Wroclaw University of Science & Technology

Faculty of Electrical Engineering
- education, research, cooperation

Politechnika Wrocławska

http://www.portal.pwr.edu.pl

Contents

- TOPIC 1: Wroclaw University of Science & Technology, Faculty of Electrical Engineering
- TOPIC 2: Faculty of Electrical Engineering – education, industry cooperation, research

EUROPEAN CAPITAL OF CULTURE
WROCLAW
2016

70th YEARS
ANNIVERSARY
WROCŁAW UNIVERSITY
OF TECHNOLOGY

Wrocław
University
of Science
and Technology

Wroclaw University of Science & Technology

Faculty of Architecture

Faculty of Civil Engineering

Faculty of Chemistry

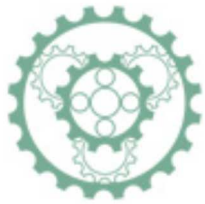
Faculty of Electronics (FacEl)

Faculty of Electrical Engineering (FacEE)

Faculty of Mining Engineering

Faculty of Environmental Engineering

Faculty of Computer Science and Management



Faculty of Mechanical and Power Engineering

Faculty of Mechanical Engineering

Faculty of Fundamental Problems of Technology

Faculty of Microsystem Electronics and Photonics

Faculty of Pure and Applied Mathematics

Wroclaw University of Technology

- 35 000 students
- 4 000 employees
- 260 buildings with new laboratories
- 3 500 students' dormitory capacity
- 41 major directions of study
- 26 English programmes

FacEE

- 1900 students
- 90 acad. teachers
- 3 major directions
- 2 Eng. programmes

Faculty of Electronics

- *Department of Electronic and Photonic Metrology*
- *Department of Computer Systems and Networks*
- *Departmentd of Field Theory, Electronics and Optoelectronics*
- *Department of Telecommunications and Teleinformatics*
- *Department of Acustics and Multimedia*
- *Department of Signal Processing Systems*
- *Department of Cybernetics and Robotics*
- *Department of Automatics, Mechatronics and Control Systems*
- *Department of Computer Science*

Faculty of Electronics - Education

6,000 students

- **Control Engineering and Robotics**
  Embedded Robotics
- **Electronics and Telecommunications**
  Advanced Informatics and Control
  Modern Telecommunications
  Advanced Applied Electronics
- **Computer Science**
  Internet Engineering
- **Teleinformatics**

Faculty of Electrical Engineering

- ***Department of Electrical Engineering Fundamentals***

Theory of Electrical Engineering, High Voltage Technology, Electrotechnology

- ***Department of Electrical Power Engineering***

Power System Control and Protection, Power System Automation, Load Flow Control, Reliability of Power Systems

- ***Department of Electrical Machines, Drives and Measurements***

Electrical Machines, Electrical Drives Control, Measurement Devices and Systems Industrial Automation, Power Electronics, Robotics

