



## CTU Global Postdoc Fellowship

### CTU Global Postdoc Fellowship

Czech Technical University in Prague now offers a new fellowship program, the CTU Global Postdoc Fellowship. This new and attractive two-year fellowship-program offers excellent researchers who have recently completed their PhD the chance to continue their research career at CTU. Fellows receive a two year fellowship and become members of a team led by a mentor.

The scholarship applicant must meet the following conditions on the date of application

- be no more than 7 years since obtaining the first PhD degree,
- PhD. studies at a university outside the Czech Republic or have completed at least a one-year working research stay abroad (outside the Czech Republic),
- be an author (co-author) of three or more publications in a journal with IF.

The CTU Global Postdoc Fellowship is open to all topics listed later in this document. Researchers are invited to apply directly to the faculty/institute, see details below. The mentor has a strong vote in the selection process.

Applicants are advised to contact mentors for more details.

The deadline for submission is indicated for each research topic/position. [How to apply.](#)

Shortcuts to topics/positions at faculties and institutes (click Topics/positions)	
Topic #3-x	<a href="#">Topics/positions</a> available at the <a href="#">Faculty of Electrical Engineering</a>
Topic #6-x	<a href="#">Topics/positions</a> available at the <a href="#">Faculty of Transportation Sciences</a>
Topic #11-x	<a href="#">Topics/positions</a> available at the <a href="#">Institute of Experimental and Applied Physics</a>
Topic #12-x	<a href="#">Topics/positions</a> available at the <a href="#">Czech Institute of Informatics, Robotics and Cybernetics</a>

*Document version 1.8* Latest version of this document as well as latest information can be found at [international.cvut.cz/postdoc](http://international.cvut.cz/postdoc)



CTU Global Postdoc Fellowship

Topics/positions available at the

## Faculty of Electrical Engineering

Applications should be sent to

E-mail: [drimakat@fel.cvut.cz](mailto:drimakat@fel.cvut.cz)

or

FEL ČVUT

Zaměstnanecké oddělení

Attn: Ing. Kateřina Dřímlová

Technická 2

166 27 Praha 6

Czech Republic

Research topic #3-9

1 Topic name	Advanced control and estimation for cooperative, connected, and automated mobility (ACE for CCAM)
ERC research field descriptor	15.9
2 Link to topic / project page	<a href="http://aa4cc.dce.fel.cvut.cz/content/open-positions">http://aa4cc.dce.fel.cvut.cz/content/open-positions</a>
3 Short description of the topic	<p>The hosting research group is currently running several research projects aimed at the (broader) goal to contribute to the development of cooperative, connected and automated mobility. Although such research aims at producing academic deliverables such as journal and conference papers, it is conducted in collaboration with industrial partners, hence a strong focus on applicability of the research findings in real life. One of the collaborating companies is a producer of railroad vehicles (trains, trams and metro), the other produces vehicle-to-everything (V2X) communication units tailored to city buses, trolleybuses and trams, hence a strong preference to public transportation in the research.</p> <p>Some research topics explored by the group are vehicle motion state estimation / localization / map-matching by multisensor fusion, braking distance prediction, collision avoidance for trams, energy-efficient train/tram/metro control, desynchronization of departures of vehicles in order to reduce peak loads on the grid, coordination of vehicles passing through signalized intersection, all these exploiting the vehicle-to-everything (V2X) wireless communication. In all these topics, algorithms and data are the key objects for our research, in particular algorithms for control and estimation, possibly (and preferably) augmented with V2X communication. The successful candidate will be invited to join a particular research quest based on their professional experience and preference, but they will also be encouraged to come up with their own ideas (as soon as they learn the possibilities and limitation of the research group and in particular the industrial partners). The interested candidate will also have an opportunity to co-supervise graduate students working in these projects.</p>
4 Description of the ideal candidate	<p>We are seeking a highly motivated postdoctoral researcher with a Ph.D. in control systems and a strong background in mathematical control theory, particularly in optimal/optimization-based control and estimation, including stochastic variants. The ideal candidate will have decent physical modeling and dataset manipulation skills. They should possess a sound engineering mindset with a strong motivation to solve real industrial problems. The successful candidate will have a keen interest in at least one of the following domains: vehicle dynamics and control, intelligent transportation systems, vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication. They should be comfortable working in a collaborative research environment and have excellent communication skills. This is equally suitable both as an entry-level and experienced postdoctoral position.</p>

Mentor

Zdeněk Hurák	Faculty of Electrical Engineering	Control Engineering	<a href="mailto:hurak@fel.cvut.cz">hurak@fel.cvut.cz</a>
--------------	-----------------------------------	---------------------	--

Salary: CZK 65 000 per month  
 Application deadline: 20 May 2024  
 Start date: 01 September 2024

**Research topic #3-11**

1 Topic name	Novel magnetic sensors for position, speed and electric current
ERC research field descriptor	174
2 Link to topic / project page	<a href="https://measure.fel.cvut.cz/index.php/careers">https://measure.fel.cvut.cz/index.php/careers</a>
3 Short description of the topic	<p>Magnetic position, speed and electric current sensors are popular for industrial, automotive, aerospace, security, and defense applications. They are cheap, reliable, rugged, and durable and they are resistant to dust and dirt. Their disadvantage is in general low accuracy (with the exception of LVDTs, which reached 0.1 % accuracy), slow response and sensitivity to external magnetic fields.</p> <p>Gradual improvement and optimization of classical magnetic position sensors by engineering development and applied research reached its limit. Only fundamental research can bring a breakthrough.</p> <p>The candidate is expected to develop new design methods and new sensor principles, use novel materials and devices to open the path towards substantially higher precision, speed of response, resistance to external magnetic fields and lower power consumption.</p> <p>He will develop novel semi-analytic methods allowing fast parametric modelling and design of magnetic position sensors and design new types of magnetic position sensors using</p> <p>(b) amorphous and nanocrystalline materials,          (c) fluxgate, TMR, and 3-D MEMS Hall sensors</p>
4 Description of the ideal candidate	<p>PhD from Physics or Electrical Engineering</p> <p>strong publication record</p> <p>Experience in FEM simulations, processing of magnetic materials, magnetic measurements and magnetic sensor testing</p>

