

**HORIZON EUROPE Research and Innovation Framework Programme
MARIE SKŁODOWSKA-CURIE ACTIONS**

**INVITATION TO APPLY FOR
POSTDOCTORAL FELLOWSHIPS 2022**



Organisation Name/ Department	Czech University of Life Sciences Prague/Faculty of Engineering, Department of Electrical Engineering and Automation, Department of Agricultural Machines
Website of the organisation	https://www.tf.czu.cz/en https://www.facebook.com/tf.czu.cz https://www.instagram.com/tfczucz/
Research Fields	<input type="checkbox"/> Chemistry (CHE) <input type="checkbox"/> Social Sciences and Humanities (SOC) <input type="checkbox"/> Economic Sciences (ECO) <input checked="" type="checkbox"/> Information Science and Engineering (ENG) <input checked="" type="checkbox"/> Environment and Geosciences (ENV) <input checked="" type="checkbox"/> Life Sciences (LIF) <input type="checkbox"/> Mathematics (MAT) <input type="checkbox"/> Physics (PHY)
Sub-Fields/ Keywords	Precision agriculture, Robotics, Autonomous vehicles, Agrivoltaic systems, Digital twin, Discrete element method, Finite element method, Abrasive wear modelling
Marie Skłodowska-Curie Action(s) of interest	<input checked="" type="checkbox"/> European Postdoctoral Fellowships (<i>European nationals or long-term residents working on R&I projects with organisations outside EU Member States and Horizon Europe Associated Countries</i>).

	<p>Duration: 24-36 months (12-24 months outgoing phase in a non-associated Third Country (TC) & 12 months mandatory return phase to a host organisation in Europe).</p> <p><input checked="" type="checkbox"/> Global Postdoctoral Fellowships (researchers of any nationality working on R&I projects by either coming to Europe from any country in the world or moving within Europe).</p> <p>Duration: 12-24 months</p>
<p>Short Description of the Organisation/ Department</p>	<p>DESCRIPTION OF THE ORGANISATION/ DEPARTMENTS:</p> <p>EXPERTISE: Our team of experts has comprehensive experience in smart solutions for the use of new technologies in the agri-food sector and its digitalization, precision agriculture and development, such as monitoring, collecting and analyzing data, design and construction of agricultural drones and robots, including digital twins, machinery and soil processing simulation via FEM and DEM, live parameters monitoring, laboratory and computational results evaluation and also development of agrivoltaic systems.</p> <p>RESEARCH TEAM COMPOSITION: The research team consists of professor, associate professors, assistant professors, Ph.D. students:</p> <ul style="list-style-type: none"> ✓ prof. František Kumhála (ORCID 0000-0002-7782-6033) ✓ Assoc. prof. Jitka Kumhálová, (ORCID 0000-0002-0867-411X); ✓ Assoc. prof. Rostislav Chotěborský (ORCID 0000-0002-8694-4453); ✓ Assoc. prof. Miloslav Linda (ORCID 0000-0003-2753-4144); ✓ Assoc. prof. Monika Hromasová (ORCID 0000-0001-5849-1955); ✓ Assist. prof. Egidijus Katinas (ORCID 0000-0002-1908-4465); ✓ PhD students: Ing. Jiří Kuře, Ing. Barbora Černilová. <p>STRENGTHS AND SCIENTIFIC ACHIEVEMENTS:</p> <p>Important publications:</p> <ol style="list-style-type: none"> 1. Katinas, Egidijus; Choteborsky, Rostislav; Linda, Miloslav; Kure, Jiri. <i>Sensitivity analysis of the influence of particle dynamic friction, rolling resistance and volume/shear work ratio on wear loss and friction force using DEM model of dry sand rubber wheel test // Tribology</i>

