ph.D.

Applicability of rice mash in the production of gluten-free bread

Abstract

The aim of this study was to enhance the effect of the addition of instant rice mash on the quality of gluten-free dough and bread made from fine and semi-coarse rice flour. Instant rice mash was investigated as a possibility to increase the quality of gluten-free dough and bread. In practical part, the effect of the addition of water in combination with the addition of instant rice mash was investigated. The effect of flour granulation and concurrently the

effect of the addition of instant rice mash was investigated at constant water addition. The rheological and thermomechanical properties, leavening and the ability of rice dough to produce and retain leavening gas were determined and the pore size was measured. Specific volume, baking loss, yield, textural properties were determined for the bread and sensory evaluation was performed. The textural properties were measured for fresh and stored bread. Higher water addition significantly increases the resistance of doughs from both flour granulations to intense stress, decrease gelatinisation and retrogradation of starch and enable to reach a higher height. The addition of instant rice mash increased the porosity of rice dough. It was also found to increase the yield of bread and decrease baking loss, hardness and chewiness and prolonged the shelf life of rice bread.

Ing. Alena Kratochvílová, Ph.D.

Date of defence: 12. 9. 2024

Supervisor: doc. Ing. Richardos Nikolaos Salek, Ph.D.

Quality changes in processed cheese as a result of heat sterilisation

Abstract

The aim of this study was to investigate the effect of sterilization on selected physicochemical, textural, rheological and sensory properties of processed cheese. Many consumers perceive the use of emulsifying salts in processed cheese as an undesirable ingredient that subsequently increases the sodium content in the processed cheeses. Therefore, there is an effort to produce processed cheeses without emulsifying salts, with the possible application of hydrocolloids. The study focused on the production of sterilized processed cheeses. Initially, processed cheeses with a wide range of dry matter and fat in dry matter content were produced and sterilized at 120 °C for 40 minutes. Subsequently, the raw material composition of the processed cheeses was supplemented with flavoring ingredients or the emulsifying salts were totally replaced with hydrocolloids (agar, gelatin, k-carrageenan, and furcellaran). Sterilized processed cheeses with flavoring ingredients and hydrocolloids were also produced. The samples of processed cheeses were sterilized at the temperatures of 120 °C for 15 minutes and 125 °C for 5 minutes. To describe the monitored parameters, basic chemical analyses were used (determination of dry matter, fat, pH, ammonia content, and determination of secondary products of lipid oxidation), as well as rheological, textural, microbiological,

and sensory. Color changes were also assessed using instrumental color analysis and the size of fat globules was measured. All tested parameters were monitored throughout the storage period of the samples at various time intervals. The results of this study indicate that all tested sterilization regimes were sufficient to ensure practical sterility of all processed cheese samples, but all sterilization regimes also affected the final pH values, TBARS, ammonia content, as well as the color and organoleptic properties of the produced samples. Flavoring ingredients, particularly tomato powder, proved to be effective in masking the negative impact caused by sterilization. The used hydrocolloids had varying effects on the textural and viscoelastic properties of the processed cheeses, with k-carrageenan significantly increasing the firmness and reduced spreadability of the samples. However, it was confirmed that hydrocolloids can be used as a total replacement for emulsifying salts in processed cheese manufacturing.

Ing. Kristýna Opustilová, Ph.D.

Date of defence: 12. 9. 2024

Supervisor: doc. Mgr. Barbora Lapčíková, Ph.D.

Study and preparation of multiple emulsions

Abstract

The presented work aimed to optimize the preparation of multiple emulsions, to assess the influence of selected process parameters (preparation temperature and application of high-speed homogenization), and the composition on the functional properties of simple and multiple emulsions. The work focuses on the production of model samples of multiple emulsions with encapsulated curcumin. The individual emulsions differed in the type of oil used in the outer phase, including olive, sunflower, pumpkin, flaxseed, and coconut oil. To describe the properties of the individual emulsions, physicochemical properties (creaming index, emulsion stability index, encapsulation efficiency, rheological properties, freezing point index) were monitored, and emulsions were visualized using confocal laser microscopy. Another parameter monitored was the digestibility of simple and multiple emulsions in vitro using a two-step procedure (simulation of stomach digestion and simulation of small intestine digestion). The digestibility of turmeric samples, in both powdered form and fresh root,

was also studied. An analysis of individual curcuminoids in the curcumin sample was performed using modulated differential scanning calorimetry and HPLC. The results of the work indicate that the stability of multiple emulsions is strongly influenced by the preparation temperature and the homogenization process. The ratio of oil to the aqueous phase does not have a significant impact on emulsion stability, but it does change the viscoelastic properties of the prepared samples. The type of oil used affects the stability of the emulsions, likely related to the ratio of saturated to unsaturated fatty acids in the oils. The digestibility of curcumin differs significantly between simple and multiple emulsions. Simple emulsions break down quickly upon contact with stomach liquid, leading to the degradation of curcumin, while multiple emulsions provide better protection for curcumin against degradation, with most curcumin being released in the small intestine. The digestibility analysis of turmeric powders revealed that fresh turmeric is much more digestible than powdered samples.

Ing. Romana Šebestíková, Ph.D.

Date of defence: 4. 6. 2024

Supervisor: doc. RNDr. Iva Burešová, Ph.D.

Technological quality and utilization possibilities of colored-wheat grains in bakery industry Abstract

Colored wheats contain polyphenolics in the outer layers of grains and their utilization in bakery industry may present a good strategy of providing value-added products to the consumers. The aim of this dissertation was to compare the rheological properties and fermentation behavior of doughs prepared from flour, ground from the grains of five types of colored wheat, obtained from 2020-2022 harvests. Three fractions of whole-meal flour were used for each variety. The flour fractions differed in the particle size of the bran, the ash content and the starch content. The baking trials, texture and sensory analyses of breads were performed and their overall acceptability was assessed. The coarser granulation of flour fractions, average hardness ($26,6 < 29,3 < 49,7$ N) and chewiness ($1610 < 1763 < 2864$ N) of bread crumb increased. Differences were found also in other parameters: springiness ($85 > 85 > 79$ %), cohesiveness ($73 > 73 > 70$ %) and resilience ($35 > 32 > 27$ %). An increase in off-flavors' intensity was detected with higher bran content.

Degree Program: PROCESS ENGINEERING

Degree Course: Tools and processes

Bhimasena Rao Nagaraj Mukunda, Ph.D.

Date of defence: 17. 4. 2024

Supervisor: prof. Ing. Berenika Hausnerová, Ph.D.

Role of Powder Characteristics in Metal Injection Molding Process

Abstract

Metal powders play a significant role in the success of precision component manufacturing via metal injection molding (MIM). Key metal powder characteristics, such as the particle size distribution and particle shape, dictate the process parameters and component characteristics. This Ph.D. thesis focuses on addressing the simultaneous effects of the above key powder characteristics on feedstock performance in the MIM process. Metal powders with particle size distributions in the range of (3-20) micrometers, prepared using two widely used fabrication technologies, gas and water atomization, were chosen in the present thesis work. Gas atomization produces spherical particles, whereas water atomization generates irregularly shaped particles. The powders with different sizes and shapes were analyzed for critical solid loading, rheology including flow instabilities, injection molding, and sintering to assess the size and shape effects in MIM. As the majority of the work emphasizes interpreting the shape of the powder particle using a qualitative microscopic technique, a quantitative approach based on the Euclidean distance mapping was developed, and the results were compared with the commercially available dynamic image analyzer.

Ing. Jan Hanzlík, Ph.D.

Date of defence: 22. 8. 2024

Supervisor: doc. Ing. Martin Bednařík, Ph.D.

The Use of Additive Technologies in Manufacturing of Injection

Abstract

With increasing demands for the quality of injection-molded products, the requirements for the design and manufacture of tools, such as injection molds, are also rising. Traditional manufacturing methods often fail to achieve the desired precision and efficiency, necessitating the use of advanced technologies. In this context, additive manufacturing technologies, such as Direct Metal Laser Sintering (DMLS) and Atomic Diffusion Additive Manufacturing (ADAM), represent innovative approaches that enable the production of complex geometric shapes and internal structures that are not practicable with conventional methods. This dissertation focuses on the research of utilizing additive technologies in the injection molding process of thermoplastics. Specifically, it addresses conformal cooling systems that, in their initial state, exhibit high surface roughness and irregularities in the cooling channels, which can negatively affect the entire processing procedure. This work discusses the impact of surface properties of cooling channels, manufactured by DMLS and ADAM technologies, on the efficiency of cooling systems. Based on these findings, a design and manufacturing of a device, along with an appropriate machining methodology and evaluation of achieved parameters, were carried out to effectively finish the surfaces of these structures. The proposed device, which is based on the Abrasive Flow Machining (AFM) method, is specifically examined for its applicability in finishing conformal cooling channels and similarly designed internal structures. The aim of these finishing operations is to achieve lower surface roughness and irregularities in the channels, which can lead to an overall increase in the efficiency of cooling systems. The research results indicate that channels produced using DMLS technology exhibit lower initial surface roughness compared to those produced using ADAM technology. Following the finishing operations of the channels using the proposed device, there is a significant reduction in surface roughness for both technologies, confirming the suitability of this device for effectively improving the surface quality of printed channels and internal structures. Statistical analysis of the obtained results included the use of confidence intervals and normality tests, which demonstrated the statistical significance of the improvement in surface quality after the finishing operation. From a practical perspective, this study has significant implications for industrial practice. Improved surface quality, for example, in the case of cooling channels in conformal cooling, leads to more efficient flow of the cooling medium, reducing the demands on the performance of cooling units and minimizing the risk of channel clogging by impurities. Overall, this dissertation introduces new insights into the field of additive manufacturing and surface finishing, providing practical

applications for improving the efficiency and quality of manufacturing processes and opening new avenues for future research. The proposed methodologies and obtained results can serve as a reference point for further studies aimed at developing new finishing methods and improving surface quality in additively manufactured components.

Ing. Miroslav Marčaník, Ph.D.

Date of defence: 20. 12. 2024

Supervisor: prof. Dr. Ing. Vladimír Pata

Statistical design of robotic arms calibration in process engineering

Abstract

The work focuses on the spatial calibration of robot arms using statistical tools. Nowadays, there are many special programming languages, simulations or virtual realities (VR), which in most cases perform the calibration using matrix relations. Mathematical and statistical solutions are not very common. The use of linear relations is valid only in certain parts in the robot workspace. According to preliminary measurements it clearly follows that the linearity of the arm during positioning cannot be assumed. The purpose of this work is to find a suitable method that respects the wear of the arm mechanism in predefined positions. According to the initial measurements, it can be assumed that the optimal solutions will be obtained using a non-linear regression function which will be of exponential type. This whole optimization method will be sought using Newton and Markwartel methods.

Ing. Martin Novák, Ph.D.

Date of defence: 20. 3. 2024

Supervisor: prof. Ing. Berenika Hausnerová, Ph.D.

Powder Injection Molding: Feedstock Tailoring and Process Optimization

Abstract

Thesis provides a contribution to the development of feedstocks for powder injection molding (PIM). It presents an optimized processing of environmentally benign feedstocks provided on the basis of thorough thermal, morphological, rheological, mechanical, and surface

analyses. Specifically, acrawax-based binder was found energy-efficient and eco-friendly for producing stainless steel parts. Comparison of PIM with selected additive manufacturing processing routes can serve as an input for further merging of these techniques.

Ing. Hana Vrbová, Ph.D.

Date of defence: 20. 12. 2024

Supervisor: prof. Dr. Ing. Vladimír Pata

Mathematical Methods of Roughness Evaluation of Machined Surface Close to the Inflection Points

Abstract

The work is focused on the area of quality assessment of heterogeneous surfaces with the main objective of finding a methodology for the assessment of these surfaces. In scientific practice, there is a lack of consistency in the methods of investigating heterogeneous surfaces produced by machining with nonconventional technologies, which may hinder the research and development of these technologies. After an initial investigation of the roughness data obtained from heterogeneous surfaces, patterns were observed that suggest an opportunity for the development of a coherent methodology. This methodology will include finding criteria for deciding whether or not the surface under investigation is considered statistically heterogeneous and thus suitable for the application of the newly found methodology.

1.2 Faculty of Management and Economics

Degree Program: ECONOMICS AND MANAGEMENT

Degree Course: Management and Economics

Cleophas Attor, Ph.D.

Date of defence: 10. 12. 2024

Supervisor: doc. Ing. Miloslava Chovancová, CSc.

Internal Employee Branding as a Strategic Tool for Building a Brand Image Within the Banking Industry: Evidence from an Emerging Economy

Abstract

Building a brand image is essential for long-term success and growth in the highly competitive banking industry. In the framework of an emerging economy, this study examines the importance of internal employee branding as a tactical tool for bolstering a positive brand image within the banking industry. This study explores how internal employee branding helps to create a brand image, using data and insights from the banking industry of the chosen emerging economy. Using a mixed-methods approach, the study asks banking employees to complete both quantitative surveys and qualitative interviews. The study clarifies the relationship between internal employee branding initiatives and the development of a strong, positive brand image within banking organizations using statistical techniques and theme analysis. A total sample of 550 was processed and analyzed through Partial Least Square-Structural Equation modeling through the application sampling techniques. This thesis adopted the two theories particularly the social exchange theory and the brand equity theory. Both probability and non-probability were adopted in this thesis. The results of the hypotheses showed that twenty of the proposed hypotheses were accepted and four were not accepted. The study revealed that brand appreciation salient, attachment, and consistency had a positive relationship with the dependent variable (brand image). Additionally, a well-thought-out internal branding strategy makes employees feel committed, proud, and belonging, which improves customer experiences and strengthens brand perception in the marketplace. It draws attention to the need for customized internal branding plans that mesh well with the unique organizational culture and context in emerging market environments. This study adds to the body of knowledge on the theoretical and practical implications of internal employee branding strategies for developing a strong and resilient brand image in the banking sector. It provides direction to banking managers and practitioners on how to use internal employee branding as a strategic tool to improve long-term sustainability, competitive advantage, and brand equity in the fast-moving markets of emerging economies.

Elona Cera, Ph.D.

Date of defence: 25. 6. 2024

Supervisor: doc. PhDr. Ing. Aleš Gregar, CSc.

