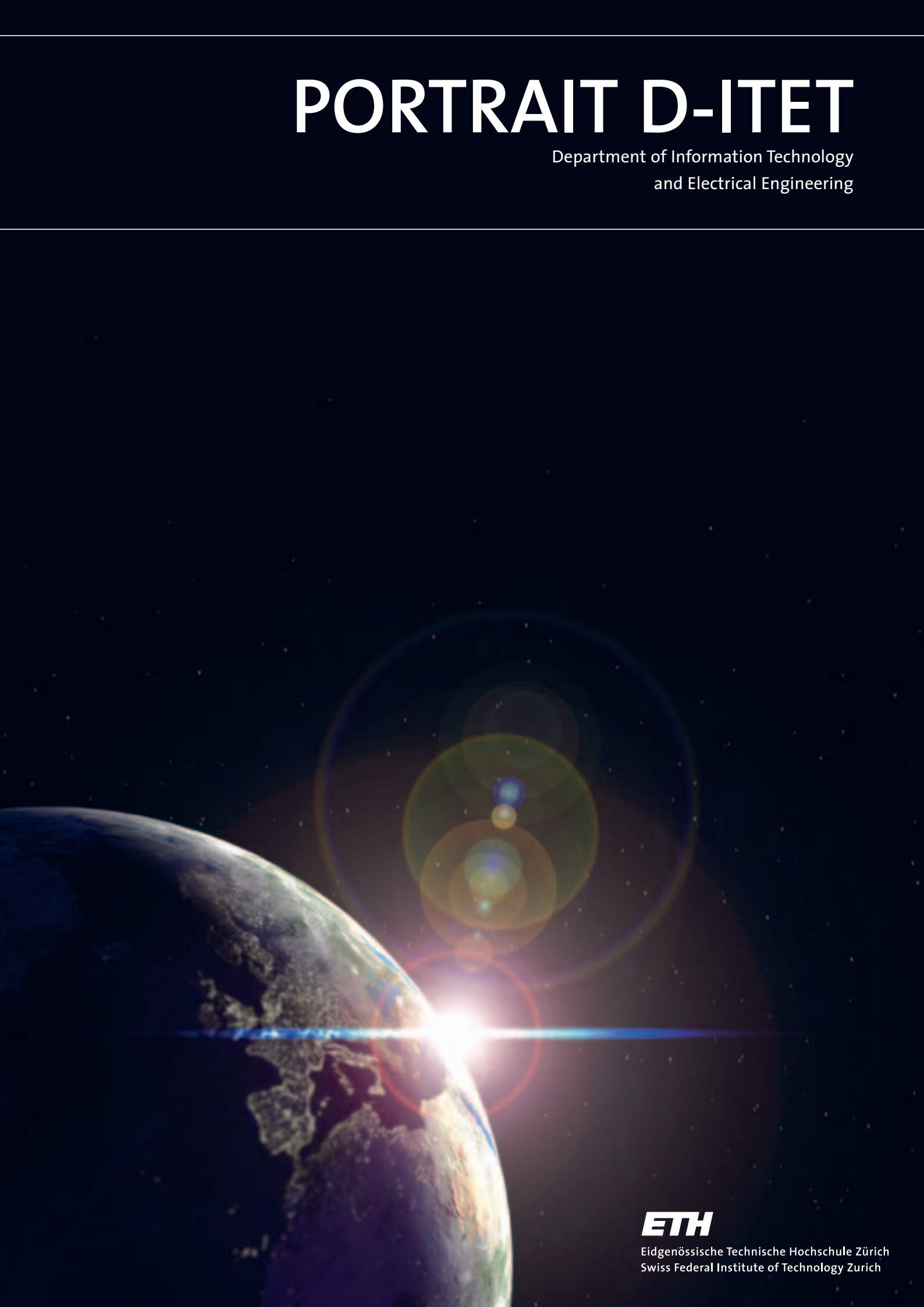
# PORTRAIT D-ITET

Department of Information Technology
and Electrical Engineering



ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich


Ultra-lightweight compressor for cabin air pressurisation of the Solar Impulse aircraft with world record speeds beyond 1'000'000 rpm



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Department management from left to right:
Prof. Lothar Thiele, Prof. Manfred Morari,
Prof. Hans-Andrea Loeliger

‘We are working on cutting-edge solutions to the complex challenges that will confront our world in the fields of information and communication, technology, energy, and health.‘

**Prof. Morari, Head of D-ITET, ETH Zurich**



# Welcome to D-ITET

Electrical engineering technologies have an ever-increasing influence on the development of our society. At D-ITET, we work on cutting-edge solutions to the complex challenges that confront our world in the fields of information and communication, technology, energy and health.

Innovations in electrical engineering are crucial for many of today's challenges, such as creating a sustainable energy supply, preventing and treating diseases, and improving data communication and processing. Known for our first-class research and top-quality education, we are committed to contributing our strengths as a leading research and knowledge centre to address these global challenges.

