

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Univerza v Ljubljani, Fakulteta za elektrotehniko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Gregor Geršak, gregor.gersak@fe.uni-lj.si

3. Raziskovalno področje (Research field):

Merjenje, senzorika, temperatura, okoljski pogoji, kalibracije

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.: Kandidat se bo ukvarjal z raziskovanjem in razvojem merilnih zmogljivosti za zaznavanje okoljskih parametrov, z osredotočenostjo na merjenje temperature zraka. Raziskoval bo vplivne veličine na izmerjeno temperaturo ter karakteristike različnih vrst temperaturnih senzorjev. Senzorji, ki bodo predmet raziskav, so lahko uporabni temperaturni senzorji (npr. Pt100), lahko pa tudi senzorji, ki temeljijo na sodobnejših pristopih, kot so temperaturni senzorji na osnovi steklenih (optičnih) vlaken ali drugi napredni senzorji. Poudarek raziskav bo na analizi merilne točnosti, dolgoročne stabilnosti ter negotovosti meritev v različnih pogojih uporabe. Delo bo vključevalo laboratorijske meritve, meritve v realnih razmerah in validacijo senzorjev za specifične aplikacije v industriji in okolju ter analizo kalibracijske možnosti.

Kandidat mora imeti osnovno znanje iz področja merilne tehnike, senzorike in obdelave merilnih podatkov. Zaželeno je znanje statistične obdelave meritev ter poznavanje osnov programiranja (npr. Python ali LabVIEW).

Eng.: The candidate will be engaged in research and development of measurement capabilities for sensing environmental parameters, with a focus on air temperature measurement. Investigation will include the influencing variables on the measured temperature and the characteristics of different types of temperature sensors. The sensors that could be the subject of research can be resistive temperature sensors (e.g. Pt100), but also more modern type sensors, such as fibre-glass-based (optical fibre) sensors or other advanced temperature sensors. The emphasis of the work will be on the analysis of measurement accuracy, long-term stability and measurement uncertainty for intended use. The work will include laboratory measurements, real-life measurements and validation of sensors for specific applications in industry and the environment and analysis of calibration possibilities.

The candidate should have basic knowledge of measuring technique, measurement systems, sensor technology, and data analysis. Expertise in statistical processing of measurement data and basic programming skills (e.g., Python or LabVIEW) is desirable.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

☒ **diplomska listina/potrdilo o zaključku študijskega programa** (diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme)

☒ **priloga k diplomi/ potrdilo o opravljenih obveznostih** (official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme)

☒ **potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij** (official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme)

☐ **nagrade** (awards (e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))

☐ **bibliografija** (bibliography)

☒ **živiljenjepis** (CV)

☐ **motivacijsko pismo** (*motivation letter*)

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** (*description of the candidate's research work*)

☐ **osnutek idejne zasnove raziskovalnega dela** (*preliminary research proposal*)

☐ **priporočilno pismo** (*letter of recommendation*)

☐ **druge priloge** (*other attachments*)

Opis raziskovalnega dela (Research work description)

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Univerza v Ljubljani, Fakulteta za elektrotehniko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Klemen Grm

3. Raziskovalno področje (Research field):

2.07.07 Tehniške vede/Računalništvo in informatika/Inteligentni sistemi - programska oprema

4. Opis raziskovalnega dela (Research work description):

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Slov.:

Metode razložljive umetne inteligence omogočajo vpogled v odločitve kompleksnih modelov globokega učenja. To razumevanje je ključno za področja, kot so računalniški vid, biometrija, avtonomna vožnja, medicinska diagnostika in druga področja, kjer je človeško razumevanje delovanja z umetno inteligenco podprtih orodij ključna za zagotavljanje zaupanja in odgovornosti.

Mladi raziskovalec bo v okviru doktorskega dela razvijal nove pristope za razložljivo umetno inteligenco, še posebej usmerjene v vizualne in biometrične podatke. Raziskovalec se bo osredotočil na:

- razvoj metod za interpretacijo globokih modelov na osnovi vizualnih in biometričnih podatkov,
- analizo notranjih mehanizmov in predstavitev globokih nevronske mreže za povečanje transparentnosti modelov,
- vrednotenje razvitih pristopov v kontekstu praktičnih biometričnih aplikacij,
- raziskovanje vpliva interpretabilnosti na robustnost, varnost in zasebnost biometričnih sistemov,
- uveljavitev novih idej in metod na področju interpretabilnosti umetne inteligence.

Pri raziskovanju bo kandidat uporabljal napredne metode s področja globokega učenja, transformerjev, mehanizmov pozornosti, predstavitev in geometrijskega učenja ter tehnik za vizualizacijo in analizo občutljivosti modelov, interpretacije mehanizmov, singularne teorije učenja, in sorodne najnovejše pristope k razložljivosti v umetnih inteligentnih sistemih.

Poleg tega bo mladi raziskovalec:

- izvedel raziskovalni obisk v eni od priznanih tujih institucij (predvidoma tri mesece),
- sodeloval pri organizaciji znanstvenih dogodkov,
- pridobil izkušnje s pripravo znanstvenih in projektnih predlogov.

Zaželeno je, da ima kandidat:

- ustrezno tehnično ali naravoslovno izobrazbo,
- znanje matematike, statistike in verjetnostne teorije,
- praktične izkušnje s strojnimi učenjem in z globokim učenjem
- dobro poznavanje programskega jezika Python,
- izkušnje s področjem računalniškega vida ali biometrije predstavljajo prednost,
- sposobnost tehničnega poročanja in znanstvenega komuniciranja,
- aktivno znanje angleškega jezika,
- sposobnost za samostojno delo in delo v skupini.

Eng.:

Explainable artificial intelligence (XAI) methods enable insights into the decisions made by complex deep learning models. Such understanding is essential for fields like computer vision, biometrics, autonomous vehicles, medical diagnostics, and other areas requiring transparency and accountability.

