

UNIVERSITY OF ZAGREB
FACULTY OF ELECTRICAL ENGINEERING
AND COMPUTING

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Dean's preface



In the year 2009, we celebrate 90 years of electrical engineering education in Croatia, which started in 1919 with the Electrical engineering department within the Technical faculty of the University of Zagreb.

A lot has changed since then. Governments, regimes, country names: Kingdom of Serbs, Croats and Slovenes, Kingdom of Yugoslavia, Federal People's Republic of Yugoslavia, Socialist Federal Republic of Yugoslavia, Republic of Croatia. Our institution changed names too: Electrical engineering department in 1919, Faculty of electrical engineering in 1956, Faculty of electrical engineering and computing in 1994, but it has never changed its aim towards excellence.

Always independent of the politics, even in the most turbulent times, we have been able to attract brightest and most capable students in the region and graduate more than 15000 engineers who were constantly highly appreciated at all labour markets, foreign and domestic. The regional leading role of our Faculty in the research and education in the fields of electrical engineering and later in computing and information and communication technology, has remained undisputed throughout almost a century.

Keeping pace with ever-changing state of technology, in the area of science which was progressing like no other, particularly throughout recent decades, the Faculty has been adopting and enhancing itself, for the benefit of our students, faculty, staff and community, making a major contribution to the economic, social and cultural life of our city and the region.

At all times ahead of the others, sometimes too avant-garde for the rest of the regional academic community, we have been persistently but gradually reforming an archaic higher education system.

I am highly confident that, in the countless years to come, the Faculty of electrical engineering and computing will continue to advance and adapt, changing only to the better. This will require a considerable effort of all the involved, but, being aware of the devotion of our employees and students to our institution, I have no doubt that they will do their best.

This Progress Report in front of you is slightly different from the previous versions. They used to include complete lists of publications which scientists of our Faculty had published during the previous two years. Now, this list has simply become too long, and therefore it is included on an accompanying disk. Even without that list, limiting ourselves to the most basic facts, we have not been able to reduce the size under hundred pages. This sole fact can give you an idea about the size and complexity of our institution.

I hope that you would enjoy browsing through this publication.

Prof. Vedran Mornar, PhD
Dean

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1. General Information



Faculty of Electrical Engineering and Computing

By the decision of the Parliament of the People's Republic of Croatia, on 26 April 1956, the former College of Engineering of the University of Zagreb was divided into four new faculties, one of them becoming the

***Faculty of Electrical Engineering,
which started its independent existence
on July 1, 1956.***

This was the start of the third, modern stage in the development of electrical engineering in Croatia, characterised by a turbulent development in electronics, electrical power engineering, electrical industry plants, automation, communications and computing.

The Faculty of Electrical Engineering (ETF - Elektrotehnicki fakultet, in Croatian) existed under this name until 7 February 1995 when it was renamed the

***Faculty of Electrical Engineering
and Computing***

Under its new name the Faculty of Electrical Engineering and Computing (FER - Fakultet elektrotehnike i računarstva, in Croatian) continued its development with a commitment to the permanent improvement of its curriculum.

The Faculty buildings "A", "B" and "C" at the present location (Unska 3, Zagreb) were completed and Faculty of Electrical Engineering and Computing equipped in 1963. With the support of the industry and government a new building ("D") was built and inaugurated in 1989 and today the Faculty offers substantial educational and R&D facilities including 35 lecture halls, more than 60 laboratories, Congress centre, tele-conference centre, faculty library and 12 department libraries, student restaurant, sport and recreation facilities on 43308 m².

The Faculty is organised in 12 departments which represent the focal points of education, research and development in various fields:



Teleconference room



Black hall

Department of Applied Physics (established in 1945)

Department of Applied Mathematics (1919)

Department of Applied Computing (2005)

Department of Electrical Engineering Fundamentals and Measurements (1924)

Department of Electric Machines, Drives and Automation (1925)

Department of Power Systems (1934)

Department of Telecommunications (1951)

Department of Electronic Systems and Information Processing (1942)

Department of Control and Computer Engineering (1954)

Department of Electroacoustics (1954)

Department of Electronics, Microelectronics, Computer and Intelligent Systems (1943)

Department of Wireless Communications (1954)

The present research and educational staff comprises more than 135 professors and 220 teaching and research assistants.

In the last few decades research and development at the Faculty has been carried out through projects promoted and funded by the Croatian Ministry of Science, Education and Sports in the fields of Applied Physics and Mathematics and in the fields of Electrical Engineering and Computing. With 19 approved scientific programmes and 74 approved scientific projects in 2007 the Faculty represents the leading institution in the fields of Electrical Engineering and Computing in Croatia. Additionally, researchers of the Faculty are currently leaders of 2 technological and 3 information projects for the Ministry, as well as the leaders of a number of industrial projects and projects with other partners.

Determined to remain a respectable research institution, FER undertakes scientific research at the highest levels of international standing. The Faculty has developed valuable international cooperation with many research institutions around the world, either directly or through inter-university cooperation. The number of international projects in the academic years 2007/2008 and 2008/2009 reached 47 projects, 11 of which are FP6 projects and 5 FP7 projects, which makes Faculty of Electrical Engineering and Computing one of the most internationally active institutions in Croatia.

Nowadays, FER counts around 4300 students at the bachelor level, 600 students at the old Dipl.-Ing. Level and 470 PhD students. All those numbers clearly emphasize our highly spirited activities in teaching and research.

Research staff of the Faculty of Electrical Engineering and Computing

Professors and lecturers	
Full professors	58
Associate professors	41
Assistant professors	42
Assistants	30
Junior researchers	151
Researchers	66



**Aula**

Finally, as an endorsement of the teaching and research excellence, FER has obtained the accreditation for the bachelor and master study programs from the ASIIN agency (Akkreditierungsagentur für Studiengänge der Ingenieurwissenschaften, der Informatik, der

Naturwissenschaften und der Mathematik). The accreditation was issued on the 23 March 2006 and 23 March 2007 by a decision of the Accreditation Commission and is valid until the 30 September 2011.

**Management and administration**

2. Historical Overview



The first building of the Technical College

When the University of Zagreb was reorganised in 1874 to become the first modern university in Croatia, it offered only the humanistic trivium of the Faculty of Law, the Theological College and the Faculty of Arts and Letters. However, documents show that in the wake of the momentous scientific discoveries

at the end of the 19th century, its reformers had already made provision for the future establishment of faculties of natural sciences, engineering and other related disciplines.

Although the Academy traditionally promoted mainly arts and sciences, a strong technical culture and tradition developed alongside, particularly electrical engineering. Zagreb established its first telegraph connection with Vienna as early as 1850, when, on September 28, the first telegram was sent from Vienna to Zagreb by Josip Jelacic, the Civil Governor of Croatia, Slavonia and Dalmatia; in 1875, a major scientific book was printed in Zagreb: *Betriebsstörungen oberirdischer Telegraphen-Leitungen, deren Aufsuchung und Behebung*, by Ferdinand Kovacevic, a pioneer and the first Croatian designer in the field of telegraphy; the first exchange in Zagreb was set up by Wilim Schwarz in 1886 and the first telephone was introduced in 1887; near the city of Šibenik, on the river Krka, on the beautiful waterfalls of Skradinski buk the hydro-power plant "Krka" was put in operation on August 28, 1895 (power generator 320 kVA, frequency 42 Hz), together with a polyphase transmission system (a 3 kV transmission line, 11



The building in Vukotinovićeve street where some departments were located from 1947 to 1963



Bronze bust of Prof. Lončar, one of the founders of the Faculty of Electrical Engineering and Computing.

km long) to supply the city of Šibenik with electrical power
-the first system of this kind in Croatia.

Zagreb was the cradle of the study of electrical engineering and electro technical sciences in Croatia: the first electric bulbs were described by Bogoslav Šulek in 1880, and the book *On Magnetism and Electricity* by Oton Kucera was published in 1891 by the Cultural Society of Croatia (Matica hrvatska). The Society of Engineers and Architects of Croatia and Slavonia, at their Annual Assembly held on February 21, 1898, proposed to establish a Technical College with an Engineering Department in Zagreb. In 1910, Dr. Juraj Žerjavić, the abbot and parson of Marija Bistrica established by a deed of donation a foundation for the establishment and maintenance of the College of Engineering at the University of Zagreb and a year later, the Civil Governor of Croatia, Slavonia and Dalmatia, Dr. Nikola Tomašić, carried out a poll which resulted in the decision to set up a Technical College. At the beginning of the 20th century, the Cultural Society of Croatia published quite a number of books dedicated to the application of natural sciences (electrical engineering), under the common title *Modern Time Inventions*, in which Oton Kucera, Stanko Plivelic and

Juraj Božicević dedicated large chapters to electrical generators, motors, electric vehicles, electric energy transmission and accumulators. At that time, the Hon. Marcel Kiepac, Križevčanin, became known by his patents -the use of the dynamo for illumination (Paris, 1911) and an electric device for remote compass indication (London, 1911).

The Technical College was founded by the decree of the State Commissioners' Council on December 10, 1918 and accepted its first students on October 1, 1919.

Among other departments, the College also had the Department of Electrical Engineering. On March 31, 1926 the Technical College was renamed the College of Engineering. The newly founded College started work on the 1st of April of the same year. In that year, the University Senate awarded an honorary Ph.D. degree to Nikola Tesla (the inventor of several hundred patents in the field of electromagnetism, polyphase alternating current, high-frequency radio and wireless communications). The first radio broadcast station in Croatia and southeastern Europe was constructed in Zagreb already in 1926 (the first radio broadcast was on May 15, 1926), only 6 years after the beginning of radio-diffusion in America. One of its initiators was young Dr. Josip Lončar, who worked together with Oton Kucera and Miroslav Plohl. In 1927, Josip Lončar published his first book under the title *Construction of Receiving Radio Stations, Part 1* (1927) and *Part 2* (1929), where he elaborated the field of radiophony, combining scientific discourse with a popular approach and which promoted him as a pioneer of radiophony in Croatia.

In the thirties, the study of electrical engineering was registered under the name of the Department of Electrical and Mechanical Engineering and at that time all the fundamental electrical engineering subjects were lectured by Josip Lončar, part-time assistant professor (*Elements of Electrical Engineering, Electrical Measurements and Introduction to Radio*). All other electrical engineering subjects for obtaining a university degree in engineering were lectured by Miroslav Plohl (*High-Voltage Techniques, Transmission and Distribution of Electric Energy, Accumulators*). The first steps in laboratory and research work were done in the Department of Electrical Engineering, established in the academic year 1928/29 and situated in a separately constructed building, behind the central building on nowadays Roosevelt Square. The founder of the Department and its first Head was Miroslav Plohl, who was appointed full professor in the same academic year. When Jure Horvat joined the College of Engineering, the subject *Power Engineering* was introduced, followed by *Electric Energy Production* in the academic year 1933/34, by *Transient Processes in Electrical Devices* in the academic year 1935/36 and,

for the first time, by Low-Voltage Current (lecturer M. Plohl) in the academic year 1936/37. After the tragic death of professor Plohl in late 1939, Anton Dolenc took over the duty of part-time lecturer in the subjects High-Voltage Techniques and Theory and Manufacturing of Electric Machines and Transformers.

From the very beginning to the 2nd World War, the whole burden of teaching and scientific work in the field was carried by professors Loncar, Plohl and Horvat. Teaching and research work was organised within the Laboratory of Electrical Measurements founded in 1924, which in the academic year 1936/37 became the Laboratory of Electrical Engineering Fundamentals, and three institutes:

- Department of Electrical Engineering,
- Department of High Voltage (founded in the academic year 1934/35),
- Department of Low-Current Techniques (founded in the academic year 1938/39).

In the Laboratory of Electrical Engineering Fundamentals, professor Loncar (in the academic year 1934/35 appointed assistant professor and in the academic year 1937/38 full professor), thanks to his extraordinary persistence and interest, collected a considerable number of precise devices and instruments, which helped with scientific work and were also used for laboratory exercises by students. In such an environment, electrical engineers were educated according to world standards and did not lag behind their colleagues in other countries.

Zagreb soon became known by its international events in the field of electrical engineering. In 1930, Professor Loncar was the first to make the reception of television pictures from London possible in Zagreb. In the same year, he wrote about it in the London Television and the Berlin Fernsehen magazines. As the author of the book About Modern Television, published in Zagreb in 1937, professor Loncar is considered a pioneer of television in Croatia. The first TV-broadcast in Zagreb and Croatia took place in 1939, when there were only two TV-stations in Europe: London and Berlin - the first television station in general having been installed in London in 1936. Also, Josip Sliškovic, a world known



The building in Savska street 16 where the Dean's Office and three departments of the Faculty of Electrical Engineering were located from 1959 to 1963.

designer of radio and TV-receivers, made possible the first test reception of a London television broadcast in Vienna in 1930.

After the 2nd World War, the Council of the College of Engineering (all departments) comprised 14 full and associate professors, among whom Dr. Josip Loncar, also a full professor. Other lecturers were suspended or their appointments were annulled, because they had been appointed during the war. The Section of Electrical Engineering of the Department of Mechanical Engineering was consequently left with only a few lecturers, and everything had to start again from the very beginning at a time when a large number of students entered University and when the need of the country for engineers was rapidly increasing. Lecturers of other departments held general subjects and mechanical engineering subjects for students of electrical engineering. In that period enormous results were achieved in lecturing and scientific work, particularly in the development of electrical and radio industry.

The first electrical engineer graduated in the academic year 1927/28 and from that time up to the establishment of the Faculty of Electrical Engineering in 1956 a total of 750 electrical engineers graduated from the University of Zagreb.

3. Study programs at Faculty of Electrical Engineering and Computing

STUDY PROGRAM SCHEME

First cycle study programs	1	Study programs: <ul style="list-style-type: none"> • Electrical Engineering and Information Technology • Computing <i>(common 1st year for both study programs)</i>		
	2	Study program: Electrical Engineering and Information Technology		Study program: Computing
	3	Specializations: <ul style="list-style-type: none"> • Wireless Communications • Electronics • Electronic and Computer Engineering • Control Engineering and Automation • Electrical Power Engineering 		Specializations: <ul style="list-style-type: none"> • Software Engineering • Computer Engineering • Telecommunication and Informatics • Computer Science • Information Processing and Multimedia Systems
Second cycle study programs	4	Study program: Electrical Engineering and Information Technology Profiles: <ul style="list-style-type: none"> • Control Engineering and Automation • Electrical Engineering Systems and Technology • Electrical Power Engineering • Electronic and Computer Engineering • Electronics 	Study program: Information and Communication Technology Profiles <ul style="list-style-type: none"> • Information Processing • Telecommunications and Informatics • Wireless Technologies 	Study program: Computing Profiles: <ul style="list-style-type: none"> • Software Engineering and Information Systems • Computer Engineering • Computer Science
	5			
Postgraduate study programs	6	Postgraduate PhD study programs Fields and branches:		Specialist study Transformers
	7	Electrical Engineering <ul style="list-style-type: none"> • Automatic Control • Electrical Measurements and Measurement Techniques • Electronics • Electric Machines • Electric Power Engineering • Radiocommunications • Telecommunications and Information Technology 		
	8	Computing		



The study of electrical engineering and information technology as well as the study of computing are classified into studies within the area of engineering sciences. These studies prepare experts and potential young scientists for important areas that have a dominant role in technological and social development. Nowadays, advances in engineering are not achieved only by ingenious inventions, but in most cases are a result of sustainable effort in research and development.

University of Zagreb, Faculty of Electrical Engineering has been offering the university curriculum in the area of electrical engineering for more than fifty years. Computing topics had been introduced into the curriculum by the development of computing and the faculty changed its name to the Faculty of Electrical Engineering and Computing in 1995. At the present time, all areas of electrical engineering are intertwined with information and communication technology as well as with computing.

3.1. First cycle study programs

Common objectives of two first cycle study programs are: to educate students for a broad range of professional careers, provide the basis for life-long learning, and prepare students for advanced studies at the graduate level.

All study programs at FER are taught according to the prerequisite system. For every study program, the set of mandatory and the set of elective courses are defined. The student can enrol all courses for which prerequisites have been completed, amounting to around 30 ECTS points per semester. The students are obliged to be present at all forms of teaching. One of the main goals of this study-program reform is the switch from teaching to learning, so the students will have around 20 lecture hours per week. All courses are graded through continuous assessment, consisting of homework, periodical tests, two mid-term exams and the final exam.

The first cycle study ends when all mandatory courses are completed and 180 ECTS points are collected. The work on the bachelor thesis, which must be publicly defended, contributes with 12 ECTS points.

The first year of study is common to both study programs, the study of Electrical engineering and information technology and the study of Computing. This first year gives the students the fundamental knowledge of mathematics, physics, electrical engineering and computing. Also, this first year teaches the student to communicate effectively and acquaints them with general principles of engineering. In the second year students broaden the knowledge in mathematics and electrical engineering or computing, but also introduces students to quality management and principles of economy. To emphasize individual work, they conduct and present a seminar.

In the third year, especially in the 6th semester, slight specializations are introduced by corresponding mandatory and elective courses, which give some practical knowledge for students who will not continue to the second level study. Some knowledge on ecology and law is also given. In the 5th semester, to increase project management and teamwork competences, they complete a project in groups of 6-8 students. The study finishes after the bachelor thesis is successfully completed and publicly defended.



First cycle study program - Electrical Engineering and Information Technology

Electrical Engineering covers the application of physical laws about electromagnetic phenomena in development of products and services that provide a benefit to the mankind. Information technology, which uses computers, computer networks, communication systems and technology to sense, process, store and display the information, today has a significant impact on electrical engineering. Nowadays, it is almost impossible to come across an activity within electrical engineering that is not interconnected with information technology. Thus, these areas have been joined into the first cycle study program of Electrical Engineering and Information Technology. This program develops the competencies to analyze and solve engineering problems of medium complexity, to work as an efficient member of a team, and to contribute to design of systems and processes in the area of electrical engineering and information technology. The fundamental knowledge of mathematics, physics, electrical engineering and information technology, backed up with usage of contemporary computer tools, is utilized.

Within the study program of Electrical Engineering and Information Technology, a student can slightly specialize in one among several offered specializations. This specialization is achieved by selecting appropriate group of courses during the third year of study.

Specialization in **Wireless Communications** is based on electromagnetism as essential wireless communication tool and on widely applied radio systems. Let's mention only the principal topics: electromagnetic wave properties, propagation, wireless communication phenomenon, basic communication system units, signal processing for communication purposes, mobile wireless systems (public and private), optical communication technologies, multimedia and radio navigation, and wireless systems applications.

Electronics encompasses analysis, design and implementation of electronic systems that contain electronic devices and electronic circuits. The students acquire theoretical and practical knowledge needed for modelling, simulation, design and production of electronic circuits and systems in the fields of microelectronics, radiofrequency and microwave electronics, power electronics, electroacoustics, audio electronics, biomedicine, electronic measurement and testing, as well as other areas in electronics.

Electronic and computer engineering prepares students for employment and advancement in development, design and realization of systems

based on analog and digital circuits, computers, systems on a chip and development of corresponding software. The program develops a knowledge base in electronic circuits, process monitoring and control, communications, instrumentation and intelligent systems. It comprises measurement of physical quantities, their conversion into electrical signals, analog and digital processing, application of embedded systems and networks for processing, storage, transmission, analysis and display of information. The emphasis of the program is in integration of multidisciplinary knowledge on circuits, algorithms and software in order to enable students to solve sophisticated problems in planning, management and control of research and development projects in modern enterprises, scientific organizations and services of a contemporary information society.

Control Engineering and Automation as multidisciplinary technological and engineering fields comprise the following knowledge: determination of requirements and criteria for control systems design related to flow of matter, energy and information; implementation of methods for information processing hardware and software for control and automation and data acquisition in the control and automation systems. Control Engineering and Automation systems; implementation of methods for system syllabus qualifies students for design, implementation analysis and design; design and implementation of and commissioning of the less complex systems in the following fields: process automation, automation of manufacturing plants; computer-controlled systems; electromechanical systems, and process measurements and actuators

Electrical Power Engineering is the branch of engineering science that studies the uses of electricity and the equipment for power generation and. Covers electric power system components, electricity consumption, generation (thermo, hydro, nuclear, renewable), transmission, distribution, electric utility operation, electric power system control, power system protection, power system reliability, government regulation, market operations, risk management etc.



**ELECTRICAL ENGINEERING AND INFORMATION TECHNOLOGY
STUDY PROGRAM SCHEME**

Semester	Course	ECTS points	Lecture hours per week	Lab hours per week
I	Mathematics 1	7	6	
	Fundamentals of Electrical Engineering	7	5	15
	Digital Logic	6	4	15
	Programming and Software Engineering	6	4	15
	Skills of Communication	3	2	
	Mathematica 1 20	1		20
		30	21	
II	Mathematics 2	7	6	
	Physics 1	6	5	15
	Algorithms and Data Structures	6	4	15
	Computer Architecture 1	6	4	15
	Management in Engineering	3	2	
	Autocad	2		30
		30	21	
III	Mathematics 3E	5	4	
	Physics 2	6	5	15
	Electronics 1	7	5	15
	Electrical Circuits	7	5	15
	Quality Management	3	2	
	Matlab	2		30
		30	21	
IV	Probability and Statistics	5	4	
	Signals and Systems	6	4	15
	Energy Technology	6	4	15
	Electromagnetic Fields	6	4	15
	Engineering Economics	4	3	
	Seminar	3	2	
		30	21	
V	Automatic Control	5	4	15
	Communication Systems	5	4	15
	Information Theory	4	3	15
	Specialization course	4	3	15
	Specialization course	4	3	15
	Sustainable Development and Environment	2	2	
	Project	6		15
		30	19	
VI	Specialization course	4	3	15
	Elective course	4	3	
	Elective course	4	3	
	Elective course	4	3	
	Commercial Law	2	2	
	BSc Thesis	12		
		30	14	

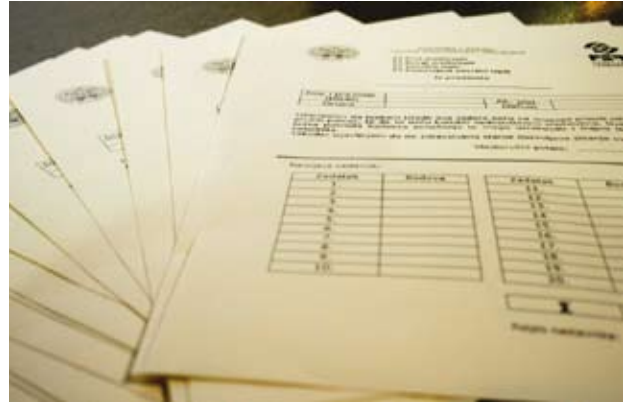
First cycle study program - Computing

The principal object of study in Computing is the computer as a universal data processing machine, together with the methods of its application in diverse areas. The holistic approach to hardware, software, and hardware-software dependencies is used. Computing encompasses the theory, methods of analysis and synthesis, design and construction, application and operation of computer systems. This first cycle study program develops the competencies to analyze and solve engineering problems of medium complexity, to work as an efficient member of a team, and to contribute to design of systems and processes in the area of computing. The fundamental knowledge of mathematics, physics and electrical engineering, backed up with usage of contemporary computer tools, is utilized. Within the study program of Computing, a student can slightly specialize in one among several offered specializations. This specialization is achieved by selecting appropriate group of courses during the third year of study.