- International ISSN 0301-679X, 2021, vol. 156, p. 106853. DOI.org/10.1016/j.triboint.2021.106853. Science Citation Index Expanded (Web of Science); ScienceDirect; INSPEC; CAB Abstracts; Scopus. WOS, IF: 4.872, AIF: 3.44, cat: 1, av: 1.416, 2020, Q1] [SCOPUS, citescore: 8, snip: 2.061, sjr: 1.401, year: 2020, quartile: Q1];
2. Kesner, Adam; Choteborsky, Rostislav; Linda, Miloslav; Hromasova, Monika; Katinas, Egidijus; Sutanto, Hadi.
Stress distribution on a soil tillage machine frame segment with a chisel shank simulated using discrete element and finite element methods and validate by experiment // Biosystems engineering.
ISSN 1537-5110, vol. 209, p. 125-138. doi.org/10.1016/j.biosystemseng.2021.06.012. Science Citation Index Expanded (Web of Science); ScienceDirect; Scopus. WOS, IF: 4,123, 2020, Q1] [SCOPUS, citescore: 7.2 snip: 2.120, sjr: 0.894, year: 2020, quartile: Q1];
 3. Katinas, Egidijus; Choteborsky, Rostislav; Linda, Miloslav; Jankauskas, Vytenis.
Wear modelling of soil ripper tine in sand and sandy clay by discrete element method // Biosystems engineering. San Diego: Academic Press Inc Elsevier Science.
ISSN 1537-5110, 2019, vol. 188, p. 305-319. DOI:10.1016/j.biosystemseng.2019.10.022. Science Citation Index Expanded (Web of Science); ScienceDirect; Scopus. WOS, IF: 3.215, AIF: 3.471, cat: 2, av: 1.326, 2019, Q1] [SCOPUS, citescore: 6.4, snip: 1.97, sjr: 0.857, year: 2019, quartile: Q1] [ai: 0.354, iai: 0.354, na: 4, nia :2, nip: 1, pai: 1.01, pai: 1.01, al: 1.071];
 4. Jankauskas, Vytenis; Katinas, Egidijus; Laskauskas, Artūras; Antonov, Maksim; Varanauskas, Valentinas; Gedzevičius, Irmantas; Aleknevičienė, Vilija.
Effect of electrode covering composition on the microstructure, wear, and economic feasibility of Fe-C-Cr manual arc-welded hardfacings // Coatings. Basel: MDPI AG.
ISSN 2079-6412, 2020, vol. 10, iss. 3, p. 1-19. DOI:10.3390/coatings10030294. Science Citation Index Expanded (Web of Science); Current Contents Engineering (Computing & Technology). WOS, IF: 2.881, AIF: 5.286, cat: 3, av: 0.514, year: 2020, quartile: Q2] [SCOPUS, citescore: 3, snip: 0.998, sjr: 0.484, 2020, Q2. [ai: 0, iai: 0, na: 7, nia :3, nip: 2, pai: 0, pai: 0, al: 1.357];
 5. Rataj, Vladimír; Kumhálová, Jitka; Macák, Miroslav; Barát, Marek; Galambošová, Jana; Chyba, Jan; Kumhála, František.
Long-Term Monitoring of Different Field Traffic Management Practices in Cereals Production with Support of Satellite Images and Yield Data in Context of Climate

	<p><i>Change // Agronomy</i>, 2022, ISSN: 2073-4395, vol. 12, iss. 1, article number 128.</p> <p>6. LEV, J. – KŘEPČÍK, V. – ŠARAUSKIS, E. – KUMHÁLA, F. <i>Electrical Capacitance Characteristics of Wood Chips at Low Frequency Ranges: A Cheap Tool for Quality Assessment. SENSORS</i>, 2021, ISSN: 1424-8220.</p> <p>7. KADEŘÁBEK, J. – SHAPOVAL, V. – MATĚJKA, P. – KROULÍK, M. – KUMHÁLA, F. <i>Comparison of Four RTK Receivers Operating in the Static and Dynamic Modes Using Measurement Robotic Arm. SENSORS</i>, 2021, ISSN: 1424-8220</p> <p>8. Tůma, Lukáš; Kumhálová, Jitka; Kumhála, František; Krepl, Vladimír. <i>The noise-reduction potential of Radar Vegetation Index for crop management in the czech Republic // Precision Agriculture 2022</i>, ISSN: 1385-2256.vol. 23, iss. 2, pp. 450-469. WOS IF: 5.385 (D10), AIF 0,851 (Q1)</p> <p>Patent:</p> <ul style="list-style-type: none"> ✓ Capacitance transducer of particulate material permeability with compensation of temperature - Kumhála František, Kavka Miroslav, Prošek Václav <p>IMPORTANT INFRASTRUCTURE:</p> <ul style="list-style-type: none"> ✓ Server 72 cores, 3 TB RAM for FEM, Server 2 x GPU P100 for DEM, PC with V100 32 GB RAM for DEM. Software Ansys multiphysics (mechanics and fluent) for FEM and Rocky DEM. ✓ Daily using CNC machines, CNC laser for plastics and wood, making mould and vacuum forming, making carbon fibre and glass fibre parts. Development of self-filament for 3D printing. ✓ Soil bin for testing newly designed soil tillage tools, validation of FEM boundary conditions and verification of digital twins accuracy, length 10 m, width 3 m, depth 1.5 m, maximum tensile force 30 kN, speed up to 4 m / s. ✓ Computer laboratory equipped with software (ArcGIS, QGIS, SNAP, ENVI, SMS, Pix4D) for spatial data and image analysis with appropriate hardware. ✓ Multicopters and fixed wings (eBee X) to retrieve data for precision agriculture forestry purposis. ✓ Multispectral and thermal cameras. ✓ Functional prototypes of agricultural and forestry drones developed for special purposes (eg spraying individual trees), own solutions. ✓ Laboratory equipment for rapid analysis of soil granular composition - optical particle size analyzer HORIBA LA 960.
<p>Previous Projects/ Research Experience</p>	<p><u>National Scientific Projects:</u></p> <ul style="list-style-type: none"> ✓ <u>The digital twin of the agricultural machine</u>