Within the scope of the doctoral research, the junior researcher will develop novel approaches for explainable AI, particularly oriented towards visual and biometric data. The researcher will specifically focus on:

- Developing methods for interpreting deep learning models, particularly focused on visual and biometric data.
- Analyzing internal mechanisms and representations of neural networks to improve transparency.
- Evaluating developed methods within practical biometric applications (face recognition, fingerprint recognition, iris recognition, etc.).
- Investigating the influence of interpretability on robustness, security, and privacy of biometric systems.
- Advancing novel ideas and methods in the domain of interpretability of artificial intelligence.

The researcher will employ and extend state-of-the-art approaches from deep learning, transformers, representational and geometric learning, visualization and sensitivity analysis techniques, mechanistic interpretability, singular learning theory, and other contemporary methodologies related to explainability in AI systems.

Additionally, the junior researcher will:

- Undertake a research visit at a recognized international institution (approximately three months).
- Participate in organizing domestic and international scientific events.
- Gain experience in scientific writing and project proposal preparation.

The following qualifications are desired:

- Appropriate educational background in technical or natural sciences.
- Solid knowledge of mathematics, statistics, and probability theory.
- Practical experience with machine learning and deep learning.
- Proficiency in Python programming.
- Experience in computer vision or biometrics is advantageous.
- Strong technical writing and scientific communication skills.
- Proficiency in English.
- Proactivity and effective communication skills.

5. Priloge, ki jih kandidat priloži k prijavi (*Documents that the candidate submits with the application*):

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☒ **življenjepis (CV)**

☒ **motivacijsko pismo** (*motivation letter*)

Opis raziskovalnega dela (*Research work description*)

1. Članica UL (*UL member*):

Univerza v Ljubljani, Fakulteta za elektrotehniko
(*University of Ljubljana, Faculty of Electrical Engineering*)

2. Ime, priimek in elektronski naslov mentorjalice (*Mentor's name, surname and email*):

Marko Jošt (marko.jost@fe.uni-lj.si)

3. Raziskovalno področje (*Research field*):

2.03.03 – Obnovljivi viri in tehnologije (*Renewable resources and technologies*)

4. Opis raziskovalnega dela (*Research work description*):

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Slov.:

Raziskovalno delo mladega raziskovalca bo umeščeno v širše področje fotovoltaike, ki v preteklih letih povsod po beleži strm razvoj. Osredotočeno bo na izdelavo in karakterizacijo perovskitnih sončnih celic, nove fotovoltaične tehnologije, ki obeta, da bo v kratkem konkurenčna tehnolgiji silicijevih sončnih celic in da bo kmalu vstopila na trg.

Glavni cilj raziskovanja bo izdelava visokoučinkovitih perovskitnih minimodulov. Potek raziskovalnega dela se bo izvajal v več medsebojno povezanih fazah. Prva faza bo usmerjena v izdelavo in karakterizacijo laboratorijskih, visokoučinkovitih perovskitnih sončnih celic z različnimi kompozicijami in energijskimi režami. V drugi fazi sledi prenos izdelave posameznih plasti z manjših na večje površine z uporabo metod »blade in slot-die coatinga«. V tretji fazi bo mladi raziskovalec optimiziral proces ablacije z laserskim žarkom, s katerim se zagotovi povezava med posameznimi celicami v minimodulu. V sodelovanju s preostalimi raziskovalci laboratorija bo tudi možnost nadgradnje v perovskitno-perovskitne tandemske minimodule. Izdelani perovskitni moduli nato enkapsulirani in testirani pod realnimi pogoji.

Mladi raziskovalec bo raziskoval v Laboratoriju za fotovoltaiko in optoelektroniko (LPVO) na Fakulteti za elektrotehniko Univerze v Ljubljani (UL FE). Njegovo raziskovalno delo bo tesno vpeto tako v raziskovalni program »Fotovoltaika in elektronika« (P2-0415) kot tudi v ostale tekoče mednarodne raziskovalne projekte, v sklopu katerih bo sodeloval z drugimi priznanimi raziskovalnimi organizacijami doma in v tujini.

Mladi raziskovalec bo vpisal doktorski študij Elektrotehnika na UL FE. Od kandidata se pričakujeta visoka stopnja motiviranosti za delo in veselje do eksperimentalnega dela v laboratoriju ter da obvlada angleški jezik.

Eng.:

The research activities of the young researcher will be focused on the area of photovoltaics, which has grown rapidly in the recent years both all over the world. The specific tasks will involve fabrication and characterization of perovskite solar cells that have the potential to compete with silicon solar cell technology and to enter the PV market soon.

The main goal of the research will be the fabrication of highly efficient perovskite minimodules. The course of the research work will be carried out in several interconnected phases. The first phase will be focused on the fabrication and characterization of laboratory, highly efficient perovskite solar cells with different compositions and energy gaps. The second phase will involve the transfer of the fabrication of individual layers from smaller to larger areas using the blade and slot-die coating methods. In the third phase, the young researcher will optimize the laser ablation process, which ensures the connection between individual cells in the minimodule. In collaboration with other researchers in the laboratory, there will also be the possibility of upgrading to perovskite/perovskite tandem minimodules. The produced perovskite modules will then be encapsulated and tested under real conditions.

The young researcher will carry out his research in the Laboratory of Photovoltaics and Optoelectronics (LPVO) at the Faculty of Electrical Engineering, University of Ljubljana (UL FE). His research activities will be tightly connected to the research programme »Photovoltaics and Electronics« (P2-0415) and other on-going international research projects, which will lead to cooperation with other renowned domestic and foreign research institutions.

The candidate will enroll to the doctoral program Electrical Engineering at UL FE. He is expected to exhibit a high level of motivation and joy for experimental work in the laboratory, and is an advanced user of the English language.

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☒ **motivacijsko pismo** (*motivation letter*)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Univerza v Ljubljani, Fakulteta za elektrotehniko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Andrej Kos, andrej.kos@fe.uni-lj.si

3. Raziskovalno področje (Research field):

Slov.: Kibernetška varnost: modeliranje groženj, simulacija kibernetških napadov, kibernetška vadbišča, umetna inteligenca v kibernetški varnosti.