Software Engineering curriculum combines theoretical knowledge with practical work and experience, developing professional competences in the field of programming, abstraction and conceptual skills in the field of computing.

It provides multidisciplinary knowledge in the field of information systems, computer science and management. Focused on application and management of information technology helping to approve efficiency of operations in different kind of businesses, it unites technological knowledge with organizational environments. The graduates can work in the field of information systems management, programming analysis, systems analysis, systems programming, system integration, user requirements analysis, e-business and information technology application.

Computer Engineering program embodies research, design and implementation of computers, computer systems and related software. It includes theory and practical aspects of the design and implementation of computers, computer based systems, mobile and embedded computers, communication systems and other systems that incorporate computers as well as software design with emphasis on applications that provide knowledge and understanding of the complete system. Computer engineering program provides system based approach to the design of computers and software as a whole. This program offers combination of core and advanced knowledge from both computing and electrical engineering required to understand, to design and to be able to envision future complex computers, computer based systems and applications running on those platforms.



Telecommunications and Informatics specialization provides knowledge and skills required for contribution to the design and implementation of networks, systems and services, especially identification, formulation and solution of intermediate engineering problems in the area of communication networks and information services. Besides general computing topics, information representation, logic and languages for specification and modelling are studied, as well as architecture of telecommunication networks and systems, and multimedia services. Elective courses cover concepts, techniques and tools related to local area networks, public mobile network, computer-telephony integration, network programming, basics of virtual environments and others, that will give qualifications and capabilities for development, production and usage of new information and communication technology.

Computer Science brings together scientific and engineering principles, theoretical analysis and computing experience to provide students with solid foundation of the discipline. The computer science module develops a high-level understanding of systems as a whole. This understanding encompasses an appreciation for the structure of computer systems and the processes involved in their construction and analysis. Students recognize many recurring themes such as abstraction, complexity, and evolutionary change and apply them to a broad range of applications as a team member in industry, utility sector and maintaining the skills as the field evolves. government institutions.

Students of computer science are capable to understand and apply essential concepts, principles and practices in the context of well-defined scenarios,

Information processing and Multimedia Systems - Information processing is an important ingredient of showing judgment in the selection and application modern multimedia systems. The study profile provides of tools and techniques. They also demonstrate the knowledge in hardware and software components for ability to work as an individual under guidance and processing, storage, coding, transfer, and analysis

COMPUTING STUDY PROGRAM SCHEME

Semester	Course	ECTS points	Lecture hours per week	Lab hours per week
I	Mathematics 1	7	6	
	Fundamentals of Electrical Engineering	7	5	15
	Digital Logic	6	4	15
	Programming and Software Engineering	6	4	15
	Skills of Communication	3	2	
	Mathematica 1	1		20
		30	21	
II	Mathematics 2	7	6	
	Physics 1	6	5	15
	Algorithms and Data Structures	6	4	15
	Computer Architecture 1	6	4	15
	Management in Engineering	3	2	
	Autocad	2		30
		30	21	
III	Mathematics 3C	5	4	
	Physics 2	6	5	15
	Electronics 1	7	5	15
	Operating Systems	7	5	15
	Quality Management	3	2	
	Matlab	2		30
		30	21	
IV	Probability and Statistics	5	4	
	Introduction to Theoretical Computer Science	6	4	15
	Signals and Systems	6	4	15
	Databases	6	4	15
	Engineering Economics	4	3	
	Seminar	3	2	
		30	21	
V	Software Design	8	4	30
	Communication Networks	4	3	15
	Information Theory	4	3	15
	Specialization course	4	3	15
	Sustainable Development and Environment	2	2	
	Software Project	8		
		30	15	
VI	Specialization course	4	3	15
	Specialization course	4	3	15
	Elective course	4	3	
	Elective course	4	3	
	Commercial Law	2	2	
	BSc Thesis	12		
		30	14	

of various types of multimedia information (signals, speech, data, images, and video). Information processing has applications in communication networks, mobile ubiquitous systems, man-machine interaction, multimedia, medical informatics, security systems, biometrics, bioinformatics, and other areas of modern information society.

3.2. Second cycle study programs

From the academic year 2008/2009 FER will offer three study programs at the master level. The study programs are:

- Electrical engineering and information technology
- Information and communication technology
- Computing

The common objectives of the three second cycle study programs are to educate students for a broad range of professional careers and provide the basis for life-long learning. Recognizing the changing professional environment that students will encounter, the programs aim to develop engineers who possess a strong foundation in mathematics, science and engineering and are able to link science and engineering principles to identify, formulate and solve complex engineering problems in professional practice and research and development contexts.

Upon enrolment, a student immediately chooses the study program and decides for a profile, which is a specialization within a chosen study program. All study programs at FER are taught according to the prerequisite system. For every profile, the following sets of courses are defined:

- Theoretical courses – the courses which comprise theory specific to one or more profiles (e.g. courses which could have the word theory in the title).
- Specialization courses – the courses which further specialise a student within a profile.
- Elective courses – all other courses in the fields of Electrical engineering, Information technology or Computing, or other fields within student's interest.
- Mathematics and science courses – courses offered at FER or other faculties within University of Zagreb, with mathematical and science content.
- Humanistic or social courses – courses offered at FER or other faculties within University of Zagreb, with humanistic or social content.

During the second cycle study program, a student must enrol at least:

- Theoretical courses – 25 ECTS points
- Specialization courses – 20 ECTS points
- Elective courses – 12 ECTS points
- Mathematics and science courses – 8 ECTS points
- Humanistic or social courses - 6 ECTS points

In addition, a student must enrol two laboratories, which give practical knowledge specific to the chosen profile. Further, a student must successfully complete a seminar, where all participating students prepare and present individual presentations. Finally, a project must be completed, where students, in groups of 6 to 8, increase their project management, collaboration and team competences.

At the end, a graduation thesis must be completed and defended, which contributes with 30 ECTS points.

All courses will be graded through continuous assessment, consisting of homework, periodical tests, two mid-term exams and the final exam. One of the main goals of this study-program reform is the switch from teaching to learning, so the students will have around 16 lecture hours per week. All courses can be taught in English. The second cycle study ends when all mandatory courses are completed and 120 ECTS points are collected.

Next table contains the recommended study scheme and the list of courses. The students can choose other paths through the study.

Second cycle study program - Electrical Engineering and Information Technology

Electrical engineering covers the application of physical laws about electromagnetic phenomena in development of products and services that provide a benefit to the mankind. Information technology, which uses computers, computer networks, communication systems and technology to sense, process, store and display the information, today has a significant impact on electrical engineering. Nowadays, it is almost impossible to come across an activity within electrical engineering that is not interconnected with information technology. Thus, these areas have been joined into the second cycle study program of Electrical engineering and information technology. This program enables a student to acquire the competencies to solve difficult engineering problems, to design complex systems, to act as a leader of a team and to conduct research and development in one of five profiles.

Within the study program, a student immediately decides for a profile. The profile determines the list of theoretical and specialization courses to choose from.

SECOND CYCLE STUDY PROGRAM SCHEME

Semester	Course	ECTS points	Lecture hours per week	Lab hours per week
VII	Theoretical course	5	3	
	Theoretical course	5	3	
	Theoretical course	5	3	
	Mathematics and science	4	3	
	Specialization course	4	2	
	Humanistic or social course	2	2	
	Laboratory of the profile, 1	5		60
		30	16	60
VIII	Theoretical course	5	3	
	Theoretical course	5	3	
	Mathematics and science	4	3	
	Specialization course	4	2	
	Specialization course	4	2	
	Humanistic or social course	2	2	
	Seminar	3	2	
Laboratory of the profile, 2	3		30	
		30	17	30
IX	Specialization course	4	2	
	Specialization course	4	2	
	Elective course	4	2	
	Elective course	4	2	
	Elective course	4	2	
	Humanistic or social course	2	2	
	Project	8		
		30	12	
X	Graduation thesis	30		
		30		

Control Engineering and Automation as a multidisciplinary scientific and technological field comprises the following knowledge: determination of requirements and criteria for control systems design related to flow of matter, energy and information; research, development and implementation of methods for information processing and data acquisition in the control systems; research, development and implementation of methods for the system analysis, the system design and the system optimization; development, design and implementation of hardware and software for computer control of systems; research, development and design of control algorithms for robots and robotized systems in industry, services and households.

Electrical Engineering Systems and Technology encompasses a wide area of electrical engineering closely related to the application of novel electrical

engineering and information technologies. The concept of the curriculum is based on a systematic approach to solving engineering and research tasks. The systematic approach comprises the knowledge and the achievements in electrotechnics, power electronics, digital technology, applied mechanics, electromechanical energy conversion, contemporary measurement techniques and means of transportation. The topics on electrical drives, mechatronic systems, modelling and construction of power electronics systems, design methodologies and diagnostics of electrical machines and devices, contemporary measurement systems, intelligent sensors and actuators are studied in detail. The multidisciplinary character of the profile includes the knowledge of applied computer systems for real-time operation, signal acquisition and processing, industrial communication networks, and system control via internet.

Electrical Power Engineering is a professional and scientific field of electrical engineering and power systems. It studies and promotes areas of power generation, transmission and distribution of electric energy as well as electric usage and energy management. By studying power systems engineering, students gain knowledge of fundamentals and applications of electrical power engineering in a wide range of topics: theory of power systems control; optimization methods applied to power systems; energy efficiency methods; reactive power control; electric facilities automation; reliability theory; expert systems; environmental protection; efficient use of energy and energy conservation; economic analysis; disturbances and transient phenomena in power systems; power system protection; 2 transmission and distribution networks network planning; development, stability, availability, reliability and operational safety of electric power system subsystems; mathematical modelling of power plants components and subsystems; deterministic and reliability analysis of operational safety; development modelling and analysis of environmental impact of electric power systems; establishment of open market environment, risk management and electrical energy trading; economy modelling, business and human resources management ,microeconomics, marketing, etc. Besides education, research is a crucial factor determining the power systems engineering progress with emphasis on the development of new power system technologies.

Electronic and Computer Engineering gives competences in development, design and implementation of electronic systems based on analog and digital circuits, computers and systems on chip, including software development. Application areas are electronic systems, measurement and instrumentation, process control, communication and intelligent systems. The profile covers measurement and acquisition of physical quantities, transform to electrical signals, analog and digital preprocessing, embedded system and networks for digital signal processing, transmission, analysis, storage and display of data. It gives strong emphasis on integration of multidisciplinary knowledge, as well as hardware,



algorithms and software design to achieve complete solutions in a wide spectrum of applications.

Electronics deals with electronic devices and electronic circuits as the basic components of electronic products that are used in all areas of human activities, thereby having a very pronounced position in the modern society. The students in the Electronics study profile acquire theoretical and practical knowledge needed for the analysis, modelling, simulation, design and production of electronic circuits and systems. The students obtain the knowledge in the field of micro- and nanoelectronics, radiofrequency and microwave electronics, optoelectronics, power electronics, audio-electronics, electroacoustics, architectural acoustics, ultrasound, biomedicine, electronic measurement and testing, as well as other areas in electronics.

Second cycle study program - Information and Communication Technology

Information and communication technology enables the transfer and utilization of all kinds of information, therefore presenting the most penetrating contemporary generic technology. As such, it is the foundation of economy and society in the 21st century. This technology generates changes in all spheres of the society. It is applicable in all branches of economy and all areas of science, and it is the background for successful entrepreneurship, as well as for all social and governmental structures. This second cycle study program enables a student to acquire the competencies to solve difficult engineering problems, to design complex systems, to act as a leader of a team and to conduct research and development in one of three profiles. Within the study program, a student immediately decides for a profile. The profile determines the list of theoretical and specialization courses to choose from.

Information processing (IP) is an important ingredient of modern information and communication systems. IP study profile includes hardware and software components for processing, storage, coding, transfer, and analysis of various types of information (signals, speech, data, images, video). Students gain knowledge in theory and applications of communications, compression techniques, information security, and real-time signal processing. Information processing has applications in communication networks, mobile ubiquitous systems, man-machine interaction, multimedia, medical informatics, security systems, biometrics, bioinformatics, and other areas of modern information society. IP study profile opens carrier paths into a wide spectrum of IT companies, industrial sector, financial and service sector, and any other area where there is a need for processing, analysis, and transfer of information. Skills include design and

development of algorithms, hardware and software systems, system testing, integration, and consulting.

Telecommunications and Informatics is based on information theory and information network theory, as well as switching algebra and automata theory. It is focused on the analysis and synthesis of multimedia information and communication in networks, as well as design and implementation of various communication systems and services. Models of local, access, and core networks are studied, including multi-service, intelligent, broadband networks and Internet, as well as planning and optimization of networks and information flows, and network management. Information transmission and routing, including photonic technology are studied, as well as information and communication services, manageable, and testable systems and networks structures with adequate performance. Knowledge is acquired in the areas of distributed systems, programming, specification and modelling languages, data processing and management in networked systems, telematic services, e-business, and systems with learning capability. Related to that communication protocols, multimedia communications, virtual reality and virtual environments, mobility in networks, mobile networks and software agents are studied. Software engineering is focused on telecommunication systems, while project management as well as research and development management are oriented towards telecom market. Acquired competencies are suitable for, but not limited to the following employment opportunities and positions: research and development of software products for networks and services in telecommunication industry; planning, implementation, testing and management of public fixed and mobile telecommunication networks, Internet and related services; design and operation of corporate and private networks and associated information systems and e-business systems with information rich contents; fundamental and applied research and high education.

Wireless Technologies comprise the scientific and professional area related to the principles of electromagnetic waves generation, transmission, propagation and reception in the area of radio- and optical frequencies; devices and software characteristics and design for the above mentioned purposes; wireless and optical networks and systems architecture which apply the methods of sound, picture and data processing and transmission; electromagnetic compatibility; wireless networks and systems planning and design (mobile communication networks, optical networks, broadcasting systems, terrestrial and satellite communication systems, wireless access, metropolitan, local networks, navigation and radar systems. Students are educated to work in the telecommunication industry, with public

mobile wireless networks operators, broadcasting companies, transmitting and communications service providers, companies with private networks, small and medium enterprise companies which design, install and maintain wireless systems, with government administration on frequency planning, regulations and radio spectrum monitoring, in education and research.

Second cycle study program - Computing

The principal object of study in Computing is the computer as a universal data processing machine, together with the methods of its application in diverse areas. The holistic approach to hardware, software, and hardware-software dependencies is used. Computing encompasses the theory, methods of analysis and synthesis, design and construction, application and operation of computer systems. This second cycle study program enables a student to acquire the competencies to solve difficult engineering problems, to design complex systems, to act as a leader of a team and to conduct research and development in one of three profiles. Within the study program Computing, a student immediately decides for a profile. The profile determines the list of theoretical and specialization courses to choose from.

Software Engineering and Information Systems is a profile where the software development is studied in a systematic, controllable and efficient way. The program focuses on the analysis and evaluation, specification, design and development of software products. Students will learn about project management, quality assurance processes and standardization. They will be encouraged to work in teams and to express their creativity. Information systems are focused on using computer hardware, communication and software technology to fulfil the needs of information and to advance almost every aspect of human activities. Technical, mathematical and other interdisciplinary knowledge is applied to analysis and restructuring of systems that include a human being as a user and a key subject. Such systems might be business systems, production or governmental systems. Complex software systems are designed, developed and implemented to serve as the basis of all the activities within the enterprises and to enhance their competitiveness.

Computer Engineering program embodies research, design and implementation of computers, computer systems and related software. It includes in-depth knowledge of theory and practical aspects of the design and implementation of computers, computer based systems, mobile and embedded devices/computers, communication systems and other systems that

incorporate computers as well as software design with emphasis on applications that require knowledge of the complete system. Computer engineering program provides system based approach to the design of computers, communication system and software as a whole. This program offers core, advanced and forefront knowledge required to creatively envision, conceptualize and design innovative, from simple to complex computers, computer based systems and applications running on those platforms.

Computer Science is the study of computers and algorithmic processes, including their principles, their hardware and software designs, their applications, and their impact on society. Computer science has scientific and mathematical, as well as practical, dimensions integrated into a distinct program study. Understanding of this integration transcends the implementation details of various components to encompass an appreciation for the complex structure of computer systems and their predictive behaviour. Computer science gives student competences for the most challenging tasks, from the infrastructural system programming to new application domains, as well as practical skills needed by the potential leaders of a group of programmers guiding them towards the most advanced problem solving paradigms.

3.3. Postgraduate study programs

Postgraduate studies at the Faculty of Electrical Engineering and Computing are organized as doctoral study and specialist studies.

Postgraduate doctoral study leads to PhD academic degree in the scientific field of Electrical Engineering and the scientific field of Computing. The study is open to applicants who have completed undergraduate study (dipl.ing.) or Master of Science study at the Faculty of Electrical Engineering and Computing, or other electrical engineering and/or computing studies, with excellent or very good marks. The field and branch of undergraduate study do not limit these applicants in choosing the field of postgraduate study. Applicants will be expected to acquire additional knowledge on their own, if necessary.

Applicants who have graduated at another relevant study with excellent or very good marks will be required to pass differential exams. Other university undergraduate studies relevant for admission to the postgraduate doctoral study are mathematics, physics and informatics.

Every applicant designs his/her programme of study by choosing the number of courses as



determined by the postgraduate study plan. The mentor appointed to student should endorse the student's selection of courses. The final choice of courses and the appointment of mentor is approved by the Faculty Council. To obtain PhD, the student must collect altogether 480 ECTS credits (including credits from previous high education) by publishing research results, and enrolling courses and passing examination. The students completes postgraduate study by preparing and defending PhD thesis.

By the academic year 2008/2009, 2102 candidates were awarded the Master of Science degree and 633 were awarded the Doctor of Science degree. The actual doctoral study program has been started in the year 2005/2006. Former Master of Science study that has been closed in the academic year 2004/2005, is in the academic year 2008/2009 replaced by the new second cycle study programs leading to the Master degree.

In the academic year 2006/2007 postgraduate specialist study in Transformers has been introduced. The essential of this study is the education of specialists for transformer production and usage in order to improve research, development, design, production and usage of transformers by inclusion of latest findings from different transformer-related areas.

Number of postgraduate students by academic year

	2007/2008	2008/2009
PhD students	133	117
PhD degree awarded	27	31
MSc degree awarded	50	37
Specialist study in Transformers	-	25

4. Student Activities

IEEE

The IEEE is a non-profit organization and the world's leading professional association for the advancement of technology. The IEEE name was originally an acronym for the Institute of Electrical and Electronics Engineers, Inc. Today, the organization's scope of interest has expanded into so many related fields, that it is simply referred to by the letters I-E-E-E (pronounced Eye-triple-E). In 2009, IEEE celebrated its 125th Anniversary. To foster an interest in the engineering profession, the IEEE also serves student members in colleges and universities around the world.

The IEEE has:

- more than 385,000 members, including 80,000 students, in over 160 countries,
- over 330 sections in ten geographic regions worldwide,
- about 1,900 chapters that unite local members with similar technical interests,
- more than 1,800 student branches at colleges and universities in 80 countries,
- 45 societies and technical councils representing the wide range of technical interests,
- more than 900 conferences worldwide each year,
- about 900 active IEEE standards and more than 400 in development.

IEEE Student Branch in the University of Zagreb was founded in 1994 at the Faculty of Electrical Engineering and Computing. Currently it counts over 200 members. Student Branch office is located in basement of Faculty's C building.

Following IEEE's goal to advance global prosperity by fostering technological innovation, IEEE Student Branch Zagreb finds its mission to create a consciousness about possibilities in making careers in technology. IEEE SB Zagreb is taking various activities to assure metamorphosis of a student into a qualified expert with a promising career.

Becoming a member, student gets combination of various resources for work, and an opportunity to network with colleagues and at the same time acquiring skills to participate on knowledge market.

Students are being profiled as superior individuals with experience on different projects. We provide this seemingly small but significant advantage which can be major turnover in achieving personal goals.

One of the prime goals of the IEEE Student Branch Zagreb is creating and promoting a professional environment among students of electrical engineering, electronics, computer science and information science and nurturing friendships among students of these technical sectors. The Branch serves as a communication channel among students and employees at the University of Zagreb, and provides information vital to the future career of the student. The Branch promotes linking with the world of professional technology within and outside institutions in which they are studying.

Since we are not a student association in the common sense of the word, but one of almost 2.000 branches which our colleagues make stronger every day, on every continent of the world, we can say we are really promoting the global community of knowledge. Student Branch Zagreb has close and friendly relationships with many student branches around Europe and even some common projects. To see what we have done so far, we are inviting you to visit www.fer.hr/ieee. A short list of successfully completed projects is provided hereafter:

- numerous lectures (Thesis dos and donts, 20 years of Chernobyl, Nikola Tesla...),
- participants at the Student Branch Congress of IEEE Region 8 in Paris and London,
- forming of energy, computer and communication chapter within the Branch,
- started a tradition of movie nights (scientific movies),
- participation in the 24h global programming challenge IEEEExtreme each year,
- completed work on the joint web of Section,





GOLD and other student branches in Croatia,

- actively helping IEEE Croatia section in numerous activities.

SRK

SRK -Studentski racunarski klub (eng. Student Computer Club) is a student organization which was founded more than ten years ago (on June 9th 1995) by group of student enthusiasts. Although computer science has changed dramatically over the years, SRK's programs and goals remained the same - promoting computer science, Unix-like operating systems, open source software, and student collaboration on various projects. Its main server "fly.srk.fer.hr" hosts all member accounts (almost 2500 of them) and most of services. SRK is open to all FER students, which become members by enlisting for a shell account on server.

SS FER

SS FER is a voluntary student union consisting mainly of students from the Faculty of Electrical Engineering and Computing, Zagreb, and its goal is organizing students' free time in a creative and educational manner. During the past two years, SS FER was involved in many different projects, workshops and events for the student community.

