Proj No.	Faculty, Department	Name of the project/Thesis		Main SupervisorL
1	Fac. Civ. Eng. (FCE) Dept of Landscape Water Conservation,	Sustainable Integrated Water Management in the Context of Global Change		doc.Ing.Dr. Tomáš Dostál p
2	FCE, Department of steel and timber structures	Next-Generation Numerical Design Modeling of Steel Structures: Digital Twins, Machine Learning, and Reliability Analysiss		prof. František Wald.
3	FCE, Dept. of Mechanics	Multiscale, Stochastic and Data-Driven Modeling of Materials and Processes		prof. Ing. Milan Jirásek
4	Fac. of Mechanical Eng. (FME), Dept. of Process Eng.	Innovative processes and equipment in green materials, chemicals, and advanced biofuels		prof. Ing. Tomáš Jirout
5	FME, Dept. of Instr. and Control Engineering	Optimal control design of large-scale time-delay systems, theory and applications		prof. Tomáš Vyhlídal
6	FME, Dept. of Mechanics	Generalized motion of biological systems driven by phase transition		prof. RNDr. Matej Daniel
7	Fac. of Electrical Eng. (FEE), Dept. of Measurement	Magnetic sensors and actuator		p
8	FEE, Dept. of Electromagnetic field	Backscattering-based, linear and nonlinear RF identification and sensing systems		Assoc. Prof. Milan Polívka
9	FEE, Dept. of Microelectronics	Wide-Bandgap Electronics for Energy Conversion		Prof. Pavel Hazdra
10	FEE, Dept. of Control Theory	Advanced control, estimation, and optimization for intelligent transportation and e-mobility		doc. Ing. Zdeněk Hurák;
11	FEE, Department of Cybernetics	Medical image analysis		prof. Jan Kybic

Proj No.	Faculty, Department	Name of the project/Thesis		Main SupervisorL
12	FEE, Dept. of Radioelectronics	Novel methods of demolition waste recognition and classification		doc. Ing. Stanislav Vítek
13	FEE, Dept. of Computer Science	Learning while searching in symbolic planners		Assoc. Prorof. Pavel Ripka f. Tomáš Pevný
14	FEE, Department of Cybernetics	Multilevel Modeling of Outcome Predictors Following Subthalamic Deep Brain Stimulation in Parkinson’s Disease		Assoc. Prof. Daniel Noák
15	FEE, Dept. of Control Theory	Diamond-based pMarcadorhotovoltaics		doc. Antonio Cammarata PhD
16	FEE, Department of Cybernetics	Deep Learning-Based Perception, Localization, and Planning for Autonomous Drone Teams		prof. Martin Saska
17	FEE, Dept. of Control Theory	Data-driven design of multi-functional alloys		Prof. Tomas Polcar
18	FEE, Department of Cybernetics	Physics-guided learning for machine control		Prof. Tomáš Svobo
19	FEE, Department of Cybernetics	Explainable end-to-end differentiable perception for self-supervised learning in robotics		Doc. Karel Zimmermann
20	FEE, Dept. of Electromagnetic field	Efficient Synthesis of the Directional Characteristic of a Multi-element Radiator or Scatterer		Doc. Pavel Hazdra
21	Fac. of Nucl. Sci. Phys. Eng. (FNSPE), Dept. of Physics	Study of jet properties with the STAR experiment at RHIC		doc. Jana Bielčíkov
22	FNSPE, Dept. of Nucl. Chemistry	Liquid-phase chemistry of Homologues of Superheavy Elements		prof. Jan John / D. Pavel Bartl
23	FNSPE, Dept. of Nucl. Chemistry	Accelerator mass spectrometry in the analysis of environmental samples		Doc. Mojmír Němec
24	FNSPE, Dept. of Physical Electronics	Classical and quantum nanophotonics		Prof. Ivan Richter

Proj No.	Faculty, Department	Name of the project/Thesis		Main SupervisorL
25	FNSPE, Dept. of Mathematics	Mathematical Modelling and Numerical Simulation of Flow, Transport and Phase Transitions		prof. Michal Beneš
26	FNSPE, Dept. of Physics	Superintegrability in classical and quantum mechanics		Doc. Libor Šnobl
27	FNSPE, Dept. of Physics	Study of novel scintillator materials for high-energy physics applications		prof. Jesus Guillermo Contreras, Ph.D.
28	FNSPE, Dept. of Physics	Studying the high-energy limit of Quantum Chromodynamics		Assoc. Prof. Jan Cepila
29	FNSPE, Dept. of Physics	Single spin asymmetry of J/ψ production in STAR experiment and EIC		Assoc. Prof. Jaroslav Bielcik
30	Fac. of Transp., Dept. of Mechanics and Materials	Machine learning for 3D printed multifunctional metamaterials		prof. Ing. Ondřej Jiroušek
31	Fac. of Biomed., Dept. of Biomedical Technology	Applications of EM fields in medical diagnostics and therapy		Prof. Dr.-Ing. Jan Vrba
32	FIT, Dept. of Software Engineering	AIOps empowered by Knowledge Graphs		doc. Ing. Tomáš Vitvar
33	FNE, Dept. of Physics	Quantum networks		Prof. Ing. Igor Jex
34	FEE, Dept. of Measurement	Quantum metrology of electrical quantities		Prof. Ing. Jan Holub
35	CIIRC, Dept. of Robotics	Learning to solve multiple view geometry		Doc. Ing. Tomáš Pajdla

Short description of research topics

Project 1	**Sustainable Integrated Water Management in the Context of Global Change**

	Fac. of Civil Eng.	Dept. of Landscape Water Conservation	
Short description	Both the ongoing climate change and intense anthropogenic activities affect the hydrological cycle substantially and have many impacts. The project deals with individual process components of the hydrological and substance cycles in natural, agricultural and urbanized landscapes and in technical systems. Main research topics are:r - Transport processes in the vadose zone of headwater catchments; - Water movement, sediment and solutes transport in the cultivated landscape - Precipitation, urban hydrology and stormwater management;		
Supervisor doc. Ing. Tomáš Dostál, Dr. (dostal@fsv.cvut.cz)		**Secondment opportunities** Federal Agency for Water Management, Austria; Dr.Peter Strauss,	

Project 2	Next-Generation Numerical Design Modeling of Steel Structures: Digital Twins, Machine Learning, and Reliability Analysis		
	Fac. of Civil Eng.	Department of steel and timber structures	
Short description	This research aims to develop next-generation numerical design models for steel structures by integrating digital twins, machine learning, structural monitoring, and reliability analysis. The work will focus on welded and bolted connections and the design of thin-walled members made pafrom structural and high-strength steels. By combining advanced numerical simulations with data-driven methods and monitoring data, the project will support improved performance assessment, reuse potential, and enhanced reliability and safety of steel structures.		
Supervisor prof. Ing. František Wald, CSc. (wald@fsv.cvut.cz)		**Secondment opportunities**	

