ANNUAL REPORT 2003

FACULTY OF ELECTRICAL ENGINEERING AND COMMUNICATION

BRNO UNIVERSITY OF TECHNOLOGY

Contents

Introduction

History

Brno University of Technology (BUT) is the second largest and the second oldest technical university in the Czech Republic. It was founded in 1849 for technical, agricultural and commercial specializations. The languages of tuition were Czech and German. In consequence of political and national disputes Czech gradually ceased to be used as a language of tuition until in 1899 the Czech Technical High School was established in Brno. After World War I and the foundation of Czechoslovakia this school merged with the German Technical School (originally bilingual) to form the High Technical School in Brno (later bearing the name of Dr. Edvard Beneš, the second President of Czechoslovakia). In the period between World War I and World War II this school was among the best technical high schools in Europe. During World War II the school was, as all other Czech high schools were, closed and the premises were used by German military institutions, and most equipment was destroyed. Immediately after the end of World War II the activities of the school were resumed. In 1951, at the beginning of Cold War, the Technical High School was closed and some departments became parts of the newly established Military Academy. Tuition for civilians continued at the former faculty of civil engineering only. However, it soon became evident that the technical university should be re-established. Since 1956 the school has gradually resumed its activities in various fields.

Electrotechnical disciplines were first taught at the university in 1905. Since 1959 when an independent Faculty of Power Engineering was founded, and subsequently transformed into Electrotechnical Faculty, over 22,000 students have graduated from the faculty. In 1993, the structure of the faculty was changed. It received a new name Faculty of Electrical Engineering and Computer Science (FEECS). The faculty was the third largest among the seven then existing faculties of BUT after, at the beginning of 2000, the Faculty of Technology and the Faculty of Management joined to establish Tomáš Baťa University in Zlín.

A number of historical decisions were taken at FEECS in 2001 in connection with the foundation of a new Faculty of Information Technology (FIT) and transformation of the Faculty of Electrical Engineering and Computer Science (FEECS) into the Faculty of Electrical Engineering and Communication (FEEC). Organizational and economic activities concerned with the foundation of FIT and transformation of FEECS were crowned by the decision of the Rector of BUT to appoint Prof. Radimír Vrba Acting Dean of FEEC and Prof. Tomáš Hruška Acting Dean of FIT as of 1 January 2000. The Faculty of Electrical Engineering and Communication came to being on 1 January 2000

The Faculty in 2003

In 2003, the Rector of Brno University of Technology was Prof. Jan Vrbka. The Vice-Rector for External Relations was Jiří Kazelle, Professor at the Department of Electrotechnology and one of the leading personalities of the Faculty.

In January 2003, Prof. Radimír Vrba, performed the duties of the Dean and since 1 February was in the office as elected Dean of the Faculty of Electrical Engineering and Communication , together with four vice-deans. At the end of 2003, there were 189 teachers and 3,132 students in all forms of state-supported study programmes. Moreover, education was provided to 209 students of the Faculty of Information Technology and 12 students of the Faculty of Mechanical Engineering. On the other hand, tuition was purchased from the Faculty of Business and Management for 41 students and from the Faculty of Information Technology for 10 students. As a result, education activities of FEEC can be quantified by the total number of 3,302 students and 189 academic staff. In comparison with the

year 2002 (when there was academic staff of 184 and 3,048 students) it means that the load of one teacher increased from 16.57 to 17.47 students, which represents an annual increase in the load of one teacher by 0.9%. Education was provided in the running out study programmes Electrical Engineering and Computer Science (EI) on one hand, and in the newly composed programmes Electrical Engineering, Electronics, Communication and Control Technology (EECR) accredited in 2001 in accordance with the Bologna Declaration. The study programmes at FEEC are now fully compatible with educational systems applied in the European Union, and thus participation of FEEC students in European mobility programmes has been ensured. Among the FEEC graduates in 2003, there were six students who completed their studies in the parallel Bachelor study programme, 288 Master programme graduates, and 19 postgraduates completed their doctoral studies. There were 1,107 new students who started their studies at the Faculty, and 93 graduates entered the doctoral study programme, 81 of them in full-time and 12 in combined postgraduate study. Tuition in English was provided to 33 foreign students paying their fees. Two members of academic staff were habilitated and appointed associate professors with the title Docent. One member of the academic staff was appointed to professorship.