- Our faculty members are pioneers in their respective fields, dedicated to fulfilling the highest standards in research and education. The spirit of discovery and innovation in our team enables us to identify new problems and research areas at an early stage.
- We benefit from a strong international network. D-ITET collaborates worldwide with leading universities, research institutes and industry partners.
- We offer our students an outstanding education that is closely linked to our research activities. Our graduates are extraordinary individuals who have gained the knowledge and the skills to leave their mark on the world.
- Excellent facilities and flexible organisation at ETH Zurich provide a powerful framework for research and teaching at D-ITET.

Today we are a community of nearly 2'000 researchers, students and staff from more than 40 countries. As we expand our programmes in the future, we look forward to sharing our vision and increasing collaboration with our students and partners worldwide.

Prof. Manfred Morari
Head of Department

Prof. Lothar Thiele
Deputy Head of Department

Prof. Hans-Andrea Loeliger
Director of Studies


# Our department

**Our faculty members are world-class experts who pursue pioneering work in electrical engineering. The professors at D-ITET are widely recognised as leaders in their fields, which range from electronics and photonics, information technology, and communication, to energy technology and biomedical engineering.**

D-ITET has made major and lasting research contributions during its history, opening up entirely new fields of study in the areas of bioelectronics, high-speed electronics, nano-photonics, ubiquitous computing, and mobile and ad-hoc networks. The groundbreaking work of our researchers is internationally recognised and has been awarded with numerous prestigious prizes.

We foster multidisciplinary cooperation among the members of D-ITET and the other departments of ETH Zurich as well as with academic and industrial partners worldwide. Acting as an engine of innovation, we pass our knowledge on to major companies, small and medium enterprises and D-ITET spin-off companies. Our department is active in the following cross-disciplinary research centres and initiatives.

Research centres at ETH Zurich:
- Centre for Imaging Science and Technology (CIMST)
- Centre for Micro and Nanosciences (FIRST)
- Energy Science Centre (ESC)
- Materials Research Centre (MRC)
- Micro and Nanoscience Platform (MNSP)
- Swiss Electromagnetics Research & Engineering Centre (SEREC)

‘Strategic industrial and academic partnerships help us to be at the forefront of research.‘

**Prof. Peter Bösiger, Institute for Biomedical Engineering, D-ITET**

Swiss research initiatives and centres:
- Competence Centre for Energy and Mobility (CCEM-CH)
- Competence Centre for Materials Science and Technology (CCMX)
- Competence Centre for Systems Physiology and Metabolic Diseases (CC-SPMD)
- Neuroscience Centre Zurich (ZNZ)
- Nano-Tera.ch (Swiss programme for engineering complex systems for health, security and the environment)
- SystemsX.ch (Swiss initiative in systems biology)

D-ITET works in close cooperation with partners in the life sciences. For example, it runs joint biosensors, bioelectronics, and bioimaging laboratories, as well as a joint doctoral programme with the University of Zurich. In medical technology, we foster strong partnerships with the University Hospital Zurich and other renowned medical institutions.

Our world-class laboratory infrastructure and high-tech equipment provide excellent conditions for top-level research. D-ITET is an inspiring place for scientists and students.

The ability to constantly adapt to new requirements is one of the success factors of the department. Our broad expertise and strong partnerships enable us to respond to new challenges and to continue setting standards in research and education.


Prof. Göran Andersson


Prof. Jürgen Biela


Prof. Helmut Bölcskei


Prof. Colombo Bolognesi


Prof. Gian-Luca Bona


Prof. Peter Bösiger


Prof. Rodney Douglas


Prof. Christian M. Franck


Prof. Richard Hahnloser


Prof. Qiuiting Huang


Prof. Johann W. Kolar


Prof. Heinz Köppl


Prof. Amos Lapidoth


Prof. Hans-Andrea Loeliger


Prof. Mathieu Luisier


Prof. John Lygeros


Prof. Kevan A. C. Martin


Prof. Manfred Morari


Prof. Bernhard Plattner


Prof. Klaas P. Prüssmann


Prof. Markus Rudin


Prof. Marco Stampanoni


Prof. Luc Van Gool


Prof. Gábor Székely


Prof. Lothar Thiele


Prof. Gerhard Tröster


Prof. Vanessa C. Wood


Prof. János Vörös


Prof. Roger P. Wattenhofer


Prof. Armin Wittneben

# Faculty team

## D-ITET research laboratories

**Integrated Systems Laboratory**
**Prof. Qiuting Huang,** analogue and mixed-signal design
**Prof. Mathieu Luisier,** computer-based modelling of nanostructures
**Prof. Vanessa C. Wood,** nanoelectronics and nanophotonics
**Adj. Prof. Hubert Kaeslin,** microelectronics design centre
**Adj. Prof. Niels Kuster,** bioelectromagnetics and EMC
**Adj. Prof. Andreas Schenk,** nanodevice physics