Project 3	**Multiscale, Stochastic and Data-Driven Modeling of Materials and Processes**

	Fac. of Civil Eng.	Dept. of Mechanics	https://mech.fsv.cvut.cz/en https://openmechanics.fsv.cvut.cz/
Short description	Predictive simulation-based design of conventional and emerging construction materials must simultaneously account for their multi-scale nature, the multi-physics character of phenomena governing their response, and their inherent uncertainties, using efficient and mathematically sound approaches. The project should contribute to advancing the state-of-the-art techniques by integrating developments in physical-based and data-driven material modeling and simulation with material informatics.		
Supervisor prof. Ing. Milan Jirásek, DrSc (milan.jirasek@fsv.cvut.cz)		**Secondment opportunities:** Eindhoven University of Technology (TU/e), The flands Luxembourg Institute of Science and Technology (LIST), Luxembourg 4-6 months of training in multiscale modeling of materials, scientific computing, technical writing, presentation skills and team work. **Co-sup.:** TU/e - Prof. Marc G.D. Geers (WoS H = 54), LIST - Dr. S. Belouettar (WoS H = 33)	

Project 4	**Innovative processes and equipment in green materials, chemicals, and advanced biofuels production technologies**		
	Fac. of Mech. Eng.	Dept. of Process Engineering	pt.fs.cvut.cz/en/main-2/
Short description	The framework topics deal with experimental analysis, numeric simulations, and modeling of processes in individual biorefinery processing steps – pretreatment, waste to X conversion technology, product separation, and purification. The studies on pretreatment integrate mechanical size reduction processes, hydrothermal pretreatment techniques, or gas cleaning and purification by hybrid processes (adsorption, absorption, cryogenics, membranes). The research of product post-treatment are based on studies reflecting separation and purification by hydromechanical separation processes (filtration, separation of suspensions by gravity or centrifugal force, fluidization), or heat (condensation, evaporation, drying) or gas separation processes.		

Supervisor prof. Ing. Tomáš Jirout, Ph.D. (tomas.jirout@fs.cvut.cz)	**Secondment opportunities:** Universitat Politècnica de Catalunya – GEMMA, Spain Lodz University of Technology – Fac. of Process and Environmental Eng, PL 4 months, Research and science activities in heat transfer processes e.g. evaporation and drying processes. Co-supervisor: prof. Ireneusz Zbicinski

Project 5	**Optimal control design of large-scale time-delay systems, theory and applications**		
	Faculty of Mechanical Engineering	Department of Instrumentation and Control Engineering	https://control.fs.cvut.cz/en/
Short description	The project focuses on developing tools for optimal design of large-scale time delay systems, considering their inherent infinite dimensionality. Such systems often arise from interconnecting local subsystems by links of distributed-parameter nature, as it is, e.g., in heat-distribution systems with long transportation pipelines. As another example, let us point to communication time delays which can play important roles in synchronization problem of multi-agent systems. Further applications can be found in control of chained mechanical systems where compensators with delays are often used to damp flexible modes, or in recently proposed non-collocated vibration absorption of complex mechanical structures by a delayed resonator. Starting from the assessment of model interpretation and controller structure, spectral and frequency domain characteristics will be considered in forming the objective functions for the optimization problem formulation, considering the physical and performance constraints. Next to theoretical design of the methods, an enhanced attention will be paid to their validation on case study models and experimental set-ups available at the department, e.g. laboratory heat transfer system, multi-link drone model, flexible mechatronic and robotic structures.		
Supervisor prof. Ing. Tomáš Vyhlídal, Ph.D. (tomas.vyhlidal@fs.cvut.cz)	**Secondment opportunities:** KU Leuven, Belgium Department of Computer Science. Three month stay, research on robust design and spectral optimization of large scale time delay systems. Co-supervisor: prof. Wim Michiels		
Project 6	Generalized motion of biological systems driven by phase transition		

	Faculty of Mechanical Engineering	Dept. of Mechanics	
	A compelling body of evidence, spanning from the molecular to the organismal level, suggests that living systems do not exist at arbitrary non-equilibrium states; rather, they actively maintain themselves in the vicinity of critical points and phase transition boundaries. While the role of such transitions in structural self-assembly is appreciated, their fundamental importance in generating "generalized motion" - the transfer of mass, energy, or information that governs biological function - remains a critically underexplored paradigm. The aim of the study is to explore the proposition that biological systems generate local entropy production to induce controlled phase transitions as a general mechanism for motion and rapid response. This hypothesis will be tested through a synergistic, multi-scale approach that tightly integrates theoretical modeling with experimental validation. A hierarchical mathematical model will generate falsifiable predictions to be tested across three platforms: artificial membranes, tissue cultures, and large scale observational models, using advanced multiphysical and biomechanical measurements.		
Supervisor prof. RNDr. Matej Daniel, Ph.D. (matej.daniel@cvut.cz)			

7	**Magnetic sensors and actuators**		
	Fac. of electr. Eng.	Dept. of Measurement	https://maglab.fel.cvut.cz/
	Example of project is the development of novel position sensor or actuator based on nanocrystalline material. Starting from material treatment and testing, analytical solution based on vector potential, through the numerical FEM model, physical model and prototype, the precision and temperature stability of the new sensor/actuator will be optimized. Other possible projects include actuators for electric drives and sensors of electric currents, speed, for non-destructive testing, precise magnetometers for space research, security applications, position tracking, navigation, geophysics and archeology. The introduction of new materials such as amorphous and nanocrystalline and amorphous alloys, new effects and principles such as GMR and SDT, new simulation and calibration methods brought magnetic sensors in the center of attention. Our lab has wide experience and international and intersectoral cooperation in all mentioned areas		
Supervisor prof. Pavel Ripka (ripka@fel.cvut.cz)	**Secondment opportunities (and much more)** **Czech metrological institute** keeps standards and develops procedures for calibrations. The laboratories of magnetic field and electric current are members of european calibration networks **Co-supervisor:** Dr. Renata Styblikova **RSDynamics** is leading company in the field of portable sensors and instruments for security applications **Co-supervisor:** Dr. Jiri Blaha		