**Mentor**

prof. Pavel Ripka	Fac. of Electrical Engineering	Measurement	<a href="mailto:ripka@fel.cvut.cz">ripka@fel.cvut.cz</a>
-------------------	--------------------------------	-------------	--

Salary: CZK 62 000 per month

Application deadline: 30 April 2024

Start date: 01 July 2024

## Research topic #3-12

1 Topic name	Control of AC Electric Drives Fed by Special Inverter Topology
ERC research field descriptor	15.11 - Electrical engineering
2 Link to topic / project page	
3 Short description of the topic	<p>The topic focuses on the control of AC electric drives (IM or SynRM) focused on utilization of less known inverter topologies (e.g. Dual inverter, 4 bridge inverter) with modern semiconductor devices (GaN, SiC) The aim is to implement own designed algorithms in a signal processor and simulation environment. The proposed modulation and control strategy should pursue the objectives of increasing the efficiency or reliability of the traction drive by means of suitably modified control based e.g.:</p> <ul style="list-style-type: none"> <li>• on improved mathematical models compensating for parameter variation,</li> <li>• on increasing the drive dynamics and control accuracy, improving the efficiency,</li> <li>• on maximizing the use of the capabilities of modern signal processors or FPGA circuits in the control of electric drives,</li> </ul> <p>on utilization of SiC or GaN semiconductors in power converter circuit.</p>
4 Description of the ideal candidate	<p>The candidate should hold a Ph.D. in electrical or control engineering, or power electronics, obtained within the last 5 years. A very good knowledge of electric drives and power electronics. Proficiency in written and oral English. The candidate should have a proven track record of research excellence, with several papers published as the main author in impactful journals (Q1/Q2 preferred).</p>

## Mentor

Jan Bauer	Fac. of Electrical Engineering	Electric Drives and Traction	bauerja2@fel.cvut.cz
-----------	--------------------------------	------------------------------	----------------------

Salary: CZK 75 000 per month

Application deadline: 30 April 2024

Start date: 01 July 2024



## CTU Global Postdoc Fellowship

Research topic #3-13

1 Topic name	Autonomous vehicle AI/ML safety framework
ERC research field descriptor	15.9
2 Link to topic / project page	<a href="https://sds.fel.cvut.cz/open-positions">https://sds.fel.cvut.cz/open-positions</a>
3 Short description of the topic	<p>Our group research interested is in Cooperative, Connected, and Automated Mobility (CCAM), with a primary focus on autonomous vehicle safety frameworks aligned with the evolving landscape of AI and ML technologies. Our commitment is to contribute to the certification potential of these cutting-edge technologies, ensuring their seamless integration into road transportation systems. We collaborate closely with industrial partners engaged in the development of road vehicles, vehicle-to-vehicle (V2V), and vehicle-to-everything (V2X) communication devices.</p> <p>In pursuit of our objectives, we delve into various critical areas:</p> <p><b>Autonomous Vehicle Safety Framework:</b> Investigating the design and verification of safety frameworks for autonomous vehicles, leveraging V2V and V2X communication, redundant sensor technologies (IMU, GPS, LiDAR, radar, etc.), and sophisticated autonomous driving algorithms. Our framework empowers vehicles to assess driving and emergency strategies, track trajectories based concurrently and collaboratively on a traffic level arbiter and ensure the safety framework's compatibility with certification requirements.</p> <p><b>Traffic and Formation Level Control:</b> Exploring methods to control and coordinate vehicles at both traffic and formation levels using V2V and V2X communication. This approach optimizes speed, spacing, and lane changes, leading to improved active safety, comfort, and overall traffic and vehicle efficiency. Holistically optimizing factors such as energy consumption, flow, and vehicle wear is central to our research.</p> <p>As a potential candidate, you will have the opportunity to join a specific research project based on your professional experience and preferences. Additionally, we encourage the generation of innovative ideas as you familiarize yourself with our research group and engage with our industrial partners. Successful candidates will also be invited to co-supervise graduate students involved in these transformative projects. Join us in shaping the future of autonomous and connected mobility, contributing to enhanced road safety, traffic efficiency, and environmental sustainability.</p>
4 Description of the ideal candidate	<p>We are seeking a postdoctoral researcher who has a Ph.D. in control systems and a solid knowledge of mathematical control theory, especially in optimal/optimization-based control and estimation, with applications in automotive or aerospace domain. The ideal candidate will have good skills in physical modeling and data manipulation. They should have a strong engineering mindset and a high motivation to tackle real industrial challenges. The successful candidate will be interested in one or more of the following areas: vehicle dynamics and control, intelligent transportation systems, vehicle-to-vehicle (V2V) and vehicle-to-everything (V2X) communication. They should be able to work well in a team and have excellent communication skills. This position is suitable for both entry-level and experienced postdoctoral researchers.</p>

Mentor

Tomáš Haniš	Fac. of Electrical Engineering	Control Engineering	<a href="mailto:tomas.hanis@cvut.cz">tomas.hanis@cvut.cz</a>
-------------	--------------------------------	---------------------	--

Salary: CZK 65 000 per month  
 Application deadline: 30 April 2024  
 Start date: 01 July 2024