We would like to point out two fairs called JobFair which we've organized in 2008. and 2009. The JobFair gave different companies an opportunity to present future career options for students who could write their CV-s and store them in the database allowing the employers to call them when ever new job positions would open up. Our mountaineering section organizes two trips for students and faculty employees per year. The first one is a mountaineering trip called Rally, and the second one is PowerTrip. PowerTrip is designed as a visit to Croatian power plants with the intent to familiarize the students with its inner workings and the technology behind it. We also organize the FER Freshmen Party each year, which plays an important part in the Zagreb cultural scene.

One of SS FERs main projects is the Club for Students of Electrotechnics (KSET). Members of this club work intensively on promoting underground and urban culture and have hosted different kinds of artists from many different areas, such as music, theatre and photography, from around the world as well as from Croatia. The club is mostly famous for its concert program with around 100 concerts per year and 30 disco listening sessions. Also, in the past couple of years the club has hosted an impressive amount of festivals and some of them are sponsored by the Ministry of Culture of Republic Croatia and Zagreb's Department for Culture.

SS FER also tries hard to provide students with some educational courses and workshops. Regarding sound management, the union organizes two courses annually: the Course on sound equipment and stage setup and Sound engineering workshop dealing with sound setup and operating the sound mixers.

Members of the photo section have also been organizing their photo course for years, since 2006., when the staff from the Faculty of Electrical Engineering and Computing recognized the quality of their work and turned the course into a class offered to FER's students. Two classes are held: Basics of analog and digital photography, and Applied photography basics. Both classes have theoretical and applied lectures. In the end students prepare their own exhibition that's held in KSET gallery. The biggest project photo section has been working on for the past two years is called Monography. It's goal is to introduce the public to the Union's work.

The computer section is also involved with different kinds of courses whose goals are to familiarize students with rarely used technologies, and to give them practical knowledge from the field of computers and networks. In 2008 the section held Basics of Java programming language workshop. The Install Fest is an event where a Linux operating system is installed in a step by step manner to show the participants how to do it properly, and it has been organized in association with Ubuntu.hr and HULK. Also, one of the projects is maintaining the complete network and web system, so all members and interested parties can learn as much from these areas as they desire. Beside that, in 2009/2010 the section began preparing a class that is



to be held on the Faculty. It is called Advanced usage of the Linux operating system.

At the end of 2008, the theatre section was established. It's members have hosted three theatre shows and acted/directed one of their own called "You can't run away from Sunday" by Tena Štivičić.

Video section held Light and Script, directing, production and editing workshop. They created more than ten movies (some in association with Brojka production). Most of these films participated in movie festivals such as Days of Croatian film and Amateur film festival. We can proudly say that they received nine awards.

In conclusion we would just like to point out that we try as hard as possible to provide an entertaining, as well as an educational environment in science and art, and that any student interested in helping our cause is more than welcome to join.

SPORT ACTIVITIES

For the last two years, the students of the Faculty of Electrical Engineering and Computing have been highly successful at sport competitions at home and abroad.

In the seasons 2007/08 and 2008/09, FER has competed in 19 out of 20 sports whose championships are organized by the University of Zagreb. In this season FER sport teams have won 1st place at futsal, rifle shooting, swimming, and water polo championships. In the overall competition, FER took 2nd place. In the season 2008/09, FER sport teams have won 1st place at judo, squash, swimming, beach volleyball and bridge championships. In the overall competition, FER again took 2nd place.

At the prestigious 2008. Barcelona tournament EUSADE, among 26 different university teams, FER won 1st place in futsal. In 2009. the University of Zagreb team won 3rd place at the 6th European futsal championship in Montenegro. Half of the university team was made up of FER students.

The Croatian Academic Sport Association (CASA) SUBOS has been active at FER for nine years. CASA SUBOS is the largest student sports club in Croatia. Currently, there are around 1000 members. In this club students take part in 20 different sport and dance classes. Every year the club organizes several competitions and other sport events at both the university and national levels.

In 2009, SUBOS members won two medals at the European and World championships in jiu-jitsu. CASA SUBOS is one of the founders of the Zagreb University Sports Federation and takes part in the organization of the official sports championship of the University of Zagreb.



eSTUDENT

During academic years 2007./2008. and 2008./2009., similar to previous years, **eSTUDENT** continued its mission of providing students with additional practical and theoretical knowledge through various forms of extracurricular education. By forming a network of best students, connecting them with best employers in Croatia, **eSTUDENT** aims to develop students' leadership abilities and encourage them in taking the responsibilities thus helping them to become competitive in multinational, multicultural, global society.

The main goal of our projects was to provide students additional education, Interesting, interactive lectures and workshops which would in turn awaken their entrepreneurial spirit and teach them the basics of entrepreneurship.

Team for Lectures and Workshops has made many useful collaborations regarding students' interests.

The largest project is the participation in the organization of BarCamp, an informal conference and gathering of people interested in Web technology and Web business. During the last two years series of lectures and workshops have been organized at FER. Leading experts from Cisco, Iskon, MojPosao, CS Computer Systems etc. held several interesting lectures for future engineers. Also, there were several





so-called soft skills workshops organized together with Prospecta and Misliona, where students obtained an opportunity to develop their communication skills. All the lectures and workshops were well-attended by students. Particular strong interest was recorded in workshops developing communication skills that students usually don't adopt during regular schooling.

Web Start Contest

Web Start Contest (www.estudent.hr/wsc) is a student contest organized by **eSTUDENT** and sponsored by Microsoft Croatia. The focus of the contest is development of web startup projects, during which students, organized into teams, develop their web-based business idea and realize it using Microsoft web technologies. The education component of the contest is realized through business and technology skills workshops, as well as participation in Microsoft Innovation Accelerator for the best teams.

The contest has so far been organized two times. During those two contests, 15 presentations and workshops were organized. 150 contestants, organized into nearly 50 teams, participated. Web Start Contest will be held for the third time soon, during which we hope to offer contestants even more opportunities for gaining key competencies in web technology and the business side of the web, as well as an opportunity to develop their ideas and get assistance in its realization.



EESTEC LC Zagreb

EESTEC (Electrical engineering students' association) is a non-political, non-profit organization of and for Electrical Engineering and Computer Science (EECS) students at universities, institutes and technical schools in Europe awarding an engineering degree. EESTEC has more than 2000 members in 24 European countries.

The aim is to promote and develop international contacts and the exchange of ideas among the students of EECS. The association achieves its aim through improving technical knowledge of EECS students, introducing them to the industry and the educational system of other countries.

EESTEC LC (local committee) Zagreb was founded in 2007. Since then this LC has organized 3 main events:

"Krabactronic electronic" (2008) – international workshop on "Accelerated Embedded System Design using FPGA" for 20 European students and 10 students from University of Zagreb. During 7 days students had a chance to learn, have fun and to get to know with Zagreb and Croatia.

"Chupakraba Electrico" (May 2009) - international workshop for 23 students from Europe and 24 students from FER. There were 2 parts of event: academic part ("Robotics, a synergy of mechanics, electronics and software") which lasted for 4 days and fun part (trip to Plitvice lakes, town Varaždin, castle Trakošćan, visiting Technical museum and sightseeing of Zagreb).

"Training for trainers – T4T" (August 2009) – international workshop for 16 European students and 5 students from FER. Main subject of workshop was "Soft skills" and improvement of skills like: "Communication Skills", "Project management", "Team management", "Time management", "Fund raising", "Public relations", "Brainstorming and problem solving". Students had a chance to visit Rijeka and beautiful Croatian sea, Varaždin and Zagreb.

LC Zagreb also organized 2 motivation, team building weekends (hill Sljeme and Strmac).

For more information please visit <http://www.eestec-zg.hr/>.

BEST

Board of European Students of Technology (BEST) is a non profit and non political student organisation present in over 30 countries in Europe. Over 2000 members from more than 82 Local BEST Groups form an innovative, growing and powerful student network.



BEST Zagreb was founded in 1999 and has evolved into a recognized and well respected student organisation with a solid base of 50 members, from almost all technical faculties, and an alumnae network consisting of over 150 engineers.

Our goals include providing students with complementary education, helping them connect with their future employers as well as raising awareness on important educational issues. We strive to help students to become more internationally minded through academic and non academic courses held across Europe.

During this two years, BEST Zagreb has delivered over 10 projects and hosted more than 120 foreign students in Zagreb. In the same time we have enabled over 100 Croatian students to attend courses all over Europe.

We would like to point out some of our projects :

BEST Company Day - a one day job fair that gathers top companies in Croatia and local students with technical background. During this day, students can gain information on employment and internship opportunities and find out about the working environment, services and products of companies presented. Within this project we have worked on our student CV database that, now, has over 1000 CVs. So far, we have organised BEST Company Day on the Faculty of electrical engineering and computing, Faculty of mechanical engineering and

naval architecture and Faculty of food technology and biotechnology.

Summer course - academic course lasting from 7-14 days with 22 participants from all over Europe. Academic part covers a hot topic in engineering and is taught by local professors. We have organised two courses, one on biomedical electronics and the other on implementation of Bologna process. Apart from the academic part, participants were introduced to Croatian culture and natural heritage. Both courses were held at the Faculty of electrical engineering and computing.

Cultural exchange - a leisure event between two Local BEST Groups that get together with a goal of experiencing other culture, people and traditions. We have had our cultural exchange with Local BEST Group Reykjavik and we have spent an amazing week exploring natural wonders of Iceland. During their stay in Croatia we showed them our cultural and natural heritage such as Plitvice lakes and Motovun.

To sum up, we have been working hard on achieving our goal of forming a desirable employee through international activities and complementary education. We would like to thank everyone who has helped us along the way and promise that we will continue working hard in the years to come. Anyone willing to help us, is more than welcome to join us in our meetings!



5.1. Department of Applied Physics

Faculty and staff

▼ Professors

Tomislav Petković – experimental hypernuclear physics; philosophy and history of science

Dubravko Pevec – reactor physics, nuclear engineering

Vladimir Knapp – nuclear physics and engineering (retired distinguished professor)

Višnja Henč-Bartolić – atomic physics, lasers (retired by the 1st of June, 2004; engaged by the Project 036-0361566-1571)

▼ Associate professors

Dubravko Horvat – gravitation, cosmology and elementary particle structures and symmetries

Lahorija Bistričić – molecular and laser physics, spectroscopy of nanohybrid polymers

Mile Baće – nuclear engineering and non-conventional energy sources (retired by the 1st of October, 2008; engaged by the Project 036-0361590-1579)

Founded in 1945

Head of the department:
Prof. **Lahorija Bistričić**, PhD

Phone: +385 1 612 96 70
Fax: +385 1 612 96 05
E-mail: pf@fer.hr
URL: <http://www.zpf.fer.hr/>

▼ Assistant professors

Zoran Narančić – elementary particle structures and symmetries

Vesna Borjanović – experimental solid state physics; investigations of nanostructured materials (quantum dots, nanorods, hybrid materials)

▼ Assistants

Saša Ilijić
Vesna Mikšić Trontl
Sanda Pleslić
Danijela Grozdanić
Anja Marunović
Mario Matijević



▼ Researchers

Radomir Ječmenica
Krešimir Trontl

▼ Administrative staff

Snježana Božić
Ana Holjak

Educational activities

Lectures in general and modern physics: General physics and introduction to quantum mechanics. Electrical, optical, and magnetic properties of materials. Laser physics. Principles and applications of superconductivity. Introductory nuclear physics. Nuclear instrumentation and detectors for particles and radiation.

Lectures on the physical basis of new energy technologies. Selected topics in energy physics. Interactions and detection of nuclear radiation. Shielding and radiation protection. Nuclear fuel cycles and materials. Nuclear safety and regulation. New energy sources. Energy conversion and storage.

First cycle study

▼ Mandatore courses

- Physics I
- Physics II

▼ Elective courses

- Modern methods of physics for Electrical Engineering and Information Technology
- Computing methods of modern physics

Second cycle study

Core courses

- Physics of materials
- Laser physics



- Quantum computers
- Fundamentals of nuclear physics

▼ Specialization courses

- Nuclear fuel cycles and reactor materials
- Radiation effects and radiation protection

▼ Elective courses

- Renewable resources and advanced technology
- Fundamentals of energy storage

Postgraduate courses

- Foundations of superconductivity and its application
- Detectors and electronic instrumentation for particle physics
- Laser physics and electrooptics
- New energy sources
- Pulsed plasma physics with applications
- Quantum physics - selected topics
- Nuclear reactor theory
- Selected topics in nuclear physics and nuclear engineering
- Selected topics in semiconductor physics

Research and development

Gravitational physics: classical and quantum physics of gravitational field. Physics of compact structures: black holes, gravastars, neutron stars, quark and strange stars.

Advanced, inherently safe, small power nuclear reactor (IRIS); Optimal fuel management of the standard PWR reactor; advanced fuel cycles and long term nuclear energy strategies; Radiation shielding. Renewable energy resources and applications.

Spectroscopy of lambda-hypernuclei in the ($e, e'K^+$) reaction, by the coincidence experiment E01-015 (HKS – HES) conducted in Hall C at Jefferson Laboratory in the period of 2007 – 2009. A brand new high resolution kaon spectrometer (HKS) together with the 3rd generation electron spectrometer (HES) provide excitation missing mass spectra for selected targets, with energy resolution of approximately of 300 – 400 keV (FWHM). The experiment measured spectra of the exotic neutron rich lambda-hypernuclei with an enhanced population of states accessible by spin-flip channels, such as the ^7He , ^{12}B , ^{28}Al with a single lambda-particle in s- or p-shell of hypernucleus.

Study of structure and vibrational dynamics of molecular systems (crystals, polymer films, nanohybrids) with application in different fields such as



optoelectronics, shape-memory materials, conducting polymers and biotechnology.

Investigation of the new materials, with desired properties: nanostructured materials, quantum dots, nanorods, and hybrid materials. Characterization of the material with different experimental techniques and developing the device structures based on new nano-materials.

Properties of laser-produced plasma from Al, Mg, Si, Nb and Mo, Cu alloy have been investigated and compared. Plasma radiation produced by ablative capillary discharge has been investigated as a radiation source for extreme ultraviolet lithography. Polyvinylchloride with additives (Sn, Zn and C) and polyacetal were used as materials for capillary production. Optimisation of working conditions was also performed.

Study of structural and electronic properties of low dimensional systems: surfaces and ultra thin metallic films by scanning tunnelling microscopy (STM) and photoemission spectroscopy.

The investigation of structural changes occurring in thin amorphous silicon during thermal treatments by EPR, GIXRD and GISAXS.

▼ Projects

Classical and Quantum Theory of Nonlinear Fields and Structures (Project 036-0982930-3144, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Dubravko Horvat, 2007 -)

Fuel management of standard and advanced nuclear reactors (Project 036-0361590-1579, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Dubravko Pevec, 2007 -)

Macrocyclic Ligands, Structural Changes of Solutions and Molecular Spectroscopy (Project

0982904-2927, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Goran Baranović, Institute Rugjer Boskovic; Project collaborator: Lahorija Bistričić, 2007 -)

International links

Brookhaven National Laboratory (BNL), Upton, New York, USA

Gesellschaft für Reaktorsicherheit (GRS), Garching, Germany

International Atomic Energy Agency (IAEA), Vienna, Austria

International Centre for Theoretical Physics (ICTP), Trieste, Italy

Paul Scherrer Institute (PSI), Villigen, Switzerland

Rheinland Westfallische Technische Hochschule Aachen, Aachen, Germany

Ruhr-Universität, Institut für Experimentalphysik V, Bochum, Germany

Universität Stuttgart, Institut für Kernenergetik und Energiesysteme, Stuttgart, Germany

Thomas Jefferson National Accelerator Facility (TJNAF), Newport News, Virginia, USA

Institut Jožef Štefan (IJS), Ljubljana, Slovenia

East Carolina University (ECU), Greenville, North Carolina, USA

Dipartimento di Lingue e Civiltà dell'Europa centro-orientale, Università degli studi di Udine, Udine, Italia

Tecnologie Avanzate e Nanoscienza (TASC) National Laboratory, Trieste, Italy

Elettra Synchrotron Light Laboratory, Trieste, Italy

Simon Fraser University, Vancouver/Burnaby, Canada

Universität Wien, Fakultät für Physik, Vienna, Austria

5.2. Department of Applied Mathematics

Faculty and staff

▼ Professors

Vladimir Čepulić (retired as distinguished professor)
– finite groups, finite mathematics

Neven Elezović – mathematical analysis

Ivan Ivanšić (retired as distinguished professor)
– topology

Ljubo Marangunić (retired) – finite mathematics,
mathematical analysis

Mervan Pašić – differential equations

Darko Žubrinić – nonlinear elliptic PDE-s, fractal
analysis

▼ Associate professors

Ilko Brnetić – mathematical analysis

Founded in 1919

Head of the department:
Prof. **Vesna Županović**, PhD

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URL: <http://www.zpm.fer.hr/>

Luka Korkut – partial differential equations

Mario-Osvin Pavčević – discrete mathematics

Vesna Županović – dynamical systems

▼ Assistant professors

Andrea Aglič Aljinović – mathematical analysis

Mario Krnić – mathematical analysis



Josipa-Pina Milišić – mathematical modeling of semiconductors

Tomislav Šikić – representation theory of affine Lie algebras

▼ Assistants

Domagoj Kovačević, PhD

Marijana Greblički, MSc

Lana Horvat-Dmitrović, MSc

Tomislav Burić

Siniša Miličić

Anamari Nakić

Goran Radunović

Maja Resman

Domagoj Vlah

Ana Žgaljić Keko

▼ Administrative staff

Zdenka Komerički

Department of Applied Mathematics is the oldest one at the Faculty of Electrical Engineering and Computing, founded in 1919. Members of the Department are working in various fields of mathematics. Some of our past professors had been originally trained in electrical engineering. Such was the case for example with the academician Danilo Blanuša, a past dean of the Faculty, whose results concerning isometric imbeddings of hyperbolic spaces into Euclidean spaces obtained international acclaim (cited among others by John Nash), as well as his correction of Max Planck's formulae from relativistic phenomenological thermodynamics, and his graph now called Blanuša's graph or Blanuša's snark (adopted as the logo of the Croatian Mathematical Society). Above the main entrance of the Department there is a nice rectangular marble plaque with an inscription cited from Plato's school: *Medeis ageometretos eisito* (in Greek), that is, «Those who do not know geometry cannot enter». For a more detailed information about the history of the Department of Applied Mathematics you are invited to consult a survey article written by professor Ivan Ivanšić, available at the web address www.zpm.fer.hr/~darko/zavod_pov (in Croatian). See also his related journal paper in Section 1.1.4. below published by *Glasnik matematički* in 2008.

In November 26, 2007, a scientific meeting has been organised by the Department of Applied Mathematics at the Faculty of Electrical Engineering and Computing on the occasion of 75th birthday of distinguished Croatian mathematician Zvonimir Janko, now retired professor emeritus of the University of Heidelberg,

Germany. A more detailed information is available via www.croatianhistory.net/etf/janko.

In 2009, when the Department of Applied Mathematics celebrated 90 years of existence, a new professional mathematical journal *Differential Equations and Applications* (DEA) has been successfully launched in Croatia upon the initiative of Professor Neven Elezović, managing editor of the journal. It is published at the pace of four issues yearly by the Element Publishing House in Zagreb and the Department of Applied Mathematics of the Faculty of Electrical Engineering and Computing. Among three editors in chief of DEA is Professor Mervan Pašić, along with Professors Mats Gyllenberg from Finland and Jean-Michel Rakotoson from France, while the associate editor is Professor Vesna Županović. You are invited to visit the web pages of DEA at the following address: dea.ele-math.com.

Educational activities

Basic calculus. Vector analysis. Linear algebra. Differential equations. Functions of a complex variable. Fourier series. Laplace transform. Discrete mathematics. Graph theory. Numerical methods in applied mathematics. Probability and stochastic processes. Croatian and international mathematical competitions.



▼ Core undergraduate courses

- Mathematics I
- Mathematics II
- Mathematics III E
- Mathematics III R
- Probability and statistics

▼ Elective courses

- Complex analysis
- Differential equations and stability theory
- Discrete mathematics
- Graph theory
- Introduction to chaos theory for engineers
- Linear algebra
- Mathematical modelling using Wolfram's Mathematica
- Numerical mathematics
- Stochastic processes

Postgraduate courses

- Differential equations and dynamical systems
- Discrete mathematical models
- Integral and discrete transformations with wavelet theory
- Equations of mathematical physics
- Combinatorial algorithms
- Finite mathematics
- Linear algebra and applications
- Mathematical methods in control theory
- Selected topics of mathematical analysis
- Basics of the theory of strategic games
- Queuing theory

Research and development

Mathematical structures in mathematical models and numerical algorithms. Construction of combinatorial structures. Symmetric block designs. Group theory. Nonlinear and quasi-linear elliptic equations. Ordinary differential equations. Dynamical systems. Fractal analysis. Inequalities in analysis and applications. Representation theory.