Project 8	**Backscattering-based, linear and nonlinear RF identification and sensing systems for IoT technologies**		
	Fac. of Electr. Eng.	Dept. of Electromagnetic Field	https://elmag.fel.cvut.cz/
Short description	Radio Frequency Identification (RFID) technology, both chip and chipless, along with the integration of stand-alone or integrated sensors, provides a physical platform for the implementation of intelligent short-range sensors for the emerging Internet of Things (IoT) technology. Such sensing devices can be seamlessly embedded into objects, products, buildings or integrated onto clothing or directly onto the human body. Applications include personal healthcare, personal and vehicle security, building and environmental monitoring, entertainment and sports, among others. The project focuses on the design, optimization, analytical and numerical evaluation of the performance and practical implementation of novel linear and non-linear backscatter-based identification and sensing transponders and systems for remote operation.		
Supervisor Assoc. Prof. Milan Polívka (polivka@fel.cvut.cz)	**Secondment opportunities** University of Roma Tor Vergata, Pervasive Electromagnetics Lab http://www.pervasive.ing.uniroma2.it/index.html **Co-supervisor:** prof. Gaetano Marrocco Grenoble Institute of Technology, LCIS **Co-supervisor:** Assoc. prof. Etienne Perret, Ph.D		

Project 9	Wide-Bandgap Electronics for Energy Conversion		
	Fac. of electr. Eng.	Dept. of Microelectronics	https://micro.fel.cvut.cz/
Short description	Semiconductor devices are at the heart of electrical energy conversion, playing a key role for environmentally friendly, sustainable solutions. Among all WBG semiconductors, diamond is deemed the ultimate material due to its extremely high breakdown electric field, high thermal conductivity, and high carrier mobility. However, the production of diamond devices suitable for power conversion applications is still hindered by technological limitations in material growth and engineering. The aim of the project is the basic research of diamond power devices (both passive and active) produced by the homoepitaxial growth. The investigation will be focused on the understanding and improvement of the basic components like pseudo-vertical/vertical Schottky diodes, pseudo-vertical/vertical PiN diodes, MESFETs or MOSFETs.		
Supervisor prof. Pavel Hazdra (hazdra@fel.cvut.cz)	**Hitachi Energy Czech Republic**		

	Co-supervisor: Prof. Jan Vobecký, Senior Principle R&D Engineer

Project 10	Advanced control, estimation, and optimization for intelligent transportation and e-mobility		
	Fac. of electr. Eng.	Dept. of Control Theory	https://control.fel.cvut.cz/en
Short description			
Supervisor doc. Ing. Zdeněk Hurák (hurak@fel.cvut.cz)	**Co-supervisor:**		

Project 11	Advanced computational methods for biomedical image reconstruction, self-supervised learning, and hierarchical classification		
	Fac. of Electr. Eng.	Department of Cybernetics	http://cmp.felk.cvut.cz
Short description	Biomedical imaging technologies generate vast amounts of data, requiring advanced computational methods for efficient processing and analysis. This project focuses on key challenges such as biomedical image reconstruction and segmentation. We plan to use self-supervised learning and hierarchical classification to improve accuracy and reduce annotation dependencies. Applications include multimodal image fusion, synthetic fluorescence image generation, 3D reconstruction of biological structures, and large-scale classification in biomedical datasets. The project involves the design, development, and evaluation of deep learning models, including CNN, self-supervised architectures, and hierarchical classification frameworks. The research aims to enhance interpretability and performance in biomedical imaging applications.		
Supervisor prof. Jan Kybic, (kybic@fel.cvut.cz)	**Secondment:** **Biomedical imaging and instrumentation lab,** Universidad Carlos III de Madrid, Instituto de Investigación Sanitaria Gregorio Marañón, Madrid, Spain **Co-supervisor:** prof. Arrate Muñoz Barrutía		

Project 12	**Novel methods of demolition waste recognition and classification**		
	Fac. of Electr. Eng.	Dept. of Radioelectronics	https://radio.fel.cvut.cz/

Short description	**Novel Methods of Demolition Waste Recognition and Classification** is a project focused on the development of innovative approaches for real-time recognition and classification of construction and demolition waste, aiming to significantly contribute to the advancement of the circular economy. The project proposes a multimodal sensing framework that combines cameras operating in visible and infrared spectra (NIR/SWIR), along with LiDAR-based 3D scanning and Time-of-Flight (ToF) sensors, to enable robust material identification directly in non-laboratory, real-world environments. The acquired data will be processed using advanced machine learning techniques optimized for accuracy, robustness, and low computational requirements to support real-time deployment. In addition to the sensing and data processing components, the project also addresses the design of efficient material sorting technologies, including optimized illumination, mechanical handling, and integration into existing demolition and recycling workflows, ultimately delivering a comprehensive system for improved resource recovery and reduced environmental impact.		
Supervisor doc. Ing. Stanislav Vítek (viteks@fel.cvut.cz)	**Secondment:** Manchester Metropolitan University, prof. Moi Hoon Yap		

Project 13	**Learning while searching in symbolic planners**		
	Fac. of Electr. Eng.	Dept. of Computer Science	https://cs.felk.cvut.cz/
Short description	The symbolic search in large state spaces is one of the foundational problems in AI. The modern solvers typically use some variant of tree search algorithm with a strong heuristic function. Not surprisingly, the heuristic function is nowadays frequently realized by neural networks. The problem is that the training set usually contains small problem instances in few numbers while the testing set contains large instances, which inevitably lead to issues with generalization. This project will therefore investigate options, how to adapt the heuristic function during the search to efficiently use information from states visited during the search. We believe this would make the search more similar to humans, which also adapts their behavior with respect to their immediate experience. We anticipate two issues: computational complexity and construction of the feedback signal from explored state space. The ultimate goal is to make the planning system competitive to (read ultimately much better than) to state of the art planners based on heuristics created by humans.		
Supervisor Assoc. Prof. Tomáš Pevný (pevnytom@fel.cvut.cz)	**Secondment:** **Artificial Intelligence and Integrated Computer Systems, Linköping University,** **Co-supervisor:** prof. Jendrik Seipp		

Project 14	Multilevel Modeling of Outcome Predictors Following Subthalamic Deep Brain Stimulation in Parkinson's Disease		
	Fac. of Electr. Eng.	Dept of Cybernetics	https://aid.fel.cvut.cz/