**Electronics Laboratory**
**Prof. Gerhard Tröster,** digital systems
**Adj. Prof. Anton Gunzinger,** supercomputing systems

**Millimeter-wave Electronics Laboratory**
**Prof. Colombo Bolognesi,** high-speed electronics

**Electromagnetic Fields and Microwave Electronics Laboratory**
**Adj. Prof. Christian Hafner**

**Photonics Laboratory, Empa**
**Prof. Gian-Luca Bona,** photonics
**Adj. Prof. Ayodhya N. Tiwari,** thin films and photovoltaics

**Communication Technology Laboratory**
**Prof. Helmut Bölcskei,** communication theory
**Prof. Armin Wittneben,** wireless communications

**Automatic Control Laboratory**
**Prof. Heinz Köppl,** biomolecular signalling and control
**Prof. John Lygeros,** control and computation
**Prof. Manfred Morari,** system dynamics and control

**Computer Engineering and Networks Laboratory**
**Prof. Bernhard Plattner,** communication systems
**Prof. Lothar Thiele,** computer engineering
**Prof. Roger P. Wattenhofer,** distributed computing

**Signal and Information Processing Laboratory**
**Prof. Amos Lapidoth,** information theory
**Prof. Hans-Andrea Loeliger,** signal processing

**Computer Vision Laboratory**
**Prof. Luc Van Gool,** visual communications
**Prof. Gábor Székely**, medical imaging

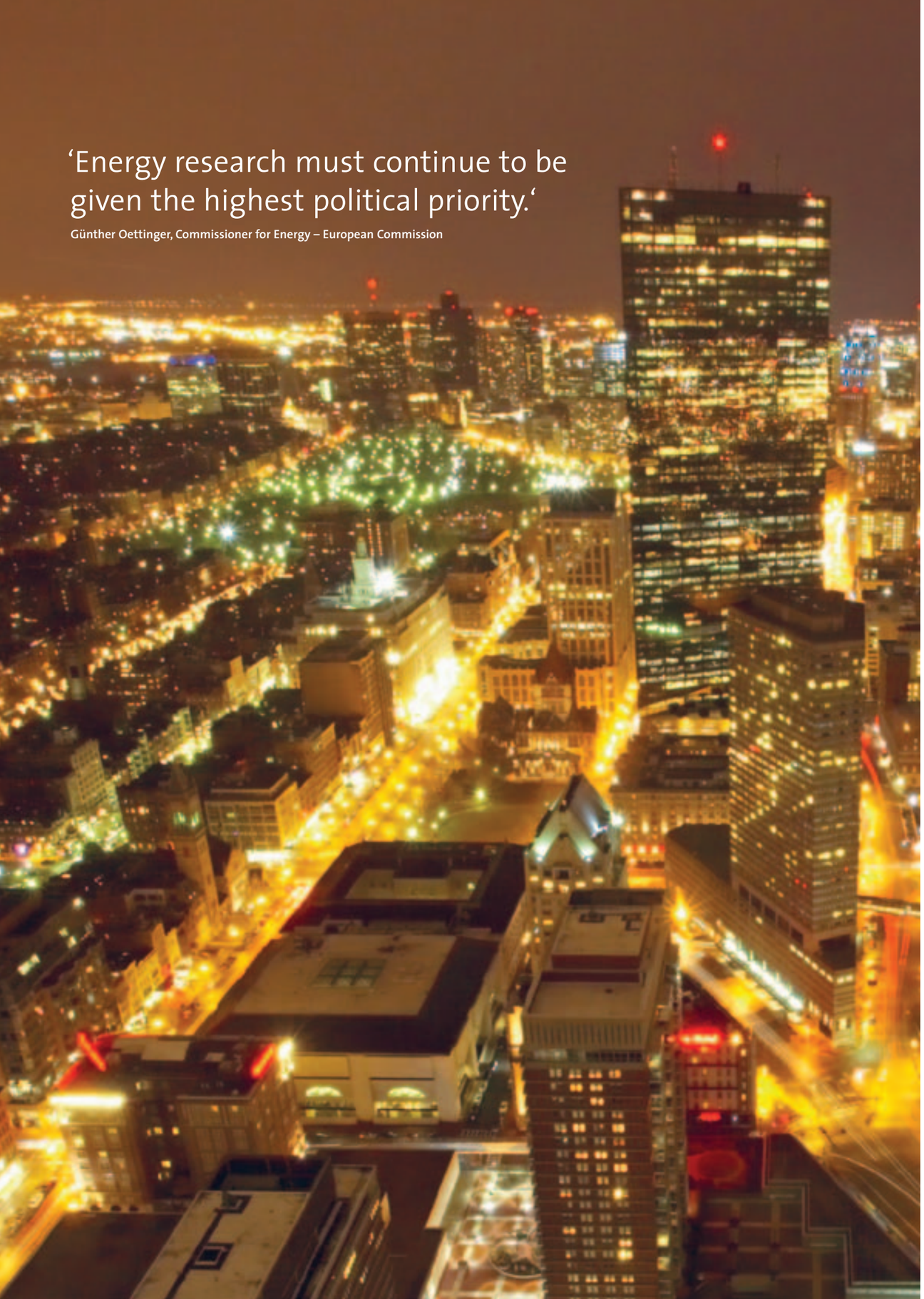
**Institute of Neuroinformatics (from 2012)**
**Prof. Rodney J. Douglas,** theoretical neuroinformatics
**Prof. Richard Hahnloser,** systems neuroscience
**Prof. Kevan A. C. Martin,** system neurophysiology
**Adj. Prof. Tobias Delbrück,** neuromorphic event-based sensory processing