Eng.: Cybersecurity, threat modeling, cyber attack simulation, cyber ranges, artificial intelligence in cybersecurity

4. Opis raziskovalnega dela (Research work description):

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Slov.: Sodobni informacijski sistemi so vse bolj kompleksni, porazdeljeni in povezani, zaradi česar so tudi vse bolj izpostavljeni kibernetškim tveganjem. Organizacije, industrijski obrati, kritična infrastruktura in obrambni sistemi se soočajo s sofisticiranimi napadi, ki vključujejo napredne trajne grožnje (angl. Advanced Persistent Threats – APT), zlorabo ranljivosti v dobavnih verigah, targetirano kompromitiranje omrežij ter manipulacijo integritete in dostopnosti podatkov in storitev. Posledično se kaže velika potreba po analizi, simulaciji in upravljanju kibernetških tveganj, ki presega klasične reaktivne strategije in temelji na proaktivnih, inteligentnih in avtomatiziranih varnostnih modelih.

Sodobne paradigme na tem področju vključujejo tehnologijo prevare (angl. deception technology), z uporabo kibernetških pasti (angl. honeypot) in t.i. honeytoknov za preusmerjanje in zaznavo napadalcev in razvoj inteligentnih sistemov za avtomatsko detekcijo anomalij; arhitekture ničelnega zaupanja (angl. zero-trust), absolutnega ničelnega zaupanja (angl. absolute zero-trust) in računalništva brez ranljivosti (angl. zero vulnerability computing), ki zagotavljajo večplastno zaščito brez implicitnega zaupanja; avtomatizacijo vdornega testiranja (angl. pentesting) z uporabo umetne inteligence, ki omogoča hitrejša in učinkovitejša zaznavanje ranljivosti ter oblikovanje prilagodljivih varnostnih politik; varnost dobavnih verig (angl. supply chain security), kjer napadalci izkoriščajo ranljivosti v programski in strojni opreми, ki jo organizacije posredno vključujejo v svoje ekosisteme; ter razvoj naprednih peskovnikov, analizo zlonamerne programske opreme, vzvratni inženiring in klasifikacijo škodljivih programov. Poseben izziv predstavljajo sistemi za skupno operativno sliko (angl. Common Operational Picture – COP) v kritičnih in obrambnih okoljih in novi načini integracije podatkov o grožnjah in varnostnih dogodkih, kar lahko prispeva k boljšemu situacijskemu zavedanju in učinkovitemu odzivu.

V kontekstu varnosti na pomenu hitro pridobivajo tudi kibernetška vadbišča (angl. cyber ranges), ki omogočajo testiranje varnostnih strategij, razvoj odpornosti in izobraževanje strokovnjakov skozi realistične simulacije napadov in odzivov. Takšni sistemi so ključni za razvoj in optimizacijo strategij kibernetške obrambe, kjer je potrebno nenehno prilagajanje dinamičnemu okolju groženj. Modeliranje napadov in zbiranje obveščevalnih podatkov o kibernetških grožnjah (angl. cyber threat intelligence) sta pomembna vidika teh raziskav, ker omogočata razumevanje taktik, tehnik in postopkov (TTP) napadalcev ter razvoj metod za napovedovanje in preprečevanje napadov.

Raziskovalno delo na tem področju tako ponuja širok spekter izzivov in omogoča razvoj inovativnih rešitev za izboljšanje kibernetške varnosti v različnih okoljih. S tem odpira možnosti za objave v uglednih znanstvenih revijah ter hkrati predstavlja visoko dodano

vrednost za industrijsko prakso, kjer so sodobne varnostne rešitve nujne za zaščito informacijskih sistemov pred vedno bolj prefinjenimi grožnjami.

Eng.: Modern information systems are becoming increasingly complex, distributed, and interconnected, making them more vulnerable to cyber risks. Organizations, industrial facilities, critical infrastructure, and defense systems face sophisticated attacks that involve Advanced Persistent Threats (APTs), supply chain vulnerabilities, targeted network compromises, and the manipulation of data and service integrity and availability. Consequently, there is a significant need for cybersecurity risk analysis, simulation, and management that goes beyond traditional reactive strategies, relying instead on proactive, intelligent, and automated security models.

Current paradigms in this field include deception technology, which employs honeypots and honeytokens to detect and mislead attackers, as well as the development of intelligent systems for automated anomaly detection. Other approaches involve zero-trust architectures, absolute zero-trust models, and zero vulnerability computing, which ensure multi-layered protection without implicit trust. The automation of penetration testing (pentesting) through artificial intelligence enables faster and more effective vulnerability detection and the creation of adaptive security policies. Supply chain security is another critical area, as attackers exploit vulnerabilities in the hardware and software integrated into organizational ecosystems. Additionally, research focuses on developing advanced sandbox environments, malware analysis, reverse engineering, and the classification of malicious software.

A particular challenge lies in Common Operational Picture (COP) systems for critical and defense environments, as well as new methods for integrating threat intelligence and security event data. These advancements contribute to improved situational awareness and effective incident response.

Cyber ranges are also gaining prominence in cybersecurity, providing realistic attack and defense simulations for testing security strategies, strengthening resilience, and training professionals. Such systems are crucial for developing and optimizing cyber defense strategies, which must continuously adapt to an evolving threat landscape. Cyber threat intelligence (CTI) and attack modeling are key aspects of this research, enabling a deeper understanding of attacker tactics, techniques, and procedures (TTPs) and facilitating predictive and preventive security measures.

Research in this field presents a broad range of challenges and opportunities for developing innovative cybersecurity solutions across different environments. It also opens avenues for publication in prestigious scientific journals while providing high added value to industrial applications, where advanced security solutions are essential for protecting information systems from increasingly sophisticated threats.

5. Priloge, ki jih kandidat priloži k prijavi (*Documents that the candidate submits with the application*):

6.