Short description	PhD position is focused on the development of predictive models for clinical outcomes following Deep Brain Stimulation (DBS) in Parkinson's disease. The research will center on identifying robust, interpretable predictors of motor improvement after subthalamic nucleus (STN) DBS, integrating preoperative clinical, motor, neuropsychological, and imaging data. Building on recent critiques of overfitted prediction models, the project will implement a structured, multi-tiered analytical framework, comparing classical regression techniques with modern penalized and hierarchical modeling strategies. The successful candidate will contribute to outcome definition, data analysis, and model development, and will have the opportunity to engage in advanced statistical methods such as dimensionality reduction and Bayesian modeling. This project offers access to a rich, curated clinical dataset and collaboration with leading neurologists, neurosurgeons, and data scientists.	
Supervisor doc. Ing. Daniel Novak, PhD (xnovakd1@fel.cvut.cz)		**Secondment:** Possible secondments are at University of Minnesota and Max Planck Institute in Leipzig

Project 15	Diamond-based photovoltaics for advanced sustainable energy				
	Faculty of Electrical Engineering	Department of Control Engineering			
Short description	The rapid increase in energy demand necessitates the development of highly efficient photovoltaic (PV) generators. Currently, conventional PV materials are constrained by the Shockley-Queisser limit, which can be surpassed by integrating multiple photon-to-current conversion processes. In this context, diamond-based materials emerge as strong candidates for next-generation PV devices. Our objective is to develop novel nanostructured diamond-based materials for advanced PV applications, leveraging the unique properties of the diamond structure. The ultimate goal is to create PV materials capable of generating electric current through multiple physical mechanisms beyond the standard photovoltaic effect, including multiple exciton generation, singlet fission, and thermoelectric conversion. To achieve this goal, doped-diamond systems will be considered. The thermal stability of selected compounds under operating conditions will be assessed by means of molecular dynamics simulations with Machine Learning force field parameterised on-the-fly via ab initio molecular dynamic simulations. Additionally, quantum mechanical calculations will be used to characterize electronic structure, photocurrent generation and transfer in terms of the geometric and electronic dopant environment. We will exploit access to High Performance Computing (HPC) centers to accelerate our computational efforts. The project's outcomes will serve as a guide for designing diamond-derived PV materials for multiprocess photon-to-current conversion, ultimately contributing to the development of innovative energy harvesting solutions.				
Supervisor doc. Antonio Cammarata, PhD cammaant@fel.cvut.cz		**Secondment**Web of Science ResearcherID: DWT-1620-2022			

Project 16	Deep Learning-Based Perception, Localization, and Planning for Autonomous Drone Teams		
	Fac. of Electr. Eng.	Department of Cybernetics	https://mrs.fel.cvut.cz/

Short description	The PhD student will work on topics related to aerial perception, localization, and planning. The research aims to enable reliable deployment of UAVs in unknown real-world environments with obstacles. The student will supervise or co-supervise 1–2 Master's students to support their research activities. In addition, a team of hardware engineers from the MRS group will support the research by maintaining a fleet of over 40 fully autonomous aerial robots designed for deployment in challenging outdoor environments. The Multi-robot Systems (MRS) group at the Czech Technical University in Prague integrates various research disciplines required for the design, implementation, experimental evaluation, and application of complex robotic systems in real-world conditions. The group is international, comprising members from 10 different nationalities, and focuses on research areas including motion and trajectory planning, locomotion generation, control, communication, coordination, image processing, and stabilization of groups of ground and aerial robots. From an application perspective, the MRS group addresses problems such as environmental monitoring using swarms of micro aerial vehicles, self-stabilizing convoys of ground and aerial robots, search and rescue robotics, monitoring and mapping of historical buildings using aerial robots, and aerial manipulation. We are proud of our achievements in international robotics competitions, such as MBZIRC 2017, where our team delivered the best performance in the multi-robot challenge among 140 teams from leading robotics groups worldwide; MBZIRC 2020, which we won overall; and DARPA SubT, where we achieved 2 first places, 1 second place, and 2 third places. Required skills for PhD positions: - A Master's degree in computer engineering, computer science, robotics, or a related field - Excellent results during Master's studies (e.g., publications or strong project outcomes) - Strong proficiency in C++ (required) - Experience with ROS, Gazebo, and Git is desirable - Experience in aerial robot control, trajectory planning, localization, or machine learning is an advantage - Experience with real UAV systems is an advantage - Passion for robotics, mathematics, programming, and abstract thinking - Ability to develop and efficiently implement complex algorithms

Supervisor prof. Martin Saska (martin.saska@cvut.cz)	**Secondment:** Prof. Antonio Franchi, University of Twente

Project 17	High-Velocity Dust Impacts on Tungsten Plasma-Facing Materials: A Predictive Multi-Scale Modeling Framework with Experimental Validation		
	Fac. of Electr. Eng.	Dept. of Control Engineering	https://nano.cvut.cz

Short description	This project addresses high-velocity dust impacts on tungsten, the primary plasma-facing material in fusion reactors, which cause surface cratering and erosion and thereby endanger the performance and lifetime of these reactors. We will develop a predictive multi-scale modeling framework to understand and mitigate this damage. At the atomic scale, molecular dynamics simulations will capture key impact processes (shock-induced melting, defect formation), illuminating how dust kinetic energy translates into material damage. Complementary high-speed dust impact experiments on tungsten samples and candidate tungsten alloys will validate the simulations and guide the design of more dust-resistant materials. Finally, we will use machine learning to integrate simulation and experimental data into a predictive model for damage under varied impact conditions. Such integrated approach will yield a tool to predict dust-induced damage in plasma-facing materials, guiding the design of more resilient tungsten components for safer, more efficient fusion energy systems.physics
Supervisor Prof. Tomas Polcar (polcar@fel.cvut.cz)	Secondment opportunities Imperial College London, Dept. of Mechanical Engineering https://www.imperial.ac.uk/mechanical-engineering/ Co-supervisor: prof. Daniel Dini, WoS H = 44 ,6500 heterocitations

Project 18	Physics-guided learning for machine control		
	Fac. of Electr. Eng.	Department of Cybernetics	https://cmp.felk.cvut.cz/~svoboda/
Short description	Robust machine control assumes modeling of robot-environment interactions. An example may include an outdoor autonomous ground robot that needs to be aware of its model and how the terrain will interact with it when a control sequence is executed. A flying robot may benefit from knowing the wind field ahead to model aerodynamic forces correctly. However, building robust perception systems that can efficiently adapt in a self-supervised manner to novel environments remains a significant challenge. We identify three core issues: (i) black-box models that ignore the robot's physical embodiment suffer from poor generalization, weak explainability, and limited transferability; (ii) sample-inefficient learning requires large volumes of annotated, domain-specific data; and (iii) complex architectures with tightly coupled components hinder modular adaptation. To address these limitations, we research a physics-guided machine learning framework that integrates physical knowledge with data-driven methods. Physical knowledge includes, among others, kinematics and the dynamics of the robot, terrain interaction and contact models, and environmental physics, such as wind. The physics can be incorporated in various ways. Two methods now researched most intensively are i) trainable machine learning pipelines may embed differentiable physical models, and ii) the learning process may be informed by constraining the predicted variable to obey physical laws; we can see it as physics-informed losses. We will seek new ways to embed the physics. Our approach aims to enable explainable, embodiment-aware, and probabilistically consistent adaptation from onboard sensory data via end-to-end differentiable architectures, enhancing robustness, efficiency, and generalization across diverse robotic platforms and environments.		