Faculty of Electrical Engineering - Education

- ***Electrical Engineering***

  EE Fundamentals and Technology

  Electrical Power Engineering

  Renewable Energy Systems

  Control in Electrical Power Engineering (MSc in English) - CPE

  Renewable Energy Systems (MSc in English) - RES

- ***Automation and Robotics***

  Automation and Control in Power Systems

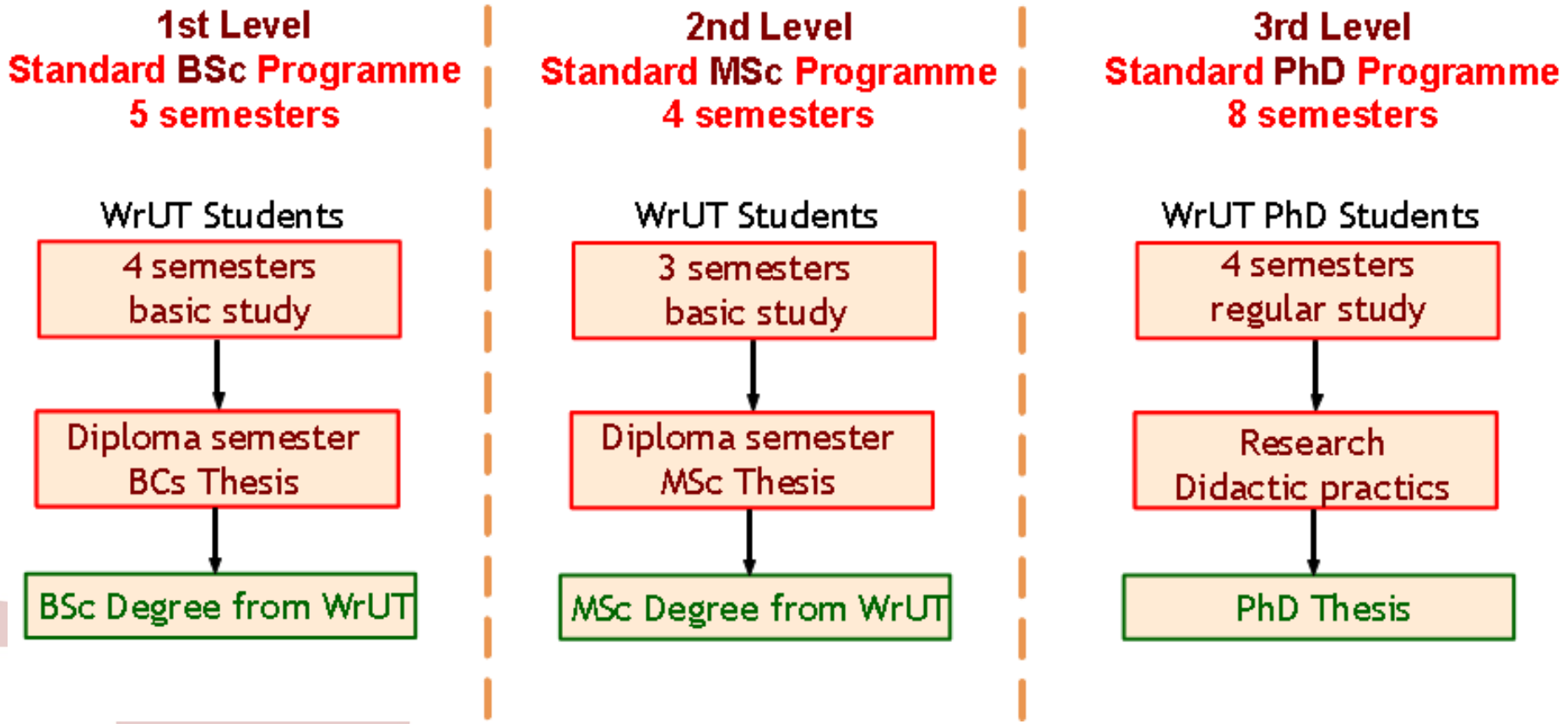
  Automation of Machines,Vehicles and Devices

- ***Mechatronics***

  in cooperation with Faculty of Mechanical Engineering and Faculty of Microsystems Electronics and Photonic

Faculty of Electrical Engineering - Education

➢ *Standard Education Programmes (in Polish language)*



Faculty of Electrical Engineering - Education

➢ *Control in Electrical Power Engineering (Joint MSc Programme)*

WrUT Standard Programme
Structure: 4 sem.

WrUT Students

2 semesters at WrUT

3rd and MSc Thesis semester at WrUT

Degree from WrUT

Wrocław University of Technology

RU - WrUT Joint Programme Student's Exchange
Structure: 2 sem. / 2 sem.

**option for a limited number of best applicants*

RU Students

2 semesters at WrUT

3rd and MSc Thesis semester at WrUT

WrUT Students

2 semesters at RU

3rd and MSc Thesis semester at RU

Degrees from both RU and WrUT

Wrocław University of Technology

RYERSON UNIVERSITY

Faculty of Electrical Engineering - Education

➢ *Renewable Energy Systems (Joint MSc Programme)*

WrUT Standard Programme
Structure: 4 sem.

WrUT Students

2 semesters at WrUT

↓

3rd and MSc Thesis semester at WrUT

↓

Degree from WrUT

Wrocław University of Technology

UMD - WrUT Joint Programme Student's Exchange
Structure: 2 sem. / 2 sem.
**option for a limited number of best applicants*

WrUT & UMD Students

2 semesters at WrUT

↓

3rd and MSc Thesis semester at UMD

↓

Degrees from both UMD and WrUT

Wrocław University of Technology

OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

Faculty of Electrical Engineering - Research

➢ Scientific position

	Evaluation 2005-2009	Evaluation 2009-2012	Direction
Faculty of Electrical Engineering	**B**	**A**	↑

- More than 40 specialized laboratories
- 4000m² laboratories
- New Laboratory of Renewable Energy Systems Including grid integrated PV system

✓ *In 2013 the Faculty of Electrical Engineering of Wrocław University of Technology has been assessed as the #1 among Electrical Engineering Faculties in Poland (evaluation every 4 years)*

✓ *Evaluation was based on: publications, patents, grants, cooperation with industry, international cooperation, investments in laboratories, innovations, internationalization of study*

Ministry of Science and Higher Education
Republic of Poland

Wroclaw University of Science & Technology

Best University of Technology in Poland!

