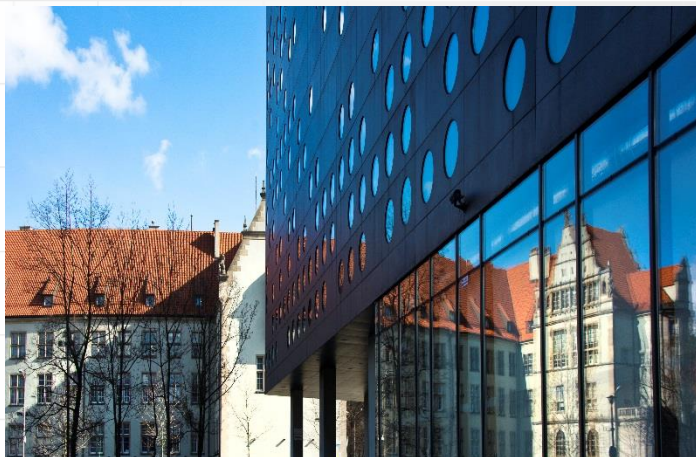




# WROCLAW UNIVERSITY OF SCIENCE AND TECHNOLOGY

Wrocław  
University  
of Science  
and Technology



## Faculty of Electronics, Photonics and Microsystems







# Poland, Wrocław







Wrocław  
University  
of Science  
and Technology

# Wrocław University of Science and Technology



HR EXCELLENCE IN RESEARCH



... years of tradition





kw

# Faculty of Electronics, Photonics and Microsystems

Janiszewskiego Street 11/17  
50-372 Wrocław

[www.wefim.pwr.edu.pl](http://www.wefim.pwr.edu.pl)