☒ **diplomska listina/potrdilo o zaključku študijskega programa** (*diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme*)

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☒ **motivacijsko pismo** (*motivation letter*)

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2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Bor Kos bor.kos@fe.uni-lj.si

3. Raziskovalno področje (Research field):

Biomedicinska tehnika

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.:

Uspostavljanje bo potekalo v Laboratoriju za biokibernetiko, ki ga sestavlja mednarodna interdisciplinarna skupina elektroinženirjev, strojnih inženirjev, biologov, mikrobiologov, zdravnikov in kemikov. Raziskovalna skupina se osredotoča na uporabo pulznih električnih polj v medicini, biologiji in biotehnologiji. Delo bo v prvi vrsti zajemalo numerično modeliranje ablacije srca s poudarkom na simulaciji porazdelitve električnega polja in širjenja akcijskega potenciala. To vključuje razvoj in izpopolnjevanje matematičnih modelov za boljše razumevanje fizikalnih in bioloških mehanizmov, ki so osnova postopkov ablacije srca. Poleg tega bo delo vključevalo analizo eksperimentalnih *in vivo* in *in vitro* podatkov ter njihovo uporabo za validacijo numeričnih modelov, da se zagotovi njihova natančnost in uporabnost v kliničnih in raziskovalnih okoljih.

Zaželeno znanje:

1. Izkušnje z numeričnim modeliranjem fizikalnih pojavov (metoda končnih elementov)
2. Izkušnje s programiranjem v programskem jeziku Matlab ali Python

Eng.:

The training will take place in the Laboratory of Biocybernetics, which consists of an international interdisciplinary group of electrical engineers, mechanical engineers, biologists, microbiologists, medical doctors and chemists. The research group focuses on the use of pulsed electric fields in medicine, biology and biotechnology. The work will primarily involve the numerical modeling of cardiac ablation, with a focus on the simulation of the electric field distribution and the propagation of the action potential. This includes the development and refinement of mathematical models to better understand the physical and biological mechanisms underlying cardiac ablation procedures. In addition, the work includes analyzing experimental *in vivo* and *in vitro* data and using it to validate numerical models to ensure their accuracy and applicability in clinical and research settings.

Bonus skills:

1. Experience with numerical modelling (e.g. finite element method)
2. Experience with programming in Matlab or Python

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

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☐ **bibliografija** (*bibliography*)

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☐ **motivacijsko pismo** (*motivation letter*)

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** (*description of the candidate's research work*)

☐ **osnutek idejne zasnove raziskovalnega dela** (*preliminary research proposal*)

☐ **priporočilno pismo** (*letter of recommendation*)

☐ **druge priloge** (*other attachments*)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Univerza v Ljubljani, Fakulteta za elektrotehniko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Benjamin Lipovšek (benjamin.lipovsek@fe.uni-lj.si)

3. Raziskovalno področje (Research field):

2.03.03 Obnovljivi viri energije (Renewable energy)
2.09.04 Optoelektronika (Optoelectronics)
2.09.03 Mikroelektronika (Microelectronics)

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.:

Raziskovalno delo mladega raziskovalca bo osredotočeno na optoelektroniko in mikroelektroniko, področji, ki sta v zadnjih letih doživeli izjemen razvoj tako v Evropi kot tudi v Sloveniji. Cilj raziskav bo poglobljena karakterizacija, načrtovanje in optimizacija sodobnih optoelektronskih in mikroelektronskih gradnikov, pri čemer bo poseben poudarek namenjen razvoju in uvajanju naprednih konceptov za izboljšanje njihovih lastnosti in zmogljivosti.

Cilji:

- Razvoj naprednih kombiniranih numeričnih modelov in simulatorjev za računalniško podprto načrtovanje optoelektronskih in mikroelektronskih gradnikov,
- razvoj inovativnih opto-električnih karakterizacijskih metod za natančno analizo njihovega delovanja,
- zasnova, optimizacija in realizacija novih konceptov nano in mikro struktur v optoelektronskih in mikroelektronskih gradnikih.

Mladi raziskovalec bo svoje delo opravljal v okviru Laboratorija za fotovoltaike in optoelektroniko (LPVO) na Fakulteti za elektrotehniko (UL FE). Aktivno bo sodeloval v raziskovalnem programu »Fotovoltaike in elektronika« (P2-0415, 2022-2027) ter pri drugih tekočih raziskovalnih projektih. Poleg tega bo vključen v sodelovanje s priznanimi raziskovalnimi organizacijami doma in tujini, kar mu bo omogočilo vpogled v najnovejše trende in razvojne smernice.

Kandidat bo vpisal doktorski študij Elektrotehnika na UL FE. Od kandidata se pričakuje, da je suveren v programiranju in numeričnem modeliranju, ima izkušnje z eksperimentalnim delom v elektroniki ali optoelektroniki ter obvlada angleški jezik.

Eng.:

The research work of the young researcher extends to the fields of optoelectronics and microelectronics, which have experienced rapid development in both Europe and Slovenia in recent years. The focus will be on in-depth characterization, design, and optimization of modern optoelectronic and microelectronic components, with a special emphasis on research and implementation of advanced concepts to improve their performance.

Objectives:

- Development of advanced combined numerical models and simulators for computer-aided design of optoelectronic and microelectronic components.
- Development of innovative optoelectronic characterization methods for in-depth analysis of their operation.
- Design, optimization, and realization of new nano- and micro-structure concepts in optoelectronic and microelectronic components.

The young researcher will conduct their work within the Laboratory for Photovoltaics and Optoelectronics (LPVO) at the Faculty of Electrical Engineering, University of Ljubljana (UL FE). They will be involved in the research program "Photovoltaics and Electronics" (P2-0415, 2022-2027) and other ongoing research projects, as well as collaborate with renowned research organizations both domestically and internationally.

The candidate will enroll in the doctoral study program in Electrical Engineering at UL FE. The expected qualifications include proficiency in programming and numerical modeling, experience in experimental work in electronics or optoelectronics, and a strong command of the English language.