Events and Activities

- meeting of the former deans of FEEC on the occasion of the 98th birthday of Prof. Jiří Brauner, one of the first deans of the Faculty of Electrical Engineering of Brno University of Technology
- traditional faculty ball held in the Centre of Brno University of Technology, a well organized and outstanding social event
- election of Prof. Radimír Vrba the Dean of the Faculty of Electrical Engineering and Communication for the period 1 February 2003 – 31 January 2006
- meeting of the managements of faculties of electrical engineering and associated faculties in Prague
- commencement of the second academic year of the Bachelor study programme EECR as an implementation of the long-term plan of the dynamic development of Brno University of Technology
- participation in the GAUDEAMUS trade fair and presentation of the new study programmes offered at FEEC
- final state examinations in subject areas of the study programme Electrical Engineering and Computer Science
- activities of Assoc. Prof. Pavel Jura, Vice-Dean for the Master programme, focused on the development of the combined and distance forms of study in the new structured study programme supported by the Development and Transformation Programme of the Ministry of Education
- activities of Prof. Zbyněk Raida, Vice-Dean for Research, focused on the guidelines for assessment and stimulation of postgraduate studies
- STUDENT EEICT 2003 Conference and Competition organized in cooperation with the Faculty of Information Technology, with 80 participants in the Bachelor and the Master section, and 126 participants in the Doctoral section
- activities of Assoc. Prof. Ivo Provazník, Vice-Dean for External Relations, focused on participation in the SOCRATES and ERASMUS programmes as well in other European programmes, and on the development of the faculty information system including faculty websites
- activities of the Faculty Secretary Miloslav Morda mainly concerned with the construction and investment projects carried out by the Faculty, especially reconstruction of integrated premises in the campus Pod Palackého vrchem, which will accommodate the Department of Biomedical Engineering, the Department of Electrotechnology and the Department of Microelectronics

- negotiations of the Dean Prof. Radimír Vrba and the Faculty Secretary Miloslav Morda with the management of Brno University of Technology on the investment plan of the University - Construction of new FEEC premises Technická 10 in the campus Pod Palackého vrchem (completion in 2007)
- work on applications for four new research plans of FEEC for the period 2005-2009 (2011) with the main investigators Pavel Jura, Jiří Kazelle, Jiří Svačina and Radimír Vrba
- election of the Chairman of the Academic Senate of FEEC Vlasta Krupková member of the Council for Higher Education
- activities of the members of the Academic Senate, mainly the Chairman Vlasta Krupková focused on the organizational, educational and economic aspects of the development of FEEC
- activities of the Advisor for Equal Opportunities Naděžda Uhdeová focused on the analysis of the causes of the very low interest of girls in studies at FEEC, and consulting for female students
- activities of Prof. Jiří Skalický, member of the Committee for Foreign Affairs, and Prof. Jaromír Brzobohatý and Jarmila Jurášová concerned with the recruitment and care of foreign students paying their fees. Education of these students is a valuable experience for participation of individuals and departments in the SOCRATES-ERASMUS programmes, and also a source of additional income for qualified teachers who are able to provide tuition in English.