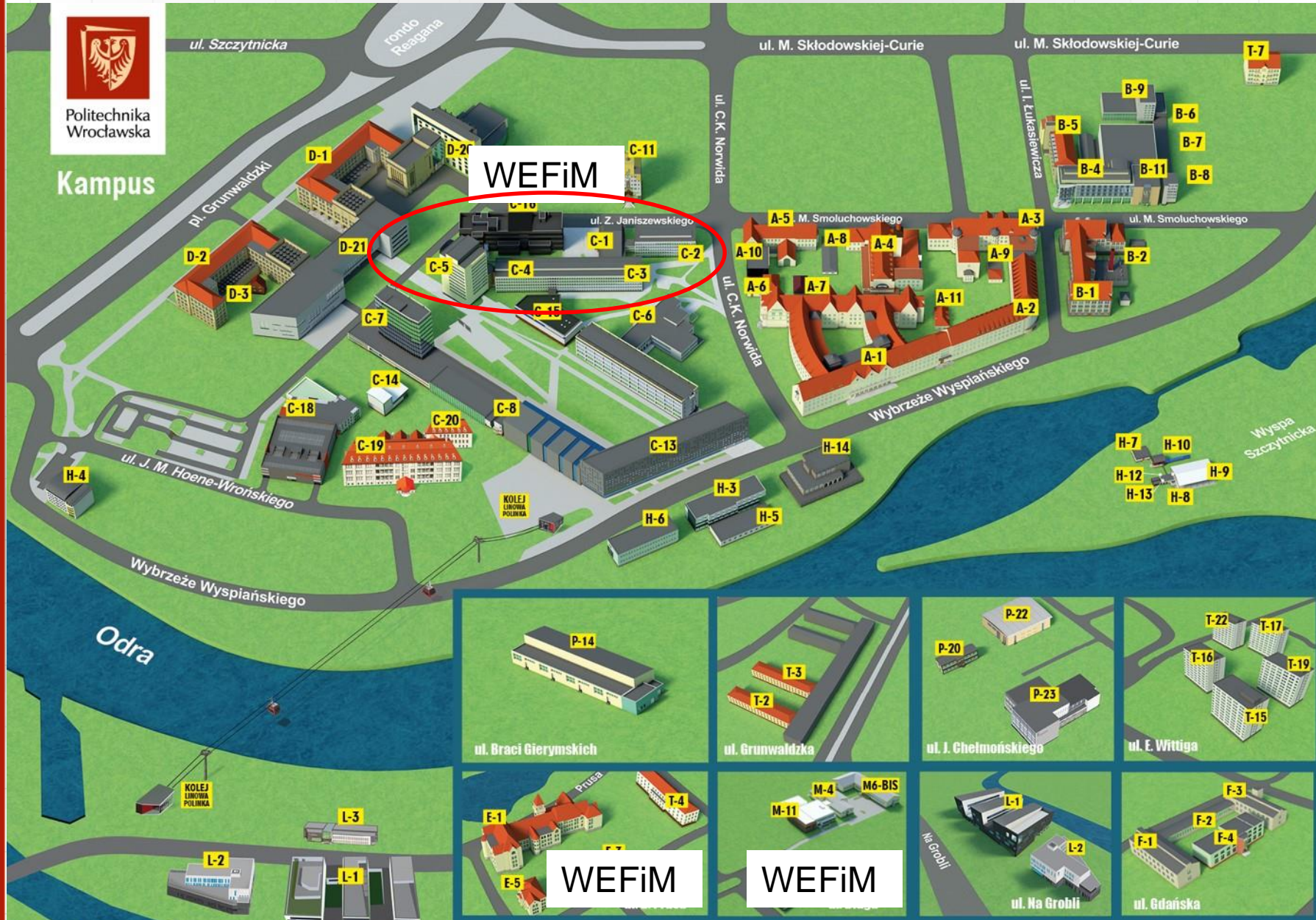


# Faculty of Electronics, Photonics and Microsystems (WEFiM)



Politechnika Wroclawska

Kampus







Długa Campus

Main  
Campus  
Janiszewskiego  
street



Prusa Campus



# Faculty of Electronics, Photonics and Microsystems

From  
15th September 2021

## Faculty of Electronics, Photonics and Microsystems

Department of Microelectronics  
and Nanotechnology

Department of Microsystems

Departemnt of Nanometrology



Department of Cybernetics and  
Robotics

Department of Electronic and  
Photonic Metrology

Department of Field Theory,  
Electronics Circuits and  
Optoelectronics

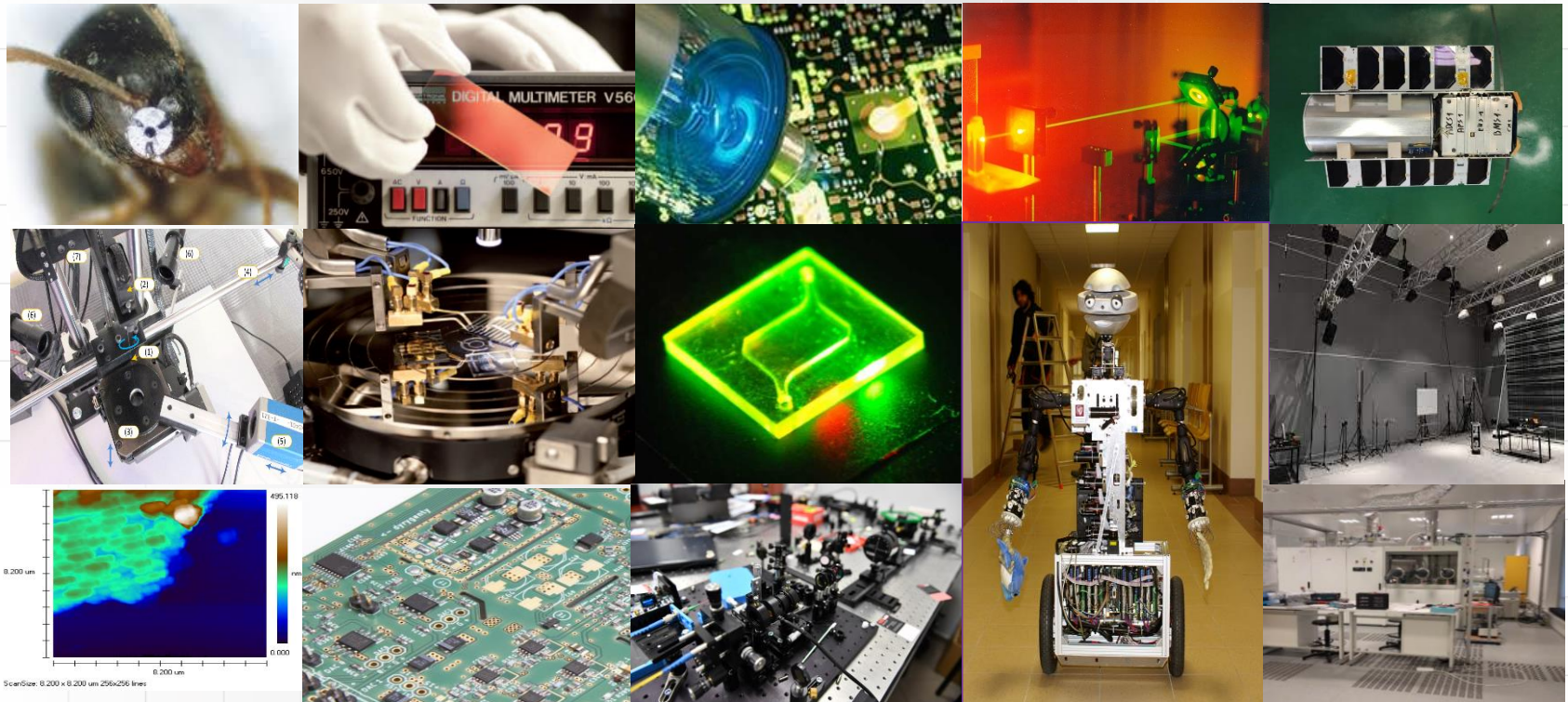
Department of Acoustic,  
Multimedia and Signal  
Processing

*Faculty of Microsystems  
Electronics and  
Photonics*

*Faculty of Electronics*



## Faculty of Electronics, Photonics and Microsystems



*Automation, Electronics and Electrical Engineering + other*



# The authorities



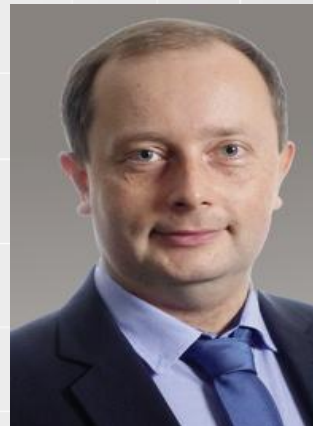
**The Dean**  
Rafał Walczak  
rafal.walczak@pwr.edu.pl



**Vice-Dean for General  
Matters,**  
Jarosław Domaradzki



**Vice-Dean for Cooperation**  
Adam Polak



**Vice-Dean for  
Students' Affairs**  
Damian Nowak



**Vice-Dean for Teaching**  
Artur Wiatrowski



**Vice-Dean for  
Students' Affairs**  
Adam Wąż



# The Faculty – short description

**The Faculty of Electronics, Photonics and Microsystems** integrates research and education at WrUST in the field of electronics, control engineering, semiconductor devices technology, photonics and microsystems for the development of modern society and economy.

Over **2300 students**

~ **15 scientific students' societies**

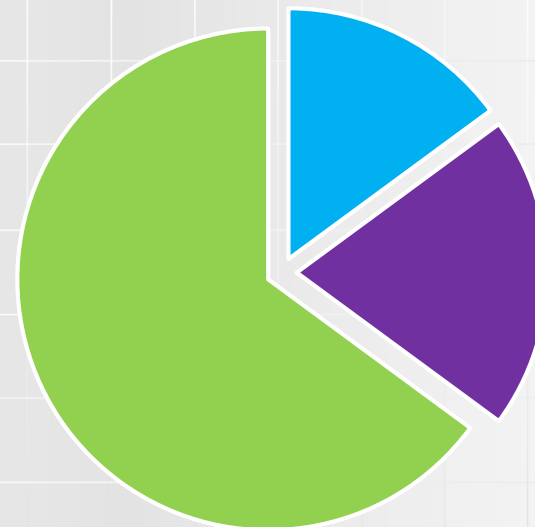
Staff: ~260

Full Profesors: **17**

Associated Professors: **23**

Assistant Professors: **74**

Teaching staff



■ Full Professors ■ Associated Professors ■ Assistant Professors ■



# Departments at the Faculty

**Department of Cybernetics and Robotics**

*K-29, prof. Ignacy Dulęba*

**Department of Electronic and Photonic Metrology**

*K-31, prof. Janusz Mroczka*

**Department of Field Theory, Electronics Circuits and Optoelectronics**

*K-35, prof. Jarosław Sotor*

**Department of Microelectronics and Nanotechnology**

*K-70, prof. Regina Paszkiewicz*

**Department of Microsystems**

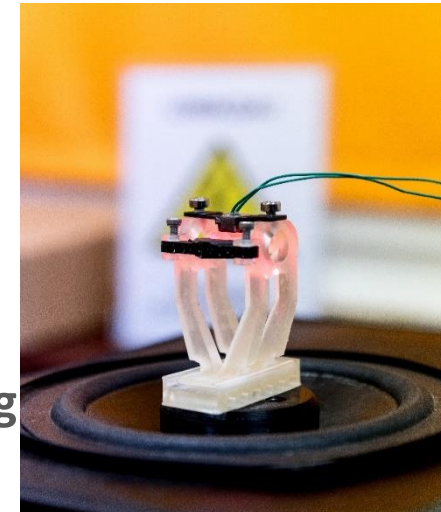
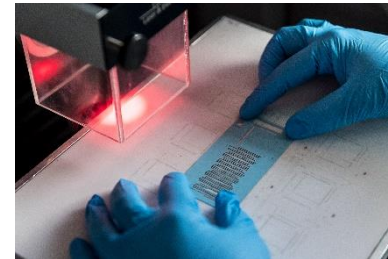
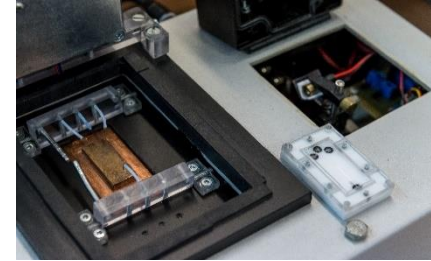
*K-71, prof. Andrzej Dziejcz*

**Department of Nanometrology**

*K-72, prof. Teodor Gotszalk*

**Department of Acoustic, Multimedia and Signal Processing**

*K-76, prof. Krzysztof Opieliński*

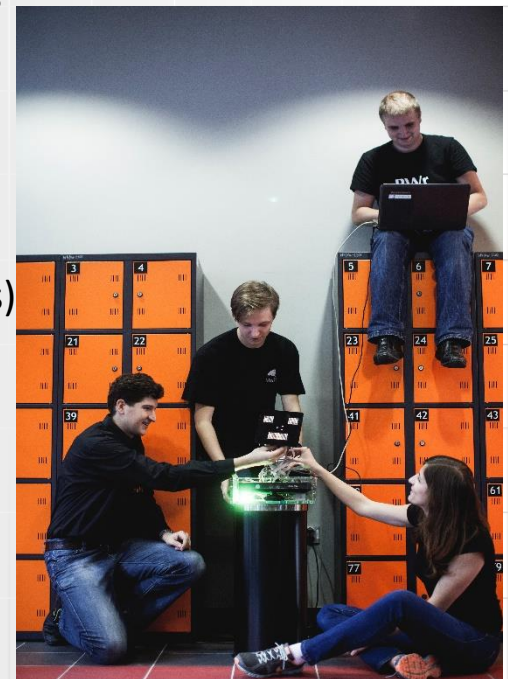
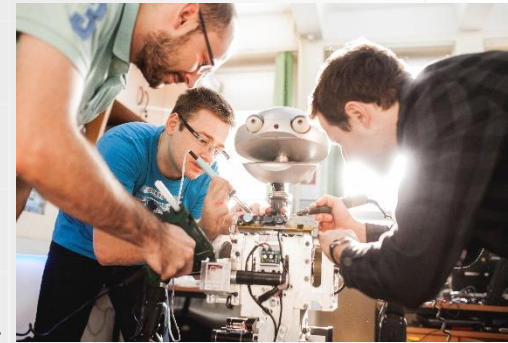