Dept. of Electrical Engineering Fundamentals

- ***Head: Prof. Ryszard Kacprzyk***

Dep. Director (R&D): ***Dr. hab. Jacek Rezmer***

Dep. Director (Education): ***Dr. Jaroslaw Szymanda***

Research Teams (RTs):

Theory of Electrical Engineering

Head: Dr. hab. Jacek Rezmer

High Voltage Technology

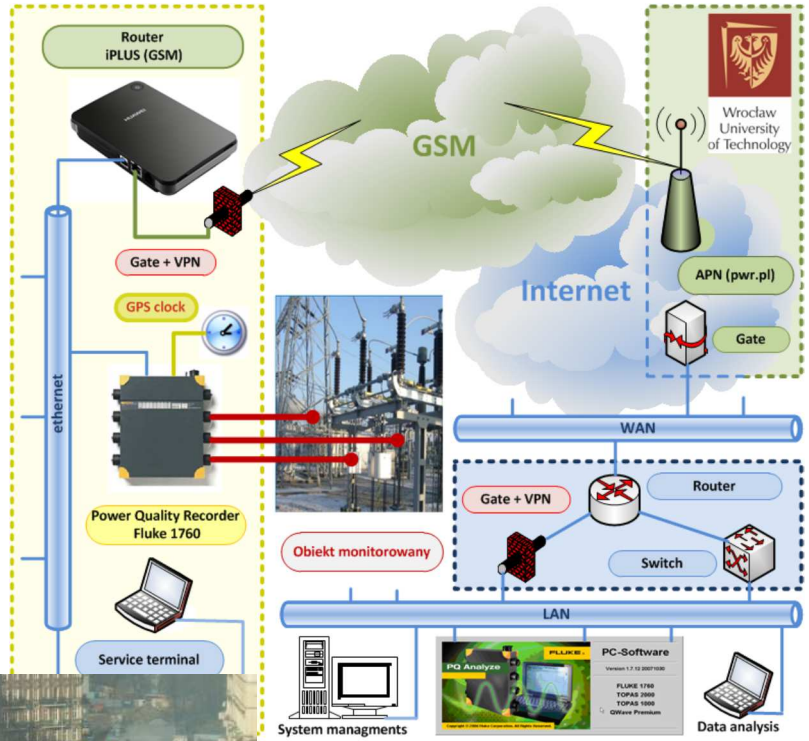
Head: dr. Krzysztof Wieczorek

Electrotechnology

Head: Dr. hab. Jan Ziaja

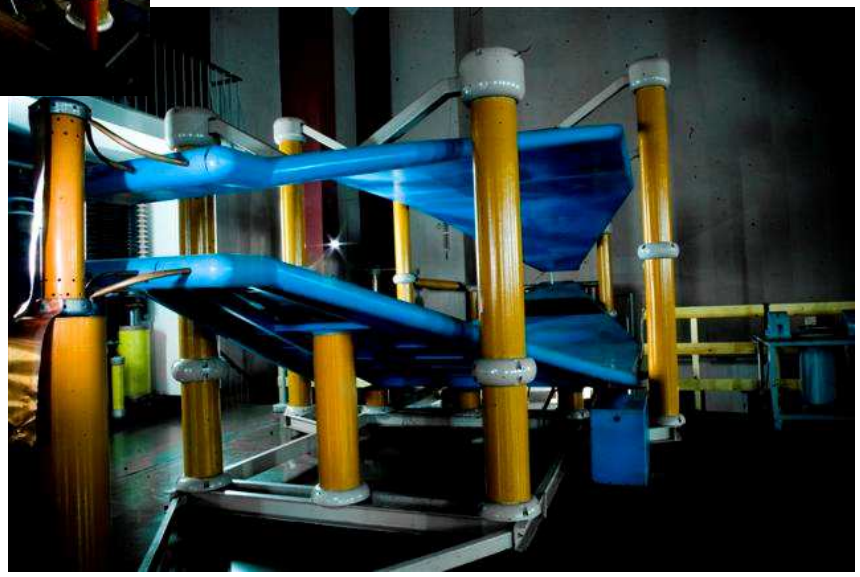
Dept. of Electrical Engineering Fundamentals

