

Expression of interest for research cooperation in Horizon 2020

Description of institution

Interested institution:	AGH - University of Science & Technology
Department carrying out the proposed research	Department of Measurement & Electronics Non-Electrical Measurement Team
Address and webpage	http://www.kmet.agh.edu.pl/ http://www.kmet.agh.edu.pl/?lang=en
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Research offer

Brief description of the department (key research facilities, infrastructure, equipment)

The Non-Electrical Measurement Team is a part of the Department of Measurement and Electronics, Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering AGH, commonly known as the "Electrical Faculty". This determines the area of our scientific activity, which encompasses all directions of research developed in the field of electrical engineering. However, the specific focus of R&D works lies in fields: mechanical measurements (strain, stress, force, torque, displacement, velocity, pressure etc.), temperature measurements, mathematical modeling, simulation, signal analysis, design and construction of measuring systems and their components, both for industrial and laboratory applications.

Research specific infrastructure and equipment: laboratories for non-electrical and electrical measurements, climatic chamber, strain-gauge apparatus, data acquisition equipment.

Licensed software: LabView, Matlab&Simulink, Statgraphics, Ansys Maxwell, MSC Adams Multibody Dynamics.

Scientific area

<input type="checkbox"/> Chemistry	<input type="checkbox"/> Social Sciences and Humanities
<input type="checkbox"/> Economic Sciences	<input checked="" type="checkbox"/> Information Science and Engineering
<input type="checkbox"/> Environment and Geosciences	<input type="checkbox"/> Life Sciences
<input type="checkbox"/> Mathematics	<input type="checkbox"/> Physics

Research field

The scientific activities of research team focus on dynamic measurements, measurements of non-electrical quantities using electrical methods, digital signal processing, mechanical measurements, tribology aspects of ground-pipeline contact phenomena, modeling and simulating of physical phenomena and elements of measurement systems. In the scope of digital signals processing, our achievements include for example studies in digital processing of mechanical and medical signals, analysis and signals decomposition using Hilbert Vibration Decomposition transformation (HVD) and Hilbert-Huang Transform (HHT). Research team have also experience in designing and practical implementation of measurement systems for industry.

The proposed research/project description

1. Strain transducers for measuring deformations of pipelines operating in the mining-deformable ground environment.
2. A study of the influence of friction forces on the transmission of soil vibration on strains and vibrations of gas pipelines.
3. The application of Hilbert Vibration Decomposition transformation (HVD) and Hilbert-Huang Transform (HHT) for signals analysis in the time domain (paraseismic strain and vibration signals, biomedical EEG and ECG signals).
4. Biomedical electrode with integrated electrode contact quality monitoring for recording electrocardiographic signals.
5. Inductive-loop for vehicle axle detection method and signal conditioning systems for inductive-loop and eddy-current sensors.
6. Measurement of impedance components, and simultaneous and multi-frequency of impedance measurement system.

Additional information (key Persons and Expertise; additional trainings, research programme, other)

Research programme:

1. Project subject: *Smart Electric Torque Tool (Inteligentna Zakrętarka Elektromechaniczna)*.
Project No.: INNOTECH-K3/48/225932/NCBR/14
2. European programme: *"Human Capital Operational Programme - Engineers' factory"*
Book within the project: Gawedzki W. *Electrical measurements of non-electrical quantities*. AGH 2010 (in Polish).
3. Project subject: *An analysis of data compression metrological properties in application to continuous recording of measurement signals*. Project No.: 8 T10C 01621

Patents:

1. *Method for monitoring the state of biomedical electrode contact with the patient's skin. (Sposób monitorowania stanu kontaktu elektrody biomedycznej ze skórą pacjenta)* — AGH University of Science & Technology; Inventors: MARSZAŁEK Zbigniew, GAWĘDZKI Wacław. Granted **2017-02-07**; Published 2017-07-31. Notification No. 406862 of 2014-01-16. — full text <http://patenty.bg.agh.edu.pl/pelneteksty/PL226438B1.pdf>.

2. *Device for non-contact friction test in the friction associations and sliding bearings. (Urządzenie do bezstykowego badania tarcia w skojarzeniach ciernych i łożyskach ślizgowych)* — AGH University of Science & Technology; Inventors: LEPIARCZYK Dariusz, GAWĘDZKI Waław, TARNOWSKI Jerzy. Granted **2016-01-20** No. PL 223397 B1; Published 2016-10-31.— Notification No. P.397113 of 2011-11-24. — full text: <http://patenty.bg.agh.edu.pl/pelneteksty/PL223397B1.pdf>
3. *Device for friction testing and feedback friction in the clutches and in the brakes. (Urządzenie do badania tarcia i sprzężeń ciernych w sprzęgłach i hamulcach tarczowych).* AGH University of Science & Technology; Inventors: LEPIARCZYK Dariusz, TARNOWSKI Jerzy, GAWĘDZKI Waław. — Granted **.2013-12-19** No. PL 217662 B1 Published 2014-08-29. — Notification No. P.389649 of 2009-11-23. — full text: <http://patenty.bg.agh.edu.pl/pelneteksty/PL217662B1.pdf>.

Expertise's for the industry:

1. Subject of expertise: *“Analysis of the impact of high-energy shocks of mining origin on gas pipelines and the method of securing the network for dynamic influences”*. 2015, Expertise's for three pipelines.
2. Subject of expertise: *“Analysis of thermovision images of fragments of the OR 601 KS OSIEK main pipeline for detecting defects and damages of the pipeline”*. 2011.