Supervisor Prof. Tomáš Svoboda (svobodat@cvut.cz)	**Secondment:** R. Agishev, K. Zimmermann, V. Kubelka, M. Pecka, T. Svoboda. MonoForce: Self-supervised Learning of Physics-aware Model for Predicting Robot-terrain Interaction. IEEE-IROS 2024 V. Salansky, K. Zimmermann, T. Petricek, T. Svoboda. Pose consistency KKT-loss for weakly supervised learning of robot-terrain interaction model. IEEE Robotics and Automation Letters, 2021, Volume 6, Issue 3. P. Vacek, D. Hurych, K. Zimmermann, and T. Svoboda. Let-It-Flow: Simultaneous Optimization of 3D Flow and Object Clustering. IEEE Transactions on Intelligent Vehicles, 2024 Z. Straka, T. Svoboda, M. Hoffmann. PreCNet: Next-Frame Video Prediction Based on Predictive Coding. IEEE Transactions on Neural Networks and Learning Systems, Vol 35, Issue 8, 2024, P. Vacek, O. Jasek, K. Zimmermann, T. Svoboda. Learning to Predict Lidar Intensities. IEEE Transactions on Intelligent Transportation Systems. April 2022, Volume 23, Issue 4.

Project 19	Explainable end-to-end differentiable perception for self-supervised learning in robotics		
	Fac. of Electr. Eng.	Department of Cybernetics	https://sites.google.com/view/karelzimermann
Short description	Accurate perception, which enables explainable reasoning about possible outcomes of the robot-environment interaction, is essential for many fundamental capabilities, such as localization, mapping, planning or control. Despite several successful robotic's solutions, a robust perception architecture that would allow for efficient self-supervised adaptation in an unknown environment remains an open research problem. We claim that the main issues that prevent one from building such architectures are the following: (i) Black-box architectures that neglect the physical embodiment of the robot, such as deep NNs, suffer from poor generalization, weak explainability, catastrophic forgetting and the impossibility of being transferred among different robotics platforms and environments; (ii) Consequent sample-inefficient learning requires a huge number of expensive, domain-specific, human-annotated data that cannot be transferred to other domains; (iii) Resulting complex architectures have a vast number of parameters that have to be adapted/learned jointly to avoid undesirable interference among independently tuned components. We aim to address these issues by designing grey-box, explainable, embodiment-aware, and end-to-end differentiable architectures that enable joint self-supervised adaptation from any successively incoming onboard measurements in a probabilistically consistent way.		
Supervisor Doc. Karel Zimmermann (zimmerk@fel.cvut.cz)	**Secondment:** R. Agishev, K. Zimmermann, V. Kubelka, M. Pecka, T. Svoboda. MonoForce: Self-supervised Learning of Physics-aware Model for Predicting Robot-terrain Interaction. IEEE-IROS 2024 V. Salansky, K. Zimmermann, T. Petricek, T. Svoboda. Pose consistency KKT-loss for weakly supervised learning of robot-terrain interaction model. IEEE Robotics and Automation Letters, 2021, Volume 6, Issue 3. co-supervisor: Prof. Tomáš Svoboda		

Project 20	Efficient Synthesis of the Directional Characteristic of a Multi-element Radiator or Scatterer

	Fac. of Electr. Eng.	Dept. of Electromagnetic Field	https://elmag.fel.cvut.cz/antennas
Short description	The topic is focused on the development of methods for the efficient synthesis of the directional characteristic of the multi-element radiators or scatterers. These methods are expected to generalize the process of the synthesis and decrease its computational complexity. It will be enabled by an efficient representation of the directional characteristic and introduction of a concept of successive synthesis with direct and heuristic approaches. The specific goals of the topic are: 1. Efficient representation of the directional characteristic of multi-element radiators and scatterers. It is a key point of their analysis, which is a necessary step accompanying the synthesis of their directional characteristic. This representation will be searched and employed to describe the positioning of a single element of the radiator or scatter on its directional characteristic and for comparison of the similarity of the directional characteristic with the synthesized one. 2. Direct successive synthesis of directional characteristic of multi-element radiators and scatterers It is a concept that is expected to decrease the computational complexity of the synthesis. It will be achieved by a successive separation of the contribution of the single element to the desired directional characteristic. Convergence of this synthesis concept will be investigated to achieve acceptable agreement of the desired directional characteristic with the synthesised one. 3. Heuristic successive synthesis of directional characteristic of multi-element radiators and scatterers The heuristic approaches will be oriented toward the improvement of the synthesis through the adjustment of complex properties of the directional characteristic and the correction of the synthesis with respect to the element interactions.		
Supervisor Doc. Pavel Hazdra (hazdrap@fel.cvut.cz)		**Secondment:** Polytechnic University of Turin, Applied Electromagnetics Group **Co-supervisor:** Prof. Giuseppe Vecchi	

Project 21	**Study of jet properties with the STAR experiment at RHIC**		
	Fac. of nucl. Eng.	Dept. of Physics	www.fjfi.cvut.cz
Short description	Jets, collimated sprays of particles, are considered as an ideal tool for studies of the theory of strong interaction (quantum chromodynamics, QCD) in proton-proton collisions at high energies accessible at the largest colliders in the world, RHIC at BNL and LHC at CERN. Moreover, in heavy-ion collisions, jets serve as a valuable probe of the quark-gluon plasma (QGP), a new state of matter in which basic building blocks of matter, quarks and gluons are deconfined and resemble the state of our Universe in the first moments after the Big Bang. High statistics data collected by the STAR experiment at RHIC in combination with new analysis techniques allow to study jets including also their sub-structure and bring thus new, more detailed information about QCD and QGP properties. The project is focused on the experimental task of jet reconstruction and its direct application to the STAR data along with performing various Monte Carlo simulations		