Achievements

In 2003, the economic results of FEEC were very good despite the dramatic changes in numbers of employees, students, and mainly in funds. The development of wages and material supply was favourable due to work on research projects of the Grant Agency of Czech Republic, the Fund of Higher Education Development, and mainly owing to the efforts of all those who under the leadership of the main investigators participated in three faculty and one inter-faculty research plans and the Research Centre. A considerable contribution to the quality of education, and also the income of the employees was the Development and Transformation Programme of the Ministry of Education for the combined and distance forms of education, which provided substantial funds for preparation of 123 titles of electronic lecture notes and manuals (12,827 printed A4 pages) for the Bachelor study programme Electrical, Electronic, Control and Communication Technology In 2003, an increased number of students were admitted to the Bachelor study programme, and thus the Faculty contributed to the intended dynamic development of Brno University of Technology declared in the long-term plan. All employees and postgraduate students of FEEC deserve my gratitude.

Radimír Vrba, Dean

Faculty of Electrical Engineering and Communication

Dean

Prof. Ing. Radimír Vrba, CSc.

Vice-Deans

Doc. Ing. Pavel Jura, CSc.
Acting Dean, Vice-Dean for Master Study Programme

Doc. Ing. Jarmila Dědková, CSc.
Vice-Dean for Bachelor Study Programme

Prof. Dr. Ing. Zbyněk Raida
Vice-Dean for Research and Doctoral Study Programme

Doc. Ing. Ivo Provazník, Ph.D.
Vice-Dean for External Relations and International Affairs

Chairman of Academic Senate

RNDr. Vlasta Krupková, CSc.

Faculty Secretary

Ing. Miloslav Morda

Student Advisor to the Dean
Jan Mertl

Advisor for Equal Opportunities
RNDr. Naděžda Uhdeová

Trade Unions Representative
Prof. Ing. Vítězslav Hájek, CSc.

Departments

Department of Control and Instrumentation
Department of Biomedical Engineering
Department of Electrical Power Engineering
Department of Electrotechnology
Department of Physics
Department of Languages
Department of Mathematics
Department of Microelectronics
Department of Radioelectronics
Department of Telecommunications
Department of Theoretical and Experimental Electrical Engineering
Department of Power Electrical and Electronic Engineering

Scientific Board

Internal Members

Prof. Ing. Libor Dědek, CSc.
Doc. Ing. Jarmila Dědková, CSc.
Prof. Ing. Tomáš Hruška, CSc.
Prof. RNDr. Jan Chvalina, DrSc.
Prof. Ing. Jiří Jan, CSc.
Doc. Ing. Pavel Jura, CSc.
Prof. Ing. Jiří Kazelle, CSc.
Doc. RNDr. Milena Kheilová, CSc.
Prof. Ing. Vladislav Musil, CSc.
Doc. Ing. Čestmír Ondrůšek, CSc.
Doc. Ing. Ivo Provazník, Ph.D.
Prof. Dr. Ing. Zbyněk Raida
Doc. Ing. Karel Rais, CSc., MBA
Prof. Ing. Václav Říčný, CSc.
Prof. Ing. Jiří Skalický, CSc.
Prof. Ing. Zdeněk Smékal, CSc.
Prof. Ing. Jiří Svačina, CSc.
Prof. Ing. Petr Vavřín, DrSc.
Prof. Ing. Kamil Vrba, CSc.
Prof. Ing. Radimír Vrba, CSc.

External Members

Ing. Milan Findura, Ph.D.
RNDr. Luděk Frank, DrSc.
Ing. Aleš John
Prof. Ing. Vladimír Kučera, DrSc.
Doc. Ing. Aleš Richter, CSc.
Ing. Ivan Skalka
Prof. Ing. Zbyněk Škvor, CSc.
Doc. RNDr. Vítězslav Veselý, CSc.
Ing. Robert Vích, DrSc.
Ing. Rostislav Vinkler
Ing. Jiří Winkler, CSc.

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Study Programmes

Bachelor and Master Study Programme Electrical Engineering and Computer Science

In 2003, 355 students graduated from the first-level study of the running out programme Electrical Engineering and Computer Science. Out of these students 346 continue their studies and 9 students failed in the comprehensive examination, 220 registered students have not completed first-level subjects.