5. Priloge, ki jih kandidat priloži k prijavi (*Documents that the candidate submits with the application*):

☒ **diplomska listina/potrdilo o zaključku študijskega programa** (*diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme*)

☒ **priloga k diplomi/ potrdilo o opravljenih obveznostih** (*official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme*)

☒ **potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij** (*official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme*)

☒ **življenjepis** (*CV*)

☒ **motivacijsko pismo** (*motivation letter*)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Univerza v Ljubljani, Fakulteta za elektrotehniko (UL FE)
University of Ljubljana, Faculty of Electrical Engineering

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Damijan Miljavec

3. Raziskovalno področje (Research field):

2.12 Električne naprave (Electric devices)
2.12.01 Elektromagnetni pretvorniki (Electromagnetic transformers)

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.:

Raziskovalno delo mladega raziskovalca bo usmerjeno na področje električnih strojev in umeščeno v širše področje elektromagnetnih pretvornikov električne energije, ki tako v Evropi kot tudi v Sloveniji v preteklih letih beleži strm razvoj še posebej na področju električne mobilnosti. Osredotočeno bo na raziskave in razvoj numeričnega modeliranja in analize elektromagnetnih struktur, načrtovanjem novih tipov električnih strojev, izračunavanjem magnetnih in toplotnih polj, uvajanjem novih materialov in merilnih metod na področju električnih strojev. Poleg tega bo delo obsegalo uporabo najnovejših optimizacijskih metod na področje načrtovanja električnih strojev.

Mladi raziskovalec bo svoje delo opravljal v okviru Laboratorija za električne stroje (LES) na Fakulteti za elektrotehniko Univerze v Ljubljani (UL FE). Njegovo raziskovalno delo bo tesno vpeto tako v raziskovalni program »Pretvorniki električne energije in regulirani pogoni« (P2-0258) kot tudi v ostale tekoče domače in mednarodne raziskovalne projekte, v sklopu katerih bo sodeloval z drugimi priznanimi raziskovalnimi organizacijami doma in v tujini. Mladi raziskovalec bo vpisal doktorski študij Elektrotehnika na UL FE. Od kandidata se pričakuje visoka stopnja motiviranosti za delo, samoiniciativnost, dobre komunikacijske sposobnosti, ustrezna izobrazba in veselje do eksperimentalnega dela v laboratoriju.

Eng.:

Research activities of the young researcher will focus on the area of electrical machines and will be placed in the broader field of electromagnetic energy converters, which has seen rapid development in Europe and Slovenia in recent years, especially in the field of electric mobility. The research work will focus on development of numerical modelling and analysis of electromagnetic structures, design of new types of electrical machines, calculation of magnetic and thermal fields, introduction of new materials and measurement methods in the field of electrical machines. In addition, the work will include the application of state-of-the-art optimization methods in the field of electrical machinery design.

The young researcher will work in the Laboratory of Electrical Machines (LES) at the Faculty of Electrical Engineering, University of Ljubljana (UL FE). His/Her research work will be closely connected to the research program "Electric Power Converters and Controlled Drives" (P2-0258) as well as other ongoing national and international research projects, where he/she will collaborate with other reputable research institutions at home and abroad. The young researcher will enroll in the doctoral study program in Electrical Engineering at UL FE. High motivation for research work, self-initiative, good communication skills, a suitable education and a willingness to do experimental work in the laboratory are expected.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

☒ **diplomska listina/potrdilo o zaključku študijskega programa** (diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme)

☒ **priloga k diplomil potrdilo o opravljenih obveznostih** (*official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme*)

☒ **potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij** (*official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme*)

☐ **nagrade** (*awards (e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award)*)

☐ **bibliografija** (*bibliography*)

☒ **življenjepis** (*CV*)

☐ **motivacijsko pismo** (*motivation letter*)

☐ **opis dosedanjega sodelovanja pri raziskovalnem delu** (*description of the candidate's research work*)

☐ **osnutek idejne zasnove raziskovalnega dela** (*preliminary research proposal*)

☐ **priporočilno pismo** (*letter of recommendation*)

☐ **druge priloge** (*other attachments*)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Univerza v Ljubljani, Fakulteta za elektrotehniko
University of Ljubljana, Faculty of Electrical Engineering

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Matej Možek (matej.mozek@fe.uni-lj.si)
Matej Možek (matej.mozek@fe.uni-lj.si)

3. Raziskovalno področje (Research field):

2.09 Elektronske komponente in tehnologije
2.09 Electronic components and technologies

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.:

Tema raziskovalnega dela mladega raziskovalca/ke (MR) bo načrtovanje, izdelava in integracija silicijevih senzorskih in aktuatorskih struktur s pametno elektroniko, kar bo vodilo v realizacijo kompleksnejših mikroelektronskih sistemov za medicinske, farmacevtske ali procesno-kemijsko inženirske aplikacije.

Delo MR predstavlja nadaljevanje obstoječih raziskav Laboratorija za mikrosenzorske strukture in elektroniko (LMSE) na področju polprevodniške tehnologije, MEMS, elektronskih vezij, mikrofluidike in debelo- ter tankoplastnih materialov v elektroniki.

Cilj raziskovalnega dela MR je razširitev obstoječih znanj na področju naprednih senzorskih sistemov za ključne aplikacije v medicini, farmaciji, procesnem-kemijskem inženirstvu in biologiji (oceanografija). Takšni sistemi bodo poleg osnovnih mikrofluidnih funkcij (kontrole pretoka, mešanja, usmerjanja itd.) izvajali še druge pomembne funkcije, kot so merjenje temperature, prevodnosti (slanost vode), globine, biološko zaznavanje, zbiranje električnega naboja idr.

Narava dela MR bo izrazito interdisciplinarna, saj bo vključevala raziskovalna področja materialov, mikrofluidne mehanike, elektronskih komponent, vezij, numeričnih simulacij in programiranja. Tema MR se tesno prepleta z izvajanjem obstoječih projektov programske skupine Mikrostrukture in nanostrukture.