Research topic #3-14

1 Topic name	Battery Modeling and State Estimation with Emphasis on State-of-Health and Prediction of Remaining Lifetime
ERC research field descriptor	15.9, 15.11, 15.24, 37.8
2 Link to topic / project page	
3 Short description of the topic	<p>The Battery &amp; Energy Storage Systems research group at CTU in Prague is seeking a candidate for the development of innovative algorithms in the field of battery management systems, specifically for lithium-ion and upcoming sodium-ion batteries. The successful candidate will be an integral part of our collaborative team, contributing to various related projects.</p> <p>The primary responsibilities will revolve around modeling and state estimation of batteries, with a particular focus on state-of-health and predicting remaining lifetime. This entails utilizing newly proposed and improved electrical circuit models and electrochemical approaches for battery modeling. State estimation will employ control engineering methods, such as Kalman filters, and may alternatively explore cutting-edge machine learning techniques. The development of models and estimation techniques will be based on battery testing data generated in our state-of-the-art battery lab.</p>
4 Description of the ideal candidate	<p>The candidate has a Ph.D. in electrical, material, or control engineering, or a closely related field, not older than 7 years. Proficiency in written and oral English is a must. The candidate has a proven track record of research excellence with several papers as the main author published in impactful journals. Strong communication skills and the ability to work collaboratively within a team-oriented environment are required.</p> <p>Advantages are:</p> <ul style="list-style-type: none"> <li>• Previous experience working abroad</li> <li>• EU Citizenship or Schengen Visa</li> <li>• Prior experience in battery modeling</li> <li>• Experience with Kalman Filters or Machine Learning</li> <li>• Programming Skills: Proficiency in programming or scripting languages such as Matlab and Python</li> </ul>

Mentor

Václav Knap	Fac. of Electrical Engineering	Electrotechnology	<a href="mailto:vaclav.knap@cvut.cz">vaclav.knap@cvut.cz</a>
-------------	--------------------------------	-------------------	--

Salary: CZK 70 000 per month

Application deadline: 30 April 2024

Start date: 01 July 2024



## CTU Global Postdoc Fellowship

### Research topic #3-15

1 Topic name	Parallel and Distributed Optimization Algorithms for Machine Learning
ERC research field descriptor	9.8
2 Link to topic / project page	<a href="https://ida.fel.cvut.cz/">https://ida.fel.cvut.cz/</a>
3 Short description of the topic	<p>The postdoc is expected to advance the state of the art in algorithms that use HPC hardware for fast training of models on large datasets. The postdoc is expected to program distributed and shared memory algorithms, as well as use the new IPU technology. These algorithms will be applied to a range of applications ranging from machine learning for public health to quantum control.</p> <p>The lab fosters a welcoming and stimulating environment, and comprises of approximately 15 people of mixed nationalities and genders, mostly consisting of PhD students and postdocs. English serves as the primary working language. A substantial portion of the total salaries are comprised of performance-related bonuses, which augment the quoted base pay.</p>
4 Description of the ideal candidate	<p>The ideal candidate will have been the main author of papers published in some of the prestigious conferences such as PODC, IJCAI, ICML, NeurIPS and/or reputable journals such as AI, JAIR, MLJ, JMLR, MathProg, SIAM Opt, JOTA, MOR, and will continue to contribute to such venues after joining the lab. (S)he will actively seek external funding opportunities. Involvement in teaching is possible but not mandatory. Proficiency in the Czech language is not required, even in the long run.</p>

### Mentor

Vyacheslav Kungurtsev	Fac. of Electrical Engineering	Computer Science	<a href="mailto:Vyacheslav.kungurtsev@fel.cvut.cz">Vyacheslav.kungurtsev@fel.cvut.cz</a>
-----------------------	--------------------------------	------------------	--

Salary: CZK 70 000 per month  
Application deadline: 30 April 2024  
Start date: 01 July 2024





## CTU Global Postdoc Fellowship

### Research topic #3-16

1 Topic name	Combinatorial Sampling in First-Order Logic
ERC research field descriptor	27.10
2 Link to topic / project page	<a href="https://ida.fel.cvut.cz/">https://ida.fel.cvut.cz/</a>
3 Short description of the topic	<p>The postdoc is expected to work on problems related to sampling of combinatorial objects with applications in (probabilistic) programming languages and neuro-symbolic deep learning. The work will be at the boundary of computational logic and combinatorics. The postdoc can focus either on the theoretical side (characterizing classes of structures that can be sampled in polynomial time) or the practical side of the problem (making the algorithms “practically” efficient).</p> <p>The lab fosters a welcoming and stimulating environment, comprising approximately 15 people, mostly consisting of PhD students and postdocs of mixed nationalities and genders. English serves as the primary working language. A substantial portion of total salaries is comprised of performance-related bonuses, which augment the quoted base pay.</p>
4 Description of the ideal candidate	<p>The ideal candidate will have been the main author of papers published in some of the top-tier conferences such as IJCAI, ICML, NeurIPS and/or reputable journals such as AI, JAIR, MLJ, JMLR, and will continue to contribute to such venues after joining the lab. (S)he will actively seek external funding opportunities. Involvement in teaching is possible but not mandatory. Proficiency in the Czech language is not required, even in the long run.</p>

### Mentor

Ondřej Kuželka	Fac. of Electrical Engineering	Computer Science	ondrej.kuzelka@fel.cvut.cz
----------------	--------------------------------	------------------	----------------------------