**Electric Power Systems and High-voltage Technology Laboratory**
**Prof. Göran Andersson,** electric power systems
**Prof. Christian M. Franck,** high-voltage engineering

**Power Electronic Systems Laboratory**
**Prof. Johann W. Kolar**

**Laboratory for High-power Electronic Systems**
**Prof. Jürgen Biela**

**Institute for Biomedical Engineering**
**Prof. Peter Bösiger,** bioimaging
**Prof. Klaas P. Prüssmann,** bioimaging
**Prof. Markus Rudin,** molecular imaging and functional pharmacology
**Prof. János Vörös,** biosensors and bioelectronics
**Prof. Marco Stampanoni,** X-ray imaging and microscopy






# A common vision

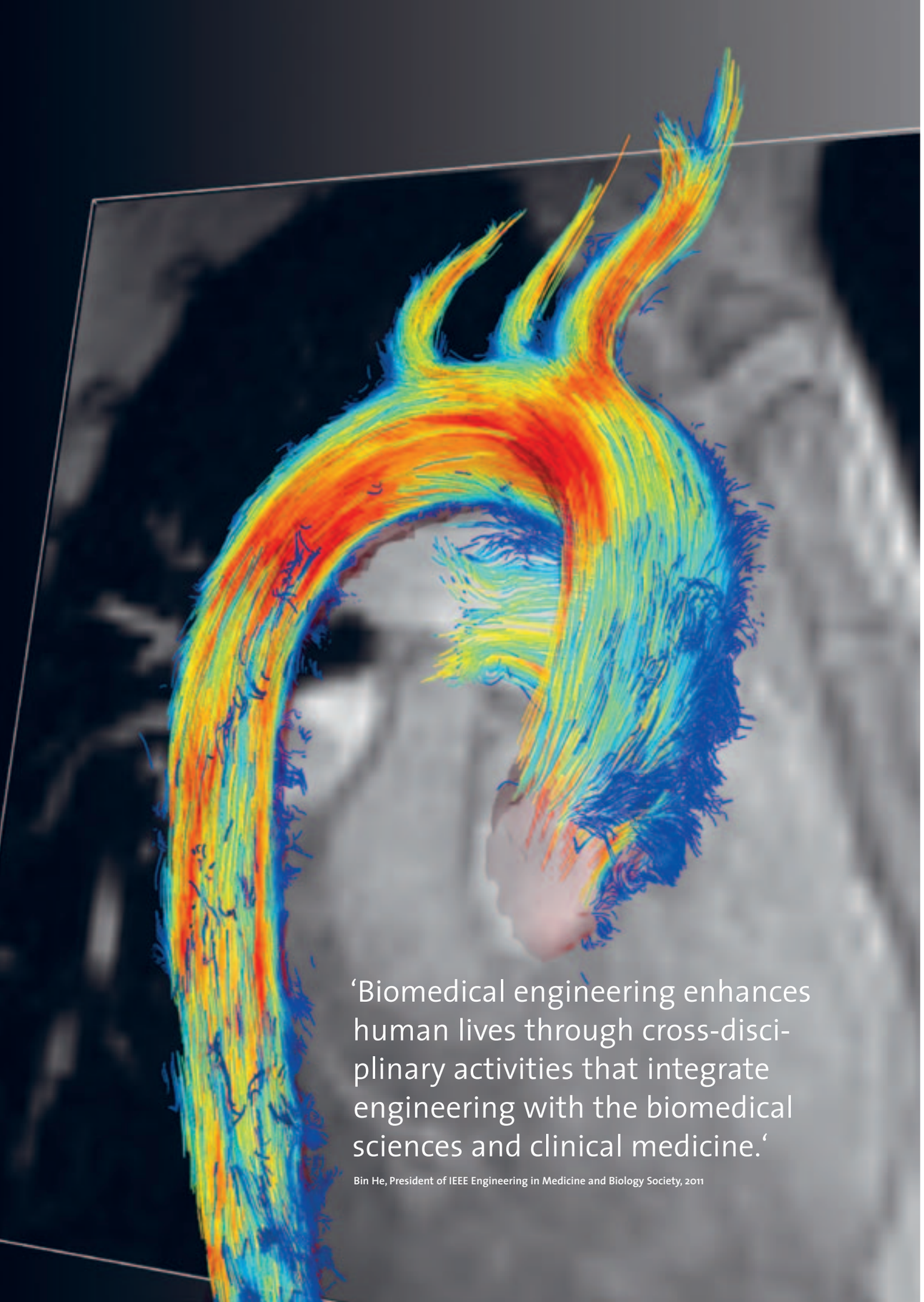
**Our vision is to be leaders in the generation and dissemination of knowledge in the field of electrical engineering and information technology.**

