Name and surname:	**Tomasz Hadaś**
Academic Degree:	dr hab. inż. (DSc.)
Institute/Department:	Institute of Geodesy and Geoinformatics
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UPWr Base of Knowledge - link:	https://bazawiedzy.upwr.edu.pl/info/author/UPWr44e97b393be1466bb641f4ff5cb82520?affil=&r=author&tab=&title=Profil%2Bosoby%2B%25E2%2580%2593%2BTomasz%2BHada%25C5%259B%2B%25E2%2580%2593%2BUniwersytet%2BPrzyrodniczy%2Bwe%2BWroc%25C5%2582awiu&lang=pl
Researchgate:	
Personal website / Working group website:	
Participation in projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	2019-2021 Real-Time GNSS for European Troposphere Delay Model (ReS4ToM), H2020, PI 2022-2025 Simultaneous Troposphere Estimation with Precise Point Positioning (STEPPP), NCN, PI 2023-2026 Precise positioning using GNSS in real time - online service (PIGEON), NCBR, PI
PhD topic:	Individual calibration of low-cost GNSS antennas - an array approach
Research discipline in Doctoral School:	Civil Engineering, Geodesy and Transport
Short description of the research problem to be solved in the PhD (minimum 1000 characters):	Low-cost GNSS receivers and antennas are becoming widely used in precision geoscience applications. One of the challanges in achieving millimeter-level positioning precision is the lack of multi-system and multi-frequency models of the antenna phase center and its variations (PCO, PCV). While type-specific models have proven to be unreliable, a robotic individual antenna calibration seems economically unjustified. Simplifying the calibration procedure and calibrating multiple antennas simultaneously can reduce calibration time and cost. The successfull candidate will first investigate the repeatability of PCO and PCV models for the selected low-cost antenna model by performing a full robotic calibration. He will then implement an algorithm to determine PCO and PCV, and study the effect of simplifying the calibration procedure on the precision and accuracy of the estimated models, based on observation files from the calibrated antennas. Finally, a 3x3 array of low-cost antennas will be placed on the robotic arm. The position of the eccentric antennas will be determined based on the three orientation angles of the robot arm. The method will be validated throug 1) comparison with an external individual model, and 2) multiple array calibration with swapped antenna positions, particularly by replacing the central antenna.
Professional skills for PhD candidate (e.g. master program, specializations, softwares, language, analytical techniques, minimum 500 characters):	- master of science in Geodesy, Geoinformatics, Physics, Aerospace Engineering, or similar; - understanding and experience in GNSS data processing (any software); - good knowledge (or keen to learn) of least-squares adjustment and Kalman Filter; - fluent English in writing and speaking (B2 level minimum); - ability to clearly present scientific concepts at conferences, workshops, and internal meetings; - programming skills (Python, Matlab); - good organization of one's own work - open for internships to external partner in and outside Europe.
a) Project title:	none
b) Agreement number:	none

c) Number of months in the project to support PhD student (in months; starting from 1st of October 2024):	0
Project website:	