Running out in 2003 is the full-time five-year Master programme EI, the follow-up three-year Master programme EI and the three-and a half-year Bachelor programme EI. In these three study programmes 300 students graduated at FEEC in study areas Electrotechnical Manufacturing and Management (EVM), Cybernetics, Automation and Measurement (KAM), Electronics and Communications (EST) and Power Electrical and Electronic Engineering (SEE). The statistics for individual study areas are in Table 1.

In the three-and a half-year Bachelor study programme EI there were 6 graduates, 3 in SEE, 1 in EST and 2 in EVM.

The year 2003 was the second year of the new three-year Bachelor study programme Electrical Engineering, Electronics, Communication and Control Technology (EECR). A new two-year follow-up Master programme EECR will be offered in the academic year 2005/06.

In the study programme for students paying their fees there were 24 students from abroad, 15 of them in the running out five-year study programme EI (7 in SEE and 8 in EST), and 9 students in the new Bachelor study programme EECR.

Following the Amendment to the Higher Education Act No. 111/98, FEEC started activities in the lifelong education system. A whole range of specialized courses for professionals are offered. For those interested in the study programme EECR, paid courses are offered. Having completed these courses and earned the prescribed number of credits, the students can start full-time study at FEEC without being required to pass the entrance examination, and the obtained credits will be recognized. In 2003, there were four students in the lifelong education programme.

The teachers of FEEC participated in tuition organized by Third Age University which has entered its fourth year at Brno University of Technology.

As the survey carried out in 2003 showed that there has been increasing interest in combined study, it was decided to open this form of study in the academic year 2004/05.

Table 1: Graduates in the study programme Electrical Engineering and Computer Science

Master study areas	*2001*	*2002*	*2003*
EVM	37	53	37
KAM	64	61	68
EST	108	105	130
SEE	48	72	59
Total	257	291	294

A priority in 2003 was the preparation for the accreditation of the Bachelor distance study programme EECR. Within the framework of the accreditation work continued on electronic lecture

notes and other electronic study texts and exercises for this programme. There are 160 subjects in this Bachelor study programme, out of which 144 are taught by teachers from FEEC and 16 subjects are provided by other faculties and centres of Brno University of Technology (FIT, Centre for Sports Activities, etc.) Electronic texts were elaborated for 59 subjects, 8 subjects were provided with virtual laboratory tasks. Written or supplemented were 123 texts containing 12,827 pages. There were 62 completely new texts containing 6,474 pages. The remaining texts were prepared in 2002 and supplemented with auto-evaluation parts for distance study. Further completed were 36 virtual laboratories for 8 subjects to be used as an aid for real laboratory exercises.

The regular assessment of the quality of teaching by students took place and the results were published on the websites of the Student part of the Academic Senate.

Transition from the formerly used administration system STUDENT to the new information system was completed. Enrolment in courses and classes (the students prepared their own timetables) and recording of examination results were done in the new system.

Bachelor study programme Electrical, Electronic, Communication and Control Technology (EECCR)

The admission procedure is a priority of the Faculty. It took place from 10 to 12 June 2003. In contrast to the previous years, the applicants were required to do tests only in an optional combination of mathematics (MA) and physics (FY), or of mathematics and fundamentals of informatics (ZI). Exempt from the entrance examination were the applicants who had passed the school-leaving examination in physics or mathematics with grade 1 or 2. The maximum possible number of points to be attained in each subject was 50. Those who had attained at least 28 points in mathematics, 22 points in physics, and 42 points in the fundamentals of informatics were admitted. Also admitted at FEEC were applicants who had received at least 78 points in the combination mathematics and fundamentals of informatics or 60 points in the combination mathematics and physics. A total of 368 applicants were admitted, enrolled in the first year were 267 students. Another 1,139 applicants, who were not required to take the entrance examination, were admitted and 826 enrolled in the first year. A total of 1,535 applicants were admitted, and 1,132 out of them enrolled in the first year of studies at FEEC.