▼ Projects

Combinatorial designs and finite geometry (Project 0362964, Ministry of Science, Education and Sports, Principal investigator: Mario-Osvin Pavčević, 2007-)

Estimates of sums, integrals and integral transformations (Project 0361054, Ministry of Science, Education and Sports, Principal investigator: Neven Elezović, 2007-)

Fractional derivatives and higher transcendental functions (Project HMP Croatia-Macedonia, National coordinator: Neven Elezović, 2007-)

Nonlinear analysis of differential equations and dynamical systems (Project 0361291, Ministry of Science, Education and Sports, Principal investigator: Mervan Pašić, 2007-)

Investigation of finite groups and their applications in combinatorics (Project 036-0000000-3223, Ministry of Science, Education and Sports, Principal investigator: Vladimir Čepulić, 2008-2009, Mirjana Garapić, 2009-)

International links

Centro de Recerca Matematica, Barcelona, Catalonia, Spain

Nankai Universtiy, Tianjin, China

Universitz of Kiev-Mohyla Academy, Kyiv, Ukraine

Vinnits State Pedagogical Universtiy, Vinnitsa, Ukraine

Karl Franzes University, Graz, Austria

University of Oklahoma, Norman, USA

American Mathematical Society, Providence, RI, USA

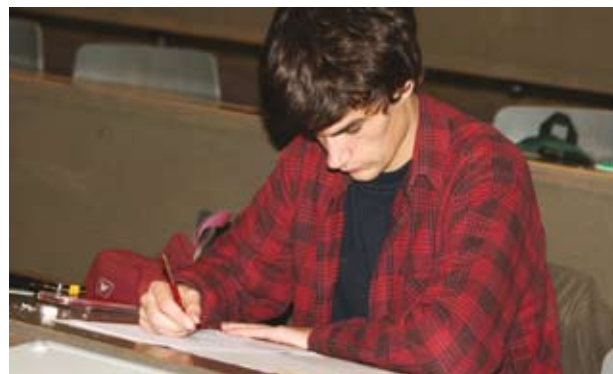
Johannes Gutenberg-Universität, Mainz, Germany

Universität Bayreuth, Germany

Universite de Bourgogne, Dijon, France

Vienna University of Technology

Mathematics Department of the Czech Academy of Sciences, Prague, Czech Republic



5.3. Department of Applied Computing

Faculty and staff

▼ Professors

Damir Kalpić – information systems, operational research

Vedran Mornar – information systems, programming paradigms, e-learning

▼ Associate professors

Mirta Baranović – databases, information systems, data warehousing, business intelligence

Marijan Đurek – computer ergonomics, computer forensics

Krešimir Fertalj – information systems, software engineering, project management

▼ Assistant professors

Gordan Gledec – networks and Internet, web technologies

Founded in 2005

Head of the department:
Prof. **Damir Kalpić**, PhD

Phone: +385 1 612 99 15
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URL: <http://www.fer.hr/zavod/zpr>

Boris Vrdoljak – database systems

Slaven Zakošek – database systems

Nikica Hlupić – system identification and optimization, algorithm design

▼ Higher Assistants

Ivica Botički

Igor Mekterović

Zvonimir Vanjak



▼ Junior researchers

Jasenka Anzil
 Mario Brčić
 Ljiljana Brkić
 Mirjana Domazet-Lošo
 Krešimir Križanović
 Boris Milašinić
 Ivana Nižetić
 Dubravka Pukljak Zoković
 Lidia Rovan
 Marija Katić

▼ Researchers

Kristina Andrić
 Ivana Ilić
 Tomislav Jaguš
 Vlatko Malović
 Stjepan Pavlek
 Nikša Stanović
 Tomislav Rajnović
 Gorana Rubinić
 Ivana Ujević
 Vedran Vrbanić
 Aldo Zelen

▼ Administrative staff

Sonja Majstorović

Educational activities

Programming, Software engineering, Algorithms and data structures, Programming paradigms and languages, Databases, Data Warehousing, Business Intelligence, Operational research, Object-oriented programming, Information systems design, Information systems security, Hardware and software ergonomics, Electronic business, Risk analysis, System Identification and Optimization.

First cycle study

▼ Mandatore courses

- Programming and software engineering
- Algorithms and data structures
- Databases
- Programming paradigms and languages
- Development of applications

▼ Elective courses

- Ergonomics in computing

Second cycle study

▼ Theoretical courses

- Advanced algorithms and data structures
- Object oriented design
- Development of information systems
- Database systems

▼ Specialization courses

- Operational research
- Business intelligence
- Security on Internet
- Protection and security of information systems
- Project management

Postgraduate courses

- Algorithms in bioinformatics
- Applied numerical methods
- Data structures and algorithms
- Databases
- Electronic business
- Management of information systems
- Methods and techniques for software development
- Operational research
- Quantitative methods in risk management

Research and development

Distance learning software has been further developed to support continuous assessment. Software for student administration has been upgraded to comply with the Bologna process. Strategy of computerisation for a major Croatian insurance company has been completed. A data warehousing project and a credit risk assessment project according to Basel II for a major Croatian bank have been completed. Computerisation of Croatian Forestry according to the beforehand delivered IT Strategy has been resumed. A set of studies related to e-Business standardisation issues have been completed and publicly presented. Participation in control and auditing of a computerisation project aimed to establish the central server for primary health care in Croatia is under way. Research concerning e-Education encompasses Computer supported education, Collaborative computer-supported learning, Blended learning, Mobile learning and administrative applications for

courses and faculty. Genetic algorithms have been developed for menu planning.

▼ Projects

Software engineering: Education and research co-operation (DAAD project in the framework of the 'Stability Pact for South-Eastern Europe', National coordinator: Damir Kalpić, 2004-)

Optimisation and risk management in information systems (Project 036-0361983-3137, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Damir Kalpić, 2007-2012)

Sustainable development of information systems (Project 036-0361983-2022, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Krešimir Fertalj, 2007-)

Semantic integration of heterogeneous data sources (Project 036-0361983-2012, Ministry of Science, Education and Sports, Republic of Croatia, Project leader: Mirta Baranović, 2007-)

Computer supported education (Project 036-0361983-2019, Ministry of Science, Education and Sports, Republic of Croatia, Project leader: Vedran Mornar, 2007-)

Geospatial Sensors and Moving Objects Databases (Project 036-0361983-2020, Ministry of Science, Education and Sports, Republic of Croatia, Project leader: Zdravko Galić, 2007-)

International links

Humboldt Universität, Berlin, Germany

Università degli Studi del Sannio, Benevento, Italy

Information Resources Management Association (IRMA), Hershey, PA, USA

European Federation of National Maintenance Societies

University of Mostar, Bosnia and Herzegovina

University of Tuzla, Tuzla, Bosnia and Herzegovina

National Institute of Education, Nanyang Technological University, Singapore

Chinese American Scholars Association (CASA), New York, USA

VRIJE University Brussels, Belgium



5.4. Department of Electrical Engineering Fundamentals and Measurements

Faculty and staff

▼ Professors

Sead Berberović – numerical field calculations, CAD

Mladen Boršić – telemetric data acquisition systems, metrology infrastructure (retired on October 1, 2008)

Josip Butorac – absolute electromagnetic measurements, calibration of standards, precise instruments and transducers

Zijad Haznadar – professor emeritus

Petar Knežević – telematic services, performance of computer systems

Armin Pavić – EM fields measurement and protection, computer-aided learning

Zoran Skočir – database design, information system development, networked economy, electronic business

Željko Štih – numerical field calculations, CIM and management

Founded in 1924

Head of Department:
Prof. **Damir Ilić**, Ph.D.

Phone: + 385 1 612 92 53
Fax: + 385 1 612 95 71
E-mail: oem@fer.hr
URL: <http://www.fer.hr/oem>

▼ Associate professors

Bruno Blašković – model checking, formal description methods, protocol synthesis

Šandor Dembitz – natural language processing, expert systems

Damir Ilić – precise electromagnetic measurements, calibration of standards, virtual instruments, measurement technique



Roman Malarić – automated data acquisition systems, electromagnetic measurements, calibration of standards

Božidar Ferković – retired, precise measurements of electromagnetic quantities

Dušan Vujević – retired, precise measurement of voltage and magnetic quantities

▼ Assistant professors

Martin Dadić – computational and applied electromagnetics

Ivan Leniček – precise electromagnetic measurements, calibration of standards

Mirko Randić – distributed object-oriented software design, network and system management

▼ Assistants

Luka Ferković
Hrvoje Hegeduš

▼ Junior researchers

Marko Banek
Drago Cmik
Kristina Ferković
Marko Jurčević
Damir Jurić
Petar Mostarac
Jakov Pavlek
Damir Pintar
Bojan Trkulja
Alan Šala
Mihaela Vranić

▼ Administrative staff

Jasenska Haladin
Sanja Ferković Živković

▼ Laboratory support

Ivan Felja (retired on December 30, 2008)
Davor Kotur
Ivica Kunšt
Dražen Franolić
Damir Matić (retired on June 30, 2008)

Educational activities

Fundamentals of electrical engineering - theory and practice. Electrostatic and electromagnetic phenomena. Basic circuits and field theory. Electrical

and non-electrical measurements, elements, methods, instruments and laboratory equipment. Metrology and absolute electromagnetic measurements. Measurement error theory, measurement technique, analysis of the measurement results. Measuring systems and virtual instruments. Metrology infrastructure, calibration and testing services. Quality management and laboratory accreditation. Telemetric data acquisition systems and automated measurement systems. Process testing and industrial measurements of magnetic material properties, isolation and earthing. Electromagnetic field theory. Electromagnetic waves and wave propagation. Numerical methods and electromagnetic field calculation. Elements of design theory and design processing. Computational electromagnetic compatibility. Electromagnetic pollution. Data processing. Data management. Databases. Data Warehousing. Data mining. E-Business. Business Intelligence.

First cycle study

▼ Mandatory courses

- Databases
- Electromagnetic Fields
- Engineering Economics
- Fundamentals of Electrical Engineering
- Information, Logic and Languages
- Management in Engineering
- Quality Management

▼ Elective courses

- Metrology Fundamentals
- Methods of Measurement

Second cycle study

▼ Theoretical courses

- Measurement Theory
- Data management
- Formal Methods in System Design

▼ Specialization courses

- Electrotechnical Measurements
- Measurement Technique
- Measurement in Technology Processes
- E-business Technologies
- Network and Service Management
- Laboratory of Electrical Engineering Systems and Technology 2

▼ Effective courses

- Natural Language Processing
- Computational Electromagnetism

Postgraduate courses

- Doctoral programme
- Computational Electromagnetic Compatibility
- Computer Aided Analysis in Electromagnetic Theory
- Computer Aided Design
- Data Warehouse Design
- Digital Measuring Instruments and Systems
- Electrical Measurement of Non Electric Quantities
- Electromagnetic Pollution
- International Measuring Traceability
- Metrology and Precise Measurements
- Quality Control and Metrology
- Selected Topics from Data Processing
- Validation of The Software

▼ Specialist study in Transformers

- Transformers - Theory and Application
- Transformers in Electric Power System
- Transformer on-line Monitoring, Diagnostics And Maintenance
- Electric Field and Insulating Systems
- Transformer Testing
- Magnetic Field and Losses in Transformers
- Materials and Processes in Transformer Production
- Electrical and Mechanical Design of Power Transformers – Selected Topics
- Thermal and Mechanical Phenomena in Transformer

Research and development

Development and permanent improvement of precise measurements of electromagnetic quantities in Croatia. Internationally accredited Primary Electromagnetic Laboratory. Development of standards, measuring devices, instruments and procedures of high accuracy. Maintenance and comparison of voltage, resistance and capacitance standards. Interlaboratory comparison of quantum JAVS voltage standard. Automation of measuring procedures. Research and development of telemetric data acquisition systems, especially in collecting data

from electric power plants and system, and transmitting them through public telephone network to the central monitoring station. Measurement of the quality of electrical energy in the Croatian distribution system. Methods of calibration of high-class wattmeters and power-meters. Organisation of metrology, certification and standardisation services in Croatia harmonised with WECC, ILAC and other requirements. Research in the area of numerical calculation of electromagnetic fields, development of software packages for numerical field calculation applicable to electromagnetic compatibility problems as well as to analysis of human exposure to low-frequency electromagnetic fields. Research and development of ship's shaft generator. EM field influence of power lines on surrounding metallic objects. Computation, measurement, and analysis of EM fields for various sources of electromagnetic pollution. Application of complex numerical computation of electromagnetic fields to design of electrical apparatus and machines in order to achieve better quality and market competitiveness. Application of software packages in the development of new designs of electromagnetic devices, to be incorporated into usual design and developing procedures. The development of the methodology and the tools for analysis of electromagnetic environment of power engineering systems and for protection of undesired electromagnetic fields. Initiation of further development and new approach to the integral solution of the problem relating to protection, control and management in the electric-power supply systems. Laboratory for Electromagnetic Fields. Measurement of electromagnetic pollution. Development of the magnetic field National Standard. Object-relational database design, data mining, information system development, data warehousing design, networked economy, applications for electronic business.

▼ Projects

Development of conditions for realization of the national magnetic field standard (Project 036-0363081-1652, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Armin Pavić, 2007 –).

Internet enabled calibrations and measurement (Project 036-0363081-1648, Ministry of Science, Education and Sports, Republic of Croatia, Principal Investigator: Roman Malarić, 2007 –).

Measurement of electromagnetic quantities at the level of standards (Project 0036-0363081-1650, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Damir Ilić, 2007 –).

Metrological Research and development of methods and procedures for measurement of electromagnetic quantities (Joint Croatian – Macedonian project for scientific and technological cooperation, Ministry of Science, Education and



Sport, Republic of Croatia, and Ministry of Science and Education, Republic of Macedonia, principal Investigator: Roman Malarić (Croatia) and Marija Čundeva Blajer (Macedonia), 2007-2008).

Networked economy (Project 0036-0362027-1638, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Zoran Skočir, 2007 –).

Numerical calculation of electromagnetic fields in transformers (Project 0036-0362321-2326, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Željko Štih, 2007 –).

Participation in Broadband Society (COST-298 Action, Šandor Dembitz became a member of Management Committee in 2007 –).

Remote laboratory (Project 0036-0363081-1653, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Mladen Boršić, 2007 – 2009, Petar Knežević 2009 –).

International links

BIPM – Bureau International des Poids et Mesures, Pavillon de Breteuil, Sèvres, France

DKD – Deutsche Kalibrierdienst, Berlin and Braunschweig, Germany

EURAMET – European Association of National Metrology Institutes, EU

Facoltà di Ingegneria dell'Università degli Studi del Sannio, Benevento, Italy

Faculty of Electrical Engineering, University of Tuzla, Bosnia and Herzegovina

ILAC – International Laboratory Accreditation Cooperation

IMEKO – International Measurement Confederation

INRIA-Futurs, Institut National de Recherche en Informatique et en Automatique, France

LNE – Laboratoire national de métrologie et d'essais, Paris, France

NIST – National Institute of Standards and Technology, Gaithersburg, Maryland, USA

NPL – National Physical Laboratory, Teddington, Middlesex, United Kingdom

NCSL International – National Conference of Standard Laboratories International

NMI (NMIA) – National Measurement Institute, Lindfield, Australia

PTB – Physikalisch-Technische Bundesanstalt, Braunschweig, Germany

Ss. Cyril and Methodius University – Skopje, Macedonia

Technische Universität Graz, Institut für Grundlagen und Theorie der Electrotechnik, Graz, Austria

University of Bihać, Faculty of Engineering, Bihać, Bosnia and Herzegovina

University of Bologna, DEIS, Bologna, Italy

University of Tokyo, Faculty of Engineering, Nuclear Engineering Research Laboratory, Tokyo, Japan

Vienna University of Technology, Institute of Software Technology and Interactive Systems (ISIS), Vienna, Austria

5.5. Department of Electric Machines, Drives and Automation

Faculty and staff

▼ Professors

Drago Ban – electrical machines and drives

Zvonko Benčić – power electronics, semiconductor power devices

Ivan Gašparac – electrical machines, industrial plants

Krešimir Čosić – interactive simulation systems, strategic planning

Ivan Ilić – retired, professor emeritus, electrical machines and drives

Željko Jakopović – power electronics, semiconductor power devices

Zlatko Maljković – electrical machines

Zvonimir Sirotić – retired distinguished professor, electrical machines

Founded in 1925

Head of the department:
Asst. Prof. **Zlatko Maljković**, PhD

Phone: +385 1 612 97 70
Fax: +385 1 612 97 05
E-mail: esa@fer.hr
URL: <http://www.esa.fer.hr/>

▼ Associate professors

Fetah Kolonić – control of drives, mechatronic systems

▼ Assistant professors

Jadranko Matuško - control of mechatronic systems

Alojz Slutej – control of electrical machines and drives

Miroslav Slamić – interactive simulation systems



Stjepan Štefan – *electrical apparatus*

Viktor Šunde - power electronics, semiconductor power devices

Nikola Švigir – technical mechanics

Mario Vražić - electrical machines, industrial plants

Damir Žarko – electrical machines and drives

▼ Assistants

Mirko Cettolo

Igor Erceg

Martina Kutija

Goran Rovišan

Toni Šimić

Sven Zelić

▼ Junior Researchers

Neven Bulić

Branimir Dropuljić

Marko Horvat

Davor Kukulja

Ivan Mrčela

Milijana Odavić

Alen Poljugan

Siniša Popović

Stjepan Stipetić

Damir Sumina

Tanja Vešić

▼ Researchers

Tena Baranašić

Zlatko Đukić

Pavao Golubović

Zlatko Hanić

Milutin Pavlica

Danko Sirotić

Stjepan Tusun

▼ Administrative staff

Snježana Krleža

Zorica Livić

Spomenka Perkušić

▼ Lab support

Marinko Miletić

Velimir Josip Pavlaković

Zdenko Štifter

Dinko Vuina

Educational activities

Fundamentals of electrical machinery. Direct current and electronically commutated motors, induction and synchronous machines. Small and special electric machines. Transformers. General theory of electromechanical conversion. Design in electromechanical engineering. Power electronics and electrical drives, control of electrical machines and drives. Mechatronic systems. Testing and diagnostics of electrical machines and drives. Applied mechanics in electrical engineering. Electric switches. Switching arrangements. Industrial plants and automation of industrial plants. Electrical traction. Electric vehicle drive and energy distribution. Interactive and real-time simulation systems based on virtual reality: simulator based training and selection, numerical methods, 3D modelling and visualization, multimedia stimuli generation, emotional state estimation.

Research and development of methods for the analysis, design and testing of electrical machines, transformers and other electrical devices, and for their implementation in various industrial, electrical, transportation and other technical systems. Modelling, simulation and identification of parameters of electrical machines and power electronics converters. Analysis of small and special machines (step motors, linear motors, electronically commutated motors) for general and special purpose. Electrical motor drives in normal and specific working conditions. Design, testing and commissioning. Reconstruction, retrofit and modernisation of high power electrical machines and drives in electrical, industrial, mining and other plants. Research, development, design and implementation of different power electronic converters. Research, development and application of the methods for automatic control of AC and DC electrical drives in industry, mining, transport, shipbuilding and elsewhere. Design, modelling and application of mechatronic systems. Reconstruction and modernisation of controlled electrical drives, automation of electrical drives and protection systems, especially in rolling mills, mining and other similar industrial plants. Design and modernisation of industrial and electrical plants. Diagnostics of electrical motors and drives.

▼ Core undergraduate courses

- Automated Testing of Electrotechnical Devices
- Automation in Industrial Plants
- Automation Systems Design
- Control Engineering
- Control of Electric Drives
- Control of Power Converters
- Defense Systems and Technologies

- Design and Automation of Industrial Plants
- Design and Development of Interactive Simulation Systems
- Design of Electric Machinery
- Design of Industrial Plants
- Development of Electrical Products
- Diagnostics and Monitoring of Machines and Drives
- Dynamics of Industrial Systems
- Electrical Actuators
- Electrical Drives
- Electrical Machines
- Electrical Machines and Transformers
- Electromechanical and Electrical Conversion
- Electromechanical and Electromagnetic Conversion
- Electromechanical Systems
- Electronics in Power Engineering
- Electrotechnical Materials and Technology
- Fundamentals of Mechatronics
- Fundamentals of Power Electronics
- Graphics and Documentation for Engineers
- Materials in Electrical Products
- Mechatronic Systems
- Physical Education
- Power Electronics
- Switching and Protection Devices
- Synchronous Machines and Excitation Systems
- Theory of Electrical Machines and Transformers

▼ Elective courses

- Computer Aided Design
- Control of Synchronous Machines
- Croatian Culture
- Defense Systems and Technologies
- Design and Construction in the Field of Electrical Machines
- Design and Development of Interactive Simulation Systems
- Dynamics and Modelling of Electromechanical Systems
- Electrical Traction
- Electrical Machine Controls Practicum
- Electronic Power Converters for Motor Drives
- Laboratory for Control of Electric Machines
- Management of Change and Human Resources
- Managerial Decision Making
- Methods and Presentation of Results in Scientific Research
- Organisational Psychology
- Power Electronics
- Power Electronics Laboratory
- Practicum in Control of Electrical Machines
- Quality Assurance and Quality Management

- Selected Chapters of Transformers
- Small and Special Electric Machines
- Sustainable Growth and Environment Protection
- Switching and Protection Devices in Electrical Plants
- Synchronous Machines and Excitations
- Technical Mechanics
- Theological Study of the Bible

Postgraduate courses

- Automated Testing of Electrical Machines
- Control Systems of Electrical Drives
- Digital Real Time Simulations
- Disturbances and Protection of Synchronous Machines
- Dynamics of Alternating Current Machines
- Electrical Machines Design Methods
- Industrial Plants
- Integration of Intelligent Components in Highly Automated
- Mechatronic System
- Intelligent Systems in Industrial Plants
- Power Electronic Systems
- Special Electrical Drives
- Theory of Power Circuit Breakers

Transformers

- Transformers - Theory and Application

Research and development

Electrical machines: Finite Element Method based analysis of synchronous generators, both hydrogenerators and turbogenerators, as well as transformers have been introduced. New advances in computing technology (hardware and software) have enabled more accurate determination of magnetic field distribution and basic machine parameters. The numerical tools are used for design of new generators and refurbishment of the existing ones. A method for accurate calculation and analysis of turbogenerator electromagnetic parameters has been developed. An analytical method based on conformal mapping has been developed for fast and reliable calculation of magnetic field and torque in surface permanent-magnet motors. Computerised on-line diagnostics for determining the state of induction motor cage rotor was investigated and applied in a large number of industrial facilities. The computerised method for on-site testing of low-voltage and high-voltage motor insulation systems has been developed and applied in power plants, chemical plants and cement industry.

Control of AC electrical drives: Research and development of digital control systems for AC electrical drives and synchronous generator excitation. Intelligent control systems and their applications in various plants. Development of a new DSP control system for electrical machines. Sensorless speed control system for slip-ring AC motor has been developed. Actual speed information is realised via rotor voltage frequency estimation (RVFE). Using line frequency as a reference, the fundamental component of the rotor frequency gives information on the slip of the motor, which in turn yields information on the speed in a digital form. The measurement of line currents and voltages for the estimation of the actual motor torque has also been realised. This torque estimation technique has replaced the mechanical torque sensor.

Power electronics: Introducing the new concept of teaching Power electronics. Development of multimedia laboratory for Power electronics enabling integration of different teaching methodologies. Evaluation of simple power semiconductor thermal model applied in a commercial circuit simulator. The obtained results corrected the existing electrothermal model. The transient thermal impedance measurement method for MOS-gated power semiconductors has been developed and tested, enabling fast and accurate on-site measurement.

Industry automation: Research and development of PROFIBUS (Industrial communication network) application in automated systems for testing of electrical machines. Coupling of an intelligent automation with soft computing related to industrial site applications. Design and build systems, which exhibit high level of intelligence, support sufficient user application flexibility related to cost effective product. Introduction of engineering tools, which represent a holistic approach to control engineering, covering all disciplines and activities required to the process automation system. Presentation and introduction of different types of modern high-level PLC programming languages. These languages are function-block-based and have been specially developed for industrial automation process control. Study of different types of application projects represented by a hierarchical and multifaceted engineering database, which contains all the data needed to fully describe the design and



function of the plant. Information about selected database, which stores data without redundancy, i.e. without duplication, despite the fact that data items may have multiple usages. General information about high-speed communication links used as a backbone for the process automation control system. Study of a Fieldbus Foundation system architecture, which provides a framework for industrial application as a distributed system composed of digital devices and control/monitoring equipment. Research and development of mechatronic systems and electric vehicle systems.