- *Mathematical methods in electrical engineering*
- *Digital signal processing*
- *Power quality assessment, wide area monitoring, LV distributed generation*
- *Modeling of electrical and magnetic circuits*



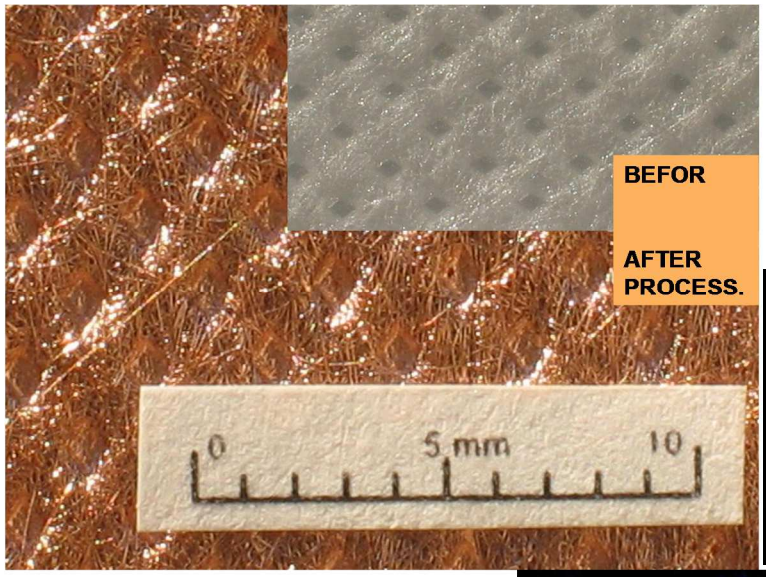
Dept. of Electrical Engineering Fundamentals

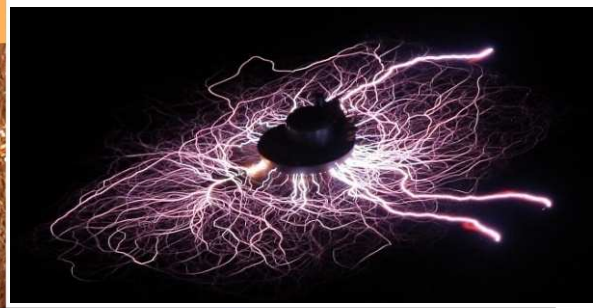
- *High voltage insulation*
- *High voltage measurement techniques*
- *Electromagnetic compatibility*
- *Lightning and overvoltage protection*
- *1.8 MV pulse generator, sphere gap (1.5 m diameter)*
- *Polymeric HV insulators, Anti-Vandal, Light, Strong, Hydrofobic*

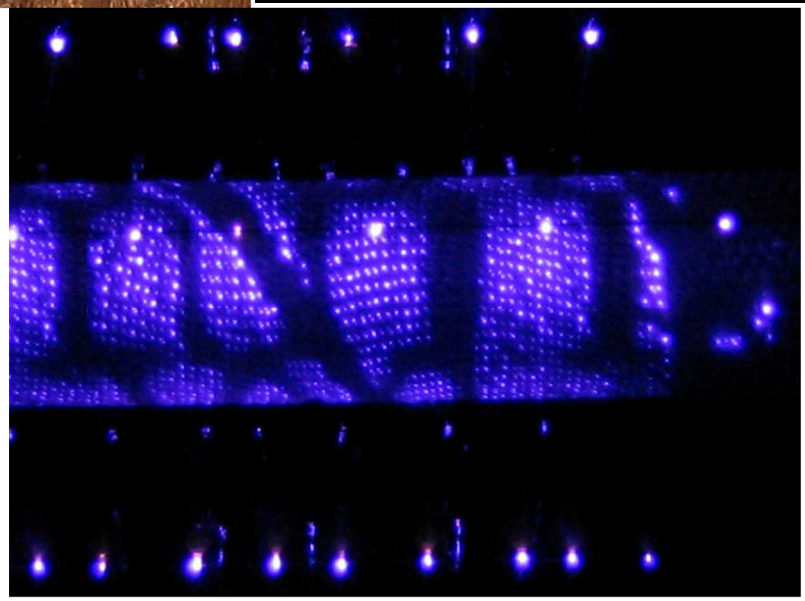


Dept. of Electrical Engineering Fundamentals

- *Charge decay investigations*
- *Dielectrics, meas. & tech.*
- *Applied electrostatics*
- *LT plasma generation and application*
- *High Resistance Transfer with a double insulation system*
- *PP-non-woven shielding*
- *Back Corona in LTAP Plasma Reactor*