Nurturing inbound open innovation: exploring the interplay of High-Performance Work Systems, Innovative Work Behaviour and Innovative Culture

Abstract

The increasing interest of companies in innovation matters has influenced research on open innovation strategies, namely in the field of human resources management strategy referred to as the "human side of open innovation". Despite the studies focused on the influence of human resource management practices in open innovation, the existing research remains nascent, with several notable research gaps: 1) mediating effects of innovative work behavior toward the connections between High Performance Working Systems (HPWS) and inbound open innovation; 2) the interactive influences of among HPWS practices (additive, combinative and multiplicative model) on inbound open innovation; 3) moderating effects of innovative culture in the relations between HPWS and inbound open innovation; 4) HPWS applied for fostering inbound open innovation in the SMEs industry. Drawing on Ability-Motivation-Opportunity theory (AMO theory), social exchange theory, and social context theory, this thesis seeks to address such research gaps through the development of a new conceptual framework that explores the direct, indirect, and interactive roles of HPWS practices on SMEs inbound open innovation. Survey was the research approach that is used in this thesis. The sample for this thesis consisted on Czech SMEs operating in high-tech manufacturing and knowledge intensive service sector according NACE (Nomenclature of Economic Activities) classification. A quantitative method has been employed to evaluate the formulated hypothesis. A total of 252 responses are used for the purposes of data analysis and hypothesis testing. The SmartPLS 4.0 software with the PROCESS along with SPSS, is used for data processing and analysis. The main results of this study state that: a) opportunity-enhancing practices directly influence innovative work behavior. Also, the results confirm the direct effects of ability-enhancing practices on inbound open innovation; b) the indirect role of innovative work behavior towards effects of opportunity-enhancing on inbound open innovation is found; c) an essential two-way interaction between ability-enhancing and opportunity-enhancing concerning inbound open innovation is found significant; d) the positive significant effect of innovative culture on motivation-enhancing practices

toward inbound open innovation. Nevertheless, the results show some unexpected results such as): a negative significant three-way interaction between ability-, motivation- and opportunity-enhancing.

Ing. Michael Fafilek, Ph.D.

Date of defence: 10. 12. 2024

Supervisor: doc. Mgr. Jan Kramoliš, Ph.D.

The Impact of Selected Sensory Marketing Tools on the Buying Behaviour of Generation Z in Clothing Stores

Abstract

Rostoucí konkurence v různých podnikatelských odvětvích má dopad, že obchody musejí stále hledat nové možnosti a inovovat stávající možnosti, jak se odlišit od konkurence k získání nových a udržení stálých zákazníků. Mezi možnosti, jak se odlišit od konkurence v nepotravinářských prodejnách je například využití senzorického marketingu, kdy se marketéři snaží pozitivně ovlivnit smysly zákazníka, to pak vede ke spokojenosti zákazníků, na opakované nákupy, loajalitu k prodejně a k impulzivním nákupům. Senzorický marketing se v současnosti hlavně využívá v prodejnách s potravinářským sortimentem. V prodejnách s nepotravinářským sortimentem se spíše soustředí na to, aby v prodejně byla hudba. Vzhledem k rostoucí konkurenci je důležité se naučit odlišit i v jiných oblastech než jen v cenách, službách a reklamách. Je důležité se soustředit i na to, aby zákazník se cítil příjemně i v prodejně. Disertační práce se zabývá tématem vlivu vybraných nástrojů senzorického marketingu na chování generace Z v prodejnách s módou. Cílem práce je zjistit, jaké nástroje vybraných druhů senzorického marketingu mají vliv na nákupní chování generace Z v prodejnách s módou. Zaměření na generaci Z je z důvodu, že tato generace se stává běžným zákazníkem. Důvodem výběru prodejen s módou je, že nelze zobecnit nástroje senzorického marketingu na všechny prodejny, které nabízejí nepotravinářský sortiment. Dalším důvodem je, že oblečení je nejčastěji impulzivně nakupované zboží mezi generací Z.

Le Truong Diem Trang, Ph.D.

Date of defence: 26. 6. 2024

Supervisor: prof. Ing. Felicita Chromjaková, PhD.

Strategic Transformation into Fourth Party Logistics: A Methodological Approach for Local Logistics Service Providers in Vietnam

Abstract

Logistics service is a significant component of the service sector. For a few decades, a new model of logistics service providers (LSP) which has appeared and played the role of integrating all operations of the supply chain is mentioned as logistics integrator or fourth party logistics (4PL). 4PL has emerged as an ideal configuration for enterprises around the world to effectively utilize their resources and obtain cost reduction across the supply chain. With the increasing competition among enterprises and customers' requirements in complicated services and global supply chain management, limitations of inbound services from LSPs have become obstacles to their development. As a result, transformation into 4PL is inevitable for LSPs in the global logistics market. Currently, many researchers demonstrate research results in related elements of logistics services and supply chain management. 4PL's operations and model are analyzed, assessed, and suggested for sustainable development. The orientation and policies in the logistics services are recommended and issued to strongly support and enhance the contribution of the logistics industry to the growth of the national economy. Moreover, investment strategies in the key areas that are established by the government create a high advantage for LSPs in Vietnam to reach outstanding objectives in both the local and international logistics markets. However, the logistics outsourcing trend in the global market that requires more than professional logistics services but high-value-added solutions through long-term contracts between logistics providers and their clients creates LSPs to face challenges in their positioning and competitive advantage in their service provision.

Ing. Zdenko Metzker, Ph.D.

Date of defence: 25. 6. 2024

Supervisor: doc. Ing. Ján Dvorský, PhD.

The Impact of Selected Aspects of Financial Management, Environment and Business Ethics on the Perception of CSR in the SME Segment

Abstract

Corporate social responsibility is now a widely discussed topic in the field of sustainable business and is receiving increasing emphasis. It is currently being addressed by researchers in various countries. Many researches shows that corporate social responsibility is the preserve of large companies with sufficient financial resources many research focuses only to corporate social responsibility in large companies. Small and medium-sized enterprises are exceptional because of their high contribution to the economy, which has a positive impact on a country's gross domestic product. The consensus emerging from the findings is that SMEs have a different approach to corporate social responsibility compared to large companies. In any case, it is important to implement corporate social responsibility in small and medium-sized enterprises as well, but this is a long-term process that brings many benefits to enterprises. Small and medium-sized enterprises are significantly different from large enterprises. The issue of corporate social responsibility in the context of SMEs in our geographical area is not so extensively elaborated in the literature, so it is appropriate to address this topic. The aim of the thesis is to investigate the relationship of financial management, business ethics and environmental aspects on the implementation and perception of corporate social responsibility in SMEs. It is hypothesized that business ethics and environmental aspects will positively influence the perception and commitment to corporate social responsibility in business practice. It can also be an organisational tool to ensure efficient use of resources, which has a positive impact on company's financial performance, which is also dependent on appropriate financial management. Thus, the impact of the perception of financial management in the context of sustainability of SMEs on their perception of corporate social responsibility is also examined. Data from Czech and Slovak firms were collected through empirical research focused on identifying the attitudes of small and medium-sized firms. Linear regression and correlation analysis methods were used to identify the influence of defined parameters on the perception of social responsibility. The thesis aims to expand knowledge beyond standard boundaries on the implementation of social responsibility activities by large companies, but also on the introduction of these practices in SMEs in our region in the context of the three aspects. Given the constant need to address environmental, social and economic challenges, there is pressure for a trend towards sustainability, environmental protection and overall responsible business practices. The results of the research provided up-to-date data on the level of use and knowledge of social responsibility in the Czech

and Slovak Republics and the impact of partial areas (financial management, environmental and ethical principles) on managerial perceptions of social responsibility in small and medium-sized enterprises in those countries.

Nguyen Huu Hoang Tho, Ph.D.

Date of defence: 29. 11. 2024

Supervisor: doc. Ing. Michal Pilík, Ph.D.

The nexus between companies' green knowledge sharing and travelers' behavioural intentions: The role of digital marketing

Abstract

With growing calls for environmental sustainability, tourism marketing is undergoing a pivotal green transformation in the digital age. This underscores the necessity to advance integrated green marketing practices that effectively shape and shift tourist behavior towards more sustainable experiences. This thesis explores the nexus between a firm's green knowledge sharing and travelers' revisiting behavioural intention, examining the mediating roles of warm glow and pro-environmental behaviors, and the moderating influence of social media influencers' green trustworthiness. A mixed-methods approach combining qualitative interviews and quantitative surveys is utilized. The qualitative findings validate the significance of the key variables and inform quantitative questionnaire development. The results of a two-wave survey among 1694 Vietnamese tourists reveal that warm glow and pro-environmental behaviors mediate the impact of green knowledge sharing on revisiting intention. As tourism moves towards greater eco-consciousness, this signals the potential of social media and influencer marketing for propagating environmental sustainability. Furthermore, social media influencers' green trustworthiness positively moderates the mediated relationship between green knowledge sharing and revisiting intention via pro-environmental behaviors. When the perceived green trustworthiness of influencers is higher, the indirect effect of green knowledge sharing on revisit intention through pro-environmental behaviors is strengthened. The service-dominant logic theory provides a valuable lens for analyzing these multifaceted relationships, emphasizing competence and motivation resources, collaborative value creation, and reciprocal exchange. Practical implications indicate that integrated green marketing practices on social media can effectively enhance revisiting intentions. This points

to the pivotal role of leveraging digital platforms to catalyze the green transformation of tourism marketing.

Nguyen Thi Lan Phuong, Ph.D.

Date of defence: 17. 5. 2024

Supervisor: prof. Ing. Aleksandr Ključnikov, Ph.D.

The Roles of Socially Responsible Human Resources Management and Ethical Leadership Towards Employee Green Behaviors in the Aviation Industry

Abstract

A collection of HRM techniques known as socially responsible human resource management is used by businesses to shape employee attitudes and behaviors to advance both inside and outside CSR activities. Nevertheless, the existing literature reviews the relationship between SRHRM and employee' s voluntary workplace green behavior and in-role green behavior through leader' s eco-helping and employee' s felt obligation, as well as the moderating role of ethical leadership which has received less attention from prior scholars. Consequently, the study attempts to develop a thorough model to evaluate the connection between SRHRM and employees' green behaviors by anchoring on the social learning theory, social exchange theory, social cognitive theory and social identity theory. Specifically, the thesis aims to investigate (1) the direct effects of SRHRM, ethical leadership on employee' s voluntary workplace green behavior (EVB) and in-role green behavior (EIB) (2) the mediating roles of leader' s eco-helping and employee' s felt obligation towards the impact of SRHRM on EVB, and EIB, and (3) the moderating roles of ethical leadership to the connections between SRHRM and EVB, and EIB. The mixed-methods approach with two stages is used. In the first stage, a qualitative study with in-depth interviews is employed to get deeper understanding on SRHRM applications in the aviation industry and complete the questionnaire. Then, in the quantitative stage, data is collected using a survey method, a questionnaire approach, and time lagged data. This thesis uses SPSS and Smart PLS statistical software to analyze data from 397 respondents working in aviation organizations in Vietnam. The main findings are, first and foremost, that SRHRM and ethical leadership have a directly positive influence on employees' voluntary workplace green behavior and in-role green behavior. Second, it is demonstrated that the leader' s eco-helping and the employee' s felt obligation positively

mediate the effect of SRHRM on EVB, and EIB. Finally, it emphasizes the importance of ethical leadership in moderating the relationships between SRHRM, EVB, and EIB. Through the leader's eco-helping and the employee's felt obligation, the moderating roles of ethical leadership mediate the transition from SRHRM to EVB, and EIB. This study is regarded as a theoretical contribution because it emphasizes social learning theory, social exchange theory, social cognitive theory and social identity theory in explaining the link between SRHRM and green behavior in the workplace, with mediators of leader's eco-helping and employee's felt obligation and moderators of ethical leadership. Besides the theoretical and practical implications, limitations, and further research are also mentioned.

Nguyen Thi Thu Huong, Ph.D.

Date of defence: 17. 5. 2024

Supervisor: doc. Zuzana Tučková, Ph.D.

Enhancing Green Knowledge Sharing: The Roles of Environmental Leadership, Green Human Resource Management, and Psychological Contract Breach in the Aviation Industry

Abstract

Green human resource management (GHRM), which is defined as integrating the environmental aspect into human resource management, has been paid attention to by previous scholars. However, the existing literature has revealed an issue with how and when GHRM describes employees' green knowledge sharing as well as the roles of environmental leadership and psychological contract breach (PCB). Thus, by anchoring on social exchange theory and social learning theory, the study aims to build a comprehensive model to investigate (1) the direct effects of GHRM, environmental leadership, and PCB on green knowledge sharing (2) the mediating roles of environmental knowledge and eco-initiatives towards the effect of GHRM on green knowledge sharing (3) the moderating roles of environmental leadership and PCB in the connections from environmental knowledge, GHRM, and eco-initiatives to green knowledge sharing. The mixed-methods approach is applied. First, the qualitative study is used to confirm and develop the questionnaire. Then, the quantitative approach is applied to test the proposed hypotheses. A two-wave time-lagged survey through

this questionnaire is employed to collect the data from 443 respondents working for leading Vietnamese airlines and other companies in the aviation industry.

Shariq Syed Muhammad, Ph.D.

Date of defence: 17. 5. 2024

Supervisor: prof. Ing. Felicita Chromjaková, PhD.

Role of digital leadership, digital technologies and dynamic capabilities to influence big data analytical capabilities for data driven decision-making

Abstract

Study offers a framework to enhance big data analytical capabilities for data driven decision making through digital leadership and digital capabilities with organizational oriented (digital strategic planning, digital departmental collaboration and top management commitment), employee oriented (digital social capital and digital literacy) and technological oriented (industrial internet of things) through the theoretical lens of dynamic capability view. Several studies has analysed the transformation process of the firm and all of them has highlighted the same problem or barriers in transformation of the firms. These barriers are organizational oriented, human oriented and technological oriented. Furthermore, these studies are conceptualize through qualitative studies but not even a single empirical or quantitative study has conducted that discusses these factors simultaneously. Current study identifies the given gap by discussing the organizational, human and technological factors all together with empirical or quantitative analysis to increase the generalizability of the study. Current study discusses these factors with a novelty and in terms of today's needs. Organizational capabilities includes digital strategic planning, digital departmental collaboration and top management commitment. Human capabilities or factors includes digital social capital and digital literacy. Whereas, technological capability or factor includes industrial internet of things. Data collected through survey questioners from 277 employees working in chemical sectors of Pakistan at decision making positions in Pakistan. Study contribute towards dynamic capability view that which category of capabilities from organization, human and technological is more important for implementation and usage of big data so that organization can focus more on building and enhancing such capabilities.