Interactive simulation: Training simulators for complex missions and tasks, based on virtual reality and 3D modeling. Generic technology for multimedia generation of stimuli with potential applications in training of emotional and cognitive control under stressful conditions.

▼ Projects

Procedures of Industrial Controller Optimization in Natural Gas Process Production, (Project 4976/04, Oil and gas company INA, Project leader: Fetah Kolonić).

Adaptive Control of Scenarios in VR Therapy of PTSD (Project 036-0000000-2029, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Krešimir Čosić, 2007-2010)

Development of Simulation System – SIMIG 2000 (Ministry of Defense, Republic of Croatia, Principal investigator: Krešimir Čosić, 2007-2008)

Electronic Licence Plate for Vessels – ERP2 (Ministry of Interior, Republic of Croatia, Principal investigator: Krešimir Čosić, 2007-2008)

Optimal Choice Of Permanent Magnets For Electromagnetic Devices (Ministry of Science, Education and Sports, Republic of Croatia, and Agencija za raziskovalno dejavnost Republike Slovenije, Republic of Slovenia, bilateral project, Principal investigator: Damir Žarko, 2007-2008)

Control of Complex Electromechanical Systems for Manipulations in Transport (Project 036-0363078-1629, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Fetah Kolonić, 2006-2009)

Electrical Power Generation Systems (Programme 0361616 Ministry of Science and Technology, Republic of Croatia, Principal investigator, Zlatko Maljković)

Refurbishment and Operation of Hydro-generators (Project 036-0361616-1617, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Zlatko Maljković)

Research Methodology for Determination PQ Diagram of a Synchronous Generator (Project 036-0361616-1618 Ministry of Science and Technology,

Republic of Croatia, Principal investigator: Ivan Gašparac)

Control of the Power Unit With Respect to the Demands of Electrical Power System (Project 036-0361621-1626, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Gorislav Erceg)

Optimization of Electric Motors and Drives for Special Conditions of Exploitation (Project 036-0361616-1619, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Drago Ban)

Power Converters with Enhanced Efficiency as Interface Between Renewable Energy Source and Grid (Project 036-0362978-2314, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Željko Jakopović)

Converters for Tram and Electrical Drive in Train (Project 036-0362978-1574 Ministry of Science and Technology, Republic of Croatia, Principal investigator: Zvonko Benčić)

International links

ABB – Industrial Systems, Vasteras, Sweden

Budapest University of Technology and Economics, Hungary

EPE–PEMC Council-Secretariat in Budapest, Hungary

Fakulta elektrotechniky a informatiky Slovenskej Technickej Univerzity v Bratislave, Bratislava, Slovakia

SIMEC GmbH&Co. KG, Chemnitz, Germany

Technische Universität München, Institute of Electrical Drives, Munich, Germany



Electric machines laboratory

University “St. Kiril & Metodij”, Faculty of Electrical Engineering, Skopje, Republic of Macedonia

University of Connecticut, Department of Mechanical Engineering, Connecticut, USA

Univerza v Ljubljani, Fakulteta za elektrotehniko, Ljubljana, Slovenia

Univerza v Mariboru, Fakulteta za elektrotehniko, računalništvo in informatiko, Maribor, Slovenia

University of Sarajevo, Faculty of Electrical Engineering, Sarajevo, Republic of Bosnia and Herzegovina

University of Tuzla, Faculty of Machine Engineering, Republic of Bosnia and Herzegovina

University of Wisconsin, Madison, USA

University of Leoben, Austria

5.6. Department of Power Systems

Faculty and staff

▼ Professors

Danilo Feretić – professor emeritus

Nikola Čavlina – nuclear power plant safety and control

Nenad Debrecin – nuclear power plants, renewable energy sources, energy efficiency

Zdravko Hebel – transmission networks, power system analysis

Slavko Krajcar – electrical facility design, distribution networks, energy market design

Ante Marušić – power system protection and local control

Vladimir Mikuličić – energy conversion, electrical power system reliability

Founded in 1934

Head of the department:
Prof. **Nenad Debrecin**, PhD

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E-mail: zvne@fer.hr
URL: <http://www.zvne.fer.hr/>

Davor Škrlec – electrical distribution systems, geographical information systems

Sejid Tešnjak – electric power system, electric power system regulation and dynamics

Tomislav Tomiša – power system automation and control

Ivo Uglešić – high voltage engineering



▼ Associate professors

Davor Grgić – nuclear power plants, reactor safety
Ivica Pavić – transmission networks, power system analysis and control

▼ Assistant professors

Marko Delimar – power system analysis, operation and control
Igor Kuzle – power system dynamics and control, equipment maintenance, electricity markets
Viktor Milardić – high voltage engineering
Zdenko Šimić – renewable energy sources, programming
Željko Tomšić – energy efficiency, energy management, power system planning

▼ Assistants

Darjan Bošnjak
Vesna Bukarica
Tomislav Capuder
Tomislav Dragičević
Juraj Havelka
Luka Lugarić
Milivoj Mandić
Boško Milešević
Hrvoje Pandžić
Domagoj Peharda
Ivan Rajšl
Davor Rašeta
Boris Sučić
Siniša Šadek
Igor Vuković

▼ Researchers

Vesna Benčik
Tomislav Fancev
Nenad Mijatović
Robert Pašičko
Slavica Robić

▼ Administrative staff

Jasna Hemen
Branka Marjanović
Neda Šimara
Ankica Turkalj

▼ Laboratory support

Ivica Berislavić
Božidar Filipović Grčić
Davor Klarin
Radoslav Zelić

Educational activities

Electric power engineering. Energy conversion technologies. Fluid mechanics. Heat transfer. Power system planning and construction. Operation, control and dynamics of the power system. Power system protection, automation and control. Open market of electric energy. Ancillary services. Maintenance of power system devices. Power facilities. Distribution networks planning and design. Low-voltage distribution networks and consumer installations. Power system analysis. High voltage engineering. Nuclear physics reactor theory. Nuclear and thermal power plants. Fuel cycles and reactors materials. Engineering reliability and safety. Energy and environment. Geographic information systems. Energy systems economics. Energy efficiency. Energy and environment management. Renewable energy sources.

First cycle study

▼ Mandatory courses

- Electric Facilities
- Energy Technologies
- Engineering Economics
- Management in Engineering
- Project
- Seminar
- Sustainable Development and Environment
- Transmission and Distribution of Electric Power

▼ Elective courses

- Electric Facilities Design
- Electromagnetic Transients and Electromagnetic Compatibility
- Energy Efficiency Audit and Energy Management Programme
- Low-voltage Power Systems
- Power Plants
- Process Measurements and Diagnostic in Power Plants
- Technical Standardization and Legislative

Second cycle study

▼ Theoretical courses

- Economics of Energy
- Energy Conversion
- High Voltage Engineering



- Laboratory of Electrical Power Engineering 1
- Laboratory of Electrical Power Engineering 2
- Power System Dynamics and Control
- Power Systems Analysis
- Project
- Seminar

▼ Elective courses

- Electric Facilities Automation
- Electric Power Market
- Electric Power Networks
- Electric Power System Operation and Planning
- Electric Traction Power Supply
- Electrical Lighting
- Energy Management and Energy Efficiency
- Energy, Environment and Sustainable Development
- Energy-Economy Models for Developing of Energy Systems
- Geospatial Databases
- Mass and Heat Transfer
- Nuclear Engineering
- Nuclear Safety
- Numerical Methods in Electric Power Systems
- Overhead Lines and Cables
- Overvoltage Protection
- Power Quality
- Power System Maintenance

- Power System Modelling and Simulation
- Power System Protection
- Power System Supervision and Remote Control
- Reliability and Availability Assessment Methods
- Renewable Resources and Advanced Technology
- Risk Assessment
- Risk Management
- Special Protection Systems
- Switching and Protection Devices

Postgraduate courses

- Advanced Nuclear Reactors in Sustainable Development
- Construction Planning of Electrical Power Production Units in Uncertainty Conditions
- Control Techniques in Electrical Engineering
- Diagnostics in Power System Maintenance
- Distribution Networks Planning
- Disturbance Inhibition and Protection of Synchronous Machines
- Dynamics of Power Plants Operation
- Electric Facilities
- Electrical Power Facilities Engineering
- Electrical Power Network Calculation
- Electrical Power Network Measurements
- Environmental Impact of Electric Power Systems

- Geoinformation Systems
- High-Voltage Networks Analysis
- Intelligent Systems in Electric Power Engineering
- Lines and Power Supply of Electric Traction
- Modelling Relations on Electricity Markets
- Nuclear Power Plant Operational Safety
- Nuclear Power Plants Concepts
- Optimization in Electric Power Networks
- Overhead Lines and Power Cables
- Overvoltages in Power System
- Power System Protection
- Power Systems Operations
- Quality of Power Supply
- Relay Protection
- Reliability Modelling in Electric Power System Subsystems
- Risk Assessment and Management
- Stochastic Assessment of Technological Risk
- Technological Probabilistic Risk Assessment
- Transformers

Research and development

Power Systems Engineering: The research is focused to development of both fundamental knowledge and applications of electrical power engineering. Studies on scientific projects include collaboration with industry, national institutions, electric utilities, and many foreign universities. The research is generally directed to increasing the availability and the reliability of a power system with an emphasis on the adjustment to the open market environment. Specific goals include: improving models and methodologies for power system analysis, operation and control; development, production and application of models and methodologies for power systems planning, maintenance and development; application of soft-computing (artificial intelligence, meta-heuristics, etc.),



Real Time Network Analysis System

information technologies (web-oriented technologies, geographic information systems, enterprise IT solutions, etc.) and operational research in improving processes of planning, development, exploitation and control of power systems; investigation on applications for coordinated control of power system devices and exploring the power system stability, security and economic operation; integration of intelligent devices and agents in energy management systems and distribution management systems equipment and software; advanced modelling of dynamics, disturbances and transient phenomena in transmission and distribution networks (in particular regarding distributed generation); advances in fault detection, restoration and outage management. At time of global changes in the energy sector, with emphasis on sustainable development, and in view of Croatia's application for joining EU, significant efforts are devoted to elimination of technical and administrative inadequacies in relation to EU legislation and directives. In particular, this implies liberalization efforts, utilities restructuring, facilities revitalization, improved legislation and adoption of new standards.

Power Technologies: General objective of the research is to develop methodologies for reliable assessment of nuclear power plants operational safety and for quantitative assessment of the environmental impact of applicable energy technologies (electric power producing plants and their technology chains), as a base for estimating optimal long-term development strategy of the Croatian power system. Research work includes new strategies of energy sector and power system development for Republic of Croatia; preparing medium and long-term electricity generation expansion plan for power system; comparison of energy, economic and environmental characteristics of different options for electric power generation; studies for rational use of energy and energy savings, assuming a centralized structure of the electricity market. Research work also includes renewable energy sources and its role in Croatian power sector, as well as electricity production considering cap on CO₂ emissions. Recent research covers development of new models for power system generation optimization and planning under uncertainties of the open electricity market. The goal of that research is to create analytical and software tools which will enable a successful transition to liberalized electricity market in Croatia and ensure healthy and efficient power system operation in compliance with environmental requirements. In the nuclear energy field the specific analysis and calculations of transients and consequences of potential accidents in NPP Krško have recently been updated with some 3D models and extended to severe power plant accidents.

▼ Projects

Classification of European Biomass Potential for Bioenergy Using Terrestrial and Earth Observations (FP7, Nenad Debrecin)

Control of Electric Power Systems in the Open Market Environment (MZOS, Sejid Tešnjač)

Croatian Transmission Network in the European Electric Power Market (MZOS, Zdravko Hebel)

Development of Electricity Market Analysis Tools (MZOS, Slavko Krajcar)

Development of power quality measuring and analyzing system (MZOS, Tomislav Tomiša)

Energy Security and Climate Change (MZOS, Nenad Debrecin)

Fulfilment of Environmental Requirements in High Voltage System (MZOS, Ivo Uglešić)

Nuclear power plants for sustainable energy generation (MZOS, Danilo Feretić)

Planning and Operation of Active Distribution Networks and Microgrids (MZOS, Davor Škrlec)

International links

AA Sitard, Netherlands

ABB Transmission & Distribution University, Ludvika, Sweden

Argonne National Laboratory, Chicago, USA

Centre for Renewable Energy Sources, Pikermi, Greece

Comillas University, Madrid, Spain

DMS Group LTD, Novi Sad, Serbia

Eidgenössische Technische Hochschule, Zürich, Switzerland

Electric Utility Portugal, Rede Electra Nacional S.A. Porto, Portugal

Faculty of Electrical Engineering, Belgrade, Serbia

Gesellschaft für Reaktor Sicherheit Garching, Garching, Germany

Institut für Hochspannungstechnik, TU Graz, Austria

Institute for Energy Technology (IFE), Energy System Department, Kjeller, Norway

Intrade Energy, Sarajevo, Bosnia and Herzegovina

International Atomic Energy Agency (IAEA), Vienna, Austria

Joanneum Research, Graz, Austria

Jožef Stefan Institute, Ljubljana, Slovenia

Katholieke Universiteit Leuven, Leuven, Belgium

Kema Consulting, Bonn, Germany

Kungliga Tekniska Hoegskolan - Institutionene för Elkraftteknik, Stockholm, Sweden

National Technical University of Athens, Athens, Greece

Norwegian Research Council, Norwegian Council for Higher Education, Centre for International University Cooperation, Oslo, Norway

Norwegian University of Science and Technology (NTNU), Trondheim, Norway

NOVEM, The Netherlands Agency for Energy and Environment, Netherlands

Nuclear Regulatory Commission, Washington, USA

Nuclear Power Plant Krško, Krško, Slovenia

Politecnico di Milano, Department of Energy, Italy

Powel Group, Norway

Ruhr - Universtät Bochum, Fakultät für Maschinenbau - Lehrstuhl fuer Steuerungstechnik; Institut fuer Energietechnik - Lehrstuhl für Nukleare und Neue

Energiesysteme, Germany

Ss. Cyril and Methodius University of Skopje, Skopje, Macedonia

Technical University of Sofia, Sofia, Bulgaria

University of Ljubljana, Ljubljana, Slovenia

University of Novi Sad, Novi Sad, Serbia

University of Maribor, Maribor, Slovenia

University of Pisa, Pisa, Italy

University "Politehnica" of Bucharest, Bucharest, Bulgaria

University of Tuzla, Tuzla, Bosnia and Herzegovina

Westinghouse, Science & Technology Center, Pittsburgh, USA



5.7. Department of Telecommunications

Faculty and staff

▼ Professors

Mladen Kos – network optimisation, performance analysis

Marijan Kunštić – information, logic and languages, switching systems

Ignac Lovrek – telecommunication system architecture, call/service modelling and processing, mobile agents and multi-agent systems

Branko Mikac – reliability, transmission systems

Vjekoslav Sinković – information theory, information networks (retired end of 2008)

Mladen Tkalić – automata theory, logical design (retired end of 2008)

Founded in 1951

Head of the department:
Prof. **Dragan Jevtić**, Ph.D.

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▼ Associate professors

Alen Bažant – data communications, local area networks, broadband access networks and technologies

Dragan Jevtić – computer telephony integration, Petri and neural nets, intelligent agents

Gordan Ježić – agent technology, mobile networks and services, mobile computation



Maja Matijašević – converged IP-based networks and IMS, multimedia communication, Quality of Service

Miljenko Mikuc – logical design, application of formal methods in telecommunication system design, network simulation systems

Igor S. Pandžić – virtual characters, virtual environments, multimedia

Miljenko Mikuc – logical design, application of formal methods in telecommunication system design, network simulation systems

Igor S. Pandžić – virtual characters, virtual environments, multimedia

▼ Assistant professors

Željka Car – software engineering, software process modelling and simulation, project management

Mario Kušek – mobile service programming, mobile software agents, software development

Ivana Podnar-Žarko - large-scale distributed systems, services in next-generation networks

Nina Skorin Kapov - network optimization and planning; WDM optical networks

▼ Assistants

Marija Furdek
Josip Gracin
Željko Ilić
Vedran Mikac
Matko Ugrin

▼ Junior Researchers

Marina Bagić Babac
Tomaž Beriša
Agata Brajdić
Aleksandra Čereković
Ognjen Dobrijević
Tomislav Grgić
Krešimir Jurasović
Ana Kuček
Ozren Lapčević
Matija Mikac
Ana Petrić
Vedran Podobnik
Krešimir Pripužić
Zrinka Puljiz
Kristina Stanković
Mirko Sužnjević
Goranka Zorić

▼ Researchers

Hrvoje Belani
Iva Bojić
Robert Čokor
Darko Grubišić
Sanja Illeš
Krunoslav Ivešić
Igor Ljubi
Sanja Mesić
Tomislav Pejša
Maroje Puh
Darian Škarica
Marin Vuković
Marko Zec

▼ Administrative staff

Silvija Jurić-Bubić
Jasna Slavinić

▼ Lab support

Krešimir Gjurin

Educational activities

Information theory and information networks. Automata theory and logical design. Telecommunication networks, Internet. Languages and algorithms. Teletraffic theory. Digital transmission and switching, all-optical networks. Data communications. Local and access networks. Communication protocols. Hardware and software architectures of telecommunication systems, processors and programming languages. Mobile agents and multi-agent systems. Formal methods and techniques. Network planning, control and management. Information and telematic services. Broadband and intelligent networks. Multimedia communications, virtual reality. Mobility. System reliability. Performance evaluation and network optimisation, quality of service. Software processes. Project management.

First cycle study

▼ Mandatory courses

- Communication networks
- Information theory
- Information, logic and languages
- Multimedia services
- Telecommunication systems and networks

- Digital logic
- Management in engineering
- Undergraduate seminar
- Undergraduate project

▼ Elective courses

- Computer telephony integration
- Fundamentals of virtual environments
- Local networks
- Network programming
- Public mobile network

Second cycle study

▼ Mandatory courses

- Graduate seminar
- Graduate project

▼ Theoretical courses

- Communication protocols
- Distributed systems
- Formal methods in system design
- Information networks
- Multimedia communications
- Photonic telecommunication networks
- Reliability of telecommunication network
- Teletraffic theory

▼ Specialization courses

- Concurrent programming
- Content networking
- Data transmission
- High speed communication networks
- Internet security
- Learning automata
- Mobile software agents
- Mobility in networks
- Network and service management
- Photonic communication technology
- Forecasting and marketing of telecommunication services
- Telecommunication software development
- Virtual environments

▼ Elective courses

- Project management

Postgraduate courses

- Analysis of information processes
- Broadband networks
- Communications in virtual environments
- Concurrent systems
- Distributed information systems
- Formalisms in telecommunications
- Information and communication
- Intelligent control and automata games
- Methods and models in automata theory
- Mobile telecommunications market
- Network availability
- Open network architectures
- Optical transmission network
- Optimisation methods for telecommunications
- Processes of software product life cycle
- Selected topics in communication protocols
- Selected topics in technologies and applications of World Wide Web
- Petri nets and distributed systems
- Software processes
- Software agents for electronic market
- Telecommunication system design
- Telecommunication network management

Research and development

Information and communication technology. Information flows and teletraffic, analytical models and simulation of information sources and flows in broadband networks. Information channel capacity in multi-user wireless systems. Performance analyses of access network technologies. Network modelling and optimisation, network planning, performance evaluation, high-speed network dynamics. Queuing network theory and applications. Logic, relation between information, knowledge and communication. Learning automata theory and applications. Software design: models, methods, languages and tools for telecommunications. Call and service conceptual modelling, concurrent programming and distributed processing. Communication and signalling protocols, formal specification and verification. Reliability and availability of telecommunication systems and network, reliability models of all-optical transmission network and its components. Comparative analysis of different protection/restoration scenarios. Fault testing and diagnosis, maintenance of telecommunication systems. Integrated communication systems, computer telephony integration. Multimedia and virtual reality, virtual characters. Mobility of users and services, mobile agents and multi-agent systems. Internet services and applications, e-business technology. Network evolution.