We are committed to
- providing first-rate education and producing graduates who are capable of taking leadership roles in their fields,
- providing cutting-edge research and fostering a spirit of creativity and interdisciplinary cooperation,
- using the new knowledge created at D-ITET to serve society and to address global challenges.

The Bachelor and Master programmes at D-ITET are closely linked to current research and reflect the latest technical and scientific knowledge. Our programmes also include application-oriented projects and seminars. The combination of a solid scientific foundation and practical training guarantees that our graduates are equipped for a career in a global environment – be it in academia, industry, or as entrepreneurs.

In research we focus on the following key societal issues.
- Energy: secure and reliable energy supply is widely regarded as one of the most important intellectual and technological challenges of the 21st century.
- Healthcare: preserving human health and well-being as well as the diagnosis and therapy of disease increasingly depend on innovative and affordable healthcare technology.
- Information: in our globalised world, massively increasing amounts of data need to be collected, processed, exchanged and stored. At the same time, the information technology required becomes smaller and cheaper and enters almost all spheres of life.

We address these global challenges by developing fundamental electrical technologies as well as methods and applications on the system level. We go beyond the existing limits of dimensions, speed and complexity. Our research ranges from building electronics at the nanoscale to creating communication and energy networks on a global scale. Strong industry partnerships enable us to transfer our innovations to the practical world and to stimulate the economy.



‘Biomedical engineering enhances human lives through cross-disciplinary activities that integrate engineering with the biomedical sciences and clinical medicine.‘

Bin He, President of IEEE Engineering in Medicine and Biology Society, 2011

# Four core research areas

**Research at D-ITET addresses the global challenges of sustainable energy, information management and healthcare for the world‘s growing population. These priorities are reflected in four core research areas: electronics and photonics, information and communication, energy, and biomedical engineering.**

Research at D-ITET is conducted by 15 laboratories. The guiding principle of all D-ITET laboratories is to encourage excellence and diversity in thinking, and to foster collaboration and innovation across traditional knowledge barriers.

## Electronics and photonics

Our goal is to find new approaches to component and system-developing technology for future electronic applications. On the component level, our research includes the miniaturisation and performance improvement of electronic and photonic components, as well as the use of new materials and processes (e.g. nanoelectronics, organic electronics). In system development we focus on the realisation of embedded electronics and smart environments.

## Information and communication

Constantly improving communication options, especially those powered by the internet, drive the development of new networking and computing technologies. D-ITET is active in the areas of signal and image processing, control systems, information theory, distributed computing, wireless networking and future internet technologies.

## Energy

Sustainable energy technologies will be critical to maintain strong economic growth and security in the 21st century and beyond, and are a major priority at D-ITET. Research foci include the development of smart grids for efficient energy supply and distribution and for integrating renewable energy sources as well as fundamental research on photovoltaics, batteries, and ultracapacitors.

## Biomedical engineering

Biomedical engineering at D-ITET is guided by the overarching goal of advancing healthcare. Bridging electrical technology and biology is essential for all areas of medicine, from prevention and diagnostics to therapy and rehabilitation. We focus on the interaction between biological and technical systems, with emphases on bioimaging, image-based modelling and bioelectronics.

FIRST Lab - production of transistors in a clean room

# Electronics and photonics

**D-ITET covers the areas of electronics and photonics with core activities ranging from physical electronics, system design and verification to a wide application field.**

Green energy and communication trends are the driving forces for future electronics and photonics research. The global demand for clean energy production with reduced $CO_2$ emission asks for innovative and economic concepts in solid-state lighting (LEDs), higher efficiency photovoltaic devices and improved electronics in automotive and power systems. Similarly, communication technology is moving towards higher speeds and bandwidths, and additional demands are appearing from medical applications, requiring small-sized portable and low-power devices.

In the upcoming decades, electronics and photonics will remain at the forefront of research in applied science and engineering due to their economic importance. The microelectronics industry will continue to follow two established trends – smaller feature sizes and higher integration densities. According to the International Technology Roadmap for Semiconductors (ITRS) today's silicon-based technology might reach its limits around 2020 with the critical dimensions of 10 nm. Significant efforts are already under way to explore potential candidates for enhancing, complementing and possibly replacing silicon as a base material for microelectronics.