MR mora imeti sposobnost strokovnega delovanja v mednarodnem okolju, kar zajema osnove pisanja znanstvenih člankov in dobro znanje angleškega jezika (B2/C1). Od MR se pričakuje visoka motiviranost, ki obsega samoiniciativnost, inovativnost, natančnost in zanesljivost pri delu. MR se aktivno vključuje v ekipo LMSE, pri čemer mora pokazati vnemo za sodelovanje z ostalimi sodelavci LMSE.

MR bo opravljal/a doktorski študij na doktorskem študijskem programu Elektrotehnika, Univerze v Ljubljani.

Eng.:

Main research topic of the young researcher candidate (YRC) will be the design, manufacturing and integration of silicon sensor and actuator structures with smart electronics, which will lead to the realization of more complex microelectronic systems for medical, pharmaceutical or chemical process engineering applications.

Research work of YRC will represent a continuation of existing research of the Laboratory for Microsensor Structures and Electronics (LMSE) in the field of semiconductor technology, MEMS, electronic circuits, microfluidics and thick- and thin-film materials in electronics.

Primary aim of YRC research work is to expand existing knowledge in the field of advanced sensor systems for key applications in medicine, pharmacy and chemical process engineering. In addition to basic microfluidic functions (flow control, mixing, etc.), such systems will perform other important functions, such as measurement of conductivity (water salinity), temperature, depth as well as biological detection, electric charge collection, etc.

Nature of YRC activity will be highly interdisciplinary, as it will include research areas of materials, microfluidic mechanics, electronic components, circuits, numerical simulations and programming. Research topic of YRC is closely intertwined with implementation of existing projects of the program group Microstructures and Nanostructures.

YRC must have the ability to work professionally in international environment, which includes the basics of writing scientific articles and a good knowledge of English (B2 / C1). YRC is expected to be highly motivated, which includes self-initiative, innovation and reliability at work. YRC can look forward to integration into the LMSE team, and must therefore exhibit enthusiasm to work with other LMSE staff.

YRC will conduct his/her doctoral study within doctoral studies program of Electrical Engineering, University of Ljubljana.

5. Priloge, ki jih kandidat priloži k prijavi (*Documents that the candidate submits with the application*):

- ☒ **diplomska listina/potrdilo o zaključku študijskega programa** (*diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme*)
- ☒ **priloga k diplomi/ potrdilo o opravljenih obveznostih** (*official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme*)
- ☒ **potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij** (*official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme*)
- ☒ **nagrade** (*awards (e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award)*)
- ☒ **bibliografija** (*bibliography*)
- ☒ **življenjepis** (*CV*)
- ☒ **motivacijsko pismo** (*motivation letter*)
- ☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** (*description of the candidate's research work*)
- ☐ **osnutek idejne zasnove raziskovalnega dela** (*preliminary research proposal*)
- ☐ **priporočilno pismo** (*letter of recommendation*)
- ☒ **druge priloge** (*other attachments*)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Univerza v Ljubljani, Fakulteta za elektrotehniko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Marko Munih <Marko.Munih@robo.fe.uni-lj.si>

3. Raziskovalno področje (Research field):

Sistemi in kibernetika, Proizvodne tehnologije in sistemi

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.:

Mladi raziskovalec (-ka) bo član Laboratorija za robotiko (LR) na UL, Fakulteti za elektrotehniko, UL (www.robolab.si). LR je na področju Analize in sinteze gibanja pri človeku in stroju usmerjen tako v gibanje robotov, kot tudi gibanje človeku. Ekipa LR ima na teh področjih ekspertizo, objave v uglednih revijah, več učbenikov objavljenih pri založbi Springer, deluje v več mednarodnih in industrijskih projektih, ima patente ter nagrajene, ekonomsko učinkovite industrijske aplikacije, je tesno povezana s priznanimi univerzami v EU.

Tema naloge bo določena s področij industrijskih robotskih aplikacij, merjenj v robotiki ali sodelujoče robotike, podrobno bo usklajena skupaj s kandidatom za MR. Tema bo vključevala razvoj senzornih sistemov v povezavi s sodelujočo robotiko, merjenja in uporabo zaprtizančnih sistemov v robotiki. Od kandidata pričakujemo zaključen magistrski študij elektrotehnike, obvezno je poznavanje področja robotike, merjenj, načrtovanja elektronskih vezij, programiranja in orodij za simulacijo elektronike ter simulacijo večjih sistemov. Prednost predstavlja odlično obvladovanje praktičnih veščin elektrotehnike, robotike, elektronike, programiranje v več programskih jezikih ter obvladovanje orodij za načrtovanje električnih vezij ter CAD, kot tudi obvladovanje več jezikov. Pričakujemo pridnost, prizadevnost in vztrajnost pri delu, dobro vključitev v raziskovalno skupino, kot tudi veščine komunikacije z akterji na področju.

Kandidati lahko več informacij pridobijo v laboratoriju.

Eng.:

The young researcher will be member of Laboratory of robotics (LR) at the UL, Faculty of Electrical Engineering (www.robolab.si). LR is focused on analysis and synthesis of robot-machine motion and in human. The LR team has long standing track in the field, particular attention is paid to the measurements in humans and machines. In these fields the lab members published in established magazines, several textbooks were issued with Springer. The LR team is active in a number of international and industrial projects, has obtained patents, has been awarded for economically efficient industrial applications, and is also linked with renowned universities in EU.

The thesis topics will be determined in the fields of industrial robot applications, measurements in robotics or collaborative robotics, detailed definition will be agreed with the candidate. The topics will include development of sensory systems in connection with collaborative robotics, measurements and use of closed loop systems in robotics. Candidate should have completed the master studies of electrical engineering, mandatory is knowledge in the fields of robotics, measurements, electronic circuit design, programming and tools for simulations of electronics and larger system simulations. Advantage could be excellent practical skills in electrical engineering, robotics, electronics, programming in several program languages, competence in tools for design of electrical circuits and mechanical design as well as mastering multiple languages. Expected is diligence, hard work, persistence, good merge with the research team, as well as communication skills with actors in the field.