*K-29, prof. Ignacy Dulęba*

**The Department conducts research in many contemporary areas of robotics:**

- kinematics, dynamics and control of manipulators and mobile robots (holonomic and nonholonomic systems, path and trajectory planning, input-output decoupling and linearization)
- advanced control algorithms for complex robotic systems (robust and adaptive control, in endogenous configuration spaces)
- planning tasks and trajectories for manipulators (stationary, mobile, space manipulators)
- theory of DES (discrete event systems) and its applications in modeling and control of automation and robotic systems
- development of complex robotic systems (ROS-based, sensor data processing, embedded systems, simulations)
- flexible manufacturing systems (Industry 4.0)
- control of mobile robot fleets (AGV/AMR systems)
- social robotics (computational mind models, human-robot interactions)
- sensors and their applications (LiDARs, echolocation systems)
- application of artificial intelligence in robotics (image processing, Markov chains)



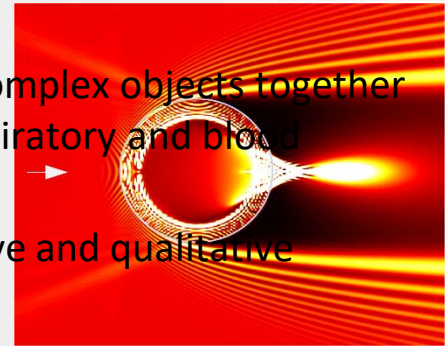


# Department of Electronic and Photonic Metrology

*K-31, prof. Janusz Mroczka*

**The Department conducts research in the area of electronics and photonics that focuses on:**

- observation and experiment methodology,
- algorithmization of the inverse problem,
- mathematical modeling of physical fields and its practical implementation using optical and impedance tomography methods,
- complex modeling of dynamic technical and biomedical systems with the lumped and distributed parameters,
- spectral and polarization analysis of scattered radiation in dispersive systems and their practical application in the assessment of properties of composite materials,
- methods of optical imaging and measurement data processing in three-dimensional space, and their fusion for lossless image coding,
- multi-sensor fusion of data of different spatial resolution using deterministic, stochastic and intelligent methods for their processing,
- the use of time-frequency representation for measurement data processing and their implementation by means of digital signal processors,
- methods of parametric identification of static and dynamic models of complex objects together with their application in measurements of properties of the human respiratory and blood circulatory systems,
- application of artificial intelligence methods for extraction of quantitative and qualitative information from measurement data.



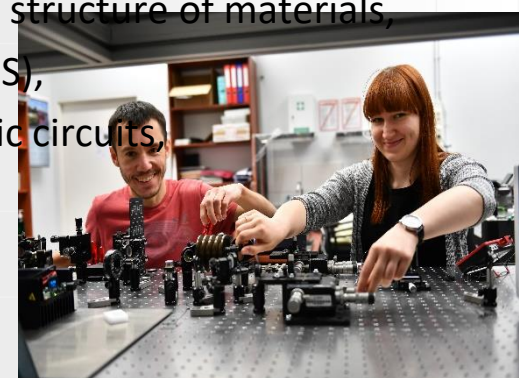
# Department of Field Theory, Electronics

## Circuits and Optoelectronics

*K-35, prof. Jarosław Sotor*

**The department conducts interdisciplinary research involving electronics, physics, computer science, and materials engineering, which mainly focuses on topics such as:**

- lasers and fiber amplifiers,
- microlasers and integrated photonic systems,
- generation and spectral conversion of ultrashort light pulses,
- application of new materials (graphene, carbon nanotubes, black phosphorus, etc.) and structures (special fibers, waveguides, etc.) in photonics,
- development of trace gas detection and sensing techniques using laser spectroscopy in the spectral range from visible light to THz,
- development of specialized laser systems dedicated to multiphoton imaging, biology, medicine, and fundamental research in physics, chemistry, and related sciences,
- ultra-precision measurement techniques based on laser interferometry and vibrometry,
- laser micromachining, laser modification of the surface and internal structure of materials,
- analysis of materials using laser-induced emission spectroscopy (LIBS),
- design and implementation of advanced analog and digital electronic circuits,
- efficient signal and image processing,
- machine learning and big data analytics,
- solving practical problems for industrial partners.



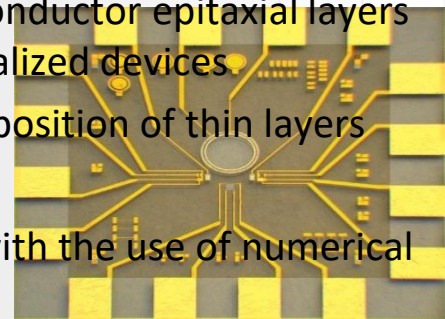


# Department of Microelectronics and Nanotechnology

*K-70, prof. Regina Paszkiewicz*

**The Department conducts research in the field of electronics and photonics, including:**

- studies of MOVPE and HVPE growth processes of Al<sub>III</sub>BV-N and Al<sub>III</sub>N complex semiconductors epitaxial structures for applications in optoelectronics, microelectronics and sensor technology
- design and implementation of device technological processes of semiconductor elements based on Al<sub>III</sub>BV-N and Al<sub>III</sub>N materials
- heterostructure technology for wide bandgap semiconductors and quantum structures for applications at high-temperature, high frequency and high power electronics
- AlGa<sub>N</sub>/Ga<sub>N</sub> heterostructure technology for gas sensors and biosensors
- AlGaInAsP-N heterostructure and low-dimensional structures technology designed for the production of optoelectronic elements
- design, modelling and technology of structures, demonstrators and models of electronic and optoelectronic devices and sensors
- simulation, using Crosslight APSYS and Comsol Multiphysics packages, of physical phenomena occurring in semiconductor devices
- characterization of electrical, optical and structural properties of semiconductor epitaxial layers and structures as well as measurement of operational parameters of realized devices
- development and implementation of prototype technologies for the deposition of thin layers
- designing of functional coatings, including optical coatings
- diagnostics and analysis of functional properties of thin-film materials with the use of numerical modelling

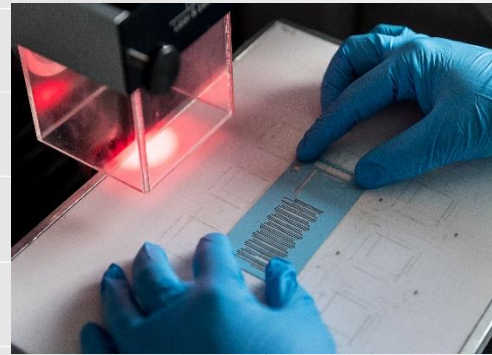
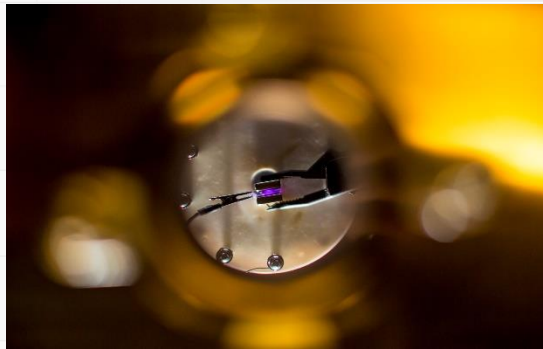


# Department of Microsystems

*K-71, prof. Andrzej Dziejczak*

Research activity:

- MEMS and MOEMS (silicon, glass, polymer and ceramics),
- application of additive techniques for microsystems and micromechatronics,
- vacuum micro- and nanoelectronics,
- development of miniature energy harvesters, medical and biomedical devices using nano- and microengineering techniques,
- synthesis of (nano)materials for chemical and biochemical sensors,
- multiparametric systems using integrated electronic sensors (physical and chemical quantities),
- development of fibrous and planar photonic devices,
- electronic assembly and packaging for interconnections and effective heat management,
- numerical modelling of electronic systems,
- manufacturing and dedicated characterization of passive components.