Admission statistics have been done for many years. Chart 1 shows the numbers of applicants, admitted and enrolled students over the period 1992-2003. It is apparent from the chart that the number of applicants in the last year was the same as in the years before the split and transformation of FEECS in 2001.

The study programme covers five areas: Automation Technology (B-AMT), Electronics and Communications (B-EST), Microelectronics (B-MET), Power Electrical and Electronic Engineering (B-SEE) and Teleinformatics (B-TLI).

The preliminary interest of applicants in individual areas was recorded at registration and then at the end of the first semester after presentations of the study areas. Statistics from academic years 2002/03 and 2003/04 are in Table 2.

The quality of incoming students has been monitored for several years. A long-term factor is the percentage of applicants who have taken the school-leaving examination in mathematics or physics, see graph 2. Contrary to the previous academic year, the number of applicants who had taken the school-leaving examination both in mathematics and physics has substantially increased. This increase is probably due to the newly introduced condition for exemption from the entrance examination.

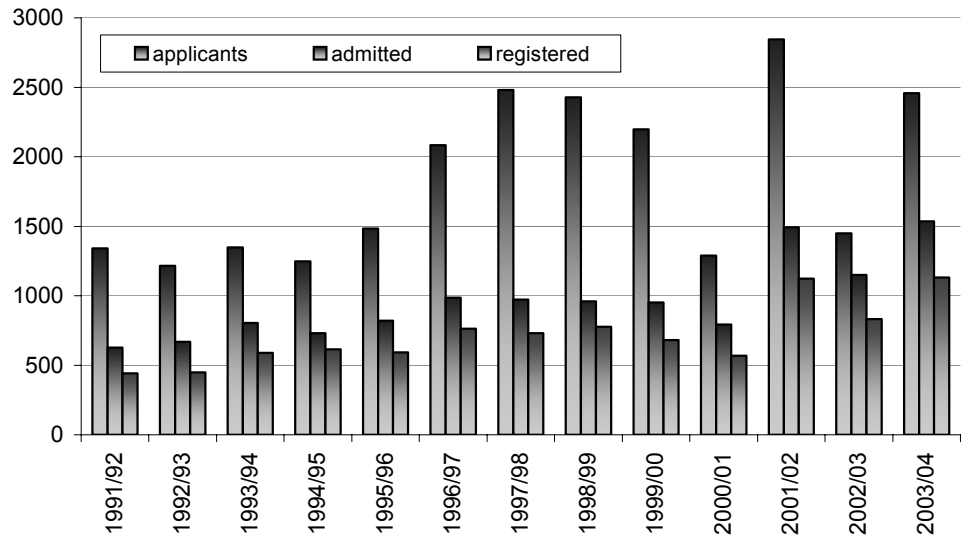
Another long-term indicator is the percentage of applicants coming from certain types of secondary schools – gymnasium-type secondary schools (G), technical secondary schools (SPŠ) and apprentice schools with the school-leaving examination (SOU), see graph 3.

Preparatory courses in mathematics and physics were offered by the Department of Mathematics and the Department of Physics to assist applicants preparing for entrance examinations, and to help them adapt to the study at university. The course in mathematics was attended by 130 and the course in physics by 40 applicants.

Our activities were focused on promoting the study programmes offered at FEEC and on in-

creasing the number of secondary-school students interested in them. Visiting days were organized on 15 January and 29 January 2003. Students and teachers visited secondary schools, and FEEC participated in the 10th GAUDEAMUS fair held 21 - 24 October 2003