The candidates can obtain more information in the laboratory.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

☒ **diplomska listina/potrdilo o zaključku študijskega programa** (diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme)

☒ **priloga k diplomii/ potrdilo o opravljenih obveznostih** (*official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme*)

☒ **potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij** (*official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme*)

☒ **življenjepis (CV)**

☒ **motivacijsko pismo** (*motivation letter*)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Univerza v Ljubljani, Fakulteta za elektrotehniko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Urban Rudež, urban.rudez@fe.uni-lj.si

3. Raziskovalno področje (Research field):

2.03 – Tehniške vede, Energetika

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Usposabljanje mladega raziskovalca bo potekalo v Laboratoriju za preskrbo z električno energijo na Univerzi v Ljubljani, Fakulteti za elektrotehniko. Raziskave, s katerimi se bo mladi raziskovalec ukvarjal, bodo s področja elektroenergetskih sistemov. Kandidat bo iskal rešitve za vsaj enega izmed mnogih ključnih izzivov na področju obratovanja in stabilnosti elektroenergetskih sistemov, pri čemer bo izkoriščal prednosti najnovejših tehnologij. Metodologija bo temeljila na digitalnih simulacijah, tako konvencionalnih kot tudi na simulacijah z digitalnim simulatorjem za simulacije v realnem času.

Spodbujanje mladega raziskovalca bo usmerjeno v sodelovanje z znanstvenimi kolegi z vsega sveta, odprto znanost, uporabo aktualnih in naprednih orodij umetne inteligence ter prenos ugotovitev v gospodarstvo ob ustrezni zaščiti intelektualne lastnine, vključno z morebitno samostojno podjetniško potjo. Poudarek bo nedvomno na ustreznem komuniciranju tako z znanstvenim svetom (na konferencah in delavnicah) kot tudi z neznanstveno javnostjo, saj se mora znanost približati širši javnosti z jasnimi in razumljivimi komunikacijskimi pristopi.

Mladi raziskovalec bo vključen v tekoče laboratorijsko delo v sklopu ARIS raziskovalnega programa »P2-0356 Elektroenergetski sistemi«, kar mu/ji bo v pomoč pri širjenju spektra njegovega znanja.

Od kandidata se zahteva zaključen magistrski študijski program 2. stopnje Elektrotehnika (smer Elektroenergetika). Zaželeno je osnovno poznavanje orodij DigSILENT PowerFactory in Python.

The training of the young researcher will take place at the Laboratory of Electric Power Supply at the University of Ljubljana, Faculty of Electrical Engineering. The research activities of the young researcher will focus on electric power systems. The candidate will seek solutions to at least one of the many key challenges in the field of electric power system operation and stability, taking advantage of the existing state-of-the-art. The methodology will be based on digital simulations, both conventional and real-time simulations using a digital simulator.

The support for the young researcher will be directed towards collaboration with scientific colleagues worldwide, open science, the use of advanced artificial intelligence tools, and the transfer of findings into the industry while ensuring proper intellectual property rights, potentially including entrepreneurial path. The emphasis will undoubtedly be on effective communication, both within the scientific community (at conferences and workshops) and with the general public, as science must be made accessible to society through clear and comprehensible communication.

The young researcher will be involved in ongoing laboratory work within the ARIS research program "P2-0356 Power Systems," which will help broaden his/hers knowledge spectrum.

The candidate is required to have completed a second-level master's degree in Electrical Engineering (specialization in Power Engineering) and possess basic knowledge of DigSILENT PowerFactory and Python.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

☒ **diplomska listina/potrdilo o zaključku študijskega programa** (*diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme*)

☒ **priloga k diplomi/ potrdilo o opravljenih obveznostih** (*official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme*)

☒ **potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij** (*official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme*)

☒ **življenjepis (CV)**

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Univerza v Ljubljani, Fakulteta za elektrotehniko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Kristina Stojmenova Pečecnik, kristina.stojmenova@fe.uni-lj.si

3. Raziskovalno področje (Research field):

Glavno raziskovalno področje mladega raziskovalca oziroma mlade raziskovalke bodo inovativni načini ocenjevanja senzorno-motoričnih in kognitivnih sposobnosti človeka s pomočjo naprednih digitalnih rešitev. Poudarek bo predvsem na sočasnem zajemu več različnih podatkov oziroma kazalnikov sposobnosti, ki omogočajo hkratno oceno stanja senzorno-motoričnih in kognitivnih sposobnosti ter njihovih kompenzacijskih mehanizmov.

Raziskave na področju ocenjevanja senzorno-motoričnih in kognitivnih sposobnosti večinoma obravnavajo vsako sposobnost posebej in s tem posredno zanemarjajo kompenzacijske mehanizme, ki jih človek redno uporablja v vsakdanjem življenju. S pomočjo naprednih digitalnih rešitev, biometričnih senzorjev in drugih neinvazivnih metod zajemanja podatkov pa je mogoče zagotoviti celostno obravnavo senzorno-motoričnih in kognitivnih sposobnosti, ki so ključnega pomena za številna področja – od upravljanja strojev in vozil do opravljanja vsakdanjih opravil.

Nadalje bo mogoče tovrstne rešitve uporabljati ne samo za oceno, temveč tudi za trening in rehabilitacijo ob upadu teh ključnih funkcionalnih sposobnosti, kar lahko prispeva k večji in daljši samostojnosti posameznika. To je v času staranja prebivalstva ena glavnih prioritet Evropske unije in drugih razvitih držav po svetu.

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (*It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.*).

Slov.: Raziskovalno delo bo potekalo v Laboratoriju za informacijske tehnologije (LaIT) v sodelovanju z raziskovalno skupino, ki deluje na področju interakcije človek-stroj. Poleg tega se bo spodbujalo sodelovanje z nacionalnimi in mednarodnimi raziskovalnimi organizacijami ter industrijskimi partnerji LaIT.