# Department of Nanometrology

*K-72, prof. Teodor Gotszalk*

**Scientific and research works carried out in the department are aimed at quantitative and qualitative observation of phenomena occurring in submicron objects such as:**

- nanoelectronic and molecular structures and systems,
- microbiological and biochemical structures,
- photonic crystals and laser optics systems,
- energy harvesting micro- and nanosystems
- MEMS/NEMS systems,
- new materials for opto- and electronics



**In the research the following research methods and techniques are used:**

- scanning probe microscopy SPM including AFM, STM, KPFM and SThM,
- electron and focused ion beam microscopy and processing (SEM/FIB),
- impedance spectroscopy,
- X-ray diffraction (XRD),
- optical spectroscopy with the use of fiber optic techniques and sensors,
- development and implementation of innovative ideas and electronic, optoelectronic and programming solutions for the needs of personalized electronic systems and functional research tools,
- data processing with the use of low-noise electronic circuits and FPGA or DSP digital technologies,
- support of the experiment with the use of programming tools.

# Department of Acoustic, Multimedia and

## Signal Processing

*K-76, prof. Krzysztof Opieliński*

The Department conducts research in the electronics discipline area that focuses on:

- Multimedia technologies in professional and amateur applications,
- Sound engineering: studio, theater, RTV, concerts,
- Data communications techniques for space missions, e.g. communication of flying objects and ground stations,
- Ultrasonic technology, including ultrasonic tomography and various applications of ultrasound in industry and medicine,
- Research and design methods in the field of environmental acoustics, architectural acoustics, electroacoustics (acoustic maps, noise emission reduction, interior acoustics, sound warning systems, virtual acoustics, sound reinforcement systems, immersion systems),
- Design of modern electroacoustic and ultrasonic transducers,
- Array processing and fusion of data from acoustic and seismic sensors and implementation of advanced digital signal processing algorithms in embedded systems,
- Signal processing in drones and their swarms, automatic obstacle detection and collision avoidance systems based on SLAM type algorithms,
- Optimal and adaptive filtering techniques based on random signal processing methods,
- Speech signal processing: practical aspects of automatic speech, speaker and emotion recognition, speech synthesis, de-noising, and echo cancellation,
- Artificial intelligence based on deep neural networks,
- Machine learning, algorithms for classification and clustering of objects and image recognition, object tracking in video images, signal processing methods dedicated to machine learning task and automatic feature selection, tensor transformations of multidimensional objects.





# Courses of study

- ❖ **Control Engineering and Robotics**
- ❖ **Electronics**
- ❖ **Electronic and Computer Engineering (1st level of studies – in English)**
- ❖ **Electronics and Telecommunications**
- ❖ **Smart Electronics**
- ❖ **Mechatronic Microsystems Engineering**  
Full-time Bachelor studies last 3.5 years (7 semesters)

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>Engineer</b>
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Full-time Master studies last 1.5 year (3 semesters)

<b>1</b>	Choice of specialization	<b>2</b>	<b>3</b>	<b>Master</b>
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# The best teaching methods

Excellent quality of education is guaranteed by external evaluations and certificates of the following institutions:

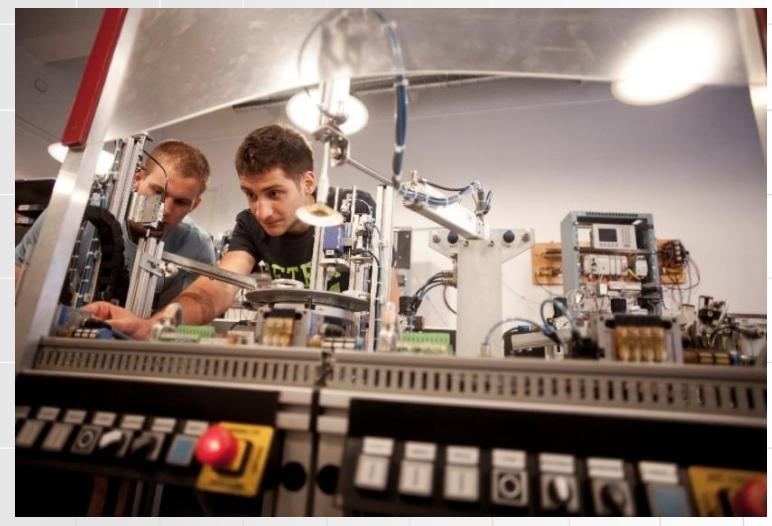
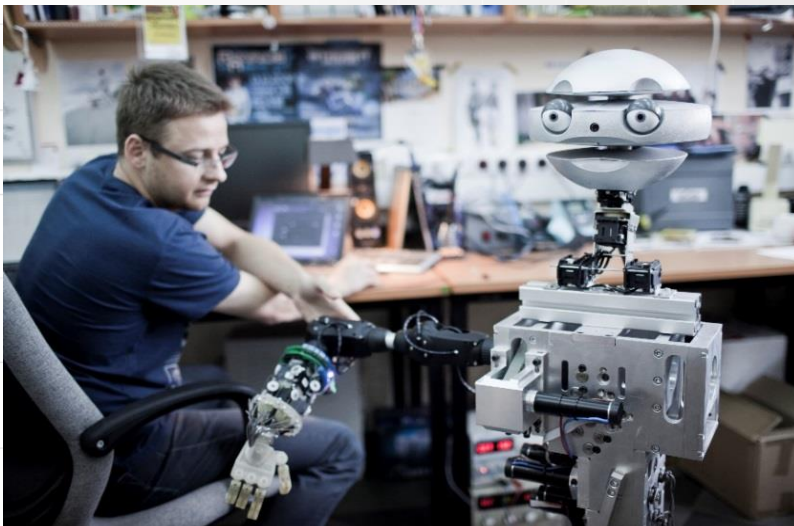
- ❖ The State Accreditation Committee (PKA – now the Polish Accreditation Committee)
- ❖ The Accreditation Commission of Technical Universities (KAUT)





# Research and education laboratories

There are many interesting research and education laboratories, including general computer laboratories and work-labs with specialist equipment.