‘Solid State Lighting with high-efficiency LEDs offers tremendous energy savings and $CO_2$ footprint reductions.‘

**Prof. Colombo Bolognesi, Millimeter-wave Electronics Laboratory, D-ITET**

At D-ITET research on electronics and photonics covers the following four areas:

**Millimeter-wave electronics**
High-performance compound semiconductor transistors are developed by tailoring the electronic properties of semiconductor materials on the atomic scale. The transistors, based on materials such as InP and GaN, are some of the world's fastest and intended for high bandwidth telecommunication applications.

**Analogue and mixed-signal design**
Integrated circuits are designed for a broad range of applications such as wireless and wireline communications, high-speed computing, sensor interfaces and smart power. One ongoing research focus is for example the realisation of RF front-ends for GSM cellular phones, using deep-submicron CMOS technologies.

**Digital systems**
Achievements in signal processing, computing and packaging technologies enable future mobile and wearable systems. Current research includes technologies and system platforms for the detection of the physical, mental and social context of the user, the development of on-body sensor networks as well as the modelling and design of smart textiles.

**Nanoelectronics and nanophotonics**
The electronic properties of nanomaterials are investigated at the single-particle and ensemble level to enable their rational integration in devices, such as solar cells, batteries, and LEDs. Targeted applications include portable electronics, electric vehicles, grid-level energy storage, and solid-state lighting.

**Prof. Colombo Bolognesi**
Millimeter-wave electronics
**Prof. Gian-Luca Bona**
Photonics
**Prof. Qiuting Huang**
Analogue and mixed-signal design
**Prof. Mathieu Luisier**
Computer-based modelling of nanostructures
**Prof. Gerhard Tröster**
Digital systems
**Prof. Vanessa C. Wood**
Nanoelectronics and nanophotonics

Permasense Project, D-ITET

# Information and communication

**Information and communication technology continues to transform the ways in which we communicate, work, play, and build machinery. The explosive development of this technology is founded not only in electronics, but very substantially also in the mathematical sciences of information, communication, control, and computation that originated in the 1940s and 1950s. Pushing these sciences further is crucial for the technology of tomorrow.**

There are plenty of challenges:

- Massive and growing amounts of data need to be processed quickly and intelligently.
- The ever-growing complexity of computers and networks must be mastered.
- Reliable and high-speed communication and computation must be assured.
- The safety and security of critical infrastructure must be guaranteed.
- New materials for nanoelectronics need to be used effectively.
- Large-scale statistical modelling, processing, and learning must be further developed.
- Advancements in neuroscience rely on the development of novel electronics and modelling tools.

At D-ITET, several research groups take on these challenges:

**communication technology** (wireless communications and communication theory),

**signal and information processing** (information theory, signal processing),

**computer engineering and networks** (distributed computing, communication systems, computer engineering),

**automatic control** (system dynamics and control, complex uncertain systems, biomolecular signalling),

**computer vision** (computer-based interpretation of 2D and 3D image data sets),

**neuroinformatics** (exploring the principles of information processing in the brain).

‘By 2020, the amount of digital information created and replicated in the world will grow to 35 trillion gigabytes.‘ IDC Report 2010

**Prof. Helmut Bölcskei**
Communication theory
**Prof. Rodney J. Douglas**
Theoretical neuroinformatics
**Prof. Luc Van Gool**
Visual communications
**Prof. Richard Hahnloser**
Systems neuroscience
**Prof. Heinz Köppl**
Biomolecular signalling and control

**Prof. Amos Lapidoth**
Information theory
**Prof. Hans-Andrea Loeliger**
Signal processing
**Prof. John Lygeros**
Control and computation
**Prof. Kevan A. C. Martin**
System neurophysiology
**Prof. Manfred Morari**
System dynamics and control

**Prof. Bernhard Plattner**
Communication systems
**Prof. Lothar Thiele**
Computer engineering
**Prof. Roger P. Wattenhofer**
Distributed computing
**Prof. Armin Wittneben**
Wireless communications

# Energy

**Numerous international studies confirm that electricity will play a key role in the future sustainable supply of energy. Electric power can be generated from renewable sources like wind and sun, it can be transmitted and distributed easily and with low losses, and it is the preferred form of energy for efficient usage.**

To reach the ambitious climatic goals set by numerous governments around the world, increased integration of renewable energy resources and more efficient use of energy are essential. At the same time, the availability and reliability of electric energy supply should remain as high as today. Wind and solar power plants are preferably built where the wind and solar radiation are maximum, e.g., off-shore or in desert regions, which are typically far away from load centres. In addition, energy generation by such plants is dictated by local weather conditions and not by demand. Hydro plants, located predominantly in Scandinavia or the Alps, are envisioned to operate as storage devices to match supply and demand.