Supervisor doc. RNDr. Jana Bielčíková, Ph.D (jana.bielcikova@fjfi.cvut.cz)	**Secondment opportunities** Physics Department, Yale University, USA, 4 months, studies of jet properties in high energy proton-proton and heavy-ion collisions in the STAR experiment at RHIC, training in big data analysis, Monte Carlo simulations **Co-supervisor:** Prof. Helen Caines (Yale University)

Project 22	**Liquid Phase Chemistry of Homologues of Superheavy Elements**		
	Fac. of nucl. Eng.	Dept. of Nuclear Chemistry	www.fjfi.cvut.cz/kjch https://jaderna-chemie.cz/en/
Short description	A new joint CTU – University of Oslo – Nuclear Physics Institute ASCR Super Heavy Elements (SHE) homologues laboratory was set-up at the U-120M cyclotron beamline in Řež (Czechia) in 2017/2018. The main focus of the new lab is on the chemistry of SHE homologues and on building an on-line versatile fast low-flow aqueous chemistry apparatus. Main attention is paid to the study of redox behaviour of homologues for element Sg (Z=106) (Mo, W), Nh (Z=113) (Tl, In), and selected lanthanoids as models for the transfermium actinoids Md, No and Lr. The topic of the proposed doctoral research will focus on liquid phase chemistry of these elements and on development of a system where electrochemistry will be combined with liquid-liquid extraction and flow radiation detection.		
Supervisor prof. Jan John (jan.john@fjfi.cvut.cz) Dr. Pavel Bartl (pavel.bartl@fjfi.cvut.cz)	**Secondment opportunities** University of Oslo, Department of Nuclear Chemistry, 3-4 months, research and training in on-line liquid phase chemistry systems. **Co-supervisor:** prof. Jon Petter Omtvedt		

23	Accelerator mass spectrometry in analysis of environmental samples		
		Dept. of Nuclear Chemistry	www.jaderna-chemie.cz/en/
Short description	A joint AMS laboratory was recently set up at the Nuclear Physics Institute CAS in collaboration with CTU in Prague FNSPE, and the Archaeological Institute, Prague, with a MILEA AMS machine from Ionplus AG. For FNSPE target analytes are U-236, I-129, Ca-41, other actinides (Pa, Pu, Cm). The topic should be focused on development of fast and reliable separation procedures and together with AMS measurement applying it to environmental or social		

	problems (screening, modelling, forensics).Potential to suggest additional nuclides suitable for low terminal voltage AMS machines.
Supervisor doc. Ing. Mojmír Němec, Ph.D. (mojmir.nemec@fjfi.cvut.cz)	**Secondment:** ETH Zurich, Laboratory of ion beam physics, prof. Marcus Christl, 3-4 months training and research stay, interlaboratory measurement comparison and development.

Project 24	Classical and quantum nanophotonics		
Short description	Multiscale stochastic data-driven modeling		
Supervisor Prof. Ivan Richter (ivan.richter@fjfi.cvut.cz)	**Secondment:**		

Project 25	**Mathematical Modelling and Numerical Simulation of Flow, Transport and Phase Transitions**			
	Faculty of Nuclear Sciences and Physical Engineering		Dept. of Mathematics	https://geraldine.fjfi.cvut.cz
Short description	Investigation of *free-boundary problems* has been developed during the last decades as a consequence of problems solved in physical or biological contexts, achieving advances in material science, space technology and fluid dynamics. Free boundaries are frequently understood as hypersurfaces described by geometrical means, which dynamically evolve due to the driving forces arising in governing partial differential equations. In the project, a class of moving boundary problems will be investigated. It is assumed that such problems are described by the law for the normal velocity of the interface incorporating mean curvature, Gaussian curvature and their differentials. The research in progress is carried out for the problems of pure advection used for fluid-component tracking, for the problems of curvature-dependent evolution up to the problems of surface diffusion. The mentioned problems involve the motion law for the hypersurface or curve together with a *conservation law for energy, mass of particular components* etc. In this sense, complete analysis of any such problems still remains a challenge. Another area of wide application for moving-fronts algorithms is the simulation of porous-media flow of multiple phases and their transitions. A careful experimental investigation has discovered fingering phenomena accompanying the transport of non-aqueous phase liquids (NAPLs) in the interaction with the wetting phase (usually water). Complicated patterns of the NAPL phase develop during the interaction with pores and other phases, and are a result of the nonlinear behavior of governing equations. The phenomenon can be described by the Hele-Shaw problem for the pressure and position of the phase interface. In case of low influence of capillarity effects, the multi-phase flow is described by a nonlinear			

	conservation law known as Buckley-Leverett problem. Recently, the research interest started to focus on the soil freezing and thawing within the context of climatic changes worldwide where especially the permafrost thaw leading to the release of large amounts of gases becomes worthy of investigation.

Supervisor Prof. Dr. Ing. Michal Beneš Faculty of Nuclear Sciences and Physical Engineering (michal.benes@fjfi.cvut.cz)		**Secondment:** *Kanazawa University, Japan* 3 months, mathematical analysis a numerical solution of the flow, transport and phase transitions problems **Co-supervisor:** prof. Hirofumi Notsu, Faculty of Mathematics and Physics, Kanazawa University

Project 26	Superintegrability in classical and quantum mechanics		
	Faculty of Nuclear Sciences and Physical Engineering	Department of Physics	https://physics.fjfi.cvut.cz/index.php/en/study/mathematical-physics
Short description	Analytical investigation of dynamical systems both in classical and quantum mechanics often employs their integrals of motion. While the notion of an integrable system can be traced back to 19th century with original applications to celestial mechanics and played an indispensable role in the formulation of quantum mechanics in early 20th century, in the last few decades there has been a growing interest in systems with more integrals of motion than needed for integrability, the so-called superintegrable systems. Their structure often implies important properties like their exact solvability without the need to solve any differential equation or separability in several coordinate systems. The applicant can opt for one (or several) of the following topics of current interest: 1. Superintegrability with higher order integrals of motion, e.g. construction and classification of such systems, their simplification by means of canonical transformations. 2. Integrable and superintegrable systems in curved backgrounds, in particular with magnetic fields. 3. Polynomial algebras of integrals of motion and their applications to the investigation of quantum superintegrable systems, e.g. determination of energy spectra.		