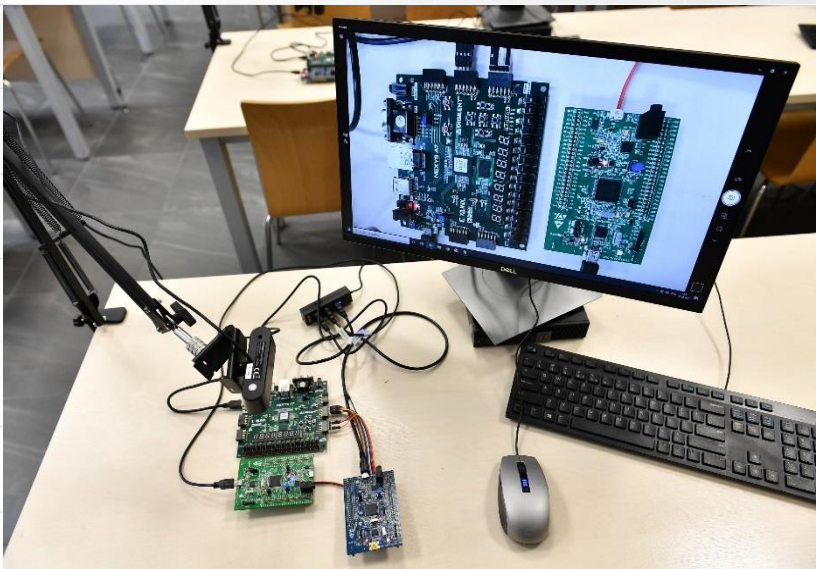
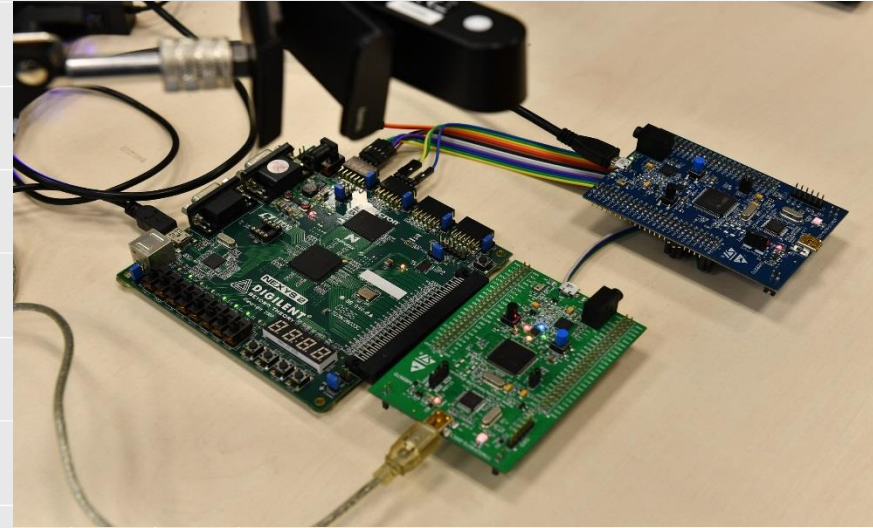






# Laboratories - examples

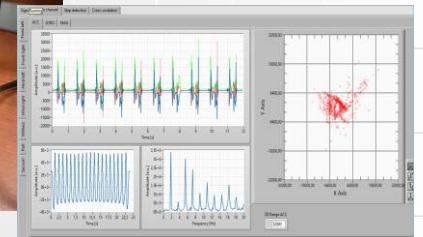
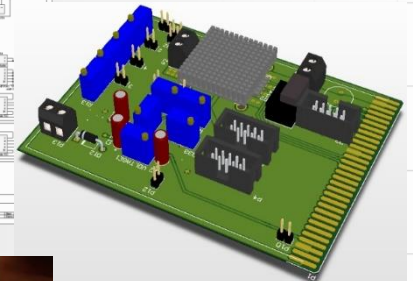
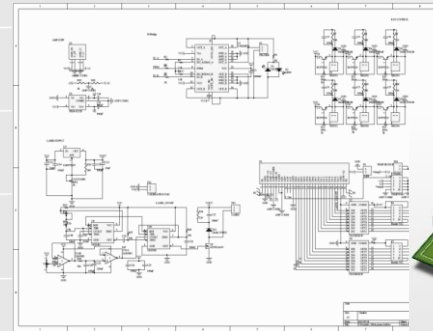
Laboratories of Microprocessor Techniques  
(also suitable for remote learning)





# Laboratories – examples

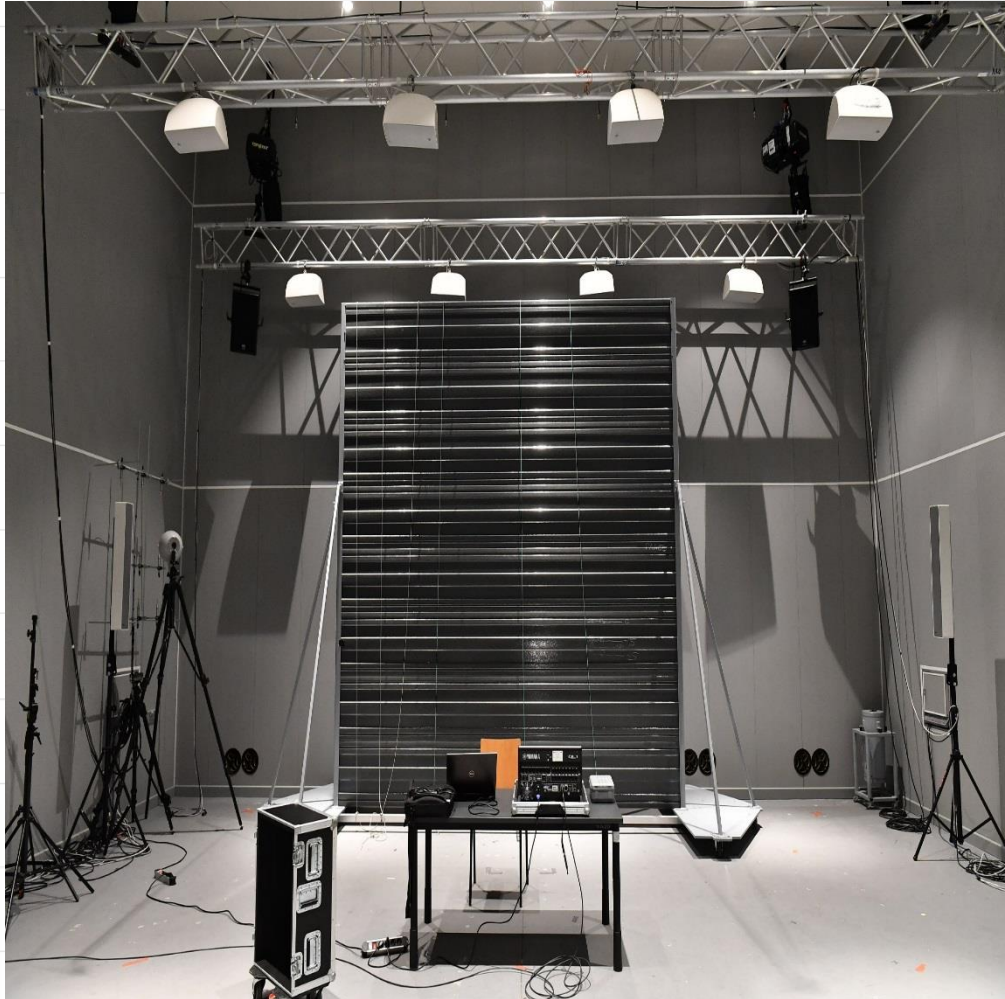
## Open laboratory and interdisciplinary projects