As a consequence, the transmission and distribution grid plays an increasingly important role. Future technologies for better generation, transmission and distribution, as well as for the efficient use of electric energy imply greater use of power electronics. In the future, methods for the optimised use of existing infrastructures and information and communications technologies, often known as the 'Smart Grid', will be deployed to control the systems and load management.

ETH Zurich is in a strong position to tackle these future challenges. The current D-ITET professorships cover the areas from transmission and distribution all the way to consumption.

'Our research is directed towards an extremely stable, efficient, and reliable intelligent power system, that links between renewable energy sources, storage systems, and loads.'

**Prof. Johann W. Kolar, Power Electronics Systems Laboratory, D-ITET**

In conjunction with the activities of the ETH department D-MAVT, the Paul Scherrer Institute (PSI), and the Swiss Federal Laboratories for Materials Science and Technology (Empa), they constitute a concerted and comprehensive approach in energy research. Four D-ITET laboratories currently pursue research in energy-related topics.

The **High-voltage Laboratory** concentrates on technologies for a future sustainable electric energy transmission system.

The research of the **Power Systems Laboratory** can be divided into three main areas: security enhancement of power systems, liberalised power systems, and new designs of future power systems.

Research carried out by the **Power Electronic Systems Laboratory** addresses challenges of fundamental or generic nature. The focus is on ultra-high switching frequencies and ultra-compact PWM converter concepts, where the considerations have a system-oriented basis. Other main research targets are bearingless motors and ultra-high speed drives. Innovation in these areas generally aims to trigger translation into future industrial products.

The **Laboratory for High-power Electronic Systems** explores high-power converter systems, which include operation at medium voltages, as required, for example, in future energy distribution for renewable energy sources or in traction applications.

In recent years there has been a significant increase in research activities as well as in the number of students in the field of energy technologies at ETH Zurich. The Energy Science Centre, which encompasses energy research across ETH Zurich, coordinates activities according to the ETH strategy 'Energy and Climate Change'.

**Prof. Göran Andersson**
Electric power systems
**Prof. Jürgen Biela**
High-power electronic systems
**Prof. Christian Franck**
High-voltage engineering
**Prof. Johann W. Kolar**
Power electronic systems

High-voltage Laboratory, D-ITET

# Biomedical engineering

**The combination of life-science and engineering principles continues to create intriguing perspectives for healthcare and disease prevention. It will boost our ability to analyse, control, support, and repair organisms from single cells to the human body.**

Electrical engineering and information technology are at the heart of this effort. Electronics is currently the only technology platform that even comes close to biological systems in terms of complexity, flexibility, and miniaturisation. The gathering, handling, and interpretation of massive amounts of information is essential for understanding and interfacing with live organisms. Furthermore, these organisms themselves rely strongly on the electrical mechanisms of signal transduction and information processing.

Biomedical engineering is a major driver of progress in healthcare. It aims to improve the prevention, diagnosis, and therapy of diseases while helping to contain the costs involved. For all these tasks, mobile technologies are especially important, promising the continuous monitoring and support of organ functions, greater independence of the elderly, and reduced hospital stays. Increasing global demand in these areas is also one of the great current opportunities for high-value-added industries in Switzerland and abroad.

D-ITET focuses on two areas of biomedical engineering that best leverage its core expertise:

- bioimaging and image-based modelling, currently comprising four professors and one assistant professor.
- bioelectronics, currently comprising a professorship in biosensors and bioelectronics and an open position in neuroelectronics.

Research and teaching in these areas are carried out primarily by the Institute for Biomedical Engineering and the Computer Vision Laboratory. The Institute for Biomedical Engineering is a joint institute of ETH Zurich and the University of Zurich and hosts several shared professorships between D-ITET and the University's Medical Faculty for seamless clinical translation. Close ties are also fostered with the Paul Scherrer Institute (PSI), the Swiss Federal Laboratories for Materials Science and Technology (Empa) and the IT'IS Foundation. Biomedical engineering at D-ITET is part of the ETH initiative in medical engineering and health.

‘Interfacing biology with electronics at the nanometer scale will enable earlier diagnosis of diseases like cancer.‘

**Prof. János Vörös, Institute for Biomedical Engineering, D-ITET**

**Prof. Peter Bösiger**
Bioimaging
**Prof. Klaas P. Prüssmann**
Bioimaging
**Prof. Markus Rudin**
Molecular imaging and functional pharmacology
**Prof. Marco Stampanoni**
X-ray imaging and microscopy
**Prof. Gábor Székely**
Medical imaging
**Prof. János Vörös**
Biosensors and bioelectronics

Magnetic Resonance Imaging (MRI) and Spectroscopy (MRS), D-ITET

# Education

**D-ITET is a first-class educational institution where teaching is strongly linked to research. Our graduates take leadership positions in the areas of electrical engineering and information technology.**

During the course of the Bologna reform, D-ITET played a pioneering role in Switzerland in reducing barriers to student mobility and facilitating the admission of students from other universities. For example, we started new Bachelor and Master programmes in 2004 and in cooperation with other departments established several interdisciplinary Master programmes.