▼ Projects

BONE, Building the Future Optical Network in Europe (EU Seventh Framework Programme, Network of Excellence, WP02 leader: Branko Mikac, 2008-2010)

e-Photon/ONe+, Optical Networks: Towards Bandwidth Manageability and Cost Efficiency (EU Sixth Framework Programme, Network of Excellence, WP-T leader: Branko Mikac, 2006 - 2008)

Data Traffic Monitoring and Analysis: Theory, Techniques, Tools and Applications for the Future Networks (COST IC 0703 - Cooperation in Science and Technology, European Commission, from: 2008-03-13 to 2012-03-12, MC member: Maja Matijašević, 2008 -)

PEACH: Presence research in action (EU Sixth Framework Programme, Coordination Action, FER co-ordinator: Igor S. Pandžić, 2006 - 2009)

Cross-Modal Analysis of Verbal and Non-verbal Communication (COST 2102, Co-operation in Science and Technology, European Commission, Management committee member and national co-ordinator: Igor S. Pandžić, 2006 - 2010)

Towards Digital Optical Network (COST 291, Co-operation in Science and Technology, European Commission, Management committee member and national co-ordinator: Branko Mikac, 2003 - 2008)

Wi-QoST: Traffic and QoS Management in Wireless Multimedia Networks (Project COST 290 – Cooperation in Science and Technology, European Commission, FER delegate: Maja Matijašević, 2007 – 2008)

Content Delivery and Mobility of Users and Services in New Generation Networks (Project 036-0362027-1639, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Maja Matijašević, 2007 – 2009)

Embodied Conversational Agents as Interface for Networked and Mobile Services (Project 036-0362027-2028, Ministry of Science, Education and

Sports, Republic of Croatia, Principal investigator: Igor S. Pandžić, 2007 –)

Knowledge-Based Network and Service Management (Project 036-0362027-1640, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Dragan Jevtić, 2007 – 2011)

Performance Analysis and Design of Broadband Networks (Project 036-0362027-1641, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Alen Bažant, 2007 – 2011)

International links

National University of Ireland, Digital Enterprise Research Institute, Galway, Ireland

Budapest University of Technology and Economics, Department of Telecommunications, Budapest, Hungary

Ecole Nationale Supérieure des Télécommunications (ENST), Paris, France

INRIA-Futurs, Institut National de Recherche en Informatique et en Automatique, France

Ecole Polytechnique Fédérale de Lausanne (EPFL), Distributed Information Systems Laboratory, Lausanne, Switzerland

Graz University of Technology, Institute of Broadband Communications, Graz, Austria

Graz University of Technology, Institute for Applied Information Processing and Communications, Graz, Austria

The Telecommunications Research Center Vienna (FTW), Austria

Vienna University of Technology, Information System Institute, Vienna, Austria

Vienna University of Technology, **Institute of Communication Networks**, Vienna, Austria

University of Ljubljana, Faculty of Computer and Information Science, Ljubljana, Slovenia

University of Ljubljana, Faculty of Electrical Engineering, Ljubljana, Slovenia

University of Maribor, Faculty of Electrical Engineering and Computer Science, Maribor, Slovenia

Athens Information Technology (AIT), Athens, Greece

Polytechnic University of Cartagena (UPCT), Cartagena (Murcia), Spain

Kyoto University, Graduate School of Informatics, Dept. of Intelligence Science and Technology,

Group of Applied Intelligence Information Processing, Japan

Mälardalen University, Västerås, Sweden

Linköping University, Division of Information Coding, Linköping, Sweden

The Royal Institute of Technology (KTH), School of Information and Communication Technology ICT, Kista, Sweden

University of Oslo, Norway

University of Ghent, Belgium

University of Brighton, Brighton, UK

University of Essex, Department of Electronic System Engineering, Colchester, UK

University of Louisiana at Lafayette, Centre for Advanced Computer Studies, Lafayette, Louisiana, USA

University of South Australia, Adelaide, Australia

Virginia Tech, USA

International Computer Science Institute, Berkeley, California, USA

Carnegie Mellon University, The Electrical and Computer Engineering Department, Pittsburgh, USA



5.8. Department of Electronic Systems and Information Processing

Faculty and staff

▼ Professors

Hrvoje Babić - member of the Croatian Academy of Science and Arts, professor emeritus

Mario Cifrek - electronic instrumentation and measurements, biomedical engineering

Branko Jeren - network and system theory, signal processing

Sven Lončarić - signal and image processing, computer vision, intelligent systems

Ratko Magjarević - electronic and computerised instrumentation, biomedical engineering, minimally invasive methods and devices

Neven Mijat - electrical network, system theory and signal processing

Vladimir Naglić – distinguished professor

Stanko Tonković - electronic instrumentation and measurements, biomedical engineering

Founded in 1943

Head of the department:
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▼ Associate professors

Vedran Bilas - electronic instrumentation and measurements, biomedical engineering

Davor Petrinović - digital signal and speech analysis and processing

Damir Seršić – digital signal and image processing

Zoran Stare - electronic instrumentation and measurements, biomedical engineering

Mladen Vučić - analogue and digital signal processing, digital system design



▼ Assistant professors

Dražen Jurišić – analog signal processing and filtering

Igor Lacković - electronic instrumentation and measurements, biomedical engineering

▼ Assistants

Hrvoje Džapo
Tomislav Pribanić
Mile Šikić

▼ Junior Researchers

Marko Butorac
Ivan Dokmanić
Hrvoje Kalinić
Zvonko Kostanjčar
Željka Lučev
Tihomir Marjanović
Goran Molnar
Tomislav Petković
Miro Ranilović
Ana Sović
Siniša Sovilj
Marko Subašić
Krešimir Šikić
Darko Vasić



▼ Researchers

Tomislav Devčić
Adam Heđi
Vesna Kezdorf
Vana Jeličić
Marko Martinjak
Ivica Medved
Saša Mrvoš
Predrag Pale
Zrinka Potočanac
Ivica Vukoja
Goran Živković

▼ Administrative staff

Jasmina Zorko
Aleksandra Cesarik

▼ Lab support

Marijan Kuri

Educational activities

Electronic measurement and instrumentation. Measurement systems. Transducers and sensors. Smart sensor systems. Electronic equipment design. Computerized instrumentation. Biomedical engineering and electronics. Biomedical informatics. Computers in medicine. ICT in health care and medicine. Signal and systems theory. Network theory. Digital signal processing. Digital speech processing. Systems for signal processing. Linear and nonlinear electric networks. Telemetry systems. Electrical filters. Numerical methods in electric network and systems design. Embedded system design. Advanced tools for digital system design. Data multimedia transmission and computer networks. Digital image processing. Neural networks. Random processes in systems. Entrepreneurship for engineers.

First cycle study

▼ Mandatory courses

- Electrical Circuits
- Electronic Equipment Design
- Embedded Systems
- Fundamentals of Electronic Measurements and Instrumentation
- Information Processing

- Management in Engineering
- Multimedia Technologies
- Signals and Systems

▼ Elective courses

- Computer Aided Design of Electronic Systems

Second cycle study

▼ Theoretical courses

- Analog and mixed signal processing
- Digital Signal Processing
- Electronic Instrumentation
- Random Processes in Systems
- Signal Processing in Communications

▼ Specialization courses

- Advanced Digital Signal Processing Methods
- Digital Image Processing and Analysis
- Digital Signal Processing Software Design
- Digital Speech Processing
- Electronic Measurements and Components
- Embedded System Design
- Industrial Measuring and Communication Systems
- Measurement and Process Control Systems
- Neural Networks
- Sensors Technologies
- Tools for Digital Design

▼ Elective courses

- Biomedical Informatics
- Biomedical Instrumentation
- Biomedical Signals and Systems
- Computer Modelling of Physiological Systems
- Electronic Equipment Power Supplies
- Entrepreneurship and Export in High-Technologies
- Industrial Measuring and Communication Systems
- Multisensor Systems and Locomotion
- Laboratory of Electronic and Computer Engineering 1
- Laboratory of Electronic and Computer Engineering 2
- Laboratory of Electronics 1
- Laboratory of Information Processing 1
- Laboratory of Information Processing 2

Postgraduate courses

- Biomechanical and Neurophysiological Mechanisms
- Biomonitoring Systems
- Digital Image Analysis
- Digital Signal Processing and Applications
- Digital Signal Processor Architectures
- Digital Simulation in Real Time
- Digital Speech Processing
- Electrical Filters - Selected Topics
- Electrical Filters in Power Systems
- Graphs and Networks
- Instrumentation in Environmental Control
- Measurement and Analysis of Stochastic Processes
- Measuring Amplifiers
- Medical Instrumentation for 2D Imaging
- Multimedia Data Transfer and Computer Networks
- Multisensor Biomonitoring Systems
- Multisensor Systems and Locomotion
- Neural Networks
- Nonlinear Systems
- Selected Topics on Digital Image Processing
- Signal Theory
- Smart Sensor Networks
- Switched Capacitor Circuits
- Systems for Measurement Nonelectrical Values
- Use of Computers in Medicine

Research and development

Analogue and digital signal processing in different fields. Digital multi-channel instrumentation systems. Intelligent electronic instrumentation. Pulsed eddy current nondestructive measurement. Distributed systems for analog and mixed signal processing. Design of analog active filters with low sensitivity, low power, low noise and tuneability of filter parameters. Embedded systems. Digital system design. Speech processing. Adaptive multidimensional signal processing. Digital image processing. Computer vision. Pattern recognition. Intelligent systems for 3-D medical image analysis. 3-D volume visualisation. Virtual reality and applications in medicine, geography, and education. Information systems and technologies. Computer networks and multimedia. Numerical methods in electrical network and filter design. Bioinformatics. Computational biology. Protein-protein interactions. Biomedical instrumentation design. Bioelectric signal analysis. Bioelectrical impedance measurement and modeling. Bioelectromagnetics. Biomonitoring. Non-invasive and minimally invasive measurement methods and instrumentation in medicine. Electrical

stimulation and cardiac pacing. Human motion and gait analysis. Diffuse infrared biotelemetry. Health technology assessment. Standardisation and safety of electromedical equipment.

▼ Projects

Noninvasive Measurements and Procedures in Biomedicine (Project 036-0362979-1554, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Stanko Tonković)

Intelligent systems for measurement of difficult-to-measure variables (Project 036-0362979-1625, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Vedran Bilas)

Complex System Modelling (Project 036-0362979-1987, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Branko Jeren)

Intelligent Methods for Image Processing and Analysis (Project 036-0362979-1989, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Sven Lončarić)

Systems for Analog and Mixed Signal Processing (Project 036-0362979-2316, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Neven Mijat)

Design and Implementation of Efficient Methods for Digital Signal Processing (Project 036-0362979-2217, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Mladen Vučić)

Minimally Invasive Measurements and Technologies in Biomedicine (Program 0362979 Ministry of Science and Technology, Republic of Croatia, Principal investigator: Stanko Tonković)

Crypto Phone for Fixed Telephony (Technological Project E51/2005, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Stanko Tonković)

Advanced Methods for the Estimation of Human Brain Activity and Connectivity (NEUROMATH) COST Action, 2006-2010. (CRO partner: Prof. dr. sc. Ratko Magjarević)

Numerical modeling of electric field distribution in electrochemotherapy and electro gene therapy of deep tissue Hrv.-slovenski projekt, 2007-2008. (CRO partner: Prof.dr.sc. Ratko Magjarevic)

Intelligent Instrumentation for Home Health Monitoring Hrv.-mađarski projekt, 2007-2009. (CRO partner: Prof. Ratko Magjarević)

Numerical Modelling of Electric Field Distribution in Electrochemotherapy of Esophagus Malignant Tumors Hrv.-slovenski projekt, 2009-2010. (CRO partner: Prof. dr. sc. Ratko Magjarević)



Curricula Reformation and Harmonisation in the field of Biomedical Engineering TEMPUS IV, 2009-2001.

Numerical modeling of electric field distribution in electrochemotherapy and electro gene therapy of deep tissue (Bilateral Croatian-Slovenian research project, Principal investigator: prof.dr.sc. Ratko Magjarević, 2007-2008).

Intelligent Instrumentation for Home Health Monitoring, (Bilateral Croatian-Hungarian research project, Principal investigator: prof.dr.sc. Ratko Magjarević, 2007-2008)

Virtual Physiological Human, (FP7 Network of Excellence, FER – General Member, Coordinator: prof.dr.sc. Sven Lončarić, 2009-2013)

An Integrated, Model-based, Approach for the Quantification of Cardiac Function based on Cardiac Imaging. (The National Foundation for Science, Higher Education and Technological Development of the Republic of Croatia, FER project coordinator: prof. dr.sc. Sven Loncaric)

Functional X-ray Neuro Imaging (Philips Medical Systems, Netherlands, Project leader: Sven Lončarić)

Physiological Modelling of MR Image Formation (COST Action B21, Croatian Coordinator:)

Medical Imaging & Medical Information Processing (CEEPUS project CII-AT-0042-02-0708 Croatian coordinator: prof. dr.sc. Sven Loncaric)

Medical Imaging & Medical Information Processing (CEEPUS project CII-AT-0042-03-0809 Croatian coordinator: prof. dr.sc. Sven Loncaric)

Language Support Portal for Students (Department for Electronic Systems and Information



Department of Electrical and Computer Engineering, New Jersey Institute of Technology, USA

Department of Information Science, Loughborough University, Loughborough, UK

Department of Radiology, University Hospital Graz, Karl-Franzens Universität Graz, Austria

Duke University, Durham, North Carolina, USA

Faculteit Geneeskunde en Farmacie Vrije Universiteit Brussel, Belgium

Image Processing and Analysis Group, School of Medicine, Yale University, USA

Institut für Signal- und Informationsverarbeitung, Eidgenössische Technische Hochschule (ETH) Zürich, Switzerland

Institute of Biomedical Engineering, University of Stuttgart, Germany

Laboratory for Biocybernetics, Faculty of Electrical Engineering, University of Ljubljana, Slovenia

Ludwig Boltzmann – Institut f. Experimentelle Anaesthesiologie u. Intensivmedizinische Forschung, Wien, Austria

Budapest University of Technology and Economics, Budapest, Hungary

Universidad Politécnica de Madrid, Madrid, Spain

ORKI – National Institute for Hospital and Medical Engineering, Budapest, Hungary

Royal Institute of Technology, Stockholm, Sweden

Scuola di Specializzazione in Ingegneria Clinica, Università degli Studi di Trieste, Trieste, Italy

Università di Firenze, Dipartimento di Sistemi e Informatica, Firenze, Italy

University of California, Berkeley, USA

University of California, Los Angeles, USA

University of California, Santa Barbara, USA

University of Cincinnati, Cincinnati, USA

University of Texas at Arlington, Arlington, USA

International links

Case Western Reserve University, Cleveland, Ohio, USA

College of Medicine, University of Wales, Cardiff, UK

Computer Vision Laboratory, Faculty of Computer Science and Informatics, University of Ljubljana, Ljubljana, Slovenia

Dipartimento di Elettrotecnica, Elettronica ed Informatica, Università degli Studi di Trieste, Trieste, Italy

Department of Applied Informatics, University of Szeged, Szeged, Hungary

Department of Bioengineering, College of Engineering, University of Toledo, USA

University of Memphis, Memphis, Tennessee, USA

5.9. Department of Control and Computer Engineering

Faculty and staff

▼ Professors

Gabro Smiljanić – retired, professor emeritus

Ljubomir Kuljača – retired, distinguished professor

Mario Kovač – computer architectures, multimedia algorithms and architectures, large scale information systems, medical information systems, smart card applications

Zdenko Kovačić – intelligent and adaptive control, industrial and mobile robotics, artificial intelligence-based control, electrical drives and servo systems, virtual reality-based systems

Nedjeljko Perić – estimation and system identification, advanced control strategies, plant and process automation, servo drives and servo systems, control of renewable energy sources

Founded in 1954

Head of the department:
Prof. **Ivan Petrović**, PhD

Phone: +385 1 612 97 95
Fax: +385 1 612 98 09
E-mail: zari@fer.hr
URL: <http://www.fer.hr/zari>

Zoran Vukić – adaptive and robust control, fault tolerant and intelligent control, non-linear and stochastic control, guidance and control of marine vehicles

Mario Žagar – microcomputer architectures, real-time microcomputer systems, distributed computing (ubiquitous, pervasive) and distributed measurements/control, design automation, open computing, e-learning



▼ Associate professors

Željko Ban – modeling and simulation, intelligent and model reference adaptive control, optimization of control algorithm parameters, control of the fuel cell and photo voltaic based energy sources, alarm systems

Danko Basch – programming language design, modelling and simulation of computer architectures, hardware description languages

Stjepan Bogdan – discrete event systems, flexible manufacturing automation, intelligent control, supervisory control, multi-agent formation control

Ivan Petrović – advanced control, optimal estimation, autonomous mobile robots, networked robotic systems, intelligent space

▼ Assistant professors

Mato Baotić – mathematical programming, hybrid systems, optimal control, model predictive control

Hrvoje Mlinarić – computer architectures, embedded system design, programmable logic, system on chip

▼ Assistants

Darko Fudurić
Igor Čavrak

▼ Junior researchers

Marko Bago
Matko Barišić
Toni Bjažić
Vedran Bobanac
Ivana Bosnić
Mišel Brezak
Ivica Draganjac
Alan Goluban
Daniel Hofman
Mate Jelavić
Srećko Jurić-Kavelj
Andreja Kitanov
Josip Knezović
Martina Marinković
Ivan Marković
Jadranko Matuško
Branko Mihaljević
Damjan Miklič
Nikola Mišković
Alan Mutka
Marin Orlić
Matko Orsag
Tomislav Pavlović
Ana Petričić
Krešimir Petrinec

Tamara Petrović
Vlaho Petrović
Tamara Radošević
Tomislav Reichenbach
Marija Seder (Đakulović)
Tomislav Sečen
Nenad Smolić-Ročak
Vedrana Spudić
Maja Varga
Mario Vašak
Krešimir Vrdoljak
Martin Žagar

▼ Researchers

Kristijan Brkić
Marko Cukon
Juraj Feljan
Luka Ledicki
Đula Nađ
Antonio Vasiljević
Goran Vasiljević

▼ Administrative staff

Blanka Gott
Snježana Poljak
Lab support
Damir Josić

Educational activities

Theory of automatic control. Non-linear and optimal control. Adaptive and robust control. System identification and state estimation. Computer controlled systems. Neural and fuzzy control. Predictive control. Process identification. Mathematical modelling and simulation. Fault tolerant systems. Process automation. Servo systems. Robotics and flexible manufacturing systems. Service robotics. Ship automation. Security and alarm systems. Intelligent measurement in control systems. Digital computer and advanced computer concepts. Microcomputers. Real-time operation of digital computers. Computer architecture. Computer networks. Computer aided design. Multimedia systems and applications. Embedded and smart card systems. Computer programming languages and operating systems. Software engineering. Open systems. Open computing. E-learning. Wireless sensor networks.

First cycle study

▼ Mandatory courses

- Automatic control
- Computer architecture 1

- Computer-Controlled Systems
- Control System Elements
- Embedded systems
- Matlab
- Open Computing

▼ Elective courses

- Alarm Systems
- Automation Practicum
- Fundamentals of Intelligent Control Systems
- Multimedia Technology
- Robotics Practicum

Second cycle study

▼ Theoretical courses

- Computers and Processes
- Control of Electrical Drives
- Estimation Theory
- Fundamentals of Robotics
- Linear Control Systems Design
- Multimedia Architecture and Systems
- Nonlinear Control Systems

▼ Specialization courses

- Adaptive and Robust Control
- Discrete Event Systems
- Mobile Robotics
- Process Automation
- Systems Modeling and Simulation
- Distributed Software Development



▼ Elective courses

- Guidance and Control of Marine Vehicles
- Intelligent Control Systems
- Manufacturing Systems Design
- Robotic Systems Control

Postgraduate courses

- Adaptive and optimal control of the systems
- Adaptive and robust control - selected topics
- Applied estimation techniques
- Control of autonomous systems
- Control of discrete event systems
- Control of robotised plants
- Design of multivariable control systems
- Digital servo systems
- Intelligent control systems
- Intelligent manufacturing systems
- Microcomputers
- Model reference adaptive control
- Model predictive and optimal control
- Modelling and simulation - selected topics
- Multimedia computer systems
- Nonlinear control systems
- Process automation - selected topics

Research and development

Optimal, adaptive and robust control strategies and their applications to control complex technical systems. Application of fuzzy logic, neural networks and genetic algorithms in the control systems. System identification and optimal estimation. Automation of systems with discrete events and flexible manufacturing systems. Modelling and control of hybrid systems. Supervisory control (e.g. multi-AGV systems, wireless sensor networks). Virtual reality and Internet-based remote motion control. Failure detection, isolation and accommodation in marine vehicles and power plant



systems. Integration of communication and control systems in plant automation. Intelligent measurement systems, multi-sensor fusion. Vision based control. Navigation and control of mobile autonomous sensory-based systems. Distributed control systems for rail vehicles. Public lighting systems. Control of renewable energy systems: wind turbines wind farms, solar energy systems, generator systems based on the oceanic tidal and wave energy. Control of fuel cells with applications in power and transport systems. Secondary regulation of frequency and power exchange in power systems. Development of embedded systems, application-specific computer architectures, and microprocessor architecture design. Research in pervasive, ubiquitous computing, Immune systems in wireless sensor networks. Research of multimedia system architectures and algorithms for parallel processor architectures. Data compression. Visual data processing in medical applications. Smart card and information systems based on smart card technology. Development of hardware description languages for digital system design. Development of computer-aided design tools. Methods for modelling and simulation of computer systems. Data encryption methods and applications. Object-oriented distributed systems. Remote data acquisition and measurement systems. Electronic commerce – electronic payment systems. Fast volume rendering and compression. Medical information systems. Telemedicine. Cooperation with EU partners in setting up EU standards for European Education Connectivity Solution. SearchMe, interactive database of products and services of ICT industry- easy search of business partners in Croatian region – prerequisite for clustering of industry SME's. Collaborative internationalisation of software engineering in Croatia. Software engineering competence centres. E-learning and rich content. Development of advanced e-learning services to integrate content and increase its availability.

▼ Projects

AEOLUS – Distributed control of large scale offshore wind farms (EU FP7 Cooperation, STREP project, FP7-ICT-2007-2, Project No.: 224548, FER Project leader: Nedjeljko Perić, 2008.-2011.)

CURE - Developing the Croatian underwater robotics research potential (EU FP7 Research Potential, Support Action project, FP7-ICT-2007-2, Project No.: 229553, Project coordinator: Zoran Vukić, 2009.-2012.)

EECS - European education connectivity solution (EU FP7 Co-operative Research, Research for SMEs, Project No.: 232324, FER Project leader: Mario Kovač, 2009.-2011.)

EURON - European robotics research network (EU FP6 IST-2002-2.3.4.2 FET pro-actives project, Network of Excellence, Project No.:507728, FER Project leader: Ivan Petrović, 2004.-2008.)

Advanced control and estimation strategies in complex systems (project 036-0361621-3012, Ministry of Science Education and Sports, Republic of Croatia, Principal investigator: Nedjeljko Perić, 2007.)

Architectures of integrated computer and communication systems and services (project 036-0361959-1971, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Mario Kovač, 2007.-)

Control of mobile robots and vehicles in unknown and dynamic environments (project 036-0363078-3018, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Ivan Petrović, 2007.-)

Control system of the fuel cells energy source with the cogeneration (project 036-1201837-3020, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Željko Ban, 2007.-)

Design and implementation of special purpose programming languages (project 036-0361959-1979, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Danko Basch, 2007.-)

Integrated control of robotic systems in complex environments (project 036-0363078-3017, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Zdenko Kovačić, 2007.-)

RoboMarSec - Underwater robotics in sub-sea protection and maritime security (project 036-0362975-2999, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Zoran Vukić, 2007.-)

Software engineering in ubiquitous computing (project 036-0361959-1965, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Mario Žagar)

Task planning & scheduling in robotic and autonomous systems (project 036-0363078-3016, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Stjepan Bogdan, 2007.-)

SI0I - Social inclusion of immigrants (EU CARDS External actions of the European

community, MULTILAT, Project No.: 42802, FER Project leader: Zoran Vukić, 2007.-2009.)

FER technology, innovation and consulting (EU CARDS Intellectual Property Rights Infrastructure Project Pilot Institution, Project leader: Mario Kovač, 2006.-2007.)

DSD - Distributed software development (Swedish-Croatian bilateral project, Mälardalen University, School of Innovation, Design and Engineering, and University of Zagreb Faculty of Electrical Engineering and Computing, Project leaders: Ivica Crnković, Mario Žagar, 2003.-2013.)

Multirobot mobile systems with global computer vision (Slovenian-Croatian bilateral project, Faculty of Electrical Engineering, University of Ljubljana and Faculty of Electrical Engineering and Computing, University of Zagreb, Project leaders: Drago Matko, Ivan Petrović, 2007.-2008.)

Advanced control techniques in electromechanical systems (Hungarian-Croatian bilateral project, Budapest University of Technology and Economics, Department of Automation and Applied Informatics and University of Zagreb Faculty of Electrical Engineering and Computing, Project leaders: Istvan Nagy, Nedjeljko Perić, 2007.-2008.)

Research on the pivotal technology of the novel linear generator system for oceanic tidal and wave energy generate electricity (Chinese-Croatian bilateral project, China University of Mining & Technology and University of Zagreb Faculty of Electrical Engineering and Computing, Project leaders: Chen Hao, Nedjeljko Perić, 2008.-2009.)