# Laboratories - examples

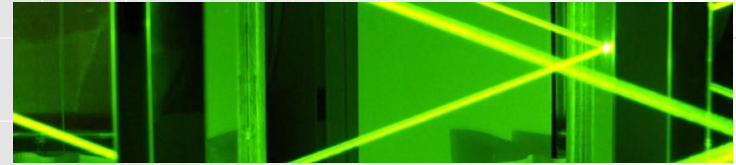
## Acoustics





# Laboratories - examples

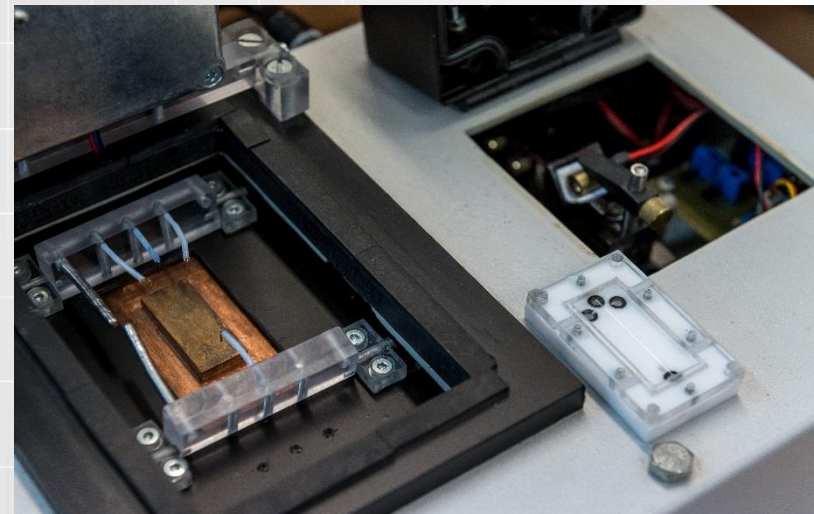
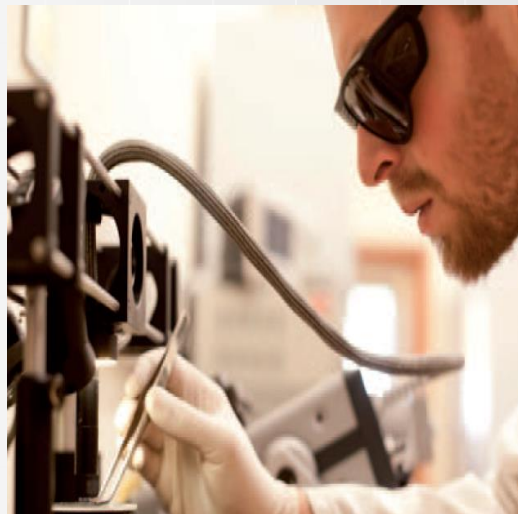
## Laboratory of lasers and optical amplifiers





# Laboratories - examples

## Laboratory of microsystems





# Laboratories - examples

## Laboratory of microelectronics and nanotechnology



# Cooperation with industry



Nokia Siemens  
Networks





## Prof. Patrick Dewilde - 2014



- Belgium, Electrical Engineering
- TUM Distinguished Affiliated Professor,
- from 2007 Scientific Director of the ICT Delft Research Centre, Delft University of Technology
- 2008 – 2013 in TUM as Director at the Institute for Advanced Study of TUM

## Prof. Gerard Wysocki - 2015

- USA, Princeton University, Electrical Engineering
- Education
  - Ph.D., Johannes Kepler University, Linz, Austria, 2003
  - MSc., Wydział Elektroniki, Politechnika Wroclawska, Polska, 1999

## VISITING PROFESSORS

Fundusz *Scientiae Wratislavienses*  
finansowany ze środków Miasta Wrocławia

**Profesor  
Gerard Wysocki**



Gerard Wysocki jest profesorem na Wydziale Electrical Engineering, Princeton University od 2008 roku, jest absolwentem Wydziału Elektroniki Politechniki Wrocławskiej, gdzie studiował w latach 1988-1993 i otrzymał magisterium z optoelektroniki. Doktoryzował się w 1995 roku na Uniwersytecie Johannes Keplera w Linzu, w Austrii. Kolejne pięć lat spędził w Rice University, Houston, w grupie specjalności inżynier Prof. Brucea Tittela, współpracując między innymi z Noblistą, Robertem Currier. Prof. Gerard Wysocki prowadzi badania skoncentrowane na rozwoju instrumentacji spektroskopii średniej rozdzielczości na skrajnie słabych sygnałach w atmosferze oraz budowy diemitycznych czujników. Jego badanie koncentruje się na wykorzystaniu efektywności i elastyczności nowych technik spektroskopii dyfrakcyjnej i skrajnych czujników optycznych, nowych koncepcji przetwarzania danych w zakresie średniej rozdzielczości i zastosowań na dużym obszarze badań czujników. Opublikował prace Prof. Gerard Wysockiego technologiczne zainicjował i realizował zaawansowane do obserwacji środowiska, atmosferycznej, detekcji bio-molekularnej w monitorowaniu biologicznego, diagnostyki i systemów i kontroli procesów przemysłowych.

Prof. Wysocki opublikował ponad 70 publikacji z IF i ponad 100 prac konferencyjnych i ogłosił kilka patentów na innowacyjne podejście spożywcze, do diagnostyki nowotworów, innowacje technologiczne i znaczący dotychczas Wysocki otrzymał wiele prestiżowych nagród, w tym m.in.:

- the 2010 NSF CAREER Award,
- the 2010 Michael Horiba Award, za istotny wkład w rozwój analizy czujników,
- 2011 Research Award Finalist of the New York Academy of Sciences,
- 2012 Early Career STAR Award from the U.S. EPA,
- 2014 Peter Werle Early Career Scientist Award.

**Program wizyty  
prof. Gerarda Wysockiego  
we Wrocławiu:**

**1.06.2015 (poniedziałek) godz. 13:15**  
sala 38/39, budynek C-4 (Janiszewskiego 11/17)

- **Spectroscopic chemical sensing in atmospheric, health, and industrial applications**  
Wykład popularno-naukowy o charakterze otwartym

**2.06.2015 (wtorek) godz. 15:15**  
sala 38/39, budynek C-4 (Janiszewskiego 11/17)

- **Opportunities and challenges in scientific career path – an American perspective**  
Seminarium otwarte dla doktorantów i magistrantów

**3.06.2015 (środa) godz. 11:15**  
sala 38/39, budynek C-4 (Janiszewskiego 11/17)

- **Laser dispersion spectroscopy – recent advances and applications**  
Wykład otwarty







# Visiting Professors - program

## Prof. Pedro Albertos - 2016



Prof. Pedro Albertos

Prof. Pedro Albertos pochodzi z Walencji w Hiszpanii. Jest profesorem tytularnym w dziedzinie Automatyki i Informatyki oraz byłym prezydentem International Federation of Automatic Control (IFAC).

Posiada tytuły Doktora Honoris Causa Politechniki Bukaresztańskiej i Uniwersytetu Oulu w Finlandii, Honorowego Profesora Północno-Wschodniego Uniwersytetu w Shenyang w Chinach, a także wiele wysokich wyróżnień zarówno hiszpańskich, jak i międzynarodowych. Jako invited professor przebywał w ponad 20 uniwersytetach całego świata, a także wygłosił kilkadziesiąt seminarów naukowych i wykładów plenarnych.

Jest autorem kilkuset publikacji naukowych, edytorem zbiorów prac i współautorem książek "Multivariable Control Systems" (Springer 2004) and "Feedback and Control for Everyone" (Springer 2010). Dał się poznać jako edytor czasopism naukowych oraz organizator i przewodniczący międzynarodowych konferencji i kongresów naukowych.

Jego główne obszary zainteresowań to sterowanie w systemach czasu rzeczywistego, cyfrowe sterowanie wielowartościowe, wbudowane systemy sterowania, sterowanie w systemach z opóźnieniem czasowym, estymacja parametrów, sterowanie adaptacyjne, a także sterowanie inteligentne w teorii i zastosowaniach w procesach przemysłowych.