	<ul style="list-style-type: none"> ✓ Modularity of agricultural machinery supported by advanced manufacturing technologies ✓ R&D of working tools of agricultural machinery ✓ Research and development of smart farming technologies for small and medium-sized farms ✓ Research of the systems for increasing soil tillage energy efficiency ✓ R&D of coconut processing line ✓ Improving the WASH sector in Kampong Chhnang Province – Cambodia <p><u>International Scientific Projects:</u></p> <ul style="list-style-type: none"> ✓ NICOPA - New and Innovative Courses for Precision Agriculture
<p>Thematic areas and a list of supervisors who are going to participate in preparing a project proposal with postdoctoral researchers.</p>	<p>THEMATIC AREA: Precision agriculture, Robotics, Autonomous vehicles, Agrivoltaic systems, Digital twin, Soil processing model, Discrete element method (DEM), Finite element method (FEM), Wear analysis.</p> <p>SUPERVISORS:</p> <p>prof. Dr. Ing. František Kumhála (FK) and Ing. Egidijus Katinas PhD. (EK)</p> <ul style="list-style-type: none"> • Current position: <p>FK: Since 2011 Professor at Czech University of Life Sciences Prague. EK: Since 2021 Assistant professor at Czech University of Life Sciences Prague.</p> <ul style="list-style-type: none"> • Professional profile: <p>FK:</p> <ul style="list-style-type: none"> ✓ 46 publications on Web of Science Core Collection ✓ 21 publications with impact factor ✓ Chairman of the Department of Agricultural Engineering, Energy and Construction of the Czech Academy of Agricultural Sciences <p>EK:</p> <ul style="list-style-type: none"> ✓ 10 publications with impact factor, ✓ Master thesis awarded in the field of technology science (2016), ✓ Scholarship for PhD students for study results from Research Council of Lithuania (2017-2018). <ul style="list-style-type: none"> • Research experience & Education: <p>FK:</p> <ul style="list-style-type: none"> ✓ 2014 – present: Chief of Department of Agricultural Machines, Faculty of Engineering, CZU Prague

	<ul style="list-style-type: none"> ✓ 2011 – present: Full professor on Department of Agricultural Machines, Faculty of Engineering, CZU Prague ✓ 2004-2011 Associate professor on Department of Agricultural Machines, Faculty of Engineering, CZU Prague ✓ Main solver and solver of national and international research projects <p>EK:</p> <ul style="list-style-type: none"> ✓ Since 2021 Assistant professor at Czech University of Life Sciences Prague. ✓ 2020-2021 Postdoc fellowship at Czech University of Life Sciences Prague; ✓ 2017-2018 junior researcher at Aleksandras Stulginskis University; ✓ 2015-2019 PhD, Vytautas Magnus University; ✓ 2013-2015 Master degree, Aleksandras Stulginskis University; ✓ 2009-2013 Bachelor degree, Aleksandras Stulginskis University.
<p>Short description of Postdoctoral Fellowships programme</p>	<p>Postdoctoral researcher activities will be focused on the following areas:</p> <ul style="list-style-type: none"> ✓ design and construction of agriculture drones and autonomous vehicles for different tasks, ✓ development and production of our own electric drone power units with significantly lower energy consumption ✓ 3D printing in the construction of agricultural drones, application of rapid prototyping, ✓ application of drones and autonomous vehicles in the program of precision agriculture, ✓ agrivoltaic systems for combined production of photovoltaic power and agricultural crops, ✓ FEM and DEM method application in agriculture and soil processing, ✓ design and development of soil processing tools, ✓ real-time data measurement, processing, and analysis during the soil processing, ✓ soil processing, fertilizing and seeding processes simulation and analysis by the DEM, ✓ measurement, evaluation, simulation of soil properties and their analysis, ✓ simulation of mixing, transportation, processing of granular material used in food, agriculture, chemical industries (fruits, vegetables, grains, pills, etc.) can be