Research on the full digital control system of the novel switched reluctance servo motor drive (Chinese-Croatian bilateral project, China University of Mining & Technology and University of Zagreb Faculty of Electrical Engineering and Computing, Project leaders: Chen Hao, Nedjeljko Perić, 2006.-2007.)

Autonomous mobile sensor platform for closed space surveillance and cleaning (project TP-E 44/2005, Ministry of Science, Education and Sports, Republic of Croatia, and Sitek s.p.a., Italy, Project leader: Stjepan Bogdan, 2005.-2007.)

DICES - Distributed component-based embedded software systems (Unity Through KnowledgeFund, Research Cooperability Programme, UKF 1A Grant Agreement No. 03/07, Project leaders: Ivica Crnković, Mario Žagar, 2008.-2011.)

Exploration robot for fire fighting units (National Foundation for Science, Croatia, and Hrid d.o.o. Zagreb, Croatia, Partnership in basic research, Principal investigator: Zdenko Kovačić, 2008.-2010.)

Multi criteria wind turbine control (National Foundation for Science, Croatia, and Končar Electrical Industries Inc. Zagreb, Croatia, Partnership in basic

research, Principal investigator: Nedjeljko Perić, 2008.-2011.)

Collaborative internationalisation of software engineering in Croatia (EU Tempus project no. 41023-2006, Grant holder: Wilhelm Schäfer, University of Paderborn, Germany, Project coordinator: Mario Žagar, 2007-2009)

Competence center for software engineering in open systems (establishment funded through EU Tempus project Collaborative internationalisation of software engineering in Croatia, Center head: Mario Žagar, 2009-)

Control of a robot for hydrodynamic processing of concrete and metal surfaces (Inteco d.o.o, Zagreb and Government Agency BICRO – IRCRO, Project Leader: Zdenko Kovačić, 2009-2010)

e-Learning now! : Development of advanced e-learning services to integrate available content (e-Učenje sad!, iProjekt, Ministry of science education and sports, Republic of Croatia, Project leader: Mario Žagar, 2008-)

eSpis Rollout: Support to court administration and case management improvement (IBM/ EuropeAid, FER Project leader: Mario Kovač, 2009.-2010.)

International links

The University of Texas, The Automation and Robotics Research Institute, Arlington, USA

The University of New Mexico, MARSHEs Lab, Albuquerque, USA

The Virginia Polytechnic Institute and State University, The Bradley Department of electrical Engineering, Blacksburg, USA

Eidgenössische Technische Hochschule Zürich (ETH), Institut für Automatik and Autonomous Systems Lab, Switzerland

Technische Universität München, Institut für Automatisierungstechnik und Autonome Systeme, Munich, Germany





Universität Rostock, Fachbereich Elektrotechnik,
Institut für Automatisierungstechnik, Rostock,
Germany

Univerza v Mariboru, Fakulteta za elektrotehniko,
računalništvo in informatiko, Maribor, Slovenia

Univerza v Ljubljani, Fakulteta za elektrotehniko,
Ljubljana, Slovenia

Sveučilište u Mostaru, Fakultet strojarstva i
računarstva, Mostar, Bosnia and Herzegovina

Technische Universität Wien, Institut für
Handhabungsgeräte und Robotertechnik,
Vienna, Austria

Mälardalen University (MdH), Department of Computer
Science and Engineering, Västerås, Sweden

Ford Motor Company, Scientific Research Laboratory,
Dearborn, Michigan, USA

IFAC – International Federation of Automatic Control

Anglia Polytechnic University, Department of Design
and Technology, Cambridge, UK

Technical University of Crete - A.B.E.A. - Anatoli S.A.,
Chania, Greece

Budapest University of Technology and Economics,
Budapest, Hungary

University of Tokyo, Institute of Industrial Sciences,
Tokyo, Japan

University of Paderborn, Paderborn, Germany

United Technologies Research Center (UTRC),
Hartford, Connecticut (U.S.)

Aalborg University, The Faculties of Engineering,
Science and Medicine, Denmark

Lund University, Department of Automatic Control,
Lund Institute of Technology, Sweden

Industrial Systems and Control, Glasgow, Scotland,
UK

Energy research Centre of the Netherlands (ECN),
Vestas Wind Systems, Denmark

China University of Mining&Technology, College of
Information and Electrical Engineering, Xuzhou,
China



5.10. Department of Electroacoustics

Faculty and staff

▼ Professors

Bojan Ivančević - electroacoustics, general acoustics, psychoacoustics, digital audiotechnology, ultrasound, hydroacoustics, architectural acoustics

Ivan Jelenčić - retired, distinguished professor

Branko Somek - retired, distinguished professor

▼ Associate professors

Hrvoje Domitrović - audio technique, sound reinforcement, loudspeakers, acoustical designing, sound recording and editing, broadcasting systems, audio in multimedia

Siniša Fajt - electroacoustics, digital sound processing, speech and hearing, acoustical

Founded in 1954

Head of the department:
Bojan Ivančević, Ph.D.

Phone: +385 1 612 96 40
Fax: +385 1 612 96 80
E-mail: ea@fer.hr
URL: <http://www.zea.fer.hr>

measurements, architectural acoustics, professional audio technique

▼ Assistant professors

Ivan Đurek - audio equipment, transducers, audio signal processing

Kristian Jambrošić - architectural acoustics, psychoacoustics, acoustic measurements, electroacoustics



▼ Assistant

Miljenko Krhen

▼ Researchers

Sanja Grubeša
Mia Suhanek
Marko Horvat
Antonio Petošić

▼ Administrative staff

Ljubica Konjević

▼ Lab support

Darko Gašparović

Educational activities

Acoustics: physical acoustics, hearing acoustics, speech and musical acoustics, speech recognition, architectural and building acoustics, control of noise and vibrations, infrasound and ultrasound in industry and medicine, prediction and measurement of noise pollution, audiology and audiometry, analysis and synthesis of speech and music, acoustical measurements.

Electroacoustics: electro-mechano-acoustical analogies, microphones, loudspeakers and enclosures, headphones, analogue and digital sound recording and reproduction, sound reinforcement in closed and open spaces, audio and data signal processing, sound systems, audio measurements.

Multimedia communications: digital audio broadcasting, radio receiver techniques, communication receivers and measurements, surround sound, multichannel recording and reproduction, movie and TV sound, Internet audio, broadband transmission of sound with GSM, sound broadcasting systems and facilities.



First cycle study

▼ Mandatory courses

- Electroacoustics
- Audio technics

▼ Elective courses

- Audio and computer
- Sound and environment
- Transmission of Audio

Second cycle study

▼ Theoretical courses

- Audiosystems

▼ Specialization courses

- Digital audiotechnics
- Analysis and processing of audio information
- Sound Quality in Broadcasting

▼ Elective courses

- Professional audio equipment
- Psychoacoustics
- Sound systems and loudspeakers
- Ultrasound in technique and medicine
- Room acoustics
- Speech and Musical Acoustics

Postgraduate courses

- Audio Forensics
- Audiocommunications
- Acoustical Design
- Electroacoustical measurements
- Electroacoustical transducers and systems
- Hearing Acoustics
- Noise and vibration
- Receiver techniques in digital transmission
- Sound in architecture
- Sound in Multimedia Systems
- The technology of acoustic space
- Ultrasonic Systems
- Architectural acoustics

Research and development

Investigation of problems in acoustics, electroacoustics and audiotechnics. Physical and physiological acoustics, surface acoustics waves, acoustical optics, hearing, speech intelligibility, audiology and audiometry, radiation of sound, architectural acoustics, problems of noise and noise control, hydroacoustics, ultrasound applications in medicine, pharmacy and industry, control rooms, sound studios and public address systems. Techniques of high fidelity, sound reproduction systems, analogue and digital processing of sound, audio amplifiers. Problems of communication, consumer receivers and receiver system planning. Digital audio signal processing in radiocommunications. Digital audio transmission and receiving. Engineering of components, equipment and systems in audio and radio receivers and radio broadcasting. Psychoacoustical models of the hearing process and their application in the recording, transmission, editing and reproducing of audio signal. Sound processing in multimedia. Development and measurement of acoustical components, equipment and spaces. Measurement and estimation of sound quality.

▼ Projects

Analysis and synthesis of ultrasound field for application on tissue (Project 036-1080231-1646, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Bojan Ivančević, 2007-2012)

Estimation, monitoring and noise control (Project 036-0361630-1633, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Hrvoje Domitrović, 2007-2012)

Acoustic characteristics of composite elements in civil engineering (Project 036-0821504-2319, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Kristian Jambrošić, 2007-2012)

Semantic Multimodal Analysis of Digital Media - COST Action 292, (2004-2008, MC Members: Siniša Fajt, Hrvoje Domitrović)



Soundscape of European Cities and Landscapes – COST TD0804 (2008-2012, MC Members: Kristian Jambrošić, Hrvoje Domitrović)

International links

Audio Engineering Society (AES), New York, USA

European Acoustical Society (EAA), Madrid, Spain

International Institute for Acoustics and Vibration (IIAV), USA

Acoustical Society of America (ASA), New York, USA

Austrian Acoustics Association (AAA), Vienna, Austria

DEGA, University of Oldenburg, Germany

Slovenian Acoustical Society (SAS), Ljubljana, Slovenia

Akustik Buero Oldenburg, Germany

Institut für technische Akustik der RWTH, Aachen, Germany

Institut für allg. Elektrotechnik und Akustik, Bochum, Germany

Institut für Allgemeine Physik, TU Vienna, Austria

IT University of Goteborg, Sweden

Queen Mary University, London, UK



5.11. Department of Electronics, Microelectronics, Computer and Intelligent Systems

Faculty and staff

▼ Professors

Adrijan Barić – modelling of electronic devices, integrated circuits, passive components and interconnect

Petar Biljanović – electronic devices, solid state circuits, microelectronics (retired 01.10. 2008.)

Leo Budin – retired, member of the Croatian Academy of Science and Arts, professor emeritus

Nikola Bogunović - formal methods in system design, model based design, model based reasoning, knowledge based systems, knowledge discovery,

Željko Butković – electronic devices and circuits, microelectronic analog and digital circuits, CAD in microelectronics

Bojana Dalbelo Bašić – artificial intelligence, machine learning, data and text mining, natural language processing, information retrieval

Vlado Glavinić – e-learning and m-learning systems, human-computer interaction, mobile applications and interfaces, Semantic Web.

Founded in 1943

Head of the department:
Prof. **Julijana Divković-Pukšec**, PhD

Phone: +385 1 612 99 35
Fax: +385 1 612 96 53
E-mail: zemris@fer.hr
URL: <http://www.zemris.fer.hr/>

Uroš Peruško – retired, distinguished professor

Slobodan Ribarić – computer architecture, digital system design, pattern recognition, biometrics, computer vision, artificial intelligence, intelligent systems, autonomy oriented computing

Siniša Srblijić – Web and cloud computing; widget-oriented and service-oriented architectures; crowdsourcing and collective intelligence, consumer programming; programming language translation; theory of computing.

Dalibor Vrsalović – design tools for complex systems based on computers; modeling and verification of complex systems and their components.



▼ Associate professors

Julijana Divković-Pukšec - electronic devices, solid state circuits, VLSI physical design

Zoran Kalafatić – computer vision, pattern recognition

Željka Mihajlović – computer graphics, visualization, animation, virtual reality

Vlado Sruk – software and hardware reliability, design methodologies, embedded systems and information technology, storage systems

▼ Assistant professors

Marin Golub – operating systems, computer security, evolutionary computation

Domagoj Jakobović – evolutionary computation, parallel and distributed computation

Leonardo Jelenković – operating systems, embedded operating systems

Igor Krois – analog design

Tomislav Suligoj – advanced electron devices, semiconductor fabrication technology, simulation modeling and characterization, solid state circuit design

Siniša Šegvić – computer vision, autonomous navigation, software design, computer architecture

▼ Lecturers

Aleksandar Szabo

▼ Assistants

Vladimir Čeperić

Stjepan Groš

Tomislav Hrkač

Vladimir Jovanović

Alan Jović

Marko Koričić

Jakov Krolo

Tvrtko Mandić

Branko Samaržija

Klemo Vladimir

▼ Junior researchers

Ivan Budiselić

Marko Čupić

Goran Delač

Ivan Fratrić

Igor Grudenić

Danko Ivošević

Mario Križan

Marijo Maračić

Darijan Marčetić

Mario Perić

Mirko Poljak

Miroslav Popović

Frane Šarić

Artur Šilić

Marin Šilić

Jan Šnajder

Dejan Škvorc

Marija Tadić

Valentina Zadrija

Sanja Žonja

Ivan Žužak

▼ Researchers

Karla Brkić

Jure Mijić

▼ Administrative staff

Dubravka Bernat

Biljana Geratović

▼ Lab support

Zvonimir Jakopović

Branko Filipčić

Educational activities

Electronic devices. Analogue electronics. Microelectronic technology, devices and circuits. Microelectronic standard circuits, ASIC and SoC design. Computer-based circuit analysis. Integrated circuit physical design and verification.

Digital logic design. Computer and communication networks. Internet technologies. E-learning and m-learning. Mobile applications. Web computing. Service-oriented architectures. Network security. Semantic Web. Computer graphics. Visualization. Programming language translation. Theory of computing. Parallel programming. Software and hardware reliability. Embedded systems. Storage systems.

First cycle study

▼ Mandatory courses

- Artificial intelligence
- Communication networks
- Computer Architecture 2

- Digital logic
- Electronics 1
- Electronics 2
- Interactive computer graphics
- Introduction to the Theory of Computing
- Operating Systems
- Programming Language Translation
- Project
- Seminar
- Software Design
- Software Project

▼ Elective courses

- Design patterns in Software Engineering
- Introduction to Pattern Recognition
- Scripting languages

▼ Skills

- Introduction to Java programming language
- PHP application development basics

Second cycle study

▼ Theoretical courses

- Advanced computer networks
- Computer aided analysis and design
- Computer animation.
- Computer graphics.
- Computer vision
- Distributed systems
- Human-computer interaction
- Intelligent multiagent systems
- Machine learning
- Microelectronic components
- Networked systems middleware
- Operating Systems for Embedded Computers
- Parallel Programming
- Pattern Recognition
- Real-Time Systems
- Service-oriented computing

▼ Specialization courses

- Advanced computer networks
- Computer aided analysis and design
- Computer animation.
- Computer graphics.
- Computer vision

- Distributed systems
- Human-computer interaction
- Intelligent multiagent systems
- Machine learning
- Microelectronic components
- Networked systems middleware
- Operating Systems for Embedded Computers
- Parallel Programming
- Pattern Recognition
- Real-Time Systems
- Service-oriented computing

▼ Elective courses

- CAD Procedures in Physical Integrated Circuit Design
- Design of Radio-frequency and Microwave Integrated Circuits
- Expert systems
- Fuzzy, evolutionary and neuro-computing
- Power Supply for Electronic Devices
- Storage systems
- User interfaces and interactive systems design
- VLSI technology

Postgraduate courses

- Advanced and intelligent networking technologies
- Algorithms in control systems
- Biometric-based Security Systems
- Compiler technology for distributed computer systems
- Computer and robot vision
- Computer graphics
- Computer systems evaluation
- Computer system security
- Custom design of VLSI/ULSI circuits
- Distributed computing systems
- Dynamic Scene Analysis
- High speed integrated circuits
- Human computer interaction
- Knowledge discovery in data sets
- Knowledge representation in information systems
- Microelectronic circuits design
- Microelectronics of computing and communicating systems
- Multiprocessors and parallel systems
- Processes in distributed computing systems
- Programming language translation in distributed computing systems
- Programmable logic circuits



- Reliability and fault-tolerance of computer systems
- Robot and Computer Vision
- Statistical models for data mining
- Storage systems
- System-on-Chip (SoC)
- Visualization methods

Research and development

▼ Electronics & microelectronics

Semiconductor material applications in non-standard fields. New semiconductor heating elements and temperature sensors. Modern homojunction and heterojunction transistor structures. New horizontal current bipolar transistor (HCBT). Development of semiconductor device models. Modelling of passive devices. Development of simulation methods and their application in microelectronics. Development of topology design methods for VLSI/ULSI circuits. Analysis and design of bipolar, CMOS, BiCMOS and GaAs analogue and digital integrated circuits. Physical layout and verification of microprocessor integrated circuits. On chip DC and RF measurements.

▼ Computing

Digital system design. Computer systems hardware and software co-design and development.



Formal methods in the design of computing systems. Software and hardware reliability. Embedded systems. Real-time systems.

Distributed systems, clusters and grids. Dependable systems design and development. Computer systems and network security. Computer graphics, animation and visualization. Human-computer interaction.

Internet computing. Web and cloud computing. Widget-oriented and service-oriented architectures. Consumer programming. Autonomy-oriented computing. Multi-agent systems. Semantic Web and ontologies. Mapping data to ontologies. Office automation. Electronic document management systems. Mobile applications and interaction.

Intelligent information systems. Crowdsourcing and collective intelligence. Evolutionary computation. Expert and other knowledge based systems. Data, text and signal mining. Machine learning. Pattern recognition. Computer vision. Biometrics. E-learning, m-learning and u-learning.

▼ Projects

Distributed Systems, Methods, and Applications (Scientific program 036-0362980, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Siniša Srblijić, 2007)

Computing Environments for Ubiquitous Distributed Systems (Scientific project 036-0362980-1921, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Siniša Srblijić, 2007-present)

Universal Middleware Platform for e-Learning Systems (Project 036-0361994-1995, Ministry of Science, Education and Sport, Republic of Croatia, Principal investigator: Vlado Glavinić, 2007-)

Intelligent Support to Omnipresence of e-Learning (Program 0361994, Ministry of Science, Education and Sport, Republic of Croatia, Program coordinator: Vlado Glavinić, 2007-)

Universal Middleware Platform for e-Learning Systems (Project 036-0361994-1995, Ministry of Science, Education and Sport, Republic of Croatia, Principal investigator: Vlado Glavinić, 2007-)

Signal Integrity of Mixed-Signal Integrated Circuits (Project 036-0361621-1622, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Adrijan Barić, 2007-)

Knowledge discovery in textual data (036-1300646-1986, Croatian Ministry of Science, Education and Sports, principal investigator: Bojana Dalbelo Bašić, 2007-2012)

Sophisticated semiconductor structures for communication technology (Project 036 – 0361566 – 1642 Ministry of Science and Technology, Republic

of Croatia, Principal investigator: Petar Biljanović from 2007-2009, Vladimir Jovanović 2009-)

Design Environments for Embedded Systems

(Project 036-0362980-1929, Ministry of Science and Technology, Republic of Croatia, Principal investigator: Daniel Gajski, 2007-)

Nanometric electron devices and circuit applications (Project 036 – 0361566 – 1567 Ministry of Science and Technology, Republic of Croatia, Principal investigator: Tomislav Suligoj, 2007-)

User-oriented scheduling heuristics (Applied information technology project 2008-050, Ministry of Science, Education and Sports, Republic of Croatia, Principal investigator: Domagoj Jakobović, 2009-2010).

Automatization of constructing and processing of paper-based assessments (Project 2008-078 Ministry of Science, Education and Sports, Republic of Croatia, Project leader: Marko Čupić, 2009-2010)

Automotive IC design for large EMC - Parachute (AMI Semiconductor Belgium BVBA, Principal investigator: Adrijan Barić, 2007-2009)

BioSecure Network of Excellence (NoE) "Biometrics for Secure Authentication" (EU project BioSec, coordinator: Prof. dr. sc. Slobodan Ribarić; start: 1. June 2005. end: 30. March 2008.)

COST Action 2101 Biometrics for Identity Documents and Smart cards (BIDS), coordinator: Prof. dr. sc. Slobodan Ribarić; start: 1. Dec. 2006. end: 30. Nov. 2009.)

Multimodal Biometric Verification System (Bilateral Croatian-Slovenian, project leader: Prof. dr. sc. Slobodan Ribarić; start: 1. January 2006. end: 30. December 2007.)

Computer aided document indexing for accessing legislation (KRO/009/006, Croatian-Flemish project, coordinators: Bojana Dalbelo Bašić and Marie-Francine Moens, 2007-2009).

Knowledge discovery and visualization of textual data (Croatian-French research project, program COGITO, coordinators: Bojana Dalbelo Bašić and Annie Morin, 2007-2008).

Advanced Vision-based Concurrent Mapping and Navigation (AviCMaL), FP6 Marie Curie International Incoming Fellowship, project number 21532, jointly proposed by Axel Pinz and Siniša Šegvić, coordinated by Axel Pinz (TU Graz), 2006-2007.

Application-Oriented Embedded System Technology (Unity Through Knowledge Fund, University of California, Irvine, USA, Principal Investigator: Daniel D. Gajski, Co-Principal Investigator: Vlado Struk, 2007-2010)

Mapping and Assessing Traffic Infrastructure (MASTIF), Croatian National Foundation for Science,

programme Partnership in basic research, project number #04/20; in collaboration with IPV Zagreb and TU Graz, coordinated by Siniša Šegvić, 2008-2011.

End-User Tool for Gadget Composition (Google Research Award, Google Inc., CA, USA, Principal investigator: Siniša Sriblić, 2007-present)

Unified Translation Memory (Google Research Award, Google Inc., CA, USA, Principal investigator: Siniša Sriblić, 2007-present)

A New Horizontal Current Bipolar Transistor (HCBT) for 0.18µm BiCMOS Integration (Asahi Kasei EMD Corp. Principal investigator: Tomislav Suligoj, 2006-)

Autonomy-Oriented Computing Structures (AOC – 036 – 0361935-1954), project leader Prof. dr. sc. Slobodan Ribarić; start: 1. Dec. 2006. end: 30. Nov. 2009.)

International links

Agilent, Santa Rosa, California, USA

AMI Semiconductor, Oudenaarde, Belgium

Cadence Design Systems GmbH, Feldkirchen, Germany

Cambridge Semiconductor, United Kingdom

Cisco Systems Inc., San Jose, California, USA

Delft University of Technology, The Netherlands

Dipartimento di Elettrotecnica ed Elettronica, Politecnico di Bari, Bari, Italy

Ecole Polytechnique Federale de Lausanne, EPFL-STI-IMM, Switzerland

Fakulteta za računalništvo in informatiko, Univerza v Ljubljani, Slovenia

Faculty of Electrical Engineering, University of Ljubljana, Slovenia

Faculty of electrical engineering, mechanical engineering, and naval architecture, University of Split, Croatia



Faculty of Information Science and Engineering,
Northeastern University, Shenyang, China

Friedrich-Alexander Universität Erlangen-
Nürnberg, Institut für Mathematische Maschinen
und Datenverarbeitung, Lehrstuhl für
Mustererkennung, Erlangen, Germany

Ghent University, INTEC, Ghent, Belgium

Google Inc., Mountain View, California, USA

Graz University of Technology, Graz, Austria

Group Lagadic, IRISA/INRIA Rennes, France

Hong Kong University of Science and Technology,
China

Inter-university MicroElectronics Center, Belgium

Institut "Jožef Stefan", Knowledge technologies
department, Slovenia

Institute of Electrical Measurement and Measurement
Signal Processing, TU Graz, Austria

IRISA, Université de Rennes 1, Rennes, France

Katholieke Universiteit Leuven, Computer science
department, Leuven, Belgium

Katholieke Universiteit Leuven, ESAT, Belgium

Medical University Graz, Institute of Medical
Informatics, Statistics and Documentation.