### Program wizyty

#### prof. Pedro Albertosa we Wrocławiu:

4.04.2016 (poniedziałek), godz. 11:00

sala D2.1 budynek C16 (ul. Janiszewskiego 17)

**„Control issues in embedded systems”**

Wykład otwarty

5.04.2016 (wtorek), godz. 15:00

sala 38-39 budynek C4 (ul. Janiszewskiego 17)

**„Dynamics and Control”**

Otwarty wykład popularno-naukowy

7.04.2016 (czwartek), godz. 11:00

sala 38-39 budynek C4 (ul. Janiszewskiego 17)

**„Time delays in industrial applications”**

Otwarte seminarium naukowe

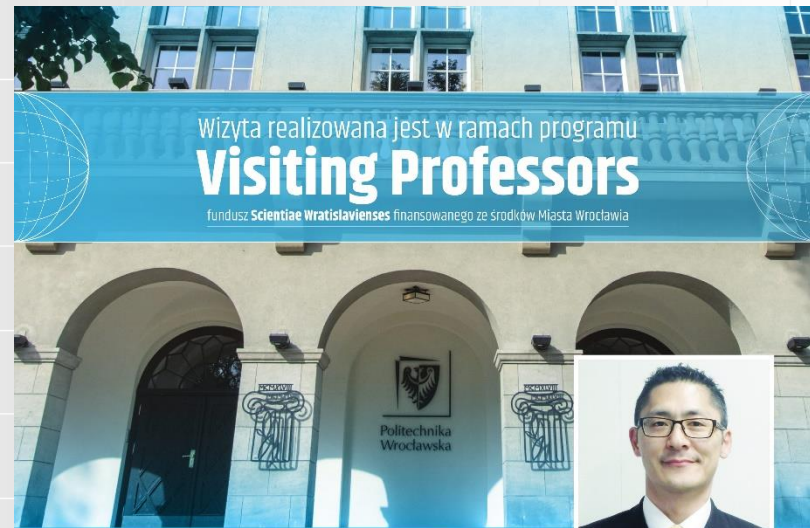
7.04.2016 (czwartek), godz. 15:00

sala D2.1 budynek C16 (ul. Janiszewskiego 17)

**„Control issues in embedded systems”**

Otwarta dyskusja związana z wykładem

## Prof. Don Futaba - 2019



Profesor Don Futaba

### Program wizyty prof. Don Futaba we Wrocławiu:

05.06.2019

12:00 – 13:00

Budynek A-1, sala 322

**Serendipity in Science; Nanotechnology from a Person who works with Carbon Nanotubes**

05.06.2019

15:00 – 16:00

Budynek A-1, Aula

**Our Efforts in Industrializing Carbon Nanotubes in Japan**

10.06.2019

11:00 – 12:00

Budynek C-2, sala 310

**Advances in the Synthesis of Single Wall Carbon Nanotubes by the Water- Assisted CVD Method**

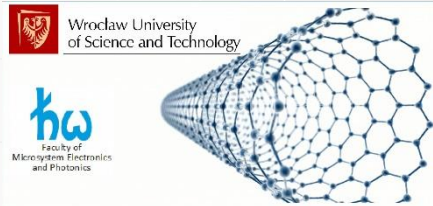
Don N. Futaba jest liderem zespołu naukowego zajmującego się wytwarzaniem (synteza) nanorurek węglowych w Państwowym Instytucie Zaawansowanej Nauki i Technologii Przemysłowej (AIST) mieszczącego się w Japonii, w mieście Tsukuba. Doktorat otrzymał na Uniwersytecie Kalifornijskim Davis (USA) w 2000 roku, w dziedzinie fizyki, a w 2004 roku dołączył do Centrum Badań nad Zaawansowanymi Materiałami Węglowymi (AIST, Japonia) prowadzonego przez Prof. Sumio Iijima. Tam też rozpracował badania nad syntezą nanorurek węglowych i odkrył nową metodę syntezy lasu nanorurek węglowych z wykorzystaniem chemicznego osadzenia z fazy gazowej w asyście wody. Jego zainteresowania naukowe obejmują syntezę i aplikacje nowych materiałów, jak również wielobranżową syntezę nanorurek węglowych, obróbkę procesową i aplikacje, które pozwolą na to, aby nanorurki węglowe stały się materiałem gotowym do komercjalizacji i użytku na skalę przemysłową. Prof. Futaba ma w swoim dorobku co najmniej 100 publikacji naukowych w czasopiśmie typu peer-review i ponad 60 międzynarodowych patentów. Jest członkiem prestiżowych stowarzyszeń naukowych, tj. American Physics Society, Materials Research Society oraz Fullerene, Nanotube, Graphene Research Society of Japan.





Dr Artur Chmielewski (JPL, USA)

© JPL



W dniu **22 maja (środa)**  
 odbędą się wykłady z udziałem:



**Dipl. Eng. Ivica KOLARIC**, Dyrektor Działu  
Functional Materials w IPA Fraunhofer, Niemcy  
„CNT application of IOT and Automotives”

M-11, s. 001, 13:15 – 14:30.



**Prof. Seisuke ATA**, National Institute of Advanced  
Industrial Science and Technology (AIST), Japonia  
„Development of CNT/polymer composite”,

M-11, s.001. 14:30-0 15:00.

Serdecznie zapraszamy i zachęcamy do udziału  
w wykładach **Wszystkich Zainteresowanych!**



Prof.  
Chengkuo Lee  
(NUS,  
Singapore)

## Electronic and Computer Engineering

The first admission took place in academic year 2016/17.

This course will give students multidisciplinary knowledge of electronics and computer engineering. It will enable them to obtain theoretical and practical knowledge in designing applied electronic systems based on analogue and digital techniques as well as gaining expertise in microprocessors, programmable logic applications and signal processing. Graduate students will be able continue second level study in the fields of Electrical Engineering, Computer Science, Automation and Robotics or Telecommunication, or other related fields.

## Effects

- ❖ Students will acquire the experience necessary for a professional career in industry as well as in research units and universities.
- ❖ Establishment of cooperation with foreign centres in the educational process (double diploma), joint grants and publications, organisation of international conference





# Studies in English (MSc Programme)

**Programme  
(Specialization)**

**Collaboration**

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*Advanced Applied  
Electronics*

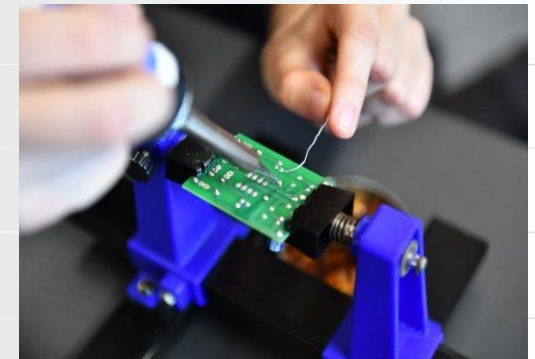
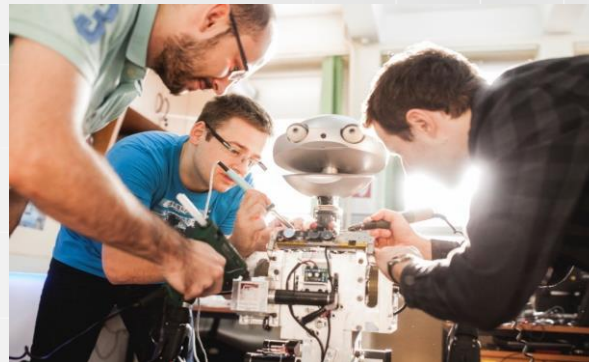
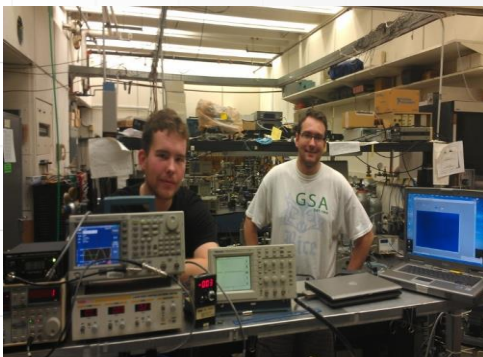
Rice University (USA)

