

Wrocław University of Environmental and Life Sciences

MODERN TECHNOLOGIES IN RESEARCH AND EDUCATION AT THE INSTITUTE OF GEODESY AND GEOINFORMATICS

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Institute of Geodesy and Geoinformatics

DRUŽICOVÉ METODY V GEODÉZII A KATASTRU, Ústav geodézie Fakulty stavební VUT v Brně, 4.02.2016

GeoTech Lab

OUTLINES

- **1. GEO-INFO-HYDRO center**
- 2. Laboratory of Geodetic Technology
- 3. Laboratory of Remote Sensing, Laser Scanning and 3D Modeling
- 4. Geodetic Monitoring Laboratory
- 5. Applications in teaching process
- 6. Research applications

RS&LiDAR Lab

GeoMon Lat

Teaching

Research

GEO-INFO-HYDRO center

Project co-financed by the European Union: European Regional Development Fund - Infrastructure and Environment Programme, Priority XIII, Application 13.1.



47 647 822.67 PLN

GEO-INFO-HYDRO center

- the total value of the project: 56 092 785.50 PLN
- the amount of expenditure qualified: 56 056 261.96 PLN
- the EU contribution:
- educational area:
- additional area:

4575,8 m² 3208,7 m²

- 6 floors, 2 elevators, parking
- laboratories, offices, seminar rooms, library, reading rooms, rooms for staff and PhD students, student social rooms



GEO-INFO-HYDRO building





UNIA EUROPEJSKA EUROPEJSKI FUNDUSZ ROZWOJU REGIONALNEGO



GEO-INFO-HYDRO center

Laboratories



Laboratory located in GEO-INFO-HYDRO building



Technical room

RS&LiDAR Lab

GeoMon Lal

Teaching

Research

Laboratory of Geodetic Technology

Geodetic instruments



Trimble S8 0,5" HP Robotic Total Station Model instrument to measure:

- distances
- angles



Trimble S8 1" DR PLUS Robotic Total Station Model instrument to measure: - distances

- angles

Trimble DiNi 0,3 Precise code level Model instrument to measure heigth differences





Leica MS50 Robotic Multistation

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Teaching

Research

Laboratory of Geodetic Technology

Geodetic instruments testing stations



Collimator stations Desinged to control geodetic instruments. Using collimators to determine axial conditions of theodolites, total stations and levels Leica service station used for testing and examination measuring instruments





Determining instruments errors, defining corrections, controlling axial conditions

Research

Laboratory of Geodetic Technology

Geodetic instruments testing bases



Longitudinal datum – to control accuracy of diistances measurements – using laser interferometer



Precise level staffs installed in the laboratory



Vertical comparator of leveling staff – designed to control height differences heghts measurements and accuracy of leveling staffs. Using laser interferometer LS10.

Laboratory of Remote Sensing, Laser Scanning and 3D Modeling

Scan stations



Leica ScanStation C10 includes a highaccuracy/long-range scanner, tilt sensor, battery, controller, data storage, autoadjusting video camera and laser plummet Leica ScanStation P20 high speed scanner





Leica Cyclone –software modules provide point cloud users with the widest set of work process options for 3D laser scanning projects in engineering, surveying, construction and related applications

Laboratory of Remote Sensing, Laser Scanning and 3D Modeling

Airborne teledetection

GNSS - OEM615 Novatel





Nikon D800



Aibot X6 – photogrammetric drone equipped with Velodyne laser scanner, IR cammera, GPS receiver, gyroscope, accelerometer, barometer, magnetometer, ultrasonic sensors

Laboratory of Remote Sensing, Laser Scanning and 3D Modeling

Kinematic measurements



Applanix220 LV is a compact, fully integrated, turnkey position and orientation system, utilizing integrated inertial technology to generate stable, reliable and repeatable positioning solutions for land-based vehicle applications

Laboratory of Remote Sensing, Laser Scanning and 3D Modeling





Geodetic Monitoring Laboratory

Geodetic sensors



Leica Robotic Total Station TS50Leica Robotic Total Station TM50Accuracy of angle measurement - 0,5"Designed to monitoring systems