Ing. Nikola Svirak, Ph.D.

Date of defence: 25. 6. 2024

Supervisor: doc. Ing. Michal Pilík, Ph.D.

The use of social networks as an online marketing plan to increase civic engagement in municipalities in the Czech Republic

Abstract

The popularity of social media continues to grow, including in the context of communication between municipalities and citizens. In recent years, social media has become a key tool in the communication strategy of municipalities, mainly because they allow for a fast flow of information and effective interaction with citizens. This thesis focuses on the potential of social media as the main communication tool, thanks to which it is possible to effectively increase civic engagement in municipalities with extended scope in the Czech Republic. The aim of the dissertation was to conduct comprehensive research using social media in communities with an extended scope. The work focused on two main areas: Citizen engagement on social networks, where the level of participation of citizens in social network communication was evaluated on the basis of the established metrics. The findings of this part of the work showed that civic engagement is very low in this regard. The second part was to examine the quality of the use of social media. The work examined in the second step how effectively communities use social networks as an online marketing tool to promote communication. A mixed research methodology was used for this research. In the first phase, a preliminary survey was carried out, based primarily on the collection of secondary data from commonly available official Facebook profiles of municipalities with extended scope (n = 205). It is in this part that communication on platforms and civic engagement has been shown to be very low. Based on this information, a qualitative research was conducted using 21 semi-structured interviews with stakeholders, municipality representatives and social network administrators. This part of the research provided valuable insights and experiences on the use of social media while confirming threats and challenges. The last part of the work was supplemented by quantitative research, which was conducted in the traditional form of a questionnaire survey, which circulated online through Google Forms through the pre-arranged official Facebook profiles of selected municipalities. Questions were aimed at verifying hypotheses about factors that could increase citizen engagement on social media.

Ho Viet Anh, Ph.D.

Date of defence: 26. 11. 2024

Supervisor: doc. Dr. Ing. Jana Matošková, Ph.D.

Impact of affect-based trust on organizational innovativeness: the moderating role of network strength in regional clusters

Abstract

Innovation is an important topic in the study of regional clusters because of its benefits in enhancing competitiveness both at the national, regional, and organizational levels. In particular, improving internal capabilities to promote innovation from within the organization is a topic that attracts many theoretical interests from scholars, but there is a lack of empirical research to evaluate it. Through developing the basic concepts of social capital and social exchange theory, this thesis explores and hypothesizes the positive impact relationship between affect-based trust and organizational innovativeness, as well as the moderating role of network strength on the above relationship. A quantitative study with 2 phases in Vietnam was conducted. Phase 1 interviewed 20 respondents who were leaders, experts, managers, and employees working in the regional cluster to further clarify the scale and give comments on the research. In phase 2, a survey with the support of the Thu Duc City government was conducted, collecting data from 408 respondents, and conducting quantitative processing using the PLS-SEM model. The research results of the thesis show that in regional clusters, affect-based trust has a positive impact on organizational innovativeness in all four aspects: product, behavior, strategy and process. However, network strength does not completely play a moderation role in the relationships mentioned above, but only shows a moderation role in 3 sub-relationships. Accordingly, empirical evidence concludes that increasing the frequency of interactions, increasing the time spent in the regional cluster will lead to an increasing influence of affect-based trust on behavioral innovativeness; and the longer the duration in the regional cluster, the stronger the impact of affect-based trust on process innovativeness. The research results add to the line of argument of many previous scholars, about trust helping to form a positive environment, encouraging experimentation and freely sharing knowledge and innovative ideas. The moderation role of network strength is a new point of this thesis. By finding the distinct roles of time in clusters and interaction frequency, new research directions from an academic perspective have been proposed. At the same time,

cluster managers and policy makers can also rely on the above results to have policies to strengthen behavioral innovation and process innovation in their regional clusters, especially in the context of emerging countries like Vietnam, which the leaders are very interested in transforming and enhancing innovation in existing regional clusters.

Degree Program: ECONOMIC POLICY AND ADMINISTRATION

Degree Course: Finance

Etsub Jekola Jemberu, Ph.D.

Date of defence: 25. 6. 2024

Supervisor: doc. Ing. Adriana Knápková, Ph.D.

Forfeited Benefits or Mitigated Losses? The Economic Impact of Not Having a Stock Market: A Synthetic Control Approach

Abstract

Despite the flourishing of financial markets globally as a financial reform strategy over the last century, roughly one-sixth of countries worldwide are still without any formal stock exchange. Numerous studies have identified positive associations between well-functioning stock markets and economic growth. However, some researchers remain justly skeptical about their contribution, particularly in developing countries. In addition to this contention, so far, no substantive effort has been made to measure the impact of stock market unavailability on an economy. This dissertation aims to address this knowledge gap by examining the economic impact of stock markets' absence in countries lacking such exchanges. Using the synthetic control method (SCM), it estimates hypothetical economic performances of selected non-exchange countries had they established stock exchanges in 1994. The method constructs credible counterfactual scenarios, known as synthetic controls, as a weighted combination of comparable countries with existing stock exchanges. These synthetic controls effectively mimic the non-exchange countries' pre-treatment economic trajectories and show their potential evolution had stock markets have been present. The analysis employs economic output, investment, and employment as key outcome variables, and covariates such as inflation, financial institution development, level of democracy, and population

growth alongside pre-treatment outcome data, are used as predictors. While six countries without a stock exchange are the focus of the study, seven other countries that established their first stock exchanges around 1994 comprise the donor pool for constructing synthetic controls. The analysis findings reveal that the impact of stock markets' absence in the non-exchange countries is heterogeneous across macroeconomic indicators and economies. While most countries forfeited substantial output gains without markets, they neither benefited nor incurred a cost in terms of aggregate investment. Exceptionally, Ethiopia appears to have benefited from not having a stock market, both in terms of output and investment gains. The employment impact, on the other hand, was found to be significantly positive for non-exchange countries like the Democratic Republic of Congo and Guinea. The significance of these results is tested using placebo tests. Robustness checks using alternative weight assignments largely confirmed the directions of the impacts estimated by the baseline analysis. The dissertation contributes to the broader literature on the impact of stock markets by introducing an uncharted approach of SCM, to the topic. It also makes the case for using SCM for estimating the impact of an absence of interventions. Furthermore, the study also has practical implications for policymakers, as it presents evidence that can inform their decision-making process regarding stock exchange establishment in their respective economies.

1.3 Faculty of Applied Informatics

Degree Program: ENGINEERING INFORMATICS

Degree Course: Automatic Control and Informatics

Ing. Jakub Husár, Ph.D.

Date of defence: 17. 10. 2024

Supervisor: doc. Ing. Jiří Pecha, Ph.D.

Mathematical Modelling of Fats and Oils Ethanolysis

Abstract

Ethyl ester, an oleochemical with great potential across various industries, is produced as the main product in a process called ethanolysis. This dissertation focuses on the mathematical modeling of ethanolysis, taking into account the side reaction - saponification, which is often neglected in the current literature but has a significant impact on the efficiency of the production process and the quality of the final product. A quantitative model of ethanolysis was proposed and validated, with a favorable average deviation of 0.04 mmol/g from experimental data obtained under a wide range of reaction conditions (40 ? 60 °C, 0.25 ? 1.0% wt. NaOH). This model was subsequently used for process simulation, optimization of reaction conditions, and as a basis for studying the reaction in a flow system for process control purposes. An offline method using refractive index measurement of the processed reaction mixture was developed for simpler monitoring of the reaction, and an online method based on FTIR spectroscopy was developed for real-time feedback acquisition. These monitoring methods were validated on a set of real samples and showed a deviation of less than 3.5% compared to the reference method - gas chromatography. The gained knowledge was applied in the design and implementation of ethanolysis in a flow reactor. Experimental data from the flow reactor were in agreement with the simulation of the proposed model. The validated model subsequently served in the design of PID and MPC control of the flow reactor, and the influence of disturbances on this system during control was also verified. This work provides original insights into ethanolysis and its control with potential applications in industrial practice.

Degree Program: ENGINEERING INFORMATICS

Degree Course: Engineering Informatics

Ing. Martin Burdík, Ph.D.

Date of defence: 29. 10. 2024

Supervisor: prof. Mgr. Roman Jašek, Ph.D., DBA

Research on Ontological Structures of Health Records and Barriers to Digitalization in Healthcare

Abstract

The current trend of rapid technological progress, mainly due to systems using artificial intelligence, is one of the most interesting topics in the field of computer science. The need to digitize personnel data has proven useful for streamlining public services and communication with state administration authorities. However, transforming health data into a digitized form is slower. This is mainly due to ethical barriers and concerns related to loss of privacy and protection of personal data. Avoiding these problems requires careful preparation of legislation, including the technical readiness of a comprehensive electronic health system with human benefit and safety as a priority. Harmonization of legal regulations and standardization of technological systems are necessary for the effectively sharing health data and ensuring quality care across health systems in our country and abroad. This work deals with data standardization, especially communication standards such as HL7 FHIR and DASTA, and their role in effectively transferring health data. The introduction of uniform international standards can facilitate the cross-border sharing of electronic health documentation and support the integration of the Czech healthcare system into the broader European context. Concerning the established terminological standards and ontological languages, the architecture of the health data display tool based on the XSL template is subsequently designed.

Ing. Michal Gracla, Ph.D.

Date of defence: 29. 11. 2024

Supervisor: doc. RNDr. Vojtěch Křesálek, CSc.

Analysis of Shot Patterns from the Expansion Pistol for the Estimation of the Shooting Distance

Abstract

The dissertation deals with the estimation of the shooting distance from an expansion pistol based on the analysis of the shot patterns. An expansion pistol with acoustic cartridges was used to create the shot patterns. Based on the literature review, it can be concluded that the area of expansion weapons has not been sufficiently published. In most publications, the mere fact that expansion weapons are similar to shooting weapons is stated. The aim of the dissertation is to propose a mathematical model to estimate the shooting distance from the expansion pistol. For this purpose, measurements and experiments were carried out consisting of the analysis of acoustic cartridges and their propellants, the resulting shot patterns,

and the fallout of gunshot residues resulting from a shot from the expansion pistol. Wolfram Mathematica software was used for data processing. Based on the obtained results, it can be stated that by analysing the shot patterns, it is possible to estimate the shooting distance from the expansion pistol with acoustic cartridges. This estimate can be considered reliable up to a maximum distance of 120 mm, longer shooting distances cannot be reliably distinguished due to the uncertainty of the measurement.

Ing. Tomáš Kadavý, Ph.D.

Date of defence: 26. 8. 2024

Supervisor: prof. Ing. Roman Šenkeřík, Ph.D.

Boundary Constraint Violation in Evolutionary Algorithms

Abstract

In recent decades, evolutionary algorithms (EA) have become popular and recognized for their robustness and effectiveness in solving a variety of optimization problems. With increasing challenges in the field of artificial intelligence (AI), especially in the context of machine learning applications, a new wave of EA research is emerging. Key aspects for the next generation of these algorithms include theoretical foundations, runtime analyses, proper benchmarking procedures, and detailed handling of critical situations, which are fundamental building blocks for achieving new successes in AI. One of the key challenges is mastering the limits of parameters of the optimized task, which define the space of permissible solutions. Although the available publications dealing with methods to prevent exceeding these limits are gradually improving and increasing in number, it is still a neglected topic that has a significant impact on the effectiveness of evolutionary algorithms (EA). This dissertation thesis focuses on the impact of various countermeasures on the performance of evolutionary algorithms (EA). The research began with an analysis of basic variants of EA, such as PSO (Particle Swarm Optimization), FA (Firefly Algorithm), and SOMA (Self-Organizing Migrating Algorithm). Attention then shifted to more advanced algorithms (state-of-the-art), selected based on benchmark sets. The study identified that integrating effective countermeasures into the design of algorithms could significantly influence their position in benchmark tests. The conclusions of the work point to a significant issue in the replicability of algorithms, caused by incomplete descriptions in publications. This situation indicates the need

for improvement in the algorithm design process to enhance their verifiability and sustainability.

Muhammad Hemin Akram, Ph.D.

Date of defence: 4. 6. 2024

Supervisor: prof. Ing. Martin Hromada, Ph.D.

Protection of Privacy Information in E-Government

Abstract

E-government services are provided in developed and most of the developing countries. The appropriate application of e-government allows for higher levels of effectiveness and efficiency in governmental tasks, improvement of processes and procedures, increases the quality of public services, also improves the use of information in the decision-making processes and allows for better communication among different governmental offices. As well as, it has a great role in reducing corruption. In e-government, individuals are concerned about their privacy since e-government frequently deals with personal information. This research studies the concerns and obstacles that affect personal information security in e-government, considering the majority of security viewpoints, it proposes a new model of e-government from perspective of protecting personal data. The study is qualitative in terms of methodology, it depends on documentary studies, content analysis and comparative study. The proposed model includes methods that enable governments to increase the level of personal data protection in the legal, social, organizational and technical areas. The model provides an improvement strategy, rules and processes, and compliance indicators in addition to outlining the personal data protection requirements for each level. As well as, in this thesis a novel methodology has been used to evaluate the proposed model. It uses SOAR (Strengths, Opportunities, Aspirations, and Results) analysis to evaluate the stages and combines it with the Analytic Hierarchy Process (AHP) to determine the feasibility of the model. The study's findings demonstrate that the model is suitable for adoption and is acceptable. The model is thus a workable choice for establishing an e-government in developing countries.

Ing. Martina Žabčíková, Ph.D.