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*Embedded Robotics*

University of Malaga  
(Spain)

*Electronics,  
Photonics and  
Microsystems*



## Summer School - examples



*Summer School - Parul University, India*



*Summer School -  
Chung Hsing University, Taiwan*



*Robotics Summer School - Malaga, Spain*

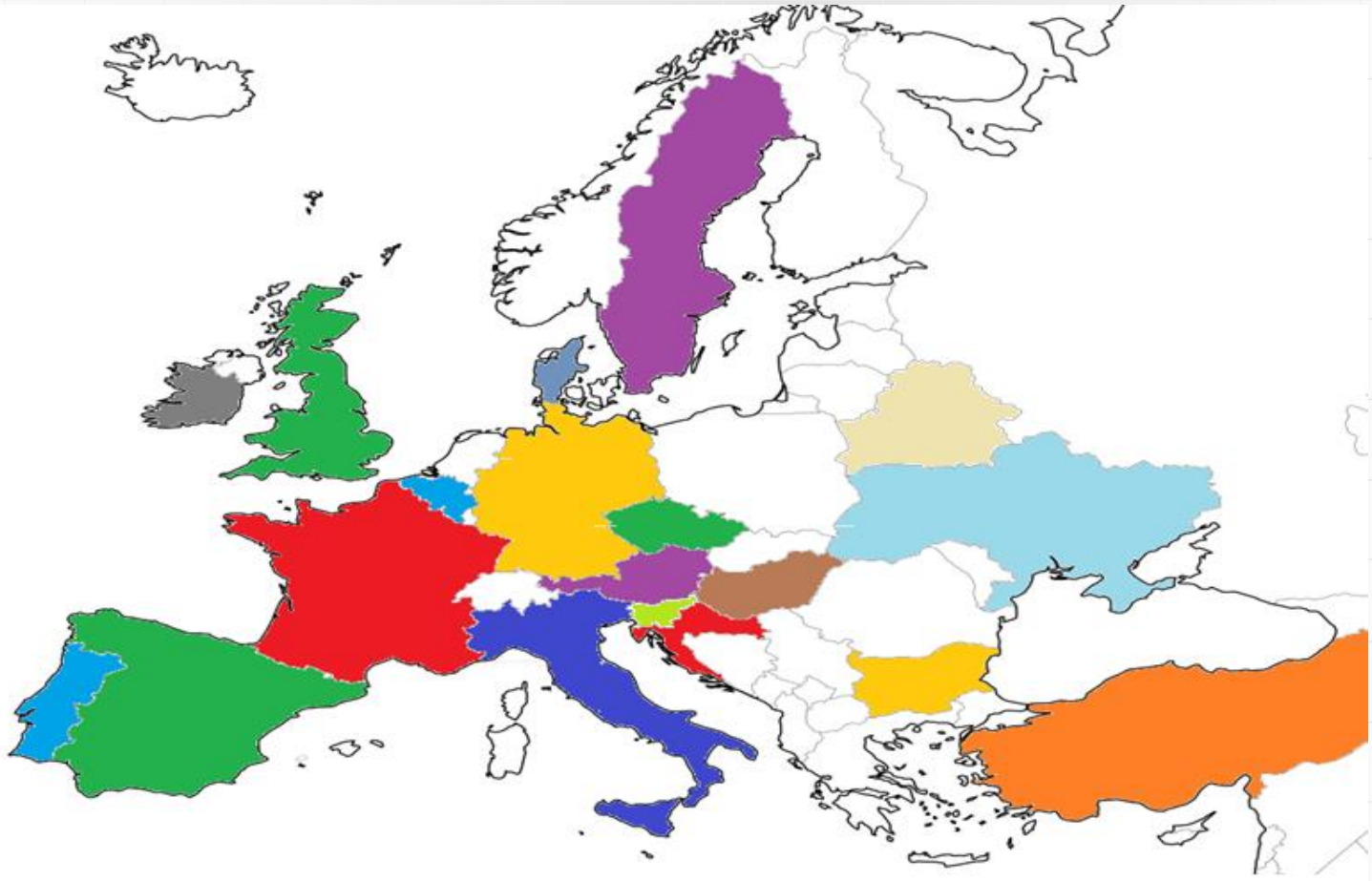


*MPEI - Moscow, Russia*





# International cooperation in Erasmus+ programme



# Student activities



More than **15** Student Scientific Clubs, some of them:

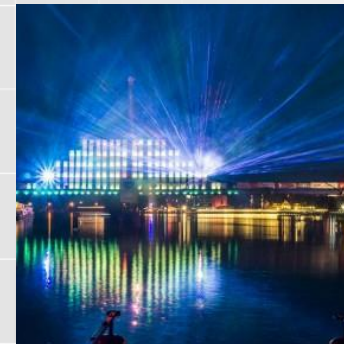
- ❖ **CHIP** (Microcontrollers and Embedded Systems)
- ❖ **KoNaR** (Robotics)
- ❖ **MOS** (Microsystems Oriented Society)
- ❖ **SNS OIM** (Student's Scientific Society Optoelectronics and Microsystems)
- ❖ **Aquatronik** (Mechatronic Yacht, Solar Yacht)
- ❖ **SPENT** (Association of Polish Nanotechnology Enthusiasts)





# Outstanding achievements of student groups

- ❖ **The silver medal** was won by the **Navy Robot** in the Line Follower Adult category, prepared by KNR members "KoNaR." With time 4.77 seconds, the first place was shorter than 0.07 seconds.
- ❖ **Gold medal for Robotic Chessboard** in Freestyle Exhibition Adult competition, scoring average 78.2% of points (KoNaR)
- ❖ 2nd place for the "JEDI" science club in the competition at **The International Micro Air Vehicle Competition 2016 (IMAV 2016)**
- ❖ **Demonstrations of the project of the scientific club SKN MOS - P.I.W.O. Light Show** (illuminations, animations, window illumination) organized in cooperation with the Lower Silesian Provincial Office (Days of the Flag of the Republic of Poland, World Autism Day, Independence Day, Wrocław Night Marathon), and Illumination of the windows of the University Clinical Hospital named after Jan Mikulicz-Radecki on the occasion of the premature baby day celebrations



# Outstanding achievements of student groups



- ❖ The success of students of the **scientific circle of the Polish Section of Audio Engineering Society AES** was conducting numerous projects in the field of sound and lighting (Polish Electricians Association Ball, Concert "A boulevard flooded with music", Robotic Arena) and participation in the **International Convention of Audio Engineering Society in Paris**, where members competed in design competition, recording competition and presented their scientific publications



- ❖ The students of **Aquatronik scientific circle** are developing the project of "**Mechatronic Yacht**", i.e. a boat made from scratch by the students in the previous years - Omega Standard and placing in it a system of sensors supporting the training process. The Solar Yacht project - a motor boat powered by photovoltaic cells - has also been implemented



# Outstanding achievements of student groups



- ❖ **PWr in Space**, scientific circle went to the competition in the USA with the rocket Pink Pantera. Students from the Faculty of Electronics, Photonics and Microsystems are also active there. They took the 2nd place at the international competition Spaceport America Cup 2022! They won this award in the 10,000 ft flight category. They were recognized for the technical documentation prepared, the level of design of the project and for being ready to take off on the very first launch day of the competition.

# Outstanding achievements of student groups



❖ **The Aerospace** scientific club operates at the Faculty of Electronics, Photonics and Microsystems. Since 2016, its members have been involved in stratospheric missions and build CanSat rockets and probes for international competitions.

Recently, students took second place at the international CanSat Competition United States.







# Thank you for your attention