Pictorial Computing Laboratory (PCL), Rome, Italy

Politecnico di Bari, Dipartimento di Elettrotecnica ed
Elettronica, Bari, Italy

Portland State University, Portland, Oregon, USA

Robert Bosch GmbH, Automotive Electronics Division,
Germany

TriQuint Semiconductor, Inc., Oregon, USA

Università degli Studi di Roma 1 La Sapienza,
Dipartimento di Scienze dell'Informazione, ,
Pictorial Computing Laboratory (PCL), Rome,
Italy.

University of California Irvine, California, USA

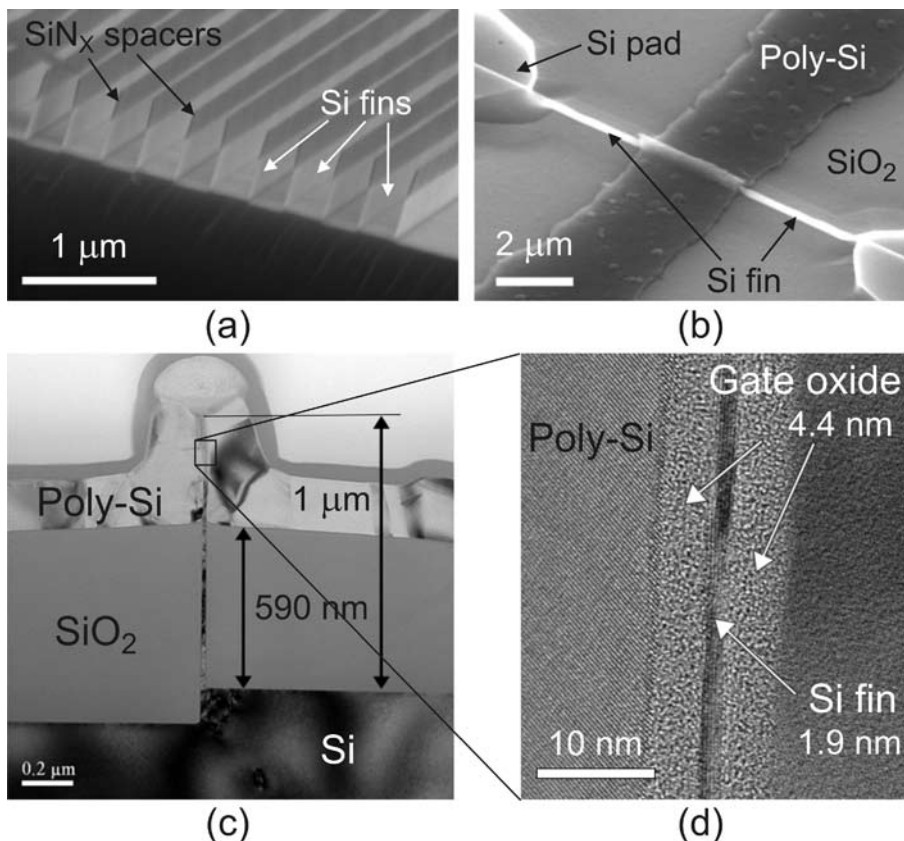
University of California, Los Angeles, USA

University of Cambridge, United Kingdom

University of German Federal Armed Forces, Munich,
Germany

University of Toronto, Toronto, Ontario, Canada

Univerza v Mariboru, Fakulteta za elektrotehniko,
racunalnistvo in informatiko, Maribor, Slovenia



5.12. Department of Wireless Communications

Faculty and staff

▼ Professors

Juraj Bartolić - electromagnetic wave theory, microwave engineering, antennas and propagation, remote sensing, EMCEMI

Sonja Grgić - video signal processing and communications, picture quality assessment, digital video broadcasting

Boris Kviz - retired, distinguished professor - optical communication systems, radio telemetry, radiolocation and navigation

Borivoj Modlic - broadcasting, wireless access networks, EMC

Robert Nađ - mobile and wireless communications, RF and microwave small signal amplifiers, circuits and communication system weak nonlinearities problems

Dina Šimunić - wireless communications, biomedical effects of electromagnetic fields, green communications, intelligent transport systems

Zvonimir Šipuš - optical communication systems, computational electromagnetics, antennas

Founded in 1954

Head of the department:
Prof. **Zvonimir Šipuš**, Ph.D.

Phone: + 385 1 6129 857
Fax: + 385 1 6129 717
E-mail: rc@fer.hr
URL: <http://www.rc.fer.hr/>

Ervin Zentner - retired, distinguished profess - antennas and propagation, mobile communications, microwave circuits, electromagnetic compatibility, radar systems

Branka Zovko-Cihlar - retired, distinguished professor - digital television, multimedia communications, television broadcasting, broadband network mobile communication

▼ Associate professors

Davor Bonefačić - microwave engineering, active antennas, radar systems

Mislav Grgić - digital mammography, computer-aided detection and diagnosis (CAD) for breast





cancer, face recognition, biometrics, image and video compression, multimedia communications

Silvio Hrabar - electromagnetic wave theory, application of microwaves, antennas, optoelectronic circuits

Tomislav Kos - radio positioning and navigation, television, cable television systems, broadband networks

Krešimir Malarić - electromagnetic wave theory, microwave communications, satellite communications, EMC, biomedical effects of electromagnetic fields

▼ Assistant professors

Gordan Šišul - wireless access networks, mobile communications, digital communications, propagation

Radovan Zentner - radio channel modelling, wireless communication, MIMO systems, antennas, propagation

▼ Assistants

Mario Cvitković

▼ Junior researchers

Iva Bačić
Dario Bojanjac
Marko Bosiljevac
Jelena Božek
Tomislav Debogović
Emil Dumić
Branimir Ivšić
Tin Komljenović
Damir Muha
Mario Muštra
Siniša Škokić
Davor Zaluški
Damir Zrno

▼ Administrative staff

Ljerka Nuić
Josipa Tanja Baček

▼ Lab support

Damir Petričević

Educational activities

Active Antennas, Advanced Electromagnetic Engineering, Antennas, Application of Microwaves in Industry and Science, Biomedical Effects of Electromagnetic Fields, Broadband Networks for Television Signal Distribution, Digital Television, Digital Video Communications, Frequency and Signal Synthesis, Microwave Communications, Microwave Engineering, Microwave Measurements, Microwave Receivers, Microwave Semiconductor Electronics, Mobile Communication, Modulation Methods, Modulations and Modulators, Noise Analysis in Communication System, Noise in Radio Communications, Numerical Analysis of Antennas and Guiding Structures, Optical Communication Systems, Optical Communications, Optical Sensors and Components, Optoelectronic Circuits, Packet Radiocommunications, Picture Quality in Digital Video Communications, Protection of Radiocommunication Systems, Radar Systems, Radio Positioning and Navigation, Radio Communication System Fundamentals, Radio Communication Systems, Radio-Frequency Amplifier Design, Radio Frequency Electronics, Satellite Communications, Spread Spectrum Systems, Television, Theory of Communication Systems, Theory of Electromagnetic Waves, Wireless Local Networks, Wireless Access Networks, Wireless Circuits Design.

First cycle study

▼ Mandatory courses

- Applied Electromagnetics
- Communication Systems
- Multimedia Technologies
- Mobile Communications

▼ Elective courses

- Digital Video
- Optical Communication Technology
- Public Mobile Network
- Radio Navigation
- Technical Standardization and Legislation

Second cycle study

▼ Theoretical courses

- Antennas and Propagation
- Microwave Engineering
- Optical Communication Systems
- Radio-Frequency Electronics
- Radio-Frequency Systems
- Video Communication Technologies

▼ Specialization courses

- Digital Broadcasting
- Mobile Internet
- Mobile Systems Planning
- Optical Networks
- Radio-Frequency and Microwave Measurements
- Satellite Communication Technology
- Wireless Access Networks

▼ Elective courses

- Application of Microwaves in Industry and Science
- Cable Networks for Interactive Communications
- Design of Radio-Frequency and Microwave Integrated Circuits
- Numerical Modeling of Antennas and Microwave Structures
- Radar Systems
- Radio-Frequency Amplifiers
- Radiometry and Remote Sensing
- Securing Wireless Systems



Postgraduate courses

- Active Antennas
- Advanced Electromagnetic Engineering
- Advanced Modulation Methods
- Biomedical Effects of Electromagnetic Fields
- Broadband Networks for Television Signal Distribution
- Communications for Multimedia Services
- Electronic Tracking Systems
- Microwave Instrumentation and Measuring Methods
- Multimedia Content Retrieval
- Navigation Systems
- Optical Sensors and Components
- Picture Quality in Digital Video Communications
- Quality of Service in Wireless Systems
- Radiofrequency System Design
- Satellite Communications
- Signal Equalization in Wireless Transmission
- Spread Spectrum Systems
- Theory of Wireless Communication Systems

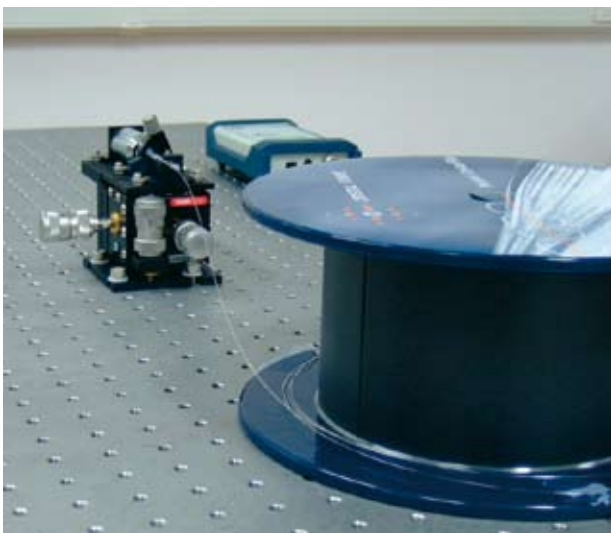
Research and development

Smart antennas for communication and radar systems. Self-oscillating push-pull phased arrays of modified rectangular and circular patches with electronic beam scanning and quasi-optical power combining capabilities. Planar and quasi-planar small antennas for mobile base station and terminal applications. Numerical methods in electromagnetic





wave scattering and antenna analysis. Conformal antennas - microstrip arrays on general convex structures. Broadband microstrip radiating elements: stacked patch antennas on planar and cylindrical structures. Introduction of genetic algorithms into the analysis of complex antenna problems. Highly sensitive fully automatic phase noise measurement system. Land and satellite mobile radio communication spectrum efficiency. Electromagnetic compatibility of wireless systems. Multimedia communications and services. Digital image and video compression algorithms. Multimedia transmission over broadband and wireless networks. Quality of service for video communications. Subjective assessment of picture quality. The effect of bit errors and packet loss on compressed video. Variable bit rate video coding and quality control. Theoretical and experimental study of TEM and GTEM cells. Electromagnetic field measurements. Biomedical effects of electromagnetic fields. High precision RF and microwave measurements. Dosimetry and densitometry of electromagnetic fields. Optical sensors. Numerical modelling of multilayer fibers. Meta-materials. New structures with metamaterials. Multi-frequency radar systems. Ionospheric and tropospheric propagation impact on satellite positioning performance.



▼ Projects

EURO-TELEPATH - Telepathology Network in Europe (COST Action IC0604, Co-operation in Science and Technology, European Commission, National coordinator: Mislav Grgić).

Intelligent Image Features Extraction in Knowledge Discovery Systems, (Ministry of Science, Education and Sport, Principal investigator: Mislav Grgić, 2007-2009).

Picture Quality Management in Digital Video Broadcasting, (Ministry of Science, Education and Sport, Principal investigator: Sonja Grgić, 2007-2009).

Lunenburg Antenna for Multimedia on Train, EUREKA cluster project: PIDEA + EURIPIDES EUR-06-109 LAFMOT - European Commission, Ministry of Science, Education and Sports, Republic of Croatia, since 2007.

European School of Antennas, Marie Curie Conferences and Training Courses, EU, since 2007.

Electromagnetic effects and structures in communication systems, Project 036-0361566-1570 Ministry of Science, Education and Sports, Republic of Croatia, since 2007.

Wireless and optical sensor communication networks, Project 275-0361566-3136 Ministry of Science, Education and Sports, Republic of Croatia, since 2007.

Antenna systems and sensors for information society technologies, COST Action IC0603, Cooperation in Science and Technology, since 2006.

Fibres for new challenges facing the information society, COST Action 299, Cooperation in Science and Technology, since 2005.

ACE Antenna Centre of Excellence, Network of Excellence, 6th Framework of EU, 2004-2007.

Efficiency increase of wireless communications systems, Project 036-0363081-1649 Ministry of Science, Education and Sports, Republic of Croatia.

Green Communications, in cooperation with Aalborg University, CTIF, Denmark.

Electromagnetic Metamaterials and Nanoelectromagnetics, (Ministry of Science, Education and Sport, Principal investigator: Silvio Hrbar, 2007-2009).

COST Action 2100 - Pervasive Mobile & Ambient Wireless Communications

Multifunctional Antennas in Communication and Radar Systems, (Ministry of Science, Education, and Sports, Principal investigator: Juraj Bartolić) (2007-2009).

ASSIST - Antenna Systems & Sensors for Information Society Technology (COST Action

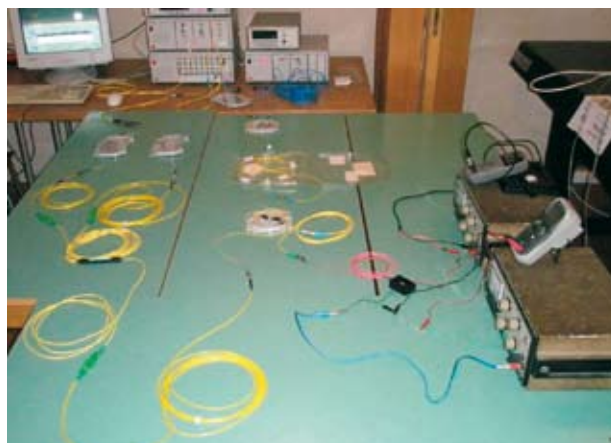
IC 0603, Co-operation in Science and Technology, European Commission, National Coordinator: Juraj Bartolić (2008-2010).

ACE2 - Antenna Centre of Excellence (FP6 - NoE, National coordinator: Juraj Bartolić).

COST 296 - MIERS (Mitigation of Ionospheric Effects on Radio Systems).

Environment for satellite positioning, (Ministry of Science, Education and Sport, Principal investigator: Tomislav Kos, 2007-2009).

Laboratory for electromagnetic compatibility and biological effects of EM fields (036-0361566-1569).



International links

Slovak University of Technology in Bratislava, Faculty of Electrical Engineering and Information Technology, Department of Telecommunications, Section of Digital Signal Processing, Bratislava, Slovakia

Technical University of Budapest, Department of Microwave Telecommunications, Signal & Digital Image Processing & Multimedia Laboratory, Budapest, Hungary

University of Essex, School of Computer Science and Electronic Engineering, Colchester, Essex, United Kingdom

University of Maribor, Faculty of Electrical Engineering and Computer Science, Institute of Automation, Laboratory for Signal Processing and Remote Control, Maribor, Slovenia

George Mason University, Department of Computer Science, Fairfax, VA, USA

University of Calgary, Department of Electrical and Computer Engineering, Alberta, Canada

University of Surrey, Electronic Engineering Department, Centre for Communication Systems Research (CCSR), Guildford, United Kingdom

City University London, Information and Biomedical Engineering Centre, London, United Kingdom

Air Force Research Laboratory, Hanscom AFB, USA

Brunel University, Department of Systems Engineering, United Kingdom

Chalmers University of Technology, Department of Electromagnetics, Goeteborg, Sweden

Motorola, Electromagnetics Research Laboratory, Florida, USA

Pacific Northwest National Laboratory, USA

Swiss Federal Institute of Technology, Department of Electrical Engineering, Zuerich, Switzerland

Technische Universität Graz, Institut für Elektro- and Biomedizinische Technik, Austria

Third University of Rome, Department of Electrical Engineering, Italy

University of Gent, Department of Information Technology, Belgium

University of Massachusetts Amherst, Department of Electrical and Computer Engineering, USA

University of Utah, Electrical Engineering Department, Salt Lake City, Utah, USA

University of Rennes, IETR, Rennes, France

University of Siena, Siena, Italy

University of Vigo, Vigo, Spain

Carlos III University of Madrid, Madrid, Spain

University of Florence, Florence, Italy

US Air-Force Research Lab, Hanscom, MA, United states

Institute for Plasma Physics, University of Stuttgart, Germany

University of Bologna, DEIS - Dipartimento di Elettronica, Informatica e Sistemistica, Italy

6. Management and Administration

6.1. Dean and Vice Deans

Vedran Mornar – Dean

Mario Cifrek – Vice Dean

Sead Berberović – Vice Dean

Hrvoje Domitrović – Vice Dean

Phone: +385 1 612 96 42

Fax: +385 1 617 00 07

E-mail: fer@fer.hr



Dean and vice deans (from left to right): Mario Cifrek, Vedran Mornar (dean), Sead Berberović, Hrvoje Domitrović

6.2. Secretary's Office and Finance Department

Vladimir Malarić -Head of Office

Marija Rumac – Head of Dean's Office

Phone: +385 1 612 96 42

Fax: +385 1 617 00 07

E-mail: fer@fer.hr

Marija Kovačević – Head of Office for General Affairs

Jožica Poslon

Đurdica Jelić – Head of Registry Department

Nikolina Miljan

Srećko Papac

Jadranka Matleković – Head of Human Resources Office

Renata Peček

Carmen Grčić



Finance Department

Phone: +385 1 612 97 22

Fax: +385 1 617 00 07

E-mail: olga.zupanic@fer.hr

Olga Županić – Chief Financial Officer

Ivana Borilović

Anka Jurić

Martina Petrović

Mira Silov

Gordana Šincek

Dijana Bontempo

Gordana Gluščević

Mara Mihaljević

Jasna Matijević

Branka Filipović

6.3. Student Administration Office

Includes admission of students, enrolment in academic year, keeping examination records, providing certificates and transcripts for earning all sorts of student rights-scholarships, organizing accomodation in student dorms, student meal discount, public transportation, and organization of promotions of graduate engineers.

Petra Žitnik - Head of Student Administration Office

Željka Bratić Odobašić - undergraduate and graduate study

Ana Zelić - undergraduate study

Phone: +385 1 6129 520

Fax: +385 1 6129 530

E-mail: stuslu@fer.hr

Sanja Horvat - undergraduate study

Vasilija Tovarloža - undergraduate and graduate study

Smiljanka Turkalj - postgraduate specialist study

Mirjana Grubiša - postgraduate doctoral study



6.4. FER Library

FER Library, as an organizational unit of the Faculty, finds its calling and mission in providing a high-quality support to scientific-teaching procedure, as an active partner in enhancing the quality of the learning outcomes.

By the usage of the Library holdings, and the skills of information retrieving, and searching the available online databases, the Library staff recommends literature to the Faculty students, as well as to graduating students, postgraduates, high-school students, corporate employees, and all who need help in finding necessary technical-scientific publications (approximately 5,000 users).

For the purposes of entry and processing of data related to the service of literature search on demand, a database was developed in the Library, as well as an interlibrary loan database. On the basis of the above mentioned databases, two web forms for communicating with the Library users were also developed.

The FER Library acts as a support in lecturing a humanities class called Research, Publication and Responsibility in Science at the graduate study program, and the Library staff is a part of the organizing committee of the annual conference of the Croatian academic and scientific libraries, which, for the 9th time in a row, takes place at the Faculty.

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 URL: <http://www.fer.hr/knjiznica>

The Library staff also participates in a scientific project of The Ministry of Education:

▼ Projects

Evaluation of Library Services: Academic and Public Libraries (122-1221210-0759) (project leader Kornelija Petr Balog, PhD., Faculty of Philosophy, Osijek)

Jadranka Lisek – Head of Library

Branka Marijanović - Librarian

Stjepan Šimara - Librarian

Zora Žitnik – Assistant Librarian



6.5. Information Support Centre

The main purpose of the Information Support Centre is to provide IT support for the Faculty. This includes:

- planning and procuring network equipment, computer equipment and software;
- planning, developing and maintaining the central web, intranet and e-learning services;
- managing faculty-wide IT security, networking infrastructure, various information services.

The Centre is constantly expanding and upgrading: the networking infrastructure including numerous switches and wireless access points, various UNIX/Linux/Windows servers, more than 250 PC workstations in various laboratories, various operating systems and application software and IT services. In the last 2-year period the Centre has developed the new Faculty web / intranet portal based on the advanced Faculty's Content Management System and the E-Campus e-learning infrastructure. In that period, the Centre has also adopted virtual server

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 Fax: +385 1 617 00 07
 E-mail: cip@fer.hr
 URL: <http://www.fer.hr/cip>

technology based on the IBM Blade system which will provide more flexible application infrastructure in the future.

Kristijan Zimmer – Head of Information Support Centre

Josip Herceg

Damir Kirasić

Vedran Klasić

Krešimir Kroflin

Vlatka Paunović

Svebor Prstačić

Siniša Tomić

Ivan Voras

Tomislav Žganec



6.6. Technical Support and Maintenance

Lovorko Erceg – Head of Technical Support and Maintenance

Dubravko Dajević – Technical Support Department

Ivan Čajsa

Marijan Kundih

Željko Stojin

Dušan Bušljeta

Boris Grgin

Miljenko Vukmanić

Josip Leskovec

Božo Armelin

Željko Bosilj

Miroslav Iličić

Josip Kalaj

Robert Veljković

Josipa Baček

Đurđica Blaga

Vesna Borošak

Mirjana Brozović

Marija Čukelj

Vera Čukelj

Đurđica Dandić

Zdenka Dandić

Mira Đurašin

Barica Kenig-Sovina

Marija Kočiš

Branka Marjanović

Manda Marković

Marija Mikić

Ljiljana Mišerić

Gordana Ožvalt

Zrinka Plodinec

Vesna Popović

Nada Rabik

Ankica Radaš

Marija Rajević

Ana Relotić

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