Dept. of Electrical Power Engineering

- ***Director: Prof. Jan Iżykowski***

Dep. Director (R&D): ***Dr. Wilhelm Rojewski***

Dep. Director (Education): ***MSc. Mirosław Kobusiński***

Research Teams:

Power System Control and Protection

Head: Prof. Eugeniusz Rosołowski

Electrical Apparatus

Head: Prof. Antoni Klajn

Electrical Engineering for Industry

Head: Dr hab. Waldemar Dolega

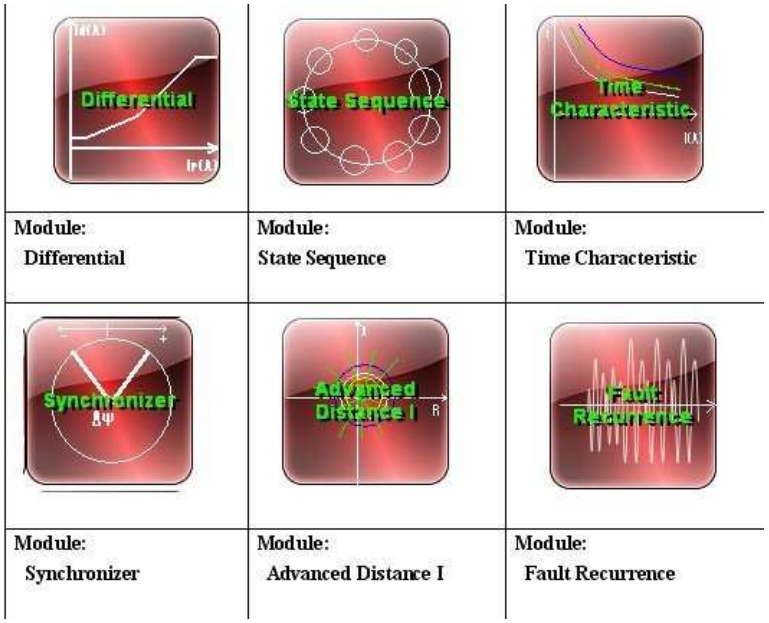
Power Networks and Systems

Head: Prof. Robert Lis

Dept. of Electrical Power Engineering

➢ *Power System Control and Protection RT*

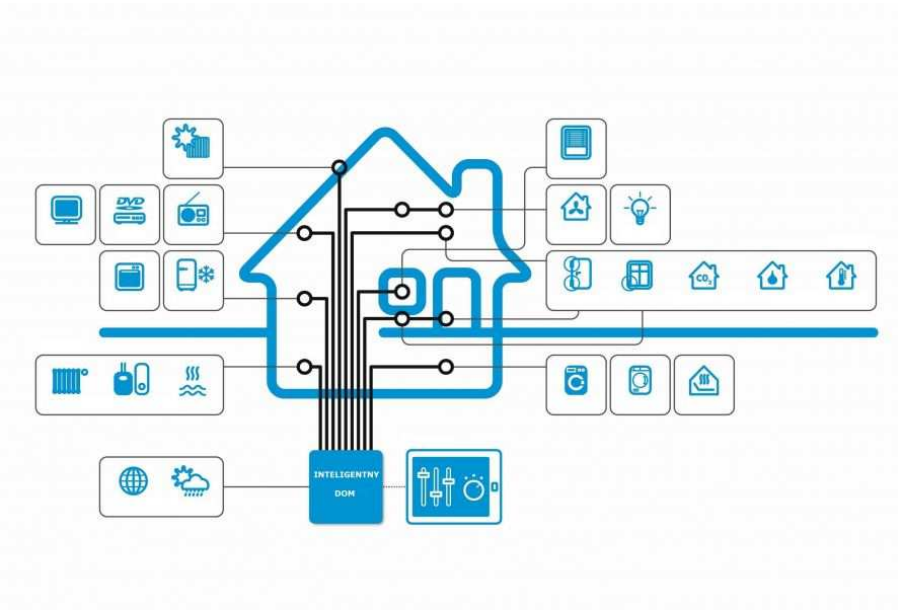
- *Power system simulation*
- *Protection of power system components (transmission networks, medium voltage distribution networks, renewable energy sources)*
- *Measurement and decision making algorithms for digital protective relays*
- *Artificial intelligence & adaptive techniques for power system protection and control*
- *Fault location on power networks*