Salary: CZK 70 000 per month

Application deadline: 30 April 2024

Start date: 01 July 2024

Research topic #3-17

1 Topic name	Smart Grids, Power System Stability and Sustainability
ERC research field descriptor	15.11, 15.12, 15.27
2 Link to topic / project page	<a href="http://k315.feld.cvut.cz/cs/content/entthemes-thesis">http://k315.feld.cvut.cz/cs/content/entthemes-thesis</a>
3 Short description of the topic	<p>The electric power industry is under pressure to phase out conventional power plants, especially coal, and increase the share of renewables in their energy mix. This trend changes the traditional power system behavior and ways of power system control. With a larger share of renewables, the overall system inertia has decreased. However, the industry has to learn how to operate synchronous generators in a system with a larger share of solar and wind that does not utilize SGs with large inertia.</p> <p>The candidate is expected to cooperate in development of new power system operation strategies or control strategies using most up to date technologies. We are looking for experience in:</p> <ul style="list-style-type: none"> <li>- Flexible AC transmission system (FACTS) devices</li> <li>- Artificial stability</li> <li>- Smart Flexibility Systems (e.g. H2flex)</li> <li>- Wide Area Systems (WAMS, WACS,WAPS etc.)</li> </ul> <p>It is preferred to continue with previous candidate research topic. The research will be supported by experienced group of researchers with close link to the power industry.</p>
4 Description of the ideal candidate	<ul style="list-style-type: none"> <li>- PhD from Electrical Engineering</li> <li>- Very good publication record</li> <li>- Experience in Power System Simulation (distributed generation, smart grids, power system stability)</li> </ul>

Mentor

Zdenek Muller	Fac. of Electrical Engineering	El. Power Engineering	zdenek.muller@fel.cvut.cz
---------------	--------------------------------	-----------------------	---------------------------

Salary: CZK 75 000 per month  
 Application deadline: 30 April 2024  
 Start date: 01 July 2024

**Research topic #3-18**

1 Topic name	Concepts of autonomous energy communities following technical and environmental aspects
ERC research field descriptor	15.9, 15.11, 15.24, 37.8
2 Link to topic / project page	
3 Short description of the topic	<p>The rapid development of electricity storage and conversion technologies brings new opportunities for the modern electricity industry. The increasing penetration of new sources and storage elements creates opportunities for building local microgrids and combining them into larger, more or less autonomous units. Thus, there is a gradual transition to a community energy concept based on local electricity generation and consumption. The idea of autonomous communities can also help mitigate grid instability caused by renewable energy sources through services that can be provided to the upstream grid. Follow-up research should focus on issues related to the optimal size of the community, its characteristics, and the type of energy systems used to achieve viable and economically acceptable autonomous energy community solutions.</p> <p>The primary responsibility will lie in innovative power system simulation models with a focus on determining the reliability and stability parameters. This will also include simulation scenarios predicting the impact of autonomous energy communities on the distribution system and opportunities for collaboration on regulatory programs. The research should also focus on determining the operating characteristics and factors that affect the lifetime of individual components. This includes assessing the impact of non-standard loads on power system insulation systems and the overall reliability of the power supply.</p> <p>The successful candidate will be an integral part of our collaborative team, contributing to various related projects.</p>
4 Description of the ideal candidate	<p>The candidate should hold a Ph.D. in electrical or control engineering, or a closely related field, obtained within the last 7 years. A very good knowledge of electrical power systems and components is assumed. Proficiency in written and oral English is a must. The candidate should have a proven track record of research excellence, with several papers published as the main author in impactful journals. Strong communication skills and the ability to work collaboratively within a team-oriented environment are also required.</p> <p>The advantage is previous experience working abroad, EU Citizenship or Schengen Visa and experience with programming or scripting languages (Matlab, Python, Mathematica)</p>

**Mentor**

Radek Procházka	Fac. of Electrical Engineering	Electrotechnology	<a href="mailto:xprocha3@fel.cvut.cz">xprocha3@fel.cvut.cz</a>
-----------------	--------------------------------	-------------------	--

Salary: CZK 70 000 per month  
 Application deadline: 30 April 2024  
 Start date: 01 July 2024

Research topic #3-19

1 Topic name	Correlative microscopy of nanomaterials and molecules for energy conversion
ERC research field descriptor	7.13, 15.11, 15.17, 32.2, 32.16, 32.19, 37.22, 37.27
2 Link to topic / project page	<a href="https://fyzika.fel.cvut.cz/en/applied-physics/">https://fyzika.fel.cvut.cz/en/applied-physics/</a> <a href="https://tacom.fel.cvut.cz/en/">https://tacom.fel.cvut.cz/en/</a>
3 Short description of the topic	Correlative microscopy integrates the capabilities of typically separate techniques to obtain often unique results and understanding when used in combination. We have recently established reference laboratory for correlative microscopy and we are engaged in several new projects where application of these methods makes indispensable part of the research. The laboratory comprises several atomic force microscopes with nanoelectrical and nanomechanical measurement regimes, Kelvin probe systems, Raman and PL micro-spectroscopy as well as optical and scanning electron microscopy setups. The GPF project will be focused on correlative analyses of structural, chemical, electronic and opto-electronic properties of modern semiconductor materials (thin film and 2D) with optical centers and organic molecules with respect to their interaction, light absorption, energetic band profiles, charge transfer, and charge carriers for applications in electronics and energy conversions. The work will occur within our broader research team and students devoted to this area of research.
4 Description of the ideal candidate	Successful candidates must have a PhD in Physics, Chemistry, Materials Science, Electrical Engineering or closely related disciplines. Prior publication track record in impacted journals with at least 3 papers as the first author and very good command of spoken and written English are mandatory. Good communication skills, initiative and team work are demanded. Prior professional experience abroad from a home country is advantageous. EU citizenship or Schengen visa is also advantageous.