	<p>performed with a knowledge acquired through experience of soil processing,</p> <ul style="list-style-type: none"> ✓ abrasive wear analysis, simulation, worn surface comparison to the actual shape
Contact Person/ Position in the Organisation/ Phone/ E-mail	<p>Pavlina Ruzickova project manager email: ruzickova@tf.czu.cz phone: + 420 605 294 906</p>
Deadline for Expressions of Interest from postdoctoral researchers	30 May 2022
Necessary documents from applicants (<i>postdoctoral researchers</i>)	<p>Please send us an application by email to ruzickova@tf.czu.cz including following documents:</p> <ul style="list-style-type: none"> ✓ CV ✓ List of publications ✓ Brief description of the project idea <p><i>(a project proposal will be made jointly by the researcher and a host institution)</i></p>
What we offer	<ul style="list-style-type: none"> ✓ Full-time contract to work on a research project and enjoy advanced training, ✓ Competitive salary – (€ 5 080*0.791) = gross amount, including compulsory deductions under national law, such as employer and employee social security contributions and direct taxes; ✓ Mobility (€ 600) and Family allowances (if applicable - € 660); ✓ Budget for Research, Training and Networking costs (€ 1 000); ✓ Special needs allowance (if applicable).
Eligibility of Applicants	<p>Experience:</p> <ul style="list-style-type: none"> ✓ Applicants should be in a possession of a doctoral degree at the call deadline (applicants who have successfully defended their doctoral thesis but who have not yet formally been awarded the doctoral degree will also be considered eligible to apply). ✓ At the call deadline, supported researchers must have a maximum of 8 years full-time equivalent experience in research, measured from the date of award of the doctoral degree (exceptions that will not count towards the amount of research experience: career breaks, work outside research, research outside Europe for reintegrating researchers). ✓ Applicants should have experience in the field of biosystems engineering and/or agriculture. Experience can be proven by the article, thesis, project or working experience in the agricultural company.

	<p>Mobility rule:</p> <ul style="list-style-type: none"> ✓ researchers of any nationality ✓ European Postdoctoral Fellowships - applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of the beneficiary for more than 12 months in the 36 months immediately before the call deadline, ✓ Global Postdoctoral Fellowships - applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of the host organisation for the outgoing phase for more than 12 months in the 36 months immediately before the call deadline. ✓ Researchers reintegrating from a TC must either be based in a TC at the call deadline or have moved directly from a TC to an EU MS or HE AC within the last 12 months before the call deadline.
<p>Additional Funding Opportunity</p>	<p>ERA Fellowships</p> <ul style="list-style-type: none"> ✓ It is open to researchers of any nationality who wish to engage in R&I projects by either coming to Europe from any country in the world or moving within Europe to a Widening Country. ✓ In order to apply for the ERA Fellowships call, applicants need to submit their proposal to the 2021 MSCA PF call. ✓ To be eligible to this call the host organisation must be located in an eligible widening country. ✓ The application to the MSCA PF call will be automatically resubmitted to this call in case the proposal fails to reach an adequate place in the ranking to be funded. <p>OP JAC</p> <ul style="list-style-type: none"> ✓ Operational Programme John Amos Comenius (OP JAC) ✓ Provider: Ministry of Education, Youth and Sports CZ (MEYS) ✓ Proposals which obtained a high score in the MSCA PF call (at least 70%) but were not funded under ✓ that call ✓ Support for arrivals to the Czech Republic and departures from the Czech Republic