Raziskovalno delo bo vključevalo predvsem:

- *pregled literature in kritično presojo obstoječih rešitev,*
- *identifikacijo in testiranje različnih metod ocenjevanja senzorno-motoričnih in kognitivnih sposobnosti,*
- *prepoznavanje metod ocenjevanja, ki jih je mogoče bistveno izboljšati z uporabo digitalnih rešitev in zbiranjem velikih podatkov,*
- *oblikovanje in razvoj novih metod ocenjevanja,*
- *validacijo novo predlaganih metod ocenjevanja z najsodobnejšimi rešitvami ter vrednotenje teh metod z uporabniškimi študijami,*
- *diseminacijo rezultatov raziskovalnega dela v znanstvenih publikacijah.*

Za uspešno izvedbo raziskovalnega dela je potrebno tekoče znanje angleščine. Zahtevane so izkušnje z zbiranjem, analizo in celovito interpretacijo podatkov. Zaželeno so izkušnje z raziskovalnim delom.

Eng.: The research work will take place at the Laboratory of Information Technologies (LaIT) in collaboration with the rest of the research group working in the field of human-machine interaction. Additionally, collaboration with national and international research organizations, as well as industry partners of LaIT, will be highly encouraged. The research work will primarily involve:

- *A state-of-the-art review and critical assessment of existing solutions,*
- *Identification and testing of different methods for assessing sensory-motor and cognitive abilities,*
- *Identification of assessment methods that can be significantly improved through the use of digital solutions and big data collection,*
- *Design and development of new assessment methods,*
- *Validation of the newly proposed assessment methods using state-of-the-art solutions and evaluation through user studies,*
- *Dissemination of research results in scientific publications.*

To achieve the envisioned objectives, fluency in English is required. Experience with research work is desirable.

5. Priloge, ki jih kandidat priloži k prijavi (*Documents that the candidate submits with the application*):

☒ **diplomska listina/potrdilo o zaključku študijskega programa** (*diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme*)

☒ **priloga k diplomi/ potrdilo o opravljenih obveznostih** (*official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme*)

☒ **potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij** (*official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme*)

☐ **nagrade** (*awards (e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award)*)

☐ **bibliografija** (*bibliography*)

☒ **življenjepis** (*CV*)

☐ **motivacijsko pismo** (*motivation letter*)

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** (*description of the candidate's research work*)

☐ **osnutek idejne zasnove raziskovalnega dela** (*preliminary research proposal*)

☐ **priporočilno pismo** (*letter of recommendation*)

☐ **druge priloge** (*other attachments*)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Univerza v Ljubljani, Fakulteta za elektrotehniko (University of Ljubljana, Faculty of Electrical Engineering)

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Tomaž Vrtovec, tomaz.vrtovec@fe.uni-lj.si

3. Raziskovalno področje (Research field):

Računalniško podprta analiza medicinskih slik (Computer-assisted medical image analysis)

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.: Mladi raziskovalec/mlada raziskovalka bo deloval/a v okviru Laboratorija za slikovne tehnologije (LST) na Fakulteti za elektrotehniko, Univerza v Ljubljani (UL FE), pri čemer bo raziskovalno delo tesno povezano z raziskovalnim programom »Analiza biomedicinskih slik in signalov« (P2-0232) in drugimi raziskovalnimi projekti laboratorija na področju računalniško podprte analize medicinskih slik. Raziskave bodo obsegale, vendar ne bodo omejene na:

- priprava, upravljanje in uporaba zbirk medicinskih slik;
- uporaba obstoječih računalniško podprtih metod za (pred)obdelavo in analizo medicinskih slik;
- načrtovanje in razvoj novih in/ali izpopolnjenih računalniško podprtih metod za analizo medicinskih slik, vključno z metodami na osnovi umetne inteligence oz. globokega učenja;
- vrednotenje razvitih metod na javno dostopnih ter zasebnih zbirkah medicinskih slik z vidika klinične diagnostike in načrtovanja terapevtskih posegov;
- priprava poročil in znanstvenih publikacij;
- druge, z opisanim raziskovalnim področjem povezane dejavnosti in aktivnosti (npr. sodelovanje pri organizaciji dogodkov in vabljenih predavanj, sodelovanje pri pripravi prijave na projektne razpise, ipd.).

Zahtevana so torej naslednja dodatna znanja oz. sposobnosti:

- aktivno znanje angleškega jezika;
- računalniško programiranje (npr. Python);
- dobro poznavanje matematike in statistike.

Poleg tega so zaželena naslednja dodatna znanja oz. sposobnosti:

- tehnično poročanje in komuniciranje o raziskavah;
- osnove globokega učenja in (medicinske) slikovne informatike;
- prilagodljivost na individualno in skupinsko delo.

Eng.: The Young Researcher will perform his/her research within the Laboratory of Imaging Technologies (LIT) at University of Ljubljana, Faculty of Electrical Engineering, with the research work closely related to the research program "Biomedical image and signal analysis" (P2-0232) and other research project in the laboratory within the field of computer-assisted medical image analysis. The research will encompass, but will not be limited to:

- design, management and usage of medical image databases;
- application of existing computer-assisted methods for (pre)processing and analysis of medical images;
- design and development of new and/or augmented computer-assisted methods for analysis of medical images;
- evaluation of the developed methods on publicly available and private databases of medical images from the perspective of clinical diagnostics and therapy planning;
- preparation of reports and scientific publications;

- other tasks and activities related to the described research field (e.g. participate in organizing events and invited lectures, participate in preparing project proposals, etc.)

The required knowledge and/or skills are therefore:

- proficiency in English language;
- computer programming (e.g. Python);
- solid knowledge in mathematics and statistics.

In addition, the preferred knowledge and/or skills are:

- technical reporting and science communication;
- basics of deep learning and (medical) imaging informatics;
- flexibility to individual and team work.

5. Priloge, ki jih kandidat priloži k prijavi (*Documents that the candidate submits with the application*):

☒ **diplomska listina/potrdilo o zaključku študijskega programa** (*diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme*)

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