Mentor

Bohuslav Rezek	Fac. of Electrical Engineering	Physics (13102)	<a href="mailto:rezekboh@fel.cvut.cz">rezekboh@fel.cvut.cz</a>
----------------	--------------------------------	-----------------	--

Salary: CZK 62 000 per month  
 Application deadline: 30 April 2024  
 Start date: 01 July 2024

**Research topic #3-20**

1 Topic name	Advanced sensors with neural networks-based edge computing
ERC research field descriptor	37.15, 37.22
2 Link to topic / project page	<a href="https://meas.fel.cvut.cz/smid/snec">https://meas.fel.cvut.cz/smid/snec</a>
3 Short description of the topic	<p>The availability of low-power microcontrollers with embedded neural network accelerators enables the design of entirely new types of sensors that use intensive computational processing at the sensing point, so-called edge processing. The implementation of local processing using neural networks is advantageous in high-dimensional and nonlinear problems.</p> <p>One example is solving the inverse problem in Electrical Resistance Tomography (ERT) directly at the sensing electrodes. Sensors using ERT help monitor flows and processes inside vessels and pipelines in the industry, enable the monitoring of structures' health, and allow specific imaging and diagnosis in medicine. Another group of applications is local-type recognition of complex signals using a large number of features. Another application area is local anomaly detection in monitored signals for machine condition monitoring and predictive maintenance.</p> <p>The main focus of the research will be modeling and developing neural networks that can be implemented in constrained sensor hardware to address the above topics, constructing sensor prototypes, and evaluating performance in real-world applications. Collaboration with other lab members responsible for the frontend parts of the sensors is expected.</p>
4 Description of the ideal candidate	<p>We seek highly motivated applicants with a Ph.D. in embedded systems, electronic engineering, or related fields and a proven track record relevant to the topic, such as publications in top journals or conferences. The ideal candidate will have good skills in microcontroller-based embedded system design and neural networks-based machine learning.</p> <p>Successful applicants will also have the opportunity to co-supervise graduate students. Previous experience of working abroad, EU citizenship, or Schengen visa are advantages.</p>

**Mentor**

Radislav Smid	Fac. of Electrical Engineering	Measurement	<a href="mailto:smid@fel.cvut.cz">smid@fel.cvut.cz</a>
---------------	--------------------------------	-------------	--

Salary: CZK 65 000 per month

Application deadline: 30 April 2024

Start date: 01 July 2024

**Research topic #3-21**

1 Topic name	Self-supervised learning in machine perception
ERC research field descriptor	9.5, 9.8. and 15.9
2 Link to topic / project page	<a href="https://cyber.felk.cvut.cz/vras">https://cyber.felk.cvut.cz/vras</a> <a href="https://cmp.felk.cvut.cz/~svoboda">https://cmp.felk.cvut.cz/~svoboda</a>
3 Short description of the topic	<p>While collecting vast amounts of data from various onboard sensors on contemporary vehicles is easy, providing manual annotations for supervised learning is extremely challenging and consequently expensive. It is especially appealing in safety-critical applications of autonomous driving, where performance requirements are extreme and datasets are large. We leverage the strong prior knowledge about various semantic classes that appear in traffic scenarios in order to construct novel self-supervised losses that allow learning from these unlabeled data. These losses typically encode first-principle models (learning the 3D flow and terrain models from sequential data or learning the 3D shapes of objects) or behavioral patterns induced by traffic rules (learning to predict future motion).</p> <p>Group and supervision: Research will be conducted within the Vision and Robotics Group under the supervision of Prof. Tomas Svoboda. The group has extensive experience with real robotics, such as successful participation in the DARPA SubT challenge (<a href="https://robotics.fel.cvut.cz/cras/darpa-subt/">https://robotics.fel.cvut.cz/cras/darpa-subt/</a>) and several state-of-the-art robotics platforms and sensors (<a href="https://robotics.fel.cvut.cz/cras/robots/">https://robotics.fel.cvut.cz/cras/robots/</a>). The Department has access to a high-performance computational cluster dedicated to artificial intelligence research and developments using traditional multi-CPU systems, but also GPUs.</p>
4 Description of the ideal candidate	We seek highly motivated applicants with a PhD in robotics, AI, or related fields and a proven track record relevant to the topic - publications in top journals or conferences (e.g. computer vision (CVPR/ICCV/ECCV), machine learning (NeurIPS/ICML), or robotics (ICRA, IROS, RSS, CoRL; IEEE-TRO, IJRR).

**Mentor**

Tomáš Svoboda	Fac. of Electrical Engineering	Cybernetics	<a href="mailto:svobodat@fel.cvut.cz">svobodat@fel.cvut.cz</a>
---------------	--------------------------------	-------------	--

Salary: CZK 70 000 per month

Application deadline: 30 April 2024

Start date: 01 July 2024



## CTU Global Postdoc Fellowship

### Research topic #3-22

1 Topic name	Neuro-symbolic integration and Deep relational learning
ERC research field descriptor	9.8
2 Link to topic / project page	<a href="https://ida.fel.cvut.cz/">https://ida.fel.cvut.cz/</a>
3 Short description of the topic	The postdoc is expected to advance the state of the art in neuro-symbolic machine learning (i.e., learning combining the principles of deep learning and logical reasoning) and/or in deep learning from relational data. (S)he may start off by extending the lines of recent research from the host lab (see the tiles <i>Deep Learning</i> , <i>Deep Relational Learning</i> , and <i>Symbolic AI</i> under the above link) or explore an original approach. The lab fosters a welcoming and stimulating environment, comprising approximately 15 people, mostly consisting of PhD students and postdocs of mixed nationalities and genders. English serves as the primary working language. A substantial portion of total salaries is comprised of performance-related bonuses, which augment the quoted base pay.
4 Description of the ideal candidate	The ideal candidate will have been the main author of papers published in some of the prestigious conferences such as IJCAI, ICML, NeurIPS and/or reputable journals such as AI, JAIR, MLJ, JMLR, and will continue to contribute to such venues after joining the lab. (S)he will actively seek external funding opportunities. Involvement in teaching is possible but not mandatory. Proficiency in the Czech language is not required, even in the long run.