Date of defence: 30. 10. 2024

Supervisor: prof. Mgr. Roman Jašek, Ph.D., DBA

Detecting Concealed Information to Identify Intentional Deception Using Electroencephalography

Abstract

Detecting concealed information to identify intentional deception represents a key challenge in security. Current lie detectors are expensive, uncomfortable, and susceptible to manipulation. Lie detectors based on electroencephalography (EEG) have become more popular than polygraphs, as they offer higher resistance to conscious influence. The primary aim of this dissertation is to develop a system for high-quality lie detection using the analysis of EEG signals obtained from a low-cost device, employing advanced machine learning methods and feature selection techniques. EEG signals were recorded during a visual experiment that examines neurophysiological changes during attempts to lie by analyzing Event-Related Potential (ERP) component P300. Differences in the P300 waveforms of participants' responses to visual stimuli of familiar and unfamiliar faces were then analyzed using a Genetic Algorithm (GA) for feature selection and a Support Vector Machine (SVM) for classification. This approach achieved high classification accuracy, confirming its effectiveness and reliability in detecting concealed information. The proposed system is user-friendly and suitable even for users without deep expertise, facilitating easy implementation with the possibility for effective use in both academic and practical scenarios. The low cost of the device and the simplification of the lie detection process using EEG indicate the potential for broader applications, including forensic and security fields.

1.4 Faculty of Multimedia Communications

Degree Program: MULTIMEDIA AND DESIGN

Degree Course: Fine Arts, Visual Arts

MgA. Kateřina Bučková, Ph.D.

Date of defence: 17. 6. 2024

Supervisor: doc. MgA. Kristýna Petříčková, Ph.D.

Figural drawing and its education at colleges and universities within the Czech and Slovak environment in the 21st century

Abstract

Drawing is a vital tool of every artist and it is fundamental part of every artistic field. It became an ideological stud of all the artistic works ? the most essential part of it. If there is an idea of an artist ? this artistic person models these ideas into drawing at first. There are still lectures of traditional figural drawing running these days at most of artistic schools where there are students using the traditional drawing technics. Drawing itself is also an essential part of every entrance examination for each artistic high school, college or university. It also forms a major part of propounding portfolios to selected studios. Figure-drawing tutorial has always been thought as one of the major tools for developing of creative abilities of every student. However there has been a significant shift in perceiving and practising of drawing. The main aim of this dissertation work is to detect what the role, connotation, status and importance of figural drawing and its education at colleges and universities within the Czech and Slovak environment in the 21st century is.

MgA. Josef Erla, Ph.D.

Date of defence: 17. 6. 2024

Supervisor: doc. MgA. Libor Nemeškal, Ph.D.

Assistant Editor in Czech Cinematography

Abstract

The dissertation focuses on the role of the assistant editor in the field of Czech audiovisual production. It outlines the framework of their rights and obligations, compares it with the international environment, and intergrates it into historical context. An integral part of this work is also a practical collection of five audiovisual works in which the student participated as an editor or assistant editor.

MgA. Petr Januschka, DiS., Ph.D.

Date of defence: 5. 11. 2024

Supervisor: prof. Mgr. MgA. Jan Gogola

21st Century American War Cinema: On the Frontline of Values

Abstract

The dissertation titled "21st Century American War Film: On the Frontline of Values" consists of a practical and a theoretical part. The practical part is a short film titled *Island of Freedom*, while the theoretical part is an analysis of the representation of American values in selected American war films reflecting the War on Terror. The common thread between the two parts is the exploration of possible ways to represent a conflict of values in cinema. Within the confines of an airplane cabin, the practical part stages a dialogue between freedom, individualism, and the pursuit of individual happiness on one side, and loyalty, family, patriotism, and community on the other. This "friction" between values is presented in an empathetic and nuanced manner, acknowledging the truth in both perspectives. The practical output is followed by the theoretical section, which analyzes the representation of values (specifically American ones) in a sample of the aforementioned type of war films, and what critics expect from such representation. Finally, the dissertation confronts the findings from both parts and draws conclusions from this comparison.

MgA. Adam Kencki, Ph.D.

Date of defence: 5. 11. 2024

Supervisor: doc. MgA. Jaroslav Prokop

Photographic work of writer, traveller and diplomat Jan Havlasa

Abstract

Cílem této disertační práce je analyzovat Havlasovu fotografickou tvorbu a zasadit ji do kontextu doby, ve které žil tj. do přelomu 19. a 20. stol. a první poloviny 20. stol., představit co a jak v jednotlivých etapách svého života fotografoval, za jakým účelem snímky pořizoval a jak s nimi dále pracoval a nakládal.

MgA. Marcel Legindi, Ph.D., DiS.

Date of defence: 17. 6. 2024

Supervisor: doc. MgA. Libor Nemeškal, Ph.D.

Efficiency of Creation in Digital Audiovisuals, The Concept of Non-Linear CGI-AV Pipeline

Abstract

This transdisciplinary thesis proposes an innovative non-linear approach to producing high-quality digital audio-visual (AV) outputs while reducing the time and manpower typically required in the traditional one-way linear CGI-AV pipelines. With central focus on efficiency of creation that would foremost benefit small to mid-size CGI-AV artist teams, the thesis provides a comprehensive comparison between linear and non-linear pipelines, highlighting their respective advantages and limitations and recommending the use of procedural strategies. The research underpinning the thesis aims to identify the calculable aspects of quality of CGI-AV outputs from the content creation perspective. Furthermore, after evaluating and defining the existing methods that would lead to the measurement of efficiency in the context of CGI-AV production, the research initiates the creation of new experimental methods to advance the field, particularly pertaining to quantifying iteration. Anticipating practical implementation, the thesis proposes effective strategies for rapid prototyping through acceleration of iterative cycles by procedural and automated approaches in the CGI-AV development process. In addition, the thesis explores the artist's changing role within new technological landscapes. It suggests novel modes of interaction between the artistic and the technical, creating the concept of art-nodes where the routine tasks are handed over to technology in order to support deeper human art-flow and promote artistic creativity and experimentation. In its scope, this work aspires to offer valuable insights and practical solutions for improving the overall efficiency and quality of audio-visual production, ultimately benefiting both the artist and the CGI-AV industry as a whole. The thesis results in the delivery of a complete, theoretically substantiated and practically tested concept of Non-Linear CGI-AV Pipeline, immediately applicable with a combination of existing software, and open the future development of an all-in-one software solution.

MgA. Kristýna Londinová, Ph.D.

Date of defence: 17. 6. 2024

Supervisor: prof. Mgr. A. Pavel Noga, ArtD.

Critical Design

Abstract

The dissertation explores the current impact of critical design in the Czech Republic, in relation to the teaching of critical practice and critical thinking in the field of design. The theoretical part of the work offers definitions and the context of critical design and practice. Furthermore, the thesis examines the current awareness of critical practice in the field of graphic design at art schools, presents its methods, benefits and challenges, and also addresses the current role of graphic designers through questionnaire surveys and interviews with experts. Readers are provided with several current methods, modes of thinking, and new perspectives that can influence their design practice. All the insights from the work served as the basis for the creation of a publication aimed at filling the absence of book sources focusing on critical design and practice in the Czech book market. The publication is authoritatively designed and is intended for students, young designers, artists, as well as for the general public interested in the subject matter.

Ing. Hana Nováková, Ph.D.

Date of defence: 17. 6. 2024

Supervisor: prof. Mgr. Peter Štarchoň, Ph.D.

VIRTUAL REALITY IN ART: CREATING A VIRTUAL STUDIO AND IMAGE GALLERY

Abstract

The dissertation explores the use of VR and AI to create an accessible virtual studio during the time of the pandemic.

Mgr. Eva Učňová, Ph.D.

Date of defence: 5. 11. 2024

Supervisor: prof. Mgr. MgA. Jan Gogola

My Costa Rica: A Personal Cinematic Travelogue Beyond Domestic and Personal Identity

Abstract

The dissertation "My Costa Rica, or Personal Film Travelogue Beyond the Domestic and Personal Identity" focuses on contemporary Czech travel documentary filmmaking with a personal focus, resulting in the creation of a personal travelogue treatment. The aim of this thesis is to explore the contemporary form of Czech personal travel writing as a manifestation of the phenomenon of personal and social identity. The thesis defines the personal travelogue as a form that incorporates familial aspects and links ethnological space with intimate identity, and traces how travel to foreign countries influences personal and collective identity. It includes an analysis and comparative study of Czech and foreign contemporary personal travelogues, focusing on how authors reflect on their personal perceptions, whether as individuals, couples, families or tourist groups. The thesis explores what individuals and members of communities can learn about themselves through the experience of traveling to 'elsewhere', and reflects on anthropologist and ethnographer views on human variation and adaptation to different life conditions. Through in-depth semi-structured interviews with prominent Czech travel documentary filmmakers, the direction of the project is validated, and these interviews shape the creative experiences and recommendations for travel writers, with an emphasis on the personal dimension. The topic of the dissertation is based on the author's intention to visit Costa Rica to visit her family ancestors, which she plans to develop in the form of a documentary film in the future. The project part is dedicated to the creation of a travel documentary film treatment situated in a Central American environment as part of an artistic research.

1.5 University Institute

Degree Program: MATERIAL SCIENCES AND ENGINEERING

Degree Course: Biomaterials and Biocomposites

Ing. Petra Dröhsler, Ph.D.

Date of defence: 30. 8. 2024

Supervisor: prof. Ing. Vladimír Sedlařík, Ph.D.

Study of conducting biocompatible systems based on biopolymers

Abstract

Conducting polymers (CPs) are a class of conjugated polymers currently used in a broad range of applications, including electronics and medical devices. The interest in these materials is motivated by their attractive properties, comprising simple straightforward synthesis, mixed electron and ionic conductivity, and environmental stability. However, the application of CP is limited by their difficult processability. This limitation can be removed via the preparation of conducting colloidal dispersions containing suitable steric stabilizers, such as polymers and biopolymers. This attractive stable form of conducting polymer can also serve for the preparation of films and scaffolds. The thesis focuses first on polyaniline colloidal dispersions stabilized by the biocompatible stabilizers sodium hyaluronate and chitosan, their preparation, the investigation of their properties, and possibilities with respect to their application. With regard to the future utilization of these systems, a precise method of preparation was established, this involving the choice of a suitable ratio of reactant and stabilizer. The colloids were characterized by UV-vis spectra, particle-size distributions, and morphology, as well as by their biological properties in terms of cytotoxicity and antibacterial activities. In the second part of the thesis, successfully prepared colloids served as precursors for the formation of conducting composite films combining polyaniline with the abovementioned polysaccharides. In addition to these films' physico-chemical characteristics, their antibacterial activity and mainly cytocompatibility with human-induced pluripotent stem cells were described. The final part of the thesis is devoted to novel, green synthesis routes for conducting polymers utilizing peroxidase enzymes. Enzymatically synthesized polyaniline colloids were described via their physicochemical and biological properties, including their cytotoxicity to fibroblasts and macrophages, as well as their immunomodulatory effect on macrophages and neutrophils.

Zahra Yadollahi, M.Sc., Ph.D.

Date of defence: 13. 12. 2024

Supervisor: prof. Ing. Petr Sáha, CSc.

Preparation and characterisation of saccharide-based antibacterial coatings

Abstract

This doctoral thesis aimed at development and characterization of saccharide-based bio-active coatings for biomedical applications. As a degradable, environmentally friendly polymer, polylactic acid was the material of choice for studying the effects of the coatings on the materials biocompatibility and antibacterial properties. The first part of the research focuses on preparation, characterization of glucosamine and chondroitin sulfate immobilized surface-activated PLA films, and the second part is dedicated to evaluating the chitosan and chondroitin sulfate coatings. Both experimental parts were also comprised of antibacterial activity and biocompatibility studies. Moreover, the release trend of the antibiotic lomefloxacin loaded chitosan and chitosan-chondroitin sulfate coated films were described.

Degree Program: NANOTECHNOLOGY AND ADVANCED MATERIALS

Degree Course: Nanotechnologies and Advanced materials

Anju Deswal, MSc., Ph.D.

Date of defence: 17. 7. 2024

Supervisor: Yadav Raghvendra Singh, Dr.

Kombucha leather: Preparation and Characterization

Abstract

Kombucha leather is bacterial cellulose-derived leather developed as vegan leather possibly well-respond to consumers' expectations regarding safety, function, aesthetics, social responsibility, reducing pollution emissions of the leather industry, and also transforming the bio-wastes into useful materials. In this doctoral thesis, Kombucha leather was prepared via the combination between polymers and cellulose harvested from kombucha fermentation using bio-wastes that comprise two basic stages. In Kombucha-derived bacterial cellulose (KBC) production step, three investigated bio-wastes (sour whey waste, waste apple juice, brewer's spent grains) all displayed the brilliant efficiency in cellulose biosynthesis of *Komagataeibacter xylinus* compared to traditional kombucha and HS standard media, especially, superiority dry weight accumulated in trials containing sour whey waste (12.59

and 12.81 g/L). The fermentation optimization has then achieved an outstanding KBC dry weight (20.14 ± 0.62 g/L) accompanied by maximizing the amount of treatment-required waste with the optimum formulation of 1000 mL/L sour whey waste, 87.39 g/L cane sugar, 6 g/L black tea, and 78.91 mL/L bacteria volume, under 21 cultured days at 30 °C. Applying on the large containers, the most responsible fermentation batch was obtained at the cultured medium depths of 0.5 cm and low residual bacteria suspension volume of only 72.31 ± 8.74 mL. The characteristics of produced cellulose membranes show no significant differences for all samples compared to bacterial cellulose from HS standard medium. In Kombucha leather fabrication phase, leather-like mat based on KBC/PU/PLA exhibited remarkable mechanical properties compared to other components. Compressive temperature and time also directly affect structures and water resistance capacity of the prepared biocomposite. Especially, KBC were treated with dimethyldichlorosilane, hexadecyltrimethoxysilane, vinyltriethoxysilane, and 3-aminopropyltriethoxysilane have spectacular improved their hydrophobicity. This KBC modification also played a vital role in enhancing compatibility or homogenous blending to provide a stable structure for produced silane-treated KBC-based leather mat. Ultimately, the ingredient and condition of kombucha leather preparation were optimized with outstanding values of elastic modulus, biodegradable and water contact angle respectively reached at 44.07 ± 0.51 N/mm², 1.31 ± 0.04 %, and 94.84 ± 1.590 from optimum leather-like mat containing KBC (13.74 % w/w), polyurethane elastomer (73.89 % w/w), and polylactic acid (12.50 % w/w), compressed at 155 °C for 5 min. Its morphology, chemical structure, thermal stability, mechanical strength, and biodegradability were characterized and compared to existing commercial leathers. Basically, the results show a possible response to the essential requirements of this Kombucha leather that prospective application in footwear, bags, or interior covering products.