Leica AR10 GNSS Antenna



Leica GR25 GNSS Receiver

Geodetic Monitoring Laboratory

Other sensors



Tiltmeter KELAG SCA124T Measuring tilt in real time Range - +/- 30 degrees Resolution – 0,03 degree Installed in inclinometer tube Vaisala WXT520 meteoroligical station measuring: -temperature -barometric pressure -humidity -wind speed -wind direction -precipitation





Precise inclinometer – Leica Nivel220 precision inclination sensor for simultaneous measurement of inclination, and temperature with resolution to 0,001 mrad (0,6cc) and accuracy to +/- 0,0047 mrad (3cc)

Geodetic Monitoring Laboratory

Software

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29-01	016 13:15:20 TM-50 S	5	Menitoring	Normal	379.9079	91.4965	14.325	0.002	-0.000	0.001	-0.001	-4.406	13.496	3.408	
29-01	2016 13:15:20 TS50	DACH	WCIECIE	Pree Stati	245.9808	97.3772	72.372	0.025	-0.002	0.001	-0.025	6434328	5664669.602	140.875	
29-01	2016 13:15:33 TM-50 S	4	Monitoring	Normal	380.0861	104.5739	14.240	0.002	-0.000	0.002	-0.001	-4.370	13.514	0.478	
29-01	2016 13:15:39 T550	DACH	WCIECIE	Pree Stati	336.2322	87.0683	20.228	0.009	-0.002	-0.002	0.009	6434359	5664734.546	141.975	
29-01	2016 13:15:47 TM-50 S	6	Monitoring	Normal	396.3482	86.7975	9.288	0.001	-0.000	0.001	-0.001	-0.521	9.074	3.412	
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29-01	2016 13:15:59 TM-50 S	3	Monitoring	Normal	396.5009	107.1140	9.183	0.001	-0.000	0.001	-0.001	-0.501	9.112	0.476	
29-01	2016 13:16:13 TM-50 S	7	Menitoring	Normal	18.0398	82.1259	6.912	0.001	0.000	0.001	-0.001	1.857	6.377	3.415	
29-01	2016 13:16:26 TM-50 S	2	Monitoring	Normal	18.0541	109.6764	6.765	0.001	0.000	0.001	-0.000	1.871	6.429	0.476	
≥ 29-01	2016 13:16:39 TM-50 S	8	Monitoring	Normal	35.1416	90.1096	12.281	0.002	-0.000	0.001	-0.002	6.363	10.330	3.400	
29-01	8016 13:16:54 TM-50 S	1	Menitoring	Normal	75.7828	109.4166	6.365	0.001	0.000	0.001	-0.001	5.845	2.337	0.562	
29-01	2016 13:17:07 TM-50 S	9	Monitoring	Normal Normal	80.5225	80.7479	6.420	0.001	0.001	0.001	-0.001	5.844	1.846	3.412	
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Leica GeoMoS – Monitor – sensor control

Leica GeoMoS – Analyzer – chart



Leica GeoMoS – Monitor – chart of measured horizontal angle

RS&LiDAR Lab

GeoMon Lab

Teaching

Research

Geodetic Monitoring Laboratory

System configuration



Leica GeoMoS – sensor location Surroundings of GEO-INFO-HYDRO building -University buildings - private buildings

Leica GeoMoS – sensor location -GNSS antenas -Total stations -Meteorological station -prisms



Geodetic Monitoring Laboratory

System configuration



Leica GeoMoS – sensor location – GEO-INFO-HYDRO building

Applications in teaching process

Existing courses:

- Satellite Geodesy
- Satellite Navigation
- Digital Photogrammetry
- Engineering Surveying

New courses:

- Laser Scanning Technology
- UAV Systems in Geodesy



Research applications: canopy growth assessment

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GeoTech Lab









3.07.15

Research

	15.05.2015	26.06.2015	3.07.2015
max	0,784	0,137	0,140
min	-0,239	-0,350	-0,096
sigma	0,246	0,089	0,048
MEAN	0,213	-0,035	-0,020
RMSE	0,321	0,093	0,051

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Feaching

Research

Research applications: 3D modelling



Research applications: Semiautomatic 3D modelling



TLS + ALS point cloud



Research applications: Semiautomatic 3D modelling



Research applications: photogrammetric mobile mapping



- Applanix 220 LV
- Ladybug 360 Video
 Spherical Camera



Thank You For Attention !