### Mentor

Filip Železný	Fac. of Electrical Engineering	Computer Science	<a href="mailto:zelezny@cvut.cz">zelezny@cvut.cz</a>
---------------	--------------------------------	------------------	--

Salary: CZK 70 000 per month

Application deadline: 30 April 2024

Start date: 01 July 2024



## CTU Global Postdoc Fellowship

Topics/positions available at the

## Faculty of Transportation Sciences

Applications should be sent to

E-mail: [knapova@fd.cvut.cz](mailto:knapova@fd.cvut.cz)

and copied to

[vyzkum@fd.cvut.cz](mailto:vyzkum@fd.cvut.cz)



Research topic #6-1

1 Topic name	Experiments and modeling of dynamic fracture of materials
ERC research field descriptor	15.17 Materials engineering 15.18 Mechanical engineering
2 Link to topic / project page	<a href="http://mech.fd.cvut.cz/vacancies/postdoc-positions">http://mech.fd.cvut.cz/vacancies/postdoc-positions</a>
3 Short description of the topic	<p>Dynamic failure and dynamic fracture of materials considering various failure mechanisms, are at the center of our interest. The overall objectives are the development of numerical models based on extensive experimental data from experiments under a broad range of strain rates. The research is aimed at establishing a fundamental understanding of material mechanics of failure at multiscale. We are seeking a highly talented and motivated researcher to work within our impact dynamics group oriented at experimental and numerical investigation of mechanical response of materials and metamaterials at dynamical loading (high-strain-rate experiments using various methods, including SHBP/OHPB, drop tests, other impact loading) using state-of-the-art methods including high speed imaging, DIC, high-speed X-ray imaging (including Flash Xray), etc.</p> <p>The aim of the project is to develop a new constitutive models for Finite Element modelling interesting new (including 3D printed) (meta)materials which would allow for FE simulations of impact under moderate and high strain rates. The approach should include new methods, e.g. physics-based machine learning. The holder of the postdoc position will be a member of a strong research group of young and highly motivated scientists, mainly PhD students and young postdocs.</p>
4 Description of the ideal candidate	The candidate is expected to hold a doctorate (or be very near to its completion) in engineering, materials science, mathematics, physics or a related discipline; or, alternatively, have a good first degree and/or significant relevant industrial experience. Experience with SHPB (Split Hopkinson Pressure Bar) experimental technique for characterization of the behavior of materials at high strain rates and/or evaluation of measured data for constitutive modelling is advantageous, though not required. Aside the constitutive modelling and FE simulations you will be expected to analyze and interpret high strain rate and gas gun experiments. Knowledge in material modelling, data acquisition systems, development of novel diagnostics and apparatuses in experimental mechanics of materials is also beneficial.

Mentor

Ondřej Jiroušek	Faculty of Transportation Sciences	Department of Mechanics and Materials	<a href="mailto:ondrej.jirousek@cvut.cz">ondrej.jirousek@cvut.cz</a>
-----------------	------------------------------------	---------------------------------------	--

Salary: CZK 62 000 per month  
 Application deadline: 31 May 2024  
 Start date: 01 September 2024

1 Topic name	Integration of cooperative and automated vehicles into traffic management (Distributed traffic control for cooperative vehicles)
ERC research field descriptor	15.6 Civil engineering 15.9 Control engineering
2 Link to topic / project page	<a href="http://lambda.fd.cvut.cz">http://lambda.fd.cvut.cz</a> <a href="http://maven-its.eu/">http://maven-its.eu/</a>
3 Short description of the topic	<p>Just the fact, that a vehicle drives by itself does not necessary lead to improvements of traffic conditions in cities. The effect depends on the way, how they are integrated into city management. The existing traffic control algorithms must be changed. The vehicles are part of the algorithms and serve as agents who negotiate with the traffic controllers (another agents) and further with traffic management centres (TMC) to optimise traffic throughput (or other performance indicators) in the road network. The algorithms are based on multiagent framework in order to ensure the distributed nature of the algorithms and include for example negotiation among agents.</p> <p>The distributed intelligence of the solution allows better integration of cooperative and automated vehicles (CAVs) and also contributes to for more robust, distributed algorithms, that adopt to the changes in environment and external disturbances.</p> <p>In the proposed multiagent solution, each cooperative vehicle has several functions. It serves as a source of traffic data (e.g. vehicle position, speed, distance to adjacent vehicles and others.), but at the same time can be addressed as an actuator. There are several use cases that might/shall be used to achieve a network wide optimum, for example:</p> <ol style="list-style-type: none"> <li>1. Green Light Optimal Speed Advisory (GLOSA),</li> <li>2. Green wave for cooperative vehicles,</li> <li>3. Signal optimisation, or</li> <li>4. Priority management.</li> </ol> <p>The work however includes also optimisation of the information being distributed among the heterogenous agents. Special focus will be on the negotiation among agents.</p> <p>Humans will be always part of the system, either as drivers of conventional or cooperative vehicles, or as pedestrians or bicycle users. They will always need to communicate with the automated vehicles and traffic management algorithms and their travel behaviour shall also be included in the research work.</p> <p>Within this work, the distributed algorithms shall be developed and evaluated using microscopic traffic simulation (preferably SUMO).</p> <p><u>References:</u></p> <ul style="list-style-type: none"> <li>• Pereira, André Maia et al. "Automated vehicles in smart urban environment: A review." 2017 Smart City Symposium Prague (SCSP) (2017): 1-8.</li> <li>• Pribyl, O, Blokpoel, R., Matowicki, M. Addressing EU climate targets: Reducing CO2 emissions using cooperative and automated vehicles, Transportation Research Part D: Transport and Environment, Volume 86, 2020, 102437, ISSN 1361-9209.</li> </ul>
4 Description of the ideal candidate	<ul style="list-style-type: none"> <li>• University degree</li> <li>• Experience with research work</li> <li>• Ability to fluently communicate in English</li> <li>• Knowledge of traffic control algorithms</li> <li>• Experiences with multi-agent systems</li> <li>• Knowledge of algorithmisation and ability to write computer programs (Java, Python, or others)</li> <li>• Highly cited work</li> </ul>