Dept. of Electrical Power Engineering

➢ *Electrical Apparatus RT*

- *Design of electrical apparatuses and installations*
- *Intelligent installations*
- *Economical and legal aspects of power system operation*
- *Investigation of electrical arc phenomena*
- *Power quality*



Dept. of Electrical Power Engineering

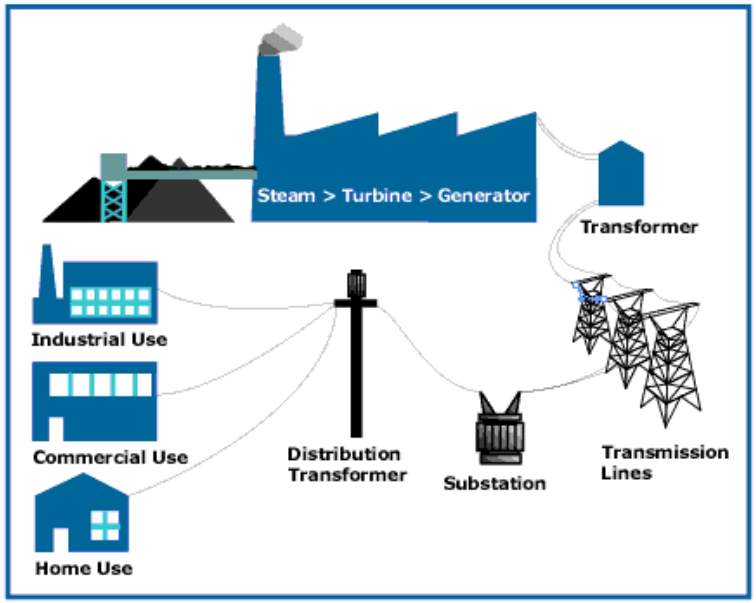
➢ *Electrical Engineering for Industry RT*

- *Energy savings in industry*
- *Investigation of overvoltages during switching operations*
- *Electrical safety – regulations and technical means*
- *Measurement of electrical fields under overhead power lines*
- *Influence of electrical fields on human being*

Dept. of Electrical Power Engineering

➢ *Power Networks and Systems RT*

- *Power system analysis and state estimation*
- *Diagnosis of blackouts in national power grid*
- *Integration of renewable energy sources into a power grid*
- *Power quality*
- *Pricing electricity at deregulated power market*



Dept. of Electrical Machines, Drives & Meas.

- ***Director: Prof. Teresa Orłowska-Kowalska***

Dep. Director (R&D): ***Dr. Marcin Pawlak***

Dep. Director (Education): ***Dr. Krzysztof Dyrcz***

Research Teams:

Electrical Machines and Measurements

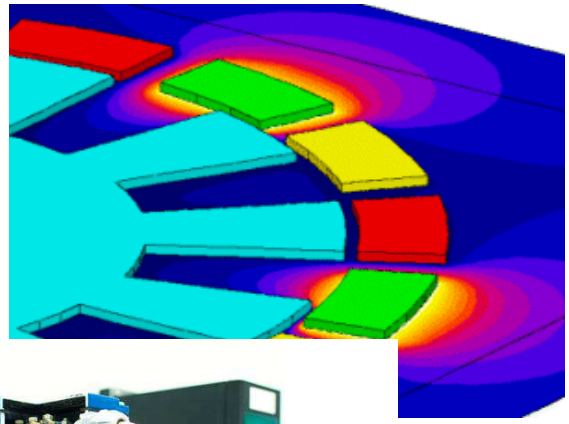
Head: Prof. Ludwik Antal

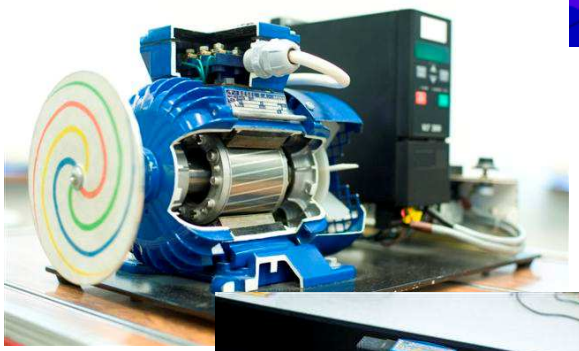
Electrical Drives, Mechatronics and Industrial Automation