John David Dmonte, MSc., Ph.D.

Date of defence: 16. 5. 2024

Supervisor: prof. Ing. et Ing. Ivo Kuřitka, Ph.D. et Ph.D.

Preparation and characterisation of nanostructured materials for electronic gas sensor devices

Abstract

Residual estrogenic hormones represent emerging pollutants in the environment. One of the most important aspects of their effective removal is the design and fabrication of an adsorption system with appropriate properties. This thesis reports on the complex research activities aimed at the development, optimized preparation, and characterization of various electrospun nanofibrous polymer systems for simultaneous removal of estrogenic hormones such as estrone, estradiol, ethinylestradiol, and estriol from wastewater. A wide scale of polymers covering polyurethanes, polyamide, cellulose acetate, polysulfone, polyether sulfone, polylactic acid, polyacrylonitrile, and polyvinylidene fluoride was studied as a matrix for nanofibrous sorption materials. A facile method was developed for the simultaneous determination of tested hormones by using a high-performance liquid chromatography technique coupled with a UV-Vis detector. Sorption kinetics modeling and description of the material vs. hormones interaction mechanisms were an integral part of this study.

Bitá Ghasemi MSc., Ph.D.

Date of defence: 19. 4. 2024

Supervisor: prof. Ing. et Ing. Ivo Kuřitka, Ph.D. et Ph.D.

Preparation and characterization of nanocomposite thin films for polymer electronics

Abstract

The breakthrough of semiconducting polymers revolutionized the electronics industry. Conjugated polymers are ideal materials for LED because of their semiconducting nature, ease of structural change, solution processability, and low cost of device solution manufacturing. Nonetheless, until now, the charge transport in semiconducting polymers has not been fully explained in all detail. Models of charge transport in organic semiconductors include band transfer, hopping, and multiple trapping and release, in which atoms are tightly confined on their equilibrium lattice sites. The correlation between microstructure and electrical characteristics in (poly)crystalline and amorphous materials is difficult to define, and there are significant changes in electrical behaviour dependent on lattice (dis)order. Furthermore, the existence of structural defects that govern non-radiative recombination is a critical factor affecting thin film electrical structure and optical properties. This research demonstrated that the optoelectronic characteristics and structural (dis)order in thin conductive polymer films

have a non-trivial thickness dependency, studied for poly(9,9-dioctylfluorene-altbenzothiadiazole), F8BT thin films. Furthermore, new results obtained during the investigation of the behaviour of nanocomposite thin films made of poly[2-methoxy-5-(2-ethylhexyloxy)-1,4-phenylenevinylene] (MEH-PPV) and Al₂O₃ nanowires demonstrated that the addition of a nanofiller can play a significant role, resulting in the creation of new energetically favourable states in polymer chains. These states preferentially emerge due to the disordering of the polymer matrix after the addition of the nanofiller. The change of thin polymer structure correlates with the final properties of nanocomposite material, such as density of states in the band gap, reduction in charge mobility, and shortening of the exciton diffusion length. These changed parameters result in the reduction of the maximum luminance and the current efficiency of the prepared diodes. On the other hand, the nanofiller addition contributed to an increase in the operational lifetime of the diodes.

Ing. Rostislav Slobodian, Ph.D.

Date of defence: 16. 5. 2024

Supervisor: prof. Ing. et Ing. Ivo Kuřitka, Ph.D. et Ph.D.

Preparation and characterization of nanocomposite thin films for sensors of organic solvent vapours

Abstract

Nanofillers based on carbon, such as graphene, carbon black, and carbon fibres, are used for composite production. Nowadays, multiwall carbon nanotubes (MWCNTs) are a widely applicable material, mainly in the fields of polymer electronics and sensors. The utilization of carbonaceous nanofillers in various sensors like pressure, deformation, motion, or sensors to detect organic compound vapours is broadly reported. Although their sensitivity is high, most applications for sensing organic vapours suffer from low selectivity. Entangled MWCNTs buckypaper structures may serve as a reference of its kind. The study presents a new method for preparing nanocomposite-based chemiresistive sensors for volatile organic compounds (VOCs). Ethanol, acetone, toluene, and heptane were selected as representative VOCs differing in polarity and hydrophobicity. The transducing layer of the sensors is made from an elastomeric matrix and carbonaceous nanofillers and deposited on substrates patterned by interdigitated electrodes. Carbon nanotubes were found to be the most suitable of the

fillers considered in the first stage of the research. Three nanocomposite materials with comparable resistivity were prepared from elastomeric copolymers with MWCNTs filler. Styrene-isoprene-styrene copolymer, ethylene-octene copolymer, and thermoplastic polyurethane were chosen as the polymer matrices. These samples manifested comparable sensitivity and better selectivity than the previously studied buckypaper. Examples of potential applications such as an integrated electronic device, "electronic nose" and a sensing microstrip antenna were demonstrated. In the next step of the research, various strategies have been adopted and employed to enhance the performance of the sensors. Spin coating was found to be the best thin film preparation technology, whereas surface plasma treatment did not yield any improvement. The introduction of graphene nanoplatelets (GNPs) as a next filler and styrene-butadiene-styrene copolymer as the next matrix allowed the preparation of VOC sensors with giant response and selectivity. The superior sensor properties were explained using Hansen solubility parameters (HSP). The main advantages of the HSP approach, i.e. simplicity, explanatory and predictive power, were proven also in this study. Moreover, it enables a rational design of new sensors based on solvent-polymer-filler interactions, thus announcing a new class of HSP-based sensors.

Andrei Munteanu, MSc., Ph.D.

Date of defence: 13. 12. 2024

Supervisor: prof. Ing. Michal Sedláčik, Ph.D.

Viscoelastic Response of Magnetorheological

Abstract

Smart materials are usually referred to the systems that can alter some of their properties when exposed to an external stimulus. Magnetorheological fluids (MRFs) and elastomers (MREs) are categorized as good examples of smart materials as they are able to change properties such as their mechanical properties and conductivity under the influence of a magnetic field. This topic has grown significantly both in the fundamental research and applications however, there is a big gap in between as in fundamental research only one type of flow is studied while in real applications, more types of flow are present. This thesis tries to marry the fundamental research of MRFs and MREs with their applications. Different types of MRFs were developed based on specific applications. To be specific this thesis includes

the development of conductive and magnetic composites based on polypyrrole (PPy), magnetite nanoparticles, nickel and iron microparticles (carbonyl iron) which were used as an MRF. The particles are used as electrical devices that are able to control the resistance and capacitance under the influence of an external magnetic field. Additionally, due to the ability of the PPy to be synthesised in different morphology, dimorphic MRFs were investigated filling an important gap of the field. Due to the rise of MRE-based materials, it is important to prepare recyclable MREs. Thermoplastic-based MREs were prepared based on several types of matrices including a thermoplastic polyurethane and a propylene-based elastomer supplemented with ethylene groups. Both types of MREs are able to be reprocessed several times. The mechanical properties after processing were similar to the initial batches. The reprocessing was simulated by studying the time dependency of the MREs and it was found that the matrix can interact and bond with the magnetic particles.

Ing. Romana Štěpančíková, Ph.D.

Date of defence: 13. 12. 2024

Supervisor: prof. Ing. Petr Slobodian, Ph.D.

Polymer composite materials for wearable electronic

Abstract

The popularity of wearable electronics and wearable technology continues to grow. In the future wearable technology is expected to become an indispensable part of our daily lives. Even the potential applications suggest that the future will be safer, easier, healthier, faster, and more fun with wearable technology. Wearable electronics as a field is developing considerably these days. Devices for wearable electronics require the following parameters such as flexibility, easy implementation, simple manufacturability, and low cost. A high impact was placed on all these parameters in this work. Commercially available objects, such as a sports T-shirt and shoes were selected for the application of the sensors, into which our piezoresistive sensors based on polymer composites and carbon nanotubes were built. Furthermore, the possibility of applying mechanoelectrical conversion using the piezoelectric principle for the construction of self-powered mechanical stimulus sensors aimed at wearable electronics was tested. Several characteristics of breathing in an individual were monitored as well as a comparison of breathing in two volunteers. Our piezoresistive sensors

can monitor respiration sensitively, reversibly, and repeatably. Sensors in the insole of the shoe were placed on the surface of the commercial insole so that they sense the pressure during walking and do not disturb the integrity of the insole. Both of our solutions for human breath monitoring and footprint detection and measurement have moved from basic material research to the development and optimization of a comprehensive solution for these applications.

2 DEFENDED HABILITATION THESES

In 2024, 8 habilitation theses were defended: 2 at the Faculty of Technology, 3 at the Faculty of Management and Economics, 2 at the Faculty of Applied Informatics and 1 at the Faculty of multimedia Communications.

2.1 Faculty of Technology

Course: Technology of Macromolecular Compounds

doc. Ing. Petr Smolka, Ph.D.

Appointed with effect from: 1st June 2024

Surface Treatment Technologies in the Processing of Polymers

Abstract

The surface properties of materials are critically important to humans and have a profound effect on all areas of human activity. Surface properties of plastics and polymers in general are a separate chapter. This work deals with the specifics of surface treatment technologies for the field of polymer processing. It focuses on surface treatment methods and the possibilities of their evaluation. It covers automotive, packaging materials and medical applications. It also touches upon plasma modification of materials, thin film preparation technologies for polymer substrates, adhesion at the polymer-metal interface, stability of colloidal dispersions, as well as the field of additive manufacturing. The results of the work show that by choosing an appropriate surface modification technology, it is possible to achieve desirable results, e.g. in the plating of plastics, joining of plastics and metals and preparation of surfaces with defined tribological properties. Surface properties also play an essential role in the development of materials with potential medical applications.

Course: Food technology

doc. Ing. Zuzana Lazárková, Ph.D.

Appointed with effect from: 1st February 2024

Evaluation of Qualitative Parameters of Selected Food Groups During Storage

Abstract

The submitted habilitation thesis deals with the evaluation of quality parameters of selected food groups during storage. Selected foods of dairy and meat origin and also foods with reduced water activity were investigated in the thesis. For some foods, 2 heat treatments (pasteurization and sterilization) were compared. Some foods were stored for short-term (2 months) and some for long-term (6 to 24 months), using different storage temperatures (-18 to 40 °C). During storage, the foods were subjected to chemical, physical, microbiological, textural, rheological and sensory analyses. In the case of durable foods that were stored for a long time, the effect of sterilization and/or temperature and storage duration on the quality of the food was monitored. This thesis presents a comprehensive description of the factors that influence the quality of food during storage, including the impact of the raw material composition (dry matter, fat and fat in dry matter content and the addition of various substances), the preservation method used (pasteurization, sterilization and osmoanabiosis) and the storage conditions (especially temperature and length).

2.2 Faculty of Management and Economics

Course: Management and Business Economics

doc. Ing. Milan Damborský, PhD.

Appointed with effect from: 1st December 2024

Localization and Rooting of Foreign Direct Investments in the Czech Republic

Abstract

The main goal of the habilitation thesis is to "evaluate the state and development of the localization and rooting of foreign direct investment in the Czech economy in the context of the global economy." This main objective is elaborated into specific goals: (1) To systematize the development of the theory of localization and rooting based on literature review. To create an overview of the assessment of the role of FDI and investment incentives as specific localization factors, including the Czech environment. (2) To determine the position of the Czech Republic as a location and source of foreign direct investment (Czech Republic as an

investor) in the context of the world and the CEE region. (3) To identify internal differentiations in the regional distribution of FDI in the Czech Republic. (4) To evaluate the rooting of significant supported foreign companies into the Czech ecosystem and to test the influence of selected institutional factors on the rooting of foreign direct investment. Furthermore, the hypothesis is tested that FDI disproportionately flow into regions with higher economic performance (and lower unemployment concentration), thus contributing to the growth of regional disparities. The thesis consistently focuses on the period up to 2020 inclusive.

doc. Ing. Veronika Večeřová, PhD.

Appointed with effect from: 1st May 2024

Modeling Online Shopping Behavior in B2C E-commerce Markets

Abstract:

The area of online shopping behavior currently occupies an irreplaceable role in the development of e-commerce. This thesis focuses on the identification of factors that influence the development of online shopping behavior of consumers in the Czech online environment and which subsequently serve to build and verify a comprehensive model of the development of online shopping behavior that reflects the current possibilities of the Czech online environment. The aim of the thesis is to create, quantify and verify a comprehensive model of relationships between determinants that influence the consumer when shopping online. The impetus for the conducted research was the discovery of the non-existence of a comprehensive model of online shopping behavior that reflects the specifics of the Czech online environment and current trends and development tendencies in the field of electronic commerce. The main research method of the thesis is the method of online questioning in the form of a questionnaire survey among a selected group of Czech online shopping respondents with the aim of evaluating the factors of online shopping behavior. The results of the questionnaire survey will subsequently be used to build a comprehensive model of online shopping behavior, which will be statistically assembled and verified using the method of structured modeling, which, based on statistical data, estimates the size and quality of the links between measured (manifest) and assumed unmeasured (latent) variables. The goal of the model is to provide a comprehensive view of the issue of current online shopping behavior, which takes

into account the factors influencing the development of the consumer's online shopping process in the Czech e-commerce environment. The validated model provides a comprehensive explanation of the current phenomenon of online shopping that integrates and extends previous studies identifying behavioral models of online shopping behavior. No previous or current research systematically addresses this phenomenon.

doc. Ing. Eva Šviráková, Ph.D.

Appointed with effect from: 1st May 2024

Economic Model of Design Value

Abstract:

The habilitation thesis aims to establish a causal link between design value and user experience. The relationship between these two variables affects the meaning of design in organizations and can be used to calculate the value of design. According to previous research, it is known that design is a comprehensive concept, and it is necessary to reject the possibility of its total quantification. Many researchers relate user experience and customer value, while others state that the value of design cannot be measured directly. One possibility is to measure the value of design using system dynamics modeling. This approach to determining the value of design is still lacking in the research literature.

The habilitation thesis approaches the calculation of design value using the research method of experimentation, which is supported by other research methods: modeling and structured questioning. The inputs to the model, which represent the opinions of the firm's managers on the design, are obtained using

a board game that provides an attractive and understandable user interface for the research participants. The habilitation thesis results in a description of the relationship between user experience and strategic design decisions. The value of the design is established with the help of an exemplary case study that incorporates key variables according to the company's business model. The value of design is calculated based on the indicator "design cost-effectiveness" over six years of the start-up firm's business. The indicator is validated experimentally in one model with an identical structure and different scenarios concerning the involvement of design change in the firm's economic development.