**Mentor**

Ondřej Přebyl	Faculty of transportation sciences	Applied mathematics	<a href="mailto:pribylo@fd.cvut.cz">pribylo@fd.cvut.cz</a>
---------------	------------------------------------	---------------------	--

Salary: CZK 62 000 per month

Application deadline: 31 May 2024

Start date: 01 September 2024



CTU Global Postdoc Fellowship

Topics/positions available at the

## Institute of Experimental and Applied Physics

Applications should be sent to:

E-mail: [Alice.Mariasova@cvut.cz](mailto:Alice.Mariasova@cvut.cz)

with a copy to [benedikt.bergmann@utef.cvut.cz](mailto:benedikt.bergmann@utef.cvut.cz)

Research topic #11-4

1 Topic name	ATLAS-Timepix3: A detector network for measurement of luminosity and the radiation fields in the ATLAS cavern - Data analysis coordinator
ERC research field descriptor	365 Physics (high energy physics, particle physics) Data analysis 37.22 Measurement technology 422
2 Link to topic / project page	<ul style="list-style-type: none"> <li>• <a href="https://cernbox.cern.ch/pdf-viewer/eos/user/b/bbergman/atlas-tpx3_upgrade_latest.pdf?contextRouteName=files-spaces-generic&amp;contextRouteParams.driveAliasAndItem=eos/user/b/bbergman">ATLAS-Timepix3 https://cernbox.cern.ch/pdf-viewer/eos/user/b/bbergman/atlas-tpx3_upgrade_latest.pdf?contextRouteName=files-spaces-generic&amp;contextRouteParams.driveAliasAndItem=eos/user/b/bbergman</a></li> <li>• <a href="https://cernbox.cern.ch/s/FPpnxC1BIPntyNC">Related project “Particle identification in high energy physics experiments and space with advanced detection systems” https://cernbox.cern.ch/s/FPpnxC1BIPntyNC</a></li> </ul>
3 Short description of the topic	<p>A network of ~13 two-layer Timepix3 pixel detectors have been installed in ATLAS with the aim of <b>measuring luminosity</b> and providing information about the <b>radiation field composition</b> at different locations in the ATLAS cavern.</p> <p>Timepix3 is a cutting-edge hybrid pixel detector with 256 x 256 pixels each of area 55 x 55 <math>\mu\text{m}^2</math>. The pixelated sensor is coupled to the readout ASIC, which provides the information of the time-of-arrival (particle interaction time, precision <math>\sim 2</math> ns) and the time-over-threshold (energy) in each pixel. Ionizing radiation interacting in the sensor is then seen as imprints in the pixel matrix with characteristic shapes depending on the particle of interest. With the two-layer approach, we further facilitate the separation of charged and neutral particles and improve impact angle determination.</p> <p>The time resolution of the devices and synchronization with the LHC orbit clock allows to resolve the bunch structure of the LCH beams, so that we expect to be able to measure the luminosity bunch-by-bunch, for the first time with hybrid pixel detectors. The capability to separate different particle classes shall be exploited to reduce the systematic errors of the luminosity measurement.</p> <p>Comparison of measured particle fluences and ATLAS simulations will be used to assign safety factors for radiation dose estimation and improve the understanding of radiation tolerance needed for detectors at the HL-LHC.</p> <p>Within the project,</p> <ul style="list-style-type: none"> <li>• you will be responsible for the analysis of data taken with ATLAS-Timepix3 and represent the team in the offline luminosity meetings and the radiation simulation group of the ATLAS experiment;</li> <li>• you will develop improved analysis methodology and define tasks for your coworkers;</li> <li>• you will be responsible for the preparation of publications and conference contributions.</li> </ul> <p>The position will help you to significantly improve your research profile by increasing leadership and mentoring skills. You will work in an international and interdisciplinary team with coworkers at different stages of the career.</p> <p>You will work in the department of “Electronics and Software” of IEAP CTU, which is a leading group in the development of pixel detector readout systems, related detector control software and novel analysis methodology. The latest activities are <a href="#">here</a> or in a compact form <a href="#">here</a>.</p>



### CTU Global Postdoc Fellowship

4 Description of the ideal candidate	You should have a Ph.D. in physics, are interested in data analysis and not scared of large data sets. Fluent English is required. Programming skills in C++, knowledge of ROOT, simulation in Geant4 and experience with leading a small team are not needed but an advantage. You will profit from knowing your way in large collaborations (ATLAS).
--------------------------------------	--

#### Mentor

<a href="#">Dr. Benedikt Bergmann</a>	Institute of Experimental and Applied Physics (IEAP CTU)	Department of electronics and software	<a href="mailto:Benedikt.bergmann@utef.cvut.cz">Benedikt.bergmann@utef.cvut.cz</a>
---------------------------------------	--	--	--