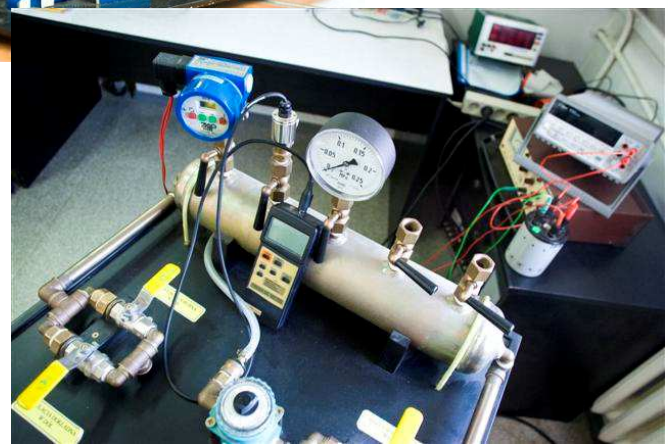
Head: Prof. Krzysztof Szabat

Dept. of Electrical Machines, Drives & Meas.

- *Construction and design of DC and AC machines (including permanent magnet machines)*
- *Modeling and testing of electrical machines based on 2D/3D field and circuit-field modeling*
- *Measurement theory*
- *Methods and measuring circuits*
- *Magnetic measurements*
- *Electromagnetic compatibility*
- *Sensors, transducers, measurement standards*





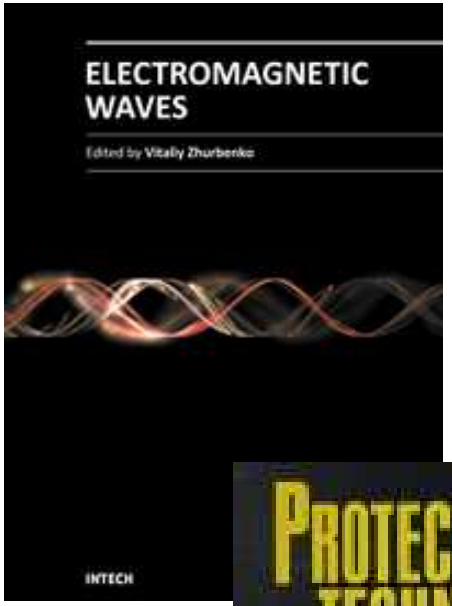


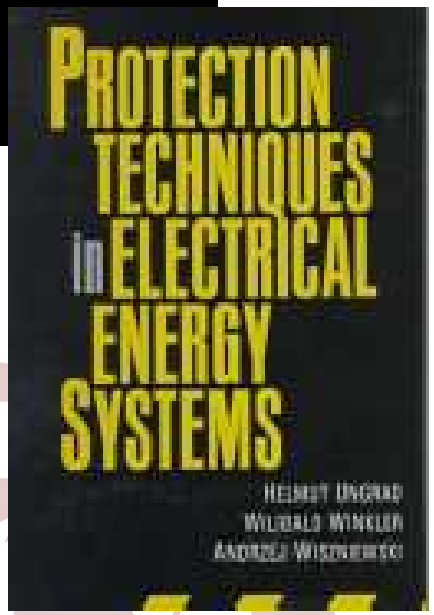
Dept. of Electrical Machines, Drives & Meas.

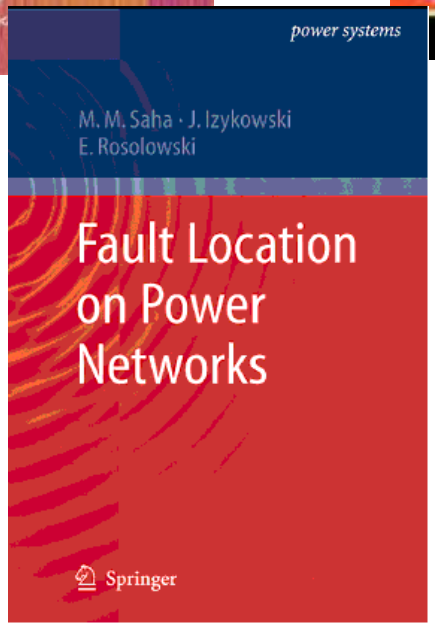
- *Controlled electrical drives*
- *Power electronics*
- *Diagnostics*
- *Industrial automation and informatics*
- *Monitoring and diagnosis of electrical drives*
- *Industrial automation and informatics*
- *Traction drives, sensorless drives, drives with complex mechanical couplings, safety drives*
- *Application of sliding-mode control, predictive control, adaptive and neuro-fuzzy control in AC motor drives*