The paper's contribution to science and practice lies in the experimentally verified evidence so that it is possible to know in which areas design investment is needed to make the most sense for the economics and management of the organization.

2.3 Faculty of Applied Informatics

Course: Machine and Process Control

doc. Ing. Martin Pospíšilik, Ph.D.

Appointed with effect from: 1st June 2024

Selected technical problems addressed in the electromagnetic compatibility laboratory

Abstract

The term Electromagnetic compatibility includes a large number of current topics addressed not only in industry, but also in the fields of law, medicine, population protection and other fields. Considering the field of Machine and Process Control, the most important topic is the issue of measurement of unwanted emissions of all kinds of electromagnetic energy as well as testing the immunity of various technical devices to these emissions.

From the point of view of the industry, these activities seem to be a well-defined area. In order for any product to be placed on the market, certain requirements set by the local authorities usually must be fulfilled. In technical field, appropriate technical standards are subject to laws or other government regulations. Similarly, as the requirements for products are determined by the relevant standards, the measurement and testing procedures are also defined, i.e. the requirements for the technical equipment of the testing laboratories. It might seem at first glance that this system does not allow any space for one's own creativity.

However, different situation occurs when new products are designed and developed. Their compliance with the binding standards is usually checked by pre-certification measurements and tests. It is often only in the test laboratory that it becomes clear what problems still need to be eliminated within the product. Because design flaws are often identified at later stages of product development, it is usually not possible to go back to the very beginning and completely change the product concept. Instead, partial modifications are usually carried out in

order to fulfil all of the required parameters. And this is where the creativity starts. It is necessary to know the requirements of the standards as well as to understand the physical principles which they are based on. Moreover, the sources of problems in the tested device should be identified and the procedures leading to the correction of the undesirable condition should be found. This detective-like work must be carried out systematically, with the aid of the application of scientific knowledge from the fields of physics and electronics.

As the author of this thesis is familiar with the fields mentioned above, applying his experience in his pedagogical and scientific practice, he chose this topic as a basis for his habilitation thesis. In the introduction, he presents his point of view on the further development of the field. The theoretical part contains the necessary theoretical framework including the macroscopic theory of the electromagnetic field and the description of normalization processes and the basic equipment of EMC laboratories. In the experimental part, five different problems unfolded by the author in the EMC laboratory are presented. These were either his own research activities or the processing of contractual research.

doc. Ing. Pavel Staša, Ph.D.

Appointed with effect from: 1st February 2024

The importance of computer modeling for solving technical tasks and phenomena of inanimate nature

Abstract

The habilitation thesis entitled "The Importance of Computer Modeling for Solving Technical Tasks and Phenomena of Inanimate Nature" examines the advantages and possibilities of using computer modeling in solving technical problems and analyzing inanimate natural phenomena. The introduction addresses and emphasizes the importance of computer modeling in today's world and lays the foundations for determining the content of the work. The current state of computer modeling is analyzed in the second section, which provides an overview of the latest technological advances and techniques used in the field. This section further delves into the advantages of computer modeling and its various possibilities in solving engineering problems and analyzing natural phenomena. In the third part, the objectives of the work are determined. In the fourth part, the theoretical framework of the work is pre-

sented. Emphasis is placed on using CFD (Computational Fluid Dynamics) analysis for solving selected problems. Subsequently, new findings and benefits in the field of CFD analysis for the flow of gases through rock massifs are demonstrated on selected tasks, and the effectiveness of computer modeling for solving problems and analyzing inanimate natural phenomena is emphasized. The experimental part of the thesis describes the verification of the performed CFD analysis on specific rock samples. The penultimate part of the work then deals with a new approach, comparing individual visualization methods and connecting results from CFD analysis with virtual and augmented reality. It then discusses the various options available to interpret results and interact with models. It highlights the importance of using computer modeling to gain insight and improve our understanding of engineering tasks and non-living natural phenomena.

2.4 Faculty of Multimedia Communications

Course: Multimedia and Design

doc. Mgr. art. Jana Potiron, ArtD.

Appointed with effect from: 1st March 2024

The original design collections of furniture and modular systems as part of the new interior concept of the University of West Bohemia in Pilsen in 2016 – 2022

Abstract

The habilitation thesis provides a comprehensive view of the author's work for The University of West Bohemia, and realizations created during the years 2016–2022. The designs respect the visual identity of The University, referencing important artists and designers. At the same time, they contribute to improving the working environment, cultural identification, and external representation. It is a presentation of a collective work in which the author looks specifically at materials, for alternative shape solutions and sustainable concepts.

3 QUALIFYING LECTURES FOR PROFESSORSHIP

3.1 Faculty of Technology

Course: Food Technology

prof. RNDr. Iva Burešová, Ph.D.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 14th May 2024

Appointed with effect from: 26th November 2024

Reformulation as a way to improve the quality of bread

Abstract

Bread is among the foods consumed daily. Bread is traditionally made from white (refined) wheat flour. The nutritional value of bread is decreased by high content of starch and low content of fibers, minerals and other nutritionally valuable substances. Wheat storage proteins may cause health issues for some consumers. Reformulations can partially or completely solve these and other shortcomings of wheat bread. The term “reformulation” is used for modifications applied to the ingredients, their ratios, as well as production processes. The goal of the reformulation is to prepare a product with quality superior to the original product, for example a product with a higher nutritional value, lower content of problematic components, or both. Reformulation focuses on the alteration of the ingredients and their relation. The modification of production processes is also necessary, since standard industrial procedures are adapted to the properties of traditional ingredients. Reformulation can negatively affect the properties and machinability of the dough, and thereby also impact the production of baked goods themselves. Reformulation can also decrease the product's quality; for example, reduce the volume of bread, change bread taste and aroma, and deteriorate crumb texture.

Theses focus on the reformulation of yeast-leavened bread. Reformulations aim at the production of gluten-free bread and bread with increased nutritional value. The text is divided into three parts. The first part focuses on the mechanism of the creation of wheat dough, as well as the functional properties of wheat dough. The second part summarizes reformulations aimed at the production of gluten-free bread. The use of naturally gluten-free flours and

their mixtures is discussed. Attention is paid, among others, to the question of how altering the ingredients may influence the amount of water required to prepare the dough with optimal consistency. The third part summarizes the possibilities of increasing the nutritional value of bread using nutritionally valuable wheat flours. The candidate's results are included in the thesis. The results obtained by the testing of the properties of naturally gluten-free flours, their blends, dough properties and products are presented. Additionally, the results of testing the applicability of nontraditional ingredients, especially nutritionally valuable flours prepared from pigmented rice and colored wheat grains, are mentioned.

Course: Technology of Macromolecular Compounds

prof. Ing. Tomáš Sedláček, Ph.D.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 14th November 2024

Appointed with effect from: 27th May 2024

Preparation, Characterization and Processing of Plastics for Tomorrow's Applications

Abstract

In today's world, plastics processing is an indispensable way to efficient and environmentally friendly preparation of a myriad of products used in all industries. Thus, it is currently impossible to imagine automotive, aerospace, medical, construction or consumer industries without the application of modern polymeric materials. In addition to the important aspect of low-energy processing and reworking of plastics, also their low density, the extensive possibility of modifying material properties according to the application requirements or techniques used in the manufacturing, with the possibility of the effective control of performance properties, can be highlighted.

The aim of this thesis is to present a) selected methods of modification of polymer systems by changing the material formulations or by the way of processing; b) methods designed for characterization and monitoring of the achieved level of desired effects or those used for long-term production quality control; c) technologies applied in the preparation of test samples and functional prototypes using laboratory, semi-operational and production lines.

These areas document my research and development activities carried out in close industrial cooperation with potential applications in the production of new plastic products. I perceive the presented results of project activities of applied and basic research not only as a personal contribution to the development of doctoral programmes at Tomas Bata University in Zlín, in which I am actively involved, but I also try to actively implement them into the teaching of courses in the Bachelor and Master of Science in Polymer Engineering programme taught at the Faculty of Technology, which I supervise.

3.2 Faculty of Applied Informatics

Course: Machine and Process Control

prof. Ing. Petr Doležal, Ph.D.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 6th February 2024

Appointed with effect from: 27th May 2024

Extraction of Relevant Features Using Deep Learning for Industrial Applications

Abstract

The theses of the qualifying lecture for professorship represent an essential part of the author's contribution to the field of extraction of relevant features from data obtained in real conditions, especially in industrial production, using deep learning tools. The work is first focused on feature extraction from visual data, and the second part on signal analysis and feature extraction from signals and time series. Both sections first contain a brief theoretical background of the investigated problem, and then the author's contribution is presented, usually realized in the form of scientific publications, project activities, or subjects of intellectual and industrial property.

prof. Ing. Alexander Hošovský, Ph.D.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 14th May 2024

Appointed with effect from: 26th November 2024

Soft computing methods in identification of smart systems

Abstract

The presented theses of the lecture for the appointment as a professor represent a cross-section of the applicant's research results in the field of system identification using soft computing methods. The main application areas of the research are the area of predictions of energy consumption in buildings and the area of soft actuators and systems using soft actuators. In the first area, the emphasis is placed on the identification of prediction models for gas consumption forecasts in different types of buildings based on regression models with errors in the form of time series. Soft computing methods are used for parallel NAR models of wavelet decomposition components optimized using the bGA algorithm. In the field of soft actuators, soft computing methods are used for 3 types of systems (a manipulator with 3 degrees of freedom driven by fluid muscles, an arm with continuous kinematics and a Peano-HASEL drive), where forward neural networks were applied to identify friction in joints and approximate the static characteristics of fluidic muscles, an ensemble of recurrent networks for black box dynamics modeling and hierarchical LMN models for direct kinematics modeling.

prof. Ing. Marek Kubalčík, Ph.D.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 14th November 2024

Appointed with effect from: 27th May 2024

Selected Advanced Methods of Process Control

Abstract

Theses provide an overview of the author's main results achieved as part of research in the field of process control. These are mainly the areas of adaptive control and control of multi-variable systems. An overview of the proposed modifications of the control algorithms is given. These are mainly algorithms based on algebraic control theory, predictive control methods and linear and nonlinear optimal control. In the field of algorithms using the polynomial approach, it is mainly about the proposals of suitable compensators for the control of

multivariable systems, in the case of predictive control, the application of artificial intelligence methods in the predictor and in solving a defined optimization problem.

prof. Ing. Jan Mareš, Ph.D.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 6th February 2024

Appointed with effect from: 27th May 2024

Cybernetic-Informatic Systems in Biomedical Data Analysis

Abstract

This work focuses on the methodology of signal and image processing and the applications of methods for the analysis of multi-channel signals obtained in the field of biomedicine. It presents the author's recent research, which can be divided into the following parts:

Research on age-related changes in the parameter of color noise in EEG recordings, where subjects underwent neurological and neuropsychological examinations. The research investigates whether the reduction in the parameter λ in connection with the power-law distribution may be caused by the loss of synapses and decreased connectivity of the brain's neural network in older individuals.

The second part of the research is centered on the detection of moving objects (facial expressions and walking) using a video camera or the KINECT system. Mathematical methods were employed to localize components of the image for the processing of each observed image. The result is a hardware robotic platform that autonomously measures walking and adjusts its behavior in different scenarios. These data are further analyzed and used for diagnosing the patient's condition through traditional statistical algorithms and artificial intelligence methods.

4 IMPORTANT SCIENTIFIC AND SPECIALIZED ASSIGNMENTS

4.1 Projectst financed by the Czech Science Foundation (GACR)

In 2024, 9 projects financed by the Czech Science Foundation were implemented at the TBU in Zlín. Total eligible costs amounted CZK 17,865 thousand for TBU in Zlín in 2024.

4.1.1 Faculty of Technology

Standard projects

GA24-11442S Rheology and modeling of polymer melt flows at very high strain rates with respect to the production of meltblown nanofibers

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Martin Zatloukal

Implementation period: 2024 - 2026

Total project cost (CZK thous.): 8 395

Total project cost – TBU (CZK thous.): 8 395

Project cost of TBU in 2024 (CZK thous.): 2 721

4.1.2 Faculty of Applied Informatics

LA grants

GF21-45465L Metaheuristic-based parametric optimization of time-delay models and control systems

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Libor Pekař

Implementation period: 2021 - 2024

Total project cost (CZK thous.): 4 652

Total project cost – TBU (CZK thous.): 4 652

Project cost of TBU in 2024 (CZK thous.): 1 162

4.1.3 Faculty of Humanities

Standard projects

GA24-11912S Self-Regulation of Digital Behaviour in Children

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Karla Hrbáčková

Implementation period: 2024 - 2026

Total project cost (CZK thous.): 4 993

Total project cost – TBU (CZK thous.): 4 993

Project cost of TBU in 2024 (CZK thous.): 1 635

4.1.4 University Institute

Standard projects

GA22-33307S Development of new 3D hierarchically structured polysaccharide and protein porous systems

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Antonín Minařík

Implementation period: 2022 - 2024

Total project cost (CZK thous.): 7 692

Total project cost – TBU (CZK thous.): 7 692

Project cost of TBU in 2024 (CZK thous.): 2 592

GA23-07244S Anisotropic Magnetorheological Elastomers with Controlled Electrical Properties

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Michal Sedláčik

Implementation period: 2023 - 2025

Total project cost (CZK thous.): 5 446

Total project cost – TBU (CZK thous.): 5 466

Project cost of TBU in 2024 (CZK thous.): 1 980

GA23-07361S Synthesis of gold nanoparticles for SERS and catalysis guided by selectively oxidized polysaccharides

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Lukáš Münster

Implementation period: 2023 - 2025

Total project cost (CZK thous.): 5 112

Total project cost – TBU (CZK thous.): 5 112

Project cost of TBU in 2024 (CZK thous.): 1 704

GA23-07425S Electro-Conductive Biomaterials

Principal investigator: MU Brno

Project investigator on behalf of TBU: Petr Humpolíček

Implementation period: 2023 - 2025

Total project cost (CZK thous.): 8 994

Total project cost – TBU (CZK thous.): 5 487

Project cost of TBU in 2024 (CZK thous.): 1 914

GA24-10384S Polymer memristors with neurosynaptic properties

Principal investigator: Academy of Sciences

Project investigator on behalf of TBU: Jarmila Vilčáková

Implementation period: 2024 - 2026

Total project cost (CZK thous.): 9 918

Total project cost – TBU (CZK thous.): 5 628

Project cost of TBU in 2024 (CZK thous.): 1 876

GA24-11534S Conductive (bio)polymer composites with covalently anchored polypyrrole for biomedical applications

Principal investigator: TBU in Zlín	
Project investigator on behalf of TBU: Jan Vícha	
Implementation period: 2024 - 2026	
Total project cost (CZK thous.):	6 981
Total project cost – TBU (CZK thous.):	6 981
Project cost of TBU in 2024 (CZK thous.):	2 281

4.2 Projects financed by the Ministry of Industry and Trade of the Czech Republic

In 2024, 7 projects financed by the Ministry of Industry and Trade of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 7,332 thousand for TBU in Zlín in 2024.