Salary: CZK 65 000 per month

Application deadline: 31 May 2024

Start date: 01 July 2024



## CTU Global Postdoc Fellowship

Topics/positions available at the

# Czech Institute of Informatics, Robotics and Cybernetics

Applications should be sent to

E-mail: [Katerina.Hanzalova@cvut.cz](mailto:Katerina.Hanzalova@cvut.cz)

or

### **CIIRC CVUT**

Attn: Mgr. Kateřina Hanzalová  
Jugoslávských partyzánů 1580/3  
160 00 Praha 6  
Czech Republic



## CTU Global Postdoc Fellowship

### Research topic #12-1

1 Topic	Machine learning security and resilience
ERC research field descriptor	9.0 Computer science
2 Link to topic / project page	<a href="https://www.ciirc.cvut.cz/teams-labs/ai/ml/">https://www.ciirc.cvut.cz/teams-labs/ai/ml/</a>
3 Short description of topic	Machine learning models play an increasingly important role in decision making across many applied domains such as robotics, health, or finance. It is therefore crucially important that they are sufficiently secure and resilient to adversarial or anomalous input. In this project, we aim to develop methods that improve the security and resilience of machine learning models, with emphasis on robotics applications, so improving the robustness of robots especially in open environments.
4 Description of ideal candidate	Background in machine learning. Experience/interest in data analytics, robotics, and cybersecurity is welcome.

### Mentor

Robert Babuška	CIIRC	Machine Learning	<a href="mailto:robert.babuska@cvut.cz">robert.babuska@cvut.cz</a>
----------------	-------	------------------	--

Salary: CZK 75 000 per month

Application deadline: Open call

Research topic #12-4

1 Topic	<b>Precise Visual Localization and Navigation via Implicit Neural Scene Representations</b>
ERC research field descriptor	9.0 Computer science
2 Link to topic / project page	<a href="https://www.ciirc.cvut.cz/cs/teams-labs/rmp/aag/">https://www.ciirc.cvut.cz/cs/teams-labs/rmp/aag/</a>
3 Short description of topic	<p>Visual localization and navigation algorithms are key capabilities for a wide range of applications, including autonomous robots such as self-driving cars and augmented / virtual reality systems. Typically, these algorithms rely on explicit and discrete scene representations, e.g., sparse Structure-from-Motion point clouds in the context of visual localization or voxel grids for navigation and path planning. Recently, implicit scene representations based on neural networks have been proposed that offer a continuous scene representation, with highly impressive results in terms of the accuracy of the represented 3D geometry.</p> <p>The objective of this post-doc project is to develop visual localization and navigation algorithms based on implicit neural scene representations. The goal is to exploit the potential of these representations, which promise highly accurate 3D scene geometry at a small memory footprint, to design highly precise localization and navigation approaches. Important scientific challenges of this project include handling changing conditions, e.g., moving furniture, and precise representations in large-scale scenes (where the camera can be 10-100 meters away from the scene).</p>
4 Description of ideal candidate	Strong background in 3D computer vision, robotics, and / or deep learning. Publications at the top conferences/journals in those fields, e.g., CVPR, ICCV, ECCV, NeurIPS, ICML, IJCV, TPAMI, ICLR, IROS, ICRA, CoRL, RSS or RAL.

Mentor

Torsten Sattler	CIIRC	RMP	<a href="mailto:torsten.sattler@cvut.cz">torsten.sattler@cvut.cz</a>
-----------------	-------	-----	--

Salary: CZK 75 000 per month

Application deadline: Open call



Research topic #12-5

1 Topic	<b>Learning visuomotor skills for robotic manipulation</b>
ERC research field descriptor	9.0 Computer science
2 Link to topic / project page	<a href="http://impact.ciirc.cvut.cz/">http://impact.ciirc.cvut.cz/</a>
3 Short description of topic	<p>Humans can solve everyday manipulation tasks remarkably efficiently and safely. With only a few interactions they learn to use tools without knowing a priori their exact physical properties or the properties of the environment to solve tasks such as hammering a nail, shoveling snow, raking leaves, or drilling holes into different materials. Currently, there is no artificial system with a similar level of visuomotor capabilities.</p> <p>The objective of this post-doc project is to develop machine learning models grounded in the physical and geometrical structure of the world to enable learning safe visuomotor skills for robotic manipulation in new unseen environments with only a minimal amount of supervision, for example, coming from observing people performing the same task.</p>
4 Description of ideal candidate	We are looking for strongly motivated candidates with interest in computer vision, machine learning and robotics. Successful candidates will have a strong background in at least one of these fields, excellent programming skills and a proven track-record of publications at the top conferences/journals in those fields that include CVPR, ICCV, ECCV, NeurIPS, ICML, IJCV, TPAMI, JMLR, IROS, ICRA, CoRL, RSS or RAL.

Mentor

Josef Šivic	CIIRC	RMP	<a href="mailto:josef.sivic@cvut.cz">josef.sivic@cvut.cz</a>
-------------	-------	-----	--

Salary: CZK 75 000 per month

Application deadline: Open call

## Applications and selection proces

To apply for the CTU Global Postdoc Fellowship you need the following documents in English:

- CV, including list of publications (max. 4 pages). At least three IF<sup>1</sup> journal publications are expected. Papers accepted for publication yet waiting to be prited **do count if** a proof of acceptance is provided.
- Motivation letter (max. 2 pages).
- PhD certificate (copy).
- [Application for CTU Postdoc Fellowship Program](#) – completed and signed.
- You may attach other documents supporting yor application such as recommendation letters etc.

Each research topic/proposal has a deadline for submission.

Please note that submissions should be sent to the contact address of the faculty/institute listed in the list of topics/positions.

### Selection process:

- Applications will be assessed by the committee on the basis of the documents sent by the applicants. The mentor has a casting vote in the selection procedure.
- The interview will be arranged online.
- The starting date is indicated for each research topic/position.

---

1 Impact Factor. We follow the Web of Science [Journal Citation Reports](#) .