Supervisor prof. Ing. Libor Šnobl, Ph.D. (libor.snobl@fjfi.cvut.cz)	**Secondment:** La Trobe University, Melbourne, Victoria, Australia Topic: polynomial algebras in the study of superintegrable systems **Co-supervisor:** Dr. Ian Marquette, Senior Lecturer, Department of Mathematics and Physical Sciences

Project 27	Study of novel scintillator materials for high-energy physics and applications		
	Faculty of Nuclear Sciences and Physical Engineering	Department of Physics	http://physics.fjfi.cvut.cz/index.php/en/research2/research-fields
Short description	Plastic scintillator detectors are widely used in high-energy physics (HEP) experiments for various applications, including calorimetry, luminosity measurement, particle tracking, and fast triggering. These detectors often operate in harsh environments, subjected to extreme radiation doses due to high collision rates and large particle multiplicities. There is significant interest in developing advanced scintillator technologies with enhanced performance to meet the demands of future experiments. Key goals include improving timing resolution, radiation hardness, and tunability of the emission wavelength, among other properties. This project proposes a detailed study of scintillator material properties to better understand the limits of current detector systems and accelerate the development of next-generation technologies with impact across HEP and medical imaging (TOF-PET). As part of this project, the student will investigate new scintillator materials based on innovative plastic matrices doped with state-of-the-art components such as nanocrystals and quantum dots. The student will have access to a laboratory for setting up dedicated test benches with NIM/VME electronics, electronic assembly workshop, spectrofluorometer, and radiation sources. The project has an important component of experimental work in the laboratory building test benches (with commercials and ideally custom electronics) and manufacturing the plastic scintillators. All of this in collaboration with groups at CERN and the nuclear chemistry department at CTU. Note that this call is only for funding. Students also **have to** apply to our PhD program (Nuclear Engineering, see details at https://fjfi.cvut.cz/en/applicants/doctoral-studies/admission-procedure-phd). **Note that the deadline to apply to the PhD program is May 21st**.		
Supervisors prof. Jesus Guillermo Contreras, Ph.D. contrgui@fjfi.cvut.cz Dr. Solangel Rojas Torres (rojassol@fjfi.cvut.cz)		**Secondment:** NUVIA a.s. (Czech Republic) European Organization for Nuclear Research (CERN) in the framework of the DRD collaboration (Geneva, Switzerland)	

Project 28	Studying high energy limit of Quantum Chromodynamics		
	Faculty of Nuclear Sciences and Physical Engineering	Department of Physics	https://physics.fjfi.cvut.cz/index.php/en/study/nuclear-and-particle-physics https://fjfi.cvut.cz/en/people/cepiljan
Short description	Perturbative Quantum Chromodynamics is a tool to study the structure of protons and nuclei. In the limit of high energies of the collision (small Bjorken-x), it allows us to the phenomenon called parton saturation, where the structure of proton is given as dynamical balance between radiation and recombination processes, which leads to the suppression of growth in the number of gluons. The behavior of the gluon distributions in this limit is described via the Balitsky-Kovchegov equation (BK), an integro-diferential equation with divergent kernel. Since there is no analytic method for solving the BK equation, one has to do it numerically. Complementary to that, the particle composition of proton as quantum particle can fluctuate. This can be addressed by combining the solution of BK equation with the use of a randomly generated profile using gluonic (hot) spots inside the proton. The topic focuses on the solution of the BK equation in its full form and combining this solution with the initial conditions generated via the hot spot model. This combined model will then be used to calculate observables. Using measured data for these observables, one can		

	fit the parameters for this model so that the model can be used to predict future measurements. In order to do that a sophisticated fitting method has to be implemented, e.g. using KAN neural networks. Note that this call is only for funding. Students also **have to** apply to our PhD program (Nuclear Engineering, see details at https://fjfi.cvut.cz/en/applicants/doctoral-studies/admission-procedure-phd). **Note that the deadline to apply to the PhD program is May 21st.**
Supervisor doc. Ing. Jan Cepila, Ph.D. (jan.cepila@fjfi.cvut.cz)	**Secondment:**

29	Single spin asymmetry of J/ψ production in STAR experiment and EIC		
	Fac. of Nucl. Science and Phys. Eng	Dept. of Physics	https://physics.fjfi.cvut.cz/en/
Short description	The spin structure of proton is one of the puzzling questions of current particle physics. The role of orbital angular momentum of partons is not well constrained. Studying transverse single-spin asymmetries (TSSAs) in J/ψ production offers a unique window into the spin structure of the proton. These asymmetries provide critical insights into the transverse momentum-dependent parton distribution functions (TMD PDFs), particularly the Sivers function, which describes the correlation between the spin of a nucleon and the transverse motion of its partons. Understanding TSSAs helps us probe the role of gluons and their spin-related dynamics in hadronic processes. Measurements of TSSAs in J/ψ production can test the universality and factorization properties of TMDs across different processes. Experimental data from polarized proton collisions at RHIC measured by STAR experiment can validate or challenge current theoretical models, helping to refine our understanding of non-perturbative QCD effects. This area of research is also essential for future experiments at facilities like the Electron-Ion Collider (EIC), where spin phenomena will play a central role.The project focuses on the experimental task of measuring the transverse single spin asymmetry of J/ψ production in existing p+p data and performing the studies of this process for ePIC experiment at future EIC.		
Supervisors: **Assoc. prof. Jaroslav Bielcik (CTU Prague)** **jaroslav.bielcik@cvut.cz** **prof. Daniel Kikola (WUT Warsaw)** **daniel.kikola@pw.edu.pl**	**Secondment:** Brookhaven National Laboratory, USA Warsaw University of Technology, Poland		

Project 30	Machine learning for 3D printed multifunctional metamaterials		
	Faculty of Transportation Sciences	Department of Mechanics and Materials	https://www.fd.cvut.cz/en/faculty/organizational-structure/departments/department-of-mechanics-and-materials

Short description	The PhD topic focuses on the use of machine learning to accelerate the design and understanding of 3D-printed multifunctional metamaterials, which exhibit tailored combinations of mechanical, thermal, and functional properties. Highly complex 3D lattice and architected structures can now be fabricated, but their design space remains extremely large and difficult to explore using traditional methods. This project will combine experimental data, numerical simulations, and data-driven approaches to uncover structure–property–process relationships and enable predictive modeling. Particular emphasis will be placed on state-of-the-art approaches such as physics-informed machine learning (PINNs), graph neural networks for lattice structures, and neural operators for fast surrogate modeling, as well as AI-driven inverse design and generative models. The project will include multiphysics learning, uncertainty quantification, and closed-loop design frameworks integrating real experimental feedback, with the goal of creating robust and reliable design of metamaterials for complex loading conditions. The overall objective is to develop an AI-enhanced framework for the rapid design and optimization of next-generation metamaterials, targeting applications in impact engineering, lightweight structures, and advanced functional systems.
Supervisor prof. Ing. Ondřej Jiroušek, Ph.D. (jirousek@fd.cvut.cz)	**Secondment:** National Cheng Kung University, Taiwan (prof. Fuh-Gwo Yuan, H-index 54) Joint Research Center, ELSA HopLab, Ispra, Italy (dr. Marco Peroni) Maribor University, Slovenia (prof. Matej Vesenjak, H-index 41)