4.2.1 Faculty of Applied Informatics

The Operational Program Enterprise and Innovations for Competitiveness (OP PIK)

EG20_321/0023675 Research and Development of an Automatic Emulsification Line of Semi-finished Radial and Diagonal Tires of Large Dimensions

Principal investigator: Prozax Otrokovice s. r. o.	
Project investigator on behalf of TBU: Vladimír Vašek	
Implementation period: 2020 – 2024	
Total project cost (CZK thous.):	51 437
Total project cost – TBU (CZK thous.):	6 044
Project cost of TBU in 2024 (CZK thous.):	4 459

EG20_321/0023870 Development of a new unmanned system for monitoring and control of environmental management

Principal investigator: AIRMOBIS s. r. o.	
Project investigator on behalf of TBU: Zuzana Komínková Oplatková	
Implementation period: 2020 – 2024	
Total project cost (CZK thous.):	13 047
Total project cost – TBU (CZK thous.):	4 314
Project cost of TBU in 2024 (CZK thous.):	2 873

The Operational Program Technologies and Applications for Competitiveness

EI22_002/0000559 Research and development of energy-saving LED lights from renewable materials

Principal investigator: TREVOS, a. s.	
Project investigator on behalf of TBU: Pavel Stoklásek	
Implementation period: 2023 – 2026	
Total project cost (CZK thous.):	15 701
Total project cost – TBU (CZK thous.):	3 631
Project cost of TBU in 2024 (CZK thous.):	0

EI22_002/0000803 Ray Service: EGIS New Generation

Principal investigator: Ray Service, a. s.

Project investigator on behalf of TBU: Radek Matušů

Implementation period: 2023 – 2026

Total project cost (CZK thous.): 43 007

Total project cost – TBU (CZK thous.): 9 041

Project cost of TBU in 2024 (CZK thous.): 0

EI22_002/0000391 Research and development of automation and operation streamlining resources for a complex IPTV/OTT solution for small and medium-sized content owners

Principal investigator: Modern TV s. r.o.

Project investigator on behalf of TBU: Roman Šenkeřík

Implementation period: 2023 – 2026

Total project cost (CZK thous.): 61 292

Total project cost – TBU (CZK thous.): 8 268

Project cost of TBU in 2024 (CZK thous.): 0

4.2.2 University InstituteThe Operational Program Technologies and Applications for Competitiveness**EI22_002/0000413 Research and development of a drinking water filtration unit**

Principal investigator: SPUR, a. s.

Project investigator on behalf of TBU: Miroslava Kovářová

Implementation period: 2023 - 2026

Total project cost (CZK thous.): 29 988

Total project cost – TBU (CZK thous.): 3 682

Project cost of TBU in 2024 (CZK thous.): 0

EI22_002/0000682 Development of a new ecological anti-noise barriers

Principal investigator: GELPO, s. r. o.

Project investigator on behalf of TBU: Radek Stoček

Implementation period: 2023 - 2026

Total project cost (CZK thous.): 28 787

Total project cost – TBU (CZK thous.): 3 324

Project cost of TBU in 2024 (CZK thous.): 0

4.3 Projects financed by the Ministry of Education, Youth and Sports of the Czech Republic

In 2024, 6 projects financed by the Ministry of Education, Youth and Sports of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 8,868 thousand for TBU in Zlín in 2024.

4.3.1 Rectorate

Operational Program Jan Ámos Komenský

EH22_012/0006919 Development of Adequate Infrastructure for Doctoral Study Programmes at TBU in Zlín (RADOST)

Project investigator on behalf of TBU: Petr Humpolíček

Implementation period: 2023 - 2026

Total project cost (CZK thous.): 54 962

Total project cost – TBU (CZK thous.): 54 962

Project cost of TBU in 2024 (CZK thous.): 730

4.3.2 University Institute

INTER EXCELLENCE - INTER ACTION Program

LUAUS23085 Synthesis of new highly active metallosilicate catalysts for olefin metathesis

Principal investigator: MU in Brno

Project investigator on behalf of TBU: David Škoda

Implementation period: 2023 - 2026

Total project cost (CZK thous.): 6 495

Total project cost – TBU (CZK thous.): 4 432

Project cost of TBU in 2024 (CZK thous.): 1 519

LUABA24039 Development of magnetoactive elastomeric Surfaces with controlled wettability for functional Liquid Manipulation - SALMON

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Michal Sedlačík

Implementation period: 2024 - 2026

Total project cost (CZK thous.): 4 317

Total project cost – TBU (CZK thous.): 4 317

Project cost of TBU in 2024 (CZK thous.): 843

LUAUS24032 Polymeric neuronal synapses

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Jarmila Vilčáková

Implementation period: 2024 - 2027

Total project cost (CZK thous.): 10 633

Total project cost – TBU (CZK thous.): 5 536

Project cost of TBU in 2024 (CZK thous.): 1 172

INTER EXCELLENCE - INTER TRANSFER Program

LTT20010 Surface functionalized glass: Concept of heterostructured nanoparticles inspired by artificial photosynthesis

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Michal Machovský

Implementation period: 2020 - 2024	
Total project cost (CZK thous.):	7 765
Total project cost – TBU (CZK thous.):	7 765
Project cost of TBU in 2024 (CZK thous.):	1 610

Program for Funding Multilateral Scientific and Technological Cooperation in the Danube Region

8X23034 Self-heating magnetic nanoconstructs for theranostic applications

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Jarmila Vilčáková

Implementation period: 2023 - 2025

Total project cost (CZK thous.):	296
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Total project cost – TBU (CZK thous.):	296
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Project cost of TBU in 2024 (CZK thous.):	123
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4.4 Projects financed by the Ministry of the Interior of the Czech Republic

In 2024, 2 projects financed by the Ministry of the Interior of the Czech Republic was implemented at the TBU in Zlín. Total eligible costs amounted CZK 4,434 thousand for TBU in Zlín in 2024.

4.4.1 Rectorate

National Recovery plan

CZ.31.1.01/MV/23_52/0000052 Implementation of the SDG Regulation - Introduction of the Higher Education Service

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Lenka Drábková

Implementation period: 2023 - 2026

Total project cost (CZK thous.):	5 027
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Total project cost – TBU (CZK thous.):	5 027
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Project cost of TBU in 2024 (CZK thous.):	1 557
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4.4.2 Faculty of Applied Informatics

IMPACT I Program

VJ02010043 Reconstruction of a security incident scenario in a virtual reality environment

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Milan Adámek

Implementation period: 2022 - 2025	
Total project cost (CZK thous.):	14 975
Total project cost – TBU (CZK thous.):	12 142
Project cost of TBU in 2022 (CZK thous.):	2 877

4.5 Projects financed by the Technology Agency of the Czech Republic

In 2024, 29 projects financed by the Technology Agency of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 52,712 thousand for TBU in Zlín in 2024.

4.5.1 Faculty of Technology

THÉTA Program

TK03020129 Rubber sealing materials development for hermetic systems of nuclear power plants

Principal investigator: TBU in Zlín	
Project investigator on behalf of TBU: Simona Mrkvičková	
Implementation period: 2020 - 2024	
Total project cost (CZK thous.):	17 022
Total project cost – TBU (CZK thous.):	4 515
Project cost of TBU in 2024 (CZK thous.):	415

TS01030047 Controlled deep biogas

Principal investigator: Czech geologic service	
Project investigator on behalf of TBU: Marek Koutný	
Implementation period: 2024 - 2028	
Total project cost (CZK thous.):	26 807
Total project cost – TBU (CZK thous.):	4 843
Project cost of TBU in 2024 (CZK thous.):	738

Environment for Life Program

SS07020305 Use of microalgae to reduce the amount of antibiotics, resistant bacteria and resistance genes in digestate from agricultural biogas plants

Principal investigator: EPS biotechnology, s. r. o.	
Project investigator on behalf of TBU: Marek Koutný	
Implementation period: 2024 - 2026	
Total project cost (CZK thous.):	13 680
Total project cost – TBU (CZK thous.):	3 515
Project cost of TBU in 2024 (CZK thous.):	1 185

TREND Program

FW10010536 The implementation of controlled pressing technology for manufacturing the new generation of carbon propellers

Principal investigator: Mejzlík Properties, s. r.o.

Project investigator on behalf of TBU: Soňa Rusnáková

Implementation period: 2024 - 2026

Total project cost (CZK thous.): 17 661

Total project cost – TBU (CZK thous.): 5 875

Project cost of TBU in 2024 (CZK thous.): 2 036

FW11020217 Development of Advanced Multi-material 3D Printers for Regenerative Medicine

Principal investigator: FYSCON s. r. o.

Project investigator on behalf of TBU: Antonín Minařík

Implementation period: 2024 - 2027

Total project cost (CZK thous.): 14 830

Total project cost – TBU (CZK thous.): 4 488

Project cost of TBU in 2024 (CZK thous.): 534

4.5.2 Faculty of Management and Economics

SIGMA Program

TQ01000548 Behavioral approaches to evidence-based decision-making in the Smart Cities Concept

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Filip Kučera

Implementation period: 2023 - 2026

Total project cost (CZK thous.): 5 395

Total project cost – TBU (CZK thous.): 3 172

Project cost of TBU in 2024 (CZK thous.): 1 406

FW03010194 Development of a System for Monitoring and Evaluation of Selected Risk Factors of Physical Workload in the Context of Industry 4.0.

Principal investigator: Incontio LTD.

Project investigator on behalf of TBU: David Tuček

Implementation period: 2021 - 2024

Total project cost (CZK thous.): 18 474

Total project cost – TBU (CZK thous.): 3 079

Project cost of TBU in 2024 (CZK thous.): 251

4.5.3 Faculty of Multimedia and Communications

SIGMA Program

TQ01000189 Museums without barriers

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Eva Gartnerová

Implementation period: 2023 - 2026	
Total project cost (CZK thous.):	9 103
Total project cost – TBU (CZK thous.):	7 451
Project cost of TBU in 2024 (CZK thous.):	2 071

4.5.4 Faculty of Applied Informatics

DELTA 2 Program

TM03000062 Isolation of high-quality proteins for animal feed by complex processing of chromium rods and similar raw materials

Principal investigator: Kovoprojekta Brno a. s.

Project investigator on behalf of TBU: Jiří Pecha

Implementation period: 2022 - 2025

Total project cost (CZK thous.):	9 246
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Total project cost – TBU (CZK thous.):	6 141
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Project cost of TBU in 2024 (CZK thous.):	1 995
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THÉTA Program

TK04020222 Decentralisation of energy sources in an existing district heating system

Principal investigator: Teplárna Otrokovice a. s.

Project investigator on behalf of TBU: Vladimír Vašek

Implementation period: 2022 - 2024

Total project cost (CZK thous.):	7 721
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Total project cost – TBU (CZK thous.):	5 140
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Project cost of TBU in 2024 (CZK thous.):	2 087
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TREND Program

FW10010237 Fail-safe and cybersecure distributed control system based on blockchain technology

Principal investigator: ELA Blockchain Services, a. s.

Project investigator on behalf of TBU: Roman Jašek

Implementation period: 2024 - 2025

Total project cost (CZK thous.):	9 535
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Total project cost – TBU (CZK thous.):	2 496
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Project cost of TBU in 2024 (CZK thous.):	1 248
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4.5.5 University Institute

M-ERA.NET Program

TH71020005 Bioactive injectable hydrogels for soft tissue regeneration after reconstructive maxillofacial surgeries INJECT-BIO

Principal investigator: TBU

Project investigator on behalf of TBU: Nabanita Saha

Implementation period: 2020 - 2024	
Total project cost (CZK thous.):	1 534
Total project cost – TBU (CZK thous.):	1 374
Project cost of TBU in 2024 (CZK thous.):	0

TH80020008 Modelling Wear of Intrinsically Self-Healing Elastomers for Reduced Particle Emission and Improved Lifetime Performance in Future e-Mobility Concepts

Project investigator on behalf of TBU: Radek Stoček

Implementation period: 2022 - 2025	
Total project cost (CZK thous.):	5 561
Total project cost – TBU (CZK thous.):	5 561
Project cost of TBU in 2024 (CZK thous.):	2 181

National Centre of Competence Program

TN02000051 National Centre of Competence - Polymer Materials and Technologies for the 21st Century

Project investigator on behalf of TBU: Vladimír Sedlařík

Implementation period: 2023 - 2028	
Total project cost (CZK thous.):	397 398
Total project cost – TBU (CZK thous.):	53 220
Project cost of TBU in 2024 (CZK thous.):	9 700

SS06020282 Ecological recycling of biopolymers

Principal investigator: SYNPO

Project investigator on behalf of TBU: Vladimír Sedlařík

Implementation period: 2023 - 2025	
Total project cost (CZK thous.):	14 161
Total project cost – TBU (CZK thous.):	3 327
Project cost of TBU in 2024 (CZK thous.):	1 263

SS07020443 Biodegradable materials for drought hardness enhancement of young plants

Principal investigator: TBU

Project investigator on behalf of TBU: Vladimír Sedlařík

Implementation period: 2024 - 2026	
Total project cost (CZK thous.):	3 321
Total project cost – TBU (CZK thous.):	1 456
Project cost of TBU in 2024 (CZK thous.):	481

SIGMA Program

TQ03000235 Research and optimisation of processing properties of polymer recyclates for their re-usage in textile applications

Principal investigator: TBU

Project investigator on behalf of TBU: Martina Pummerová

Implementation period: 2024 - 2025	
Total project cost (CZK thous.):	5 700

Total project cost – TBU (CZK thous.):	3 026
Project cost of TBU in 2024 (CZK thous.):	1 513

TQ05000002 Fully Bio-based Advanced Filtration Systems for Removal of Emerging Pollutants from Water BAPUR

Principal investigator: TBU

Project investigator on behalf of TBU: Vladimír Sedlařík

Implementation period: 2024 - 2027

Total project cost (CZK thous.):	8 511
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Total project cost – TBU (CZK thous.):	8 511
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Project cost of TBU in 2024 (CZK thous.):	1 121
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THÉTA Program

TK03030157 Next generation all-solid-state Li-ion batteries

Project investigator on behalf of TBU: Petr Sáha

Implementation period: 2020 - 2025

Total project cost (CZK thous.):	24 596
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Total project cost – TBU (CZK thous.):	24 596
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Project cost of TBU in 2024 (CZK thous.):	4 493
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TK05020019 Development of LiFePO₄ rechargeable batteries for stationary applications

Project investigator on behalf of TBU: Petr Sáha

Implementation period: 2023 - 2025

Total project cost (CZK thous.):	21 860
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Total project cost – TBU (CZK thous.):	5 258
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Project cost of TBU in 2024 (CZK thous.):	1 891
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TK05020036 Halogen-free safety electrical cables meeting the requirements of LOCA of the latest types of nuclear power plants and the latest requirements for fire safety according to European and national legislation (CPR EU/305/2011, EN 50575, CSN 73 0895)

Principal investigator: PRAKAB Pražská kabelovna, s. r. o.