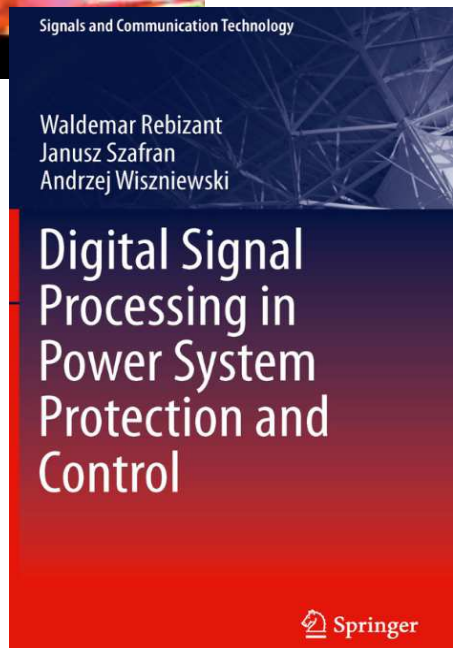
Faculty of Electrical Engineering - Research

➢ *Books*









Faculty of Electrical Engineering - Research

➢ *Selected organized international conferences*

- *International Symposium on Modern Electric Power Systems (MEPS) – hold every 4 years: 2015, 2010, 2006, 2002, 1998*
- *18th Power Systems Computation Conference (PSCC), August 18-22, 2014*
- *International Workshop on High Voltage Engineering*
- *International Conference on Environment and Electrical Engineering EEEIC (until 2010)*
- *International Symposium on Electrical Machines*
- *Electrical Power Networks – EPNet, September 19 – 21, 2016*
- *PAC World Conference, Wroclaw 27-29 June 2017*

Faculty of Electrical Engineering - Research

➢ *Selected organized international conferences*

PSCC

MEPS'15

XLVIII International Symposium on Electrical Machines SME 2012

Electrical Power Networks

http://www.epnet2016.pwr.edu.pl

Konferencja Naukowo-Techniczna
19-21.09.2016, Szklarska Poręba

EPNet 2016

pacworld PROTECTION, AUTOMATION & CONTROL WORLD *Wroclaw 27-29 June 2017*

Faculty of Electrical Engineering - Research

➢ *Selected Patents*

- ***US (USA): 13 patents***
- ***EP (Europe) : 6 patents***
- ***SE (Sweden): 2 patents***
- ***FR (France): 1 patent***
- ***CA (Canada): 5 patents***
- ***RU (Russia): 2 patents***
- ***PL (Poland): many***

Examples:

WISZNIEWSKI A., REBIZANT W., KLIMEK A.: **"Method of determining voltage stability margin for load shedding within an electrical power system",** US Patent No. 7,996,116B2, 2011-08-09; British Patent No. GB2450762B, 2012-05-12; Chinese Patent No. CN101340090B, 2013-08-14; Patent Applications: CA2636524 (A1), 2009-01-02; EP2079143A2, 2009-07-15.

REBIZANT W., SOLAK K., WISZNIEWSKI A., KLIMEK K.: **"Fuzzy Interference Relay and Method for Current Differential Protection of a Transmission Line",** European Patent No. EP2502318B1, 2013-09-11; Patent Applications WO2010/060814 (A1), EP2502318A1, US20120224287A1, CA2780750A1, 2011-05-26, CN102696161A, 2012-09-26.

Faculty of Electrical Engineering - Research

➢ *Selected research projects:*

- ***Cyber security of low voltage smart power grids, ERA-NET Smart Grids - Salvage***
- ***Reliability of data transfer using different Power Line Communication technologies in LV and MV power systems***
- ***The new generation of energy-efficient electric drives for pumps and fans for mining***
- ***Sensors for measuring factors threats in the environment - modeling and monitoring***

The National Centre for Research and Development

INNOWACYJNA GOSPODARKA
NARODOWA STRATEGIA SPÓJNOŚCI

SmartGrids ERA-Net

Faculty of Electrical Engineering - Research

Automation Technology Products, Västeras, Sweden
Research Center, Kraków, Poland

GE Power Management

Markham, Canada

SIEMENS

PTD, Energy Automation, Berlin, Germany

NPTC

Next-Generation Power Technology Center
Myongji University, Yongin, Korea

PSE-Operator S.A.
Transmission System Operator

Polskie Sieci Elektroenegetyczne
Polish Transmission System Operator

AREVA

Schneider Electric

AREVA T&D, Świebodzice, Poland
AREVA UK, Stafford, UK

Faculty of Electrical Engineering

Thank you
for your attention

Что дальше?