Project 31	**Applications of EM fields in medical diagnostics and therapy**		
	Fac. of Biomed., Dept. of Biomedical Technology	Dept. of Biomedical Technology	https://www.fbmi.cvut.cz/en/research/teams https://bioem.fbmi.cvut.cz/doku.php/en/start
Short description	Our research team is primarily engaged in the design of methods and instrumentation for medical diagnostics and therapy based on the interaction of electromagnetic fields with biological tissues, with a strong emphasis on the use of non-ionizing radiation. We offer a research topic in the field of microwave-based diagnostics and therapy, particularly focusing on microwave imaging and therapeutic hyperthermia, which is successfully applied in cancer treatment. Diagnostic applications include non-invasive temperature monitoring during thermotherapy and detection and classification of stroke. The project aims at the development and optimization of advanced reconstruction and control algorithms, combining numerical modeling, inverse problem techniques, and AI-driven approaches, together with experimental validation to improve imaging resolution, treatment precision, and safety. The candidate will be involved in one or more of these areas, including the design of novel reconstruction algorithms, antenna elements, imaging and hyperthermia systems, treatment planning methods, amplifier design, and permittivity measurements.		
Supervisor Prof. Dr.Ing. Jan Vrba (jan.vrba@fbmi.cvut.cz)	**Secondment opportunities:** • Politecnico di Torino, Italy • TU Ilmenau, Germany		

Project 32	AIOps empowered by Knowledge Graphs		
Short description			
Supervisor doc. Ing. Tomáš Vitvar (tomas.vitvar@fit.cvut.cz)	**Secondment:**		

Project 33	Quantum networks		
	FNSPE	Dept. Physics	
Short description	Quantum networks are extensively used in quantum data processing and computation. While methods for generating networks are conceptually as well as technologically highly advanced, the quantum information application part has a large potential to be explored. The project will focus on computational applications of quantum networks along several possible lines: - development of new quantum algorithms targeting various platforms, including qubit based and optical systems - adaptation and generalisation of known quantum algorithms to concrete applications and physical systems - study of impact of network properties, including topology and other physical constraints, on achieving quantum advantage - applications of quantum networks to areas like economics or sociology		
Supervisor Prof. Igor Jex () igor.jex@fjfi.cvut.cz	**Secondment:** KOBENHAVNS UNIVERSITET UNIVERSITY OF GLASGOW UNIVERSITA DEGLI STUDI DI BARI ALDO MORO		

Project 34	Quantum metrology of electrical quantities		
	Fac. of Electr. Eng.	Dept. of Measurement	https://meas.fel.cvut.cz/
Short description	Quantum metrology of electrical quantities is currently moving from the laboratory to industrial applications. The primary goal of current research is to close the "metrological triangle"—connecting voltage, resistance, and current via fundamental constants—while making these standards portable and accessible. Based on the applicant's experience, the Fphysicsspecific topic will be assigned to one of the following areas: - quantum Hall impedance standard - measurement optimization and automation - uncertainty sources identification and modelling		

	- FEM simulations and parameter optimization of impedance standards - digital impedance bridges for quantum metrology
Supervisor prof. Jan Holub (holubjan@fel.cvut.cz)	**Secondment:** Czech Metrology Institute https://cmi.gov.cz/?language=en Co-supervisor: Ing. Jan Kučera, Ph.D.

35	Learning to solve multiple view geometry		
	CIIRC	Dept. of Robotics and Machine Perception	aag.ciirc.cvut
Short description	Multiple view geometry is an important field in computer vision and robotics, which provides understanding to the foundations of the subject. The development of this field has, however, not yet been greatly influenced by the recent advances in machine learning and geometrical machine learning in particular [1]. We aim at using machine learning to address long-standing problems in multiple view geometry that have not been solved by traditional techniques. For instance, current methods for computing camera geometry from image matches can cope efficiently with only relatively simple problems in two-view geometry [2]. Thus, there are still often no really efficient solvers for problems involving more views and more complex geometry [3,4,5]. The classical approach to solver design leads in this case to very complicated computation procedures due to trying to solve exact algebraic problems. Recent advances in numerical algebraic geometry [5,6,7] start providing a practical alternative to the elimination-based approaches [8]. In particular, we believe that these approaches can be greatly improved in efficiency and robustness by learning optimal strategies of solving [9], efficient problem analysis [10], and fitting the problem to the data. Our plan is to generalize our approach from [11] to solving hard problems in multiple-view geometry that would use machine learning to tune solving techniques to the data and thus making them tractable and efficient. [1] M. Bronstein et al. “Geometric deep learning: going beyond Euclidean data”. IEEE Signal Processing Magazine, vol. 34, no. 4, pp. 18-42, 2017. [2] D. Nister and F. Schaffalitzky. “Four Points in Two or Three Calibrated Views: Theory and Practice”. International Journal of Computer Vision, IJCV 2006. [3] R Fabbri et al. “TRPLP – Trifocal Relative Pose From Lines at Points”. IEEE Conference on Computer Vision and Pattern Recognition, CVPR 2020. [4] T Duff et al. “PLMP - Point-Line Minimal Problems in Complete Multi-View Visibility”. IEEE International Conference on Computer Vision, ICCV 2019. [5] T Duff et al. “PL1P - Point-line Minimal Problems under Partial Visibility in Three Views”. European Conference on Computer Vision. ECCV 2020. [6] V Larsson et al. “Beyond Grob. Bases: Basis Selection for Min. Solvers”. CVPR 2018. [7] D Peifer et al. “Learning selection strategies in Buchberger's algorithm”. International Conference on Machine Learning, ICML 2020. [8] E. Bernal et al. “Machine learning the real discriminant locus”. ArXiv, June 2020. [9] E Brachmann et al. "DSAC – Diff. RANSAC for Camera Localization", CVPR 2017. [10] R Ranftl, V Koltun. “Deep Fundamental Matrix Estimation”. ECCV 2018. [Rolinek] M Vlastelica et al. “Differentiation of Blackbox Combinatorial Solvers”. ICLR 2020. [11] P Hruby et al. “Learning To Solve Hard Minimal Problems”. CVPR 2022.		
Supervisor doc. Ing. Tomáš Pajdla, Ph.D. (pajdla@cvut.cz)	**Secondment:** Possible secondments are at ETH Zurich and KTH Stockholm		