Project investigator on behalf of TBU: Tomáš Sedláček

Implementation period: 2023 - 2025

Total project cost (CZK thous.):	17 957
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Total project cost – TBU (CZK thous.):	3 185
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Project cost of TBU in 2024 (CZK thous.):	1 206
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TREND Program

FW01010327 Advanced polymer and composite materials for additive manufacturing

Principal investigator: SPA 2000 s. r. o.

Project investigator on behalf of TBU: Jarmila Vilčáková

Implementation period: 2020 - 2024

Total project cost (CZK thous.):	18 134
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Total project cost – TBU (CZK thous.):	4 376
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Project cost of TBU in 2024 (CZK thous.):	169
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FW03010006 Permanent protection of touch screens to prevent the deposition of organic pollutants on their surface

Principal investigator: FORTES interactive, s.r.o.

Project investigator on behalf of TBU: Martina Pummerová

Implementation period: 2021 - 2024

Total project cost (CZK thous.): 29 572

Total project cost – TBU (CZK thous.): 5 200

Project cost of TBU in 2024 (CZK thous.): 1 300

FW03010465 Technological production scrap as an innovative material source in a process of production of nonwoven textile

Principal investigator: PFNonwovens Czech s.r.o.

Project investigator on behalf of TBU: Tomáš Sedláček

Implementation period: 2021 - 2024

Total project cost (CZK thous.): 67 165

Total project cost – TBU (CZK thous.): 13 164

Project cost of TBU in 2024 (CZK thous.): 2 790

FW06010191 Research and development of solar reflexive coating system for enhancing the energy performance of buildings

Principal investigator: ROKOSPOL, a. s.

Project investigator on behalf of TBU: Milan Masař

Implementation period: 2023 - 2025

Total project cost (CZK thous.): 29 979

Total project cost – TBU (CZK thous.): 8 061

Project cost of TBU in 2024 (CZK thous.): 6 683

FW06010324 Carbon footprint reduction of nonwoven textile for disposable hygiene and medical applications

Principal investigator: PFNonwovens Czech s.r.o.

Project investigator on behalf of TBU: Tomáš Sedláček

Implementation period: 2023 - 2026

Total project cost (CZK thous.): 49 251

Total project cost – TBU (CZK thous.): 7 956

Project cost of TBU in 2024 (CZK thous.): 1 992

FW06010527 A new generation of nanostructured pleated filters for collective and personal protection of the population

Principal investigator: SPUR, a. s.

Project investigator on behalf of TBU: Miroslava Kovářová

Implementation period: 2023 - 2025

Total project cost (CZK thous.): 29 323

Total project cost – TBU (CZK thous.): 5 159

Project cost of TBU in 2024 (CZK thous.): 1 713

FW10010207 Intelligent thermotropic coatings for thermal management of buildings

Principal investigator: ROKOSPOL, a. s.

Project investigator on behalf of TBU: Michal Machovský

Implementation period: 2024 - 2026

Total project cost (CZK thous.):	29 323
Total project cost – TBU (CZK thous.):	5 159
Project cost of TBU in 2024 (CZK thous.):	1 713

FW10010547 Procession of plastic recyclates towards vacuum shaped products

Principal investigator: Plastix Trade s. r.o.

Project investigator on behalf of TBU: Vladimír Sedlařík

Implementation period: 2024 - 2025

Total project cost (CZK thous.):	10 111
Total project cost – TBU (CZK thous.):	2 256
Project cost of TBU in 2024 (CZK thous.):	1 128

4.6 Projects financed by the Ministry of Health

In 2024, 2 projects financed by the Ministry of Health was implemented at the TBU in Zlín.

Total eligible costs amounted CZK 3,496 thousand for TBU in Zlín in 2024.

4.6.1 Faculty of Technology

Program to support applied health research for the years 2020 - 2026

NU23-08-00243 Functional replacements for nerve tissue regeneration fabricated using advanced 3D printing techniques

Project investigator on behalf of TBU: Antonín Minařík

Implementation period: 2023 - 2026

Total project cost (CZK thous.):	15 609
Total project cost – TBU (CZK thous.):	10 167
Project cost of TBU in 2024 (CZK thous.):	2 663

4.6.2 University Institute

Program to support applied health research for the years 2020 - 2026

NW24-03-00331 Selectively modified betaglacans as immunoactivatory carriers of anticancer drugs for the treatment of colon cancer

Project investigator on behalf of TBU: Jan Vícha

Implementation period: 2024 - 2027

Total project cost (CZK thous.):	15 718
Total project cost – TBU (CZK thous.):	4 844
Project cost of TBU in 2024 (CZK thous.):	833

4.7 Projects financed by the Ministry of Culture

In 2024, 3 projects financed by the Ministry of Culture was implemented at the TBU in Zlín.

Total eligible costs amounted CZK 2,721 thousand for TBU in Zlín in 2024.

4.7.1 Faculty of Management and Economics

NAKI III Program

DH23P03OVV064 Mapping, management and financing of local culture in the Czech Republic in the context of its public support and preservation of intangible cultural heritage

Project investigator on behalf of TBU: Pavel Bednář

Implementation period: 2023 - 2027

Total project cost (CZK thous.): 12 193

Total project cost – TBU (CZK thous.): 12 193

Project cost of TBU in 2024 (CZK thous.): 2 721

4.7.2 Faculty of Multimedia Communications

National Recovery Plan

0313000076 From Art to Learning

Project investigator on behalf of TBU: Jitka Honsová

Implementation period: 2023 - 2024

Total project cost (CZK thous.): 570

Total project cost – TBU (CZK thous.): 570

Project cost of TBU in 2024 (CZK thous.): 0

313000070 G18 EduLab: G18 Gallery's participatory educational creative workshops

Project investigator on behalf of TBU: Eva Gartnerová

Implementation period: 2023 - 2024

Total project cost (CZK thous.): 450

Total project cost – TBU (CZK thous.): 450

Project cost of TBU in 2024 (CZK thous.): 0

4.8 Projects financed by European Commission

In 2024, 8 projects financed by European Commission was implemented at the TBU in Zlín.

Total eligible costs amounted CZK 8,631 thousand for TBU in Zlín in 2024.

4.8.1 Faculty of Technology

Horizon 2020 Program

Strategies of circular Economy and Advanced bio-based solutions to keep our Lands and seas alive from plastics contamination (SEALIVE)

Project investigator on behalf of TBU: Marek Koutný

Implementation period: 2019 – 2024

Total project cost (CZK thous.): 282 111

Total project cost – TBU (CZK thous.): 5 673

Project cost of TBU in 2024 (CZK thous.): 0

4.8.2 Faculty of Management and Economics

Horizon Europe Program

Sustainable Horizons

Project investigator on behalf of TBU: Michaela Blahová

Implementation period: 2022 – 2024

Total project cost – TBU (CZK thous.): 4 619

Project cost of TBU in 2024 (CZK thous.): 0

4.8.3 Faculty of Applied Informatics

Horizon Europe Program

European Doctoral Network for Safe and Sustainable by Design Electromagnetic Shielding Material / PARASOL

Project investigator on behalf of TBU: Stanislav Kovář

Implementation period: 2022 – 2026

Total project cost (CZK thous.): 65 830

Project cost of TBU in 2024 (CZK thous.): 1 975

Developing and deploying SOC capabilities for the academic sector - a teamwork of Universities and RTOs in the CEE region / SOCCER

Project investigator on behalf of TBU: Roman Šenkeřík

Implementation period: 2023 – 2026

Total project cost (CZK thous.):

Project cost of TBU in 2024 (CZK thous.):

4.8.4 University Institute

Horizon 2020/Europe Program

101036910 Storage Research Infrastructure Eco-System StoRIES

Project investigator on behalf of TBU: Petr Sáha

Implementation period: 2021- 2025

Total project cost – TBU (CZK thous.): 336

Project cost of TBU in 2024 (CZK thous.): 89

101078935 TWINVECTOR: TWINNING FOR DEVELOPMENT OF WORLD-CLASS NEXT GENERATION BATTERIES

Project investigator on behalf of TBU: Viera Pechancová

Implementation period: 2022- 2025

Total project cost (CZK thous.): 33 235

Total project cost – TBU (CZK thous.): 9 295

Project cost of TBU in 2024 (CZK thous.): 0

101069505 SOLiD - Sustainable manufacturing and optimized materials and interfaces for lithium metal batteries with digital quality control

Project investigator on behalf of TBU: Viera Pechancová

Implementation period: 2022 – 2026

Total project cost (CZK thous.): 171 906

Total project cost – TBU (CZK thous.): 7 482

Project cost of TBU in 2024 (CZK thous.): 1 540

101007733 CORDIS Sustainable production of Cellulose-based products and additives to be used in SMEs and rural areas

Project investigator on behalf of TBU: Vladimír Sedlařík

Implementation period: 2021 – 2025

Project cost of TBU in 2024 (CZK thous.): 0

101157688 Bio-based sustainable SURFactants TO foster GREEN industry / SurfTo-Green

Project investigator on behalf of TBU: Petr Humpolíček

Implementation period: 2024 – 2029

Total project cost (CZK thous.): 191 022

Total project cost – TBU (CZK thous.): 11 700

Project cost of TBU in 2024 (CZK thous.): 3 029

101132349 Fair, healthy and environmentally-friendly food systems from primary production to consumption AGROECOLOGY

Project investigator on behalf of TBU: Vladimír Sedlář

Implementation period: 2024

101138029 SOLiD Safe, sustainable and Modular HYbrid systems for Long-duration Energy storage and grid Services / SMHYLES

Project investigator on behalf of TBU: Viera Pechancová

Implementation period: 2024 – 2027

Total project cost (CZK thous.): 196 950

Total project cost – TBU (CZK thous.): 4 342

Project cost of TBU in 2024 (CZK thous.): 2 048

4.9 PROJECTS – SUMMARY

Number of projects implemented in 2024												
Component part / Provider	European Commission	Czech Science Foundation	Ministry of Health	Ministry of Culture	Ministry of Industry and trade of the Czech Republic		Ministry of Education, Youth and Sports of the Czech Republic		Ministry of the Interior of the Czech Republic	Ministry of Agriculture of the Czech Republic	Technology Agency of the Czech Republic	Total
					MIT total	Operational Programme projects	MEYS total	Operational Programme projects				
Faculty of Technology	1	1	1	0	0	0	0	0	0	0	5	8
Faculty of Management and Economics	1	0	0	1	0	0	0	0	0	0	2	4
Faculty of Multimedia Communications	0	0	0	2	0	0	0	0	0	0	1	3
Faculty of Applied Informatics	2	1	0	0	5	5	0	0	1	0	3	12
Faculty of Humanities	0	1	0	0	0	0	0	0	0	0	0	1
Faculty of Logistics and Crisis Management	0	0	0	0	0	0	0	0	0	0	0	0
TBU Library	0	0	0	0	0	0	0	0	0	0	0	0
University Institute	7	6	1	0	2	2	5	0	0	0	18	39
Rectorate	0	0	0	0	0	0	1	1	1	0	0	2
TBU total	11	9	2	3	7	7	6	1	2	0	29	69
Total costs acknowledged for TBU in Zlín in 2024 za UTB (in CZK thousands)												
Component part / Provider	European Commission	Czech Science Foundation	Ministry of Health	Ministry of Culture	Ministry of Industry and trade of the Czech Republic		Ministry of Education, Youth and Sports of the Czech Republic		Ministry of the Interior of the Czech Republic	Ministry of Agriculture of the Czech Republic	Technology Agency of the Czech Republic	Total
					MIT total	Operational Programme projects	MIT total	Operational Programme projects				
Faculty of Technology	0	2 721	2 663	0	0	0	0	0	0	0	4908	10 292
Faculty of Management and Economics	0	0	0	2 721	0	0	0	0	0	0	1 657	4 378
Faculty of Multimedia Communications	0	0	0	0	0	0	0	0	0	0	2 071	2 071
Faculty of Applied Informatics	1 975	1 162	0	0	7 332	7 332	0	0	2 877	0	5 330	18 676
Faculty of Humanities	0	1 635	0	0	0	0	0	0	0	0	0	1 635
Faculty of Logistics and Crisis Management	0	0	0	0	0	0	0	0	0	0	0	0
TBU Library	0	0	0	0	0	0	0	0	0	0	0	0
University Institute	6 656	12 347	833	0	0	0	5 267	0	0	0	38746	63 849
Rectorate	0	0	0	0	0	0	3 601	730	1 557	0	0	5 158
TBU total	8 631	17 865	3 496	2 721	7 332	7 332	8 868	730	4 434	0	52 712	106 059

Science Activity Annual Report

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The publication was not checked for language or editorial.