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Academic Degree	dr hab. inż. (DSc.)
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UPWr Base of Knowledge - link	https://bazawiedzy.upwr.edu.pl/info.seam?id=UPWr3719fc45efdc4a24ae17f595857b47a9&affil=&lang=pl
Researchgate:	https://www.researchgate.net/profile/Grzegorz_Jozkow
Personal website / Working group website:	
Projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	1. UAS remote sensing for flood extent estimation (2016). Climate-KIC Pathfinder Programme. RF and tasks coordinator. 2. EPOS-PL - System Obserwacji Płyty Europejskiej (2017-2022). Program Operacyjny Inteligentny Rozwój 2015-2018. RF. 3. Integracja technik pozycjonowania w czasie rzeczywistym (2019). Europejski Fundusz Rozwoju Regionalnego, Program Operacyjny Województwa Dolnośląskiego, „Bon na innowację". RF and task 2 coordinator. 4. Innowacyjne technologie ograniczenia migracji zasolonych wód podziemnych do wód powierzchniowych w rejonie Obiektu Unieszkodliwiania Odpadów Wydobywczych Żelazny Most (Faza 1: 2019-2020). NCBiR. RF. 5. GATHERS – Integration of Geodetic and imAging TecHniques for monitoring and modelling the Earth's surface defoRmations and Seismic risk (2019-2022). European Union, Horizon 2020 Widespread Twinning. RF and Quality Manager. 6. WATERAGRI - WATER RETENTION AND NUTRIENT RECYCLING IN SOILS AND STREAMS FOR IMPROVED AGRICULTURAL PRODUCTION (2020-2024). European Union, Horizon 2020 research and innovation programme. RF. 7. EPOS-PL+ - System Obserwacji Płyty Europejskiej (2020-2023). Europejski Fundusz Rozwoju Regionalnego w ramach Programu Operacyjnego Inteligentny Rozwój 2014-2020. RF.
Research topic and funding	
1) PhD topic:	Improving the quality of UAV-borne LiDAR and photogrammetric data used to monitor terrain surface deformations.
2) Research discipline in Doctoral School	Civil Engineering and Transport
3) Short description of the research problem to be solved in the PhD:	Underground mining causes deformation of the land surface. In urbanized areas the effects of these deformations pose a serious threat for the infrastructure and people. Typical surveying techniques used to monitor these deformations (e.g. levelling) are time-consuming and may be insufficient since they provide relatively little information about the deformation (only along the levelling lines). The use of satellite interferometry (InSAR) techniques allows for the determination of deformation in a continuous manner (for the entire area), however, the relatively low ground resolution of SAR data predisposes the InSAR technique to monitor deformation in larger areas without providing information about deformations that occur within a single pixel of SAR image. Airborne laser scanning (LiDAR) and photogrammetric techniques can provide information on the magnitude of deformation with high spatial resolution. However, due to high costs, deformation monitoring with the use of manned platforms can be performed with low time resolution. The reduction of these costs is possible thanks to the use of inexpensive unmanned aerial vehicles (UAVs) commonly known as drones. The main limitation of such platforms is their payload causing that professional airborne laser scanners or cameras cannot be mounted. Moreover, such high performance sensors are also expensive. Less expensive sensors (e.g. Velodyne scanner) that can be mounted on drones provide data (point cloud) of lower quality in terms of deformation monitoring applications. The quality of this data can be improved at various stages, e.g. during processing of observations used to create georeferenced point cloud or during further processing that aims at deformation determination. In particular, methods for more accurate sensor or inter-sensor calibration of LiDAR system may be developed in order to improve the geometrical quality of the data. In addition, the point cloud georeferencing process can be also improved. In the case of the Velodyne scanner, it can be potentially achieved by developing additional scan adjustment method that benefits from the Velodyne scanner design which uses multiple laser diodes to collect range data. In the case of photogrammetric data additional information from UAV-borne or terrestrial laser scanning point cloud can be included in the image block bundle adjustment process. The improvement of data quality during subsequent processing can be achieved by detecting stable areas that may be considered as another constrain during point cloud registration/georeferencing. The problem of distinguishing between terrain surface changes caused by deformations and other causes (e.g. earthwork) can be also addressed in the scope of these thesis. The presented problem of improving the quality of LiDAR and photogrammetric data obtained with inexpensive sensors mounted on UAVs used to monitor terrain surface deformation is therefore multifaceted and is not limited to the solutions proposed above. This topic is related to GATHERS project that includes scientific collaboration with TU Wien.
4) Professional skills for PhD candidate (e.g. master program, specializations, softwares, language, analytical techniques):	Preferred are candidates who graduated in Gedesy, Goescience or similar field, preferably with the photogrammetry or geoinformatics specialty. Knowledge of methods used for photogrammetric image processing (including Computer Vision algorithms). Knowledge of airborne laser scanning technology, in particular georeferencing method. Skills of point cloud processing, in particular ground point extraction (filtering) or classification and DTM creation (using any software). Programming skills, preferably in Python, Matlab. An additional advantage is the experience in performing UAV flights for photogrammetric purposes.
5) Details of the project to support PhD research	
a) Project title:	0
b) Agreement number:	0
c) Number of months in the project to support PhD (in months; starting from 1st of October 2021):	0
6) Project webside:	