Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Fakulteta za gradbeništvo in geodezijo

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

Aleš Marjetič, amarjeti@fgg.uni-lj.si

3. Raziskovalno področje (*Research field*):

Geodezija

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 oziroma mlada raziskovalka (MR) se bo z raziskovalnim delom usposabljal v okviru raziskovalnega programa P2-0227 z naslovom Geoinformacijska infrastruktura in trajnostni prostorski razvoj Slovenije. Ožja raziskovalna skupina, ki raziskuje v okviru omenjenega raziskovalnega programa in v katero bo vključen kandidat, se ukvarja z raziskovanjem naprednih metod precizne terestrične geodetske izmere, deformacijske analize in inženirske geodezije.
Kandidat mora izkazovati željo po raziskovanju in razvoju novih pristopov za spremljanje premikov točk in deformacij različnih naravnih in grajenih objektov ter optimizacijo merskih postopkov pri klasični terestrični geodetski izmeri in terestričnem laserskem skeniranju. Cilj raziskovalnega dela bo tudi nadgradnja klasičnih terestričnih merskih postopkov in obdelav meritev s kombinacijo rezultatov meritev drugih merskih metod (fotogrametričnih in GNSS) ter vrednosti drugih merskih senzorjev (npr. IMU, inklinometri) kot podpora pri izboljšanju rezultatov za določitev kakovostnih informacij o deformacijskem stanju obravnavanega objekta. To bo vključevalo raziskovalno delo na deloma vsebinsko ločenih sklopih, ki jih bo kandidat v svojem zaključnem delu povezal v eno celoto.
Raziskovalno bo kandidat sodeloval pri naslednjih raziskovalnih tematikah:

- *Precizni terestrični geodetski izmeri za spremljanje premikov in deformacij naravnih in grajenih objektov s poudarkom na optimizaciji merskih in računskih postopkov v izravnavi meritev za določitev natančnih položajev in premikov točk v preciznih geodetskih mrežah oziroma sprememb geometrije deformabilnega objekta.*
- *Deformacijski analizi pri raziskovanju problematike koordinatnih osnov v geodetskih mrežah ter razvoju alternativnih pristopov k določanju stabilnih referenčnih točk.*
- *Optimizaciji merskih postopkov v inženirski geodeziji – preizkušanju in kalibraciji sodobne merske opreme ter razvoju inovativnih metod za izboljšanje natančnosti meritev.*
- *Morebitnih aplikacijah drugih merskih metod, kot so fotogrametrične metode, metode GNSS ter laserskega skeniranja pri inženirskih nalogah ter povezovanju z dodatnimi merskimi senzorji (IMU, inklinometri), odvisno od interesa kandidata.*

Prednost pri izbiri bodo imel kandidati, ki so dosegli nadpovprečne študijske rezultate, ima predhodno geodetsko izobrazbo, je vešč programiranja v enem od programskih jezikov (matlab, python…) in izkazujejo željo po samostojnem znanstveno-raziskovalnem delu, ki bo vključevalo kombinacijo terenskega dela, eksperimentalnih meritev, podatkovnih analiz in razvoj matematičnih modelov za interpretacijo rezultatov. Mladi raziskovalec bo imel pri svojem raziskovalnem delu tudi možnost sodelovanja pri znanstvenih objavah in projektih s praktičnimi aplikacijami v geodetskem inženirstvu.

Eng.:
A Young Researcher (MR) will undergo research training within the framework of the research program P2-0227, titled Geoinformation Infrastructure and Sustainable Spatial Development of Slovenia. The selected candidate will join a specialized research group within this program, focusing on advanced methods of precise terrestrial geodetic measurement, deformation analysis, and engineering geodesy.
The candidate should demonstrate a strong interest in research and the development of new approaches for monitoring point displacements and deformations of various natural and man-made structures, as well as optimizing measurement procedures in classical terrestrial geodetic surveys and terrestrial laser scanning. The

research will also aim to enhance traditional terrestrial measurement methods by integrating results from other measurement techniques (such as photogrammetry and GNSS) and incorporating data from additional sensors (IMU, inclinometers) to improve the quality of deformation analysis. The research will involve several interrelated subtopics, which the candidate will ultimately integrate into a cohesive final thesis.
The candidate will be involved in the following research areas:

- *Precise terrestrial geodetic measurement for monitoring displacements and deformations of natural and built structures, with a focus on optimizing measurement and computational procedures in measurement adjustment to determine accurate point positions and movements within geodetic networks or changes in the geometry of deformable objects.*
- *Deformation analysis, particularly addressing challenges related to reference coordinate frames in geodetic networks and developing alternative approaches for determining stable reference points.*
- *Optimization of measurement procedures in engineering geodesy, including testing and calibration of modern surveying equipment and the development of innovative methods to improve measurement precision.*
- *Potential applications of other measurement techniques, such as photogrammetry, GNSS, and laser scanning, for engineering tasks and their integration with additional measurement sensors (IMU, inclinometers), depending on the candidate's interests.*

Preference will be given to candidates who have above-average academic achievements, hold a prior geodetic education background, possess programming skills in one of the programming languages (e.g., Matlab, Python) and demonstrate a strong interest in independent scientific research, combining fieldwork, experimental measurements, data analysis, and mathematical modeling for result interpretation.
The Young Researcher will also have the opportunity to contribute to scientific publications and research projects with practical applications in geodetic engineering.

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)*