Our main Bachelor/Master programme leads to the Master in Electrical Engineering and Information Technology. The programme permits a specialisation in one of the following areas:

- communications,
- micro and optoelectronics,
- computers and networks,
- systems and control,
- electrical power systems and mechatronics.

We also offer the following interdisciplinary Master programmes. In collaboration with the Department of Mechanical and Process Engineering:
- Biomedical Engineering,
- Energy Science and Technology,
- Micro- and Nanosystems,
- Robotics, Systems and Control.

In collaboration with the University of Zurich:
- Neural Systems and Computation (from autumn 2012)

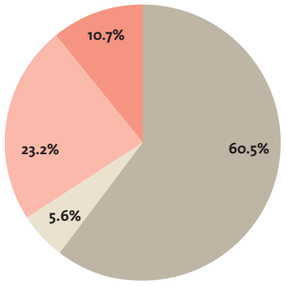
While the Bachelor courses are taught in German, all courses at the Master level are taught in English. In the Master programmes, every student is supported by a professor (‘tutor‘) who assists the student in the selection of her or his courses. The Master programmes are also the preferred path towards our doctoral programme for students, who have obtained Bachelor degrees from outside ETH.

Each year, over 300 doctoral students are active in groundbreaking research at D-ITET. Doctoral studies take about three to four years (beyond the Master degree) and result in a thesis with a definite scientific contribution on an international level. Doctoral students are individually supervised by a professor, and they typically hold paid positions with one of the research laboratories of the department.

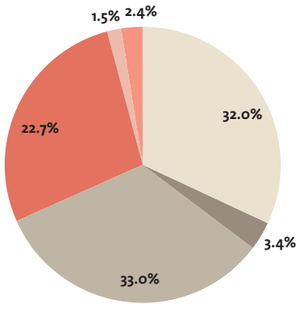
In 2011 D-ITET established a continuing-education programme for engineers with an academic Master degree and professional experience. Upon completion they are awarded a Diploma of Advanced Studies (DAS) in Information Technology and Electrical Engineering.

# Facts & figures

| Statistics | 2000 | 2005 | 2010 | Percentage international |
|---|---|---|---|---|
| **Students** | **775** | **942** | **951** | **30.2%** |
| Bachelor students | – | 605 | 547 | 21.8% |
| Master students | – | 283 | 365 | 38.1% |
| Diploma students | 745 | 36 | 12 | 16.7% |
| Guest students, post-graduate students | 30 | 18 | 27 | 100.0% |
| **Doctoral students** | **224** | **318** | **345** | **66.1%** |
| **Professors** (FTE) | **25** | **23** | **27** | **66.7%** |
| Full professors | 21 | 18 | 22 | 68.2% |
| Assistant professors (incl. tenure track) | 4 | 5 | 5 | 60.0% |
| **Personnel** (FTE) | **387** | **442** | **441** | **56.7%** |
| Scientific staff | 327 | 365 | 368 | 63.6% |
| Technical, IT and administrative staff | 60 | 77 | 73 | 21.9% |




| Funding (MCHF) | 60.7 |
|---|---|
| Federal governmental base funding | 36.7 |
| Additional federal governmental funding | 3.4 |
| Second-party funding (obtained competitively from federal sources or from EU) | 14.1 |
| Third-party funding (from private sources) | 6.5 |




| Origin of second- and third-party funding (MCHF) | 20.6 |
|---|---|
| National organisations | 6.6 |
| Research contracts from federal offices | 0.7 |
| European research programmes (framework programmes) | 6.8 |
| Partnerships with business | 5.7 |
| Endowments and legacies | 0.3 |
| Other third-party funding | 0.5 |



# Departmental institutions

**In addition to its research laboratories D-ITET also runs a number of departmental services including an IT Support Group, a Microelectronic Design Centre and a mechanical workshop.**

**IT Support Group**
The support group enables efficient use of the IT infrastructure. Services are offered in the areas of system administration (MacOS, Linux, Solaris, Windows), information and IT security, software development (e.g. database and web applications), web design and the hosting of internet services.

**Microelectronics Design Centre**
The Microelectronics Design Centre provides microelectronic circuit design (VLSI chips and ASICs) and printed circuit board design (PCBs) services for the D-ITET laboratories. To that end, the Design Centre operates a vast array of commercial electronic design automation (EDA) software packages.

**Mechanical workshop**
The D-ITET workshop is equipped with the latest computer automated machines, and employs highly skilled machinists who manufacture parts, experimental setups, and prototypes for the research laboratories.

**Imprint**

Please refer to our homepage for further information.
**www.ee.ethz.ch**

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Department of Information Technology
and Electrical Engineering

ETH Zurich is located in the city centre
and at Hönggerberg.
D-ITET is mainly situated in the centre.