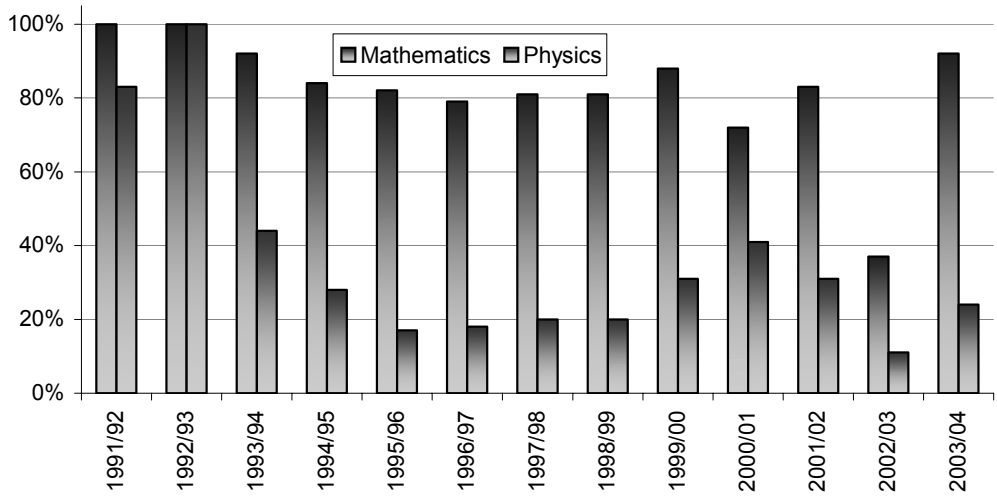
Study administration became part of the FEEC information system (electronic registration and enrolment in courses, electronic recording of study results, study reports, recording of interest in study areas), which simplified it and made relevant information accessible to students.



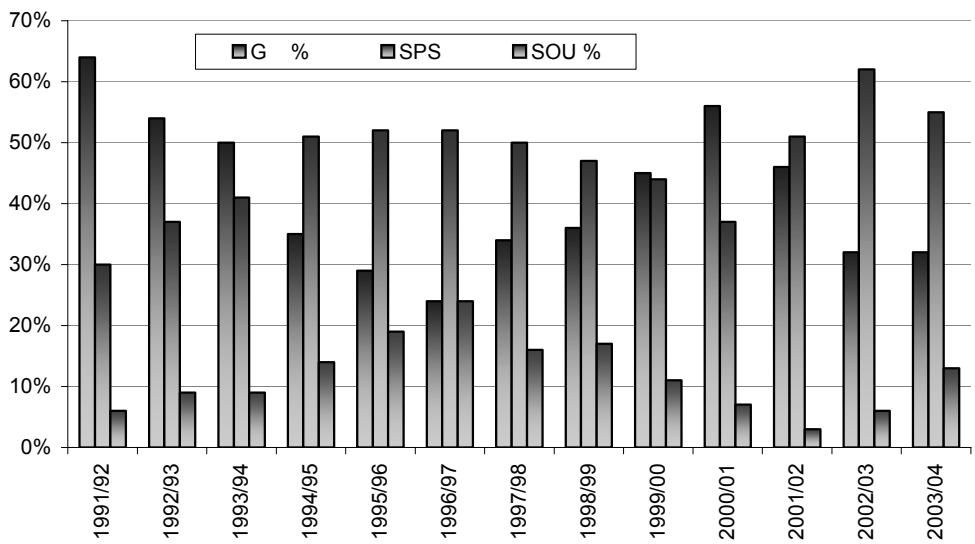
Graph 1: Applicants, admitted and registered students in the years 1992-2004 (before 2001 at the former FE or FEI before the foundation of FIT)

Table 2: Interest in study areas

Ac. year		*B-AMT*	*B-EST*	*B-MET*	*B-SEE*	*B-TLI*	*not given*	*total*
2002/03	registration	91	332	43	49	331	0	846
	meeting	76	250	38	51	295	76	786
2003/04	registration	134	428	68	92	371	39	1132
	meeting	120	248	73	77	329	130	977



Graph 2: Percentages of students who have taken the school-leaving examination in mathematics of physics



Graph 3: Percentages of students coming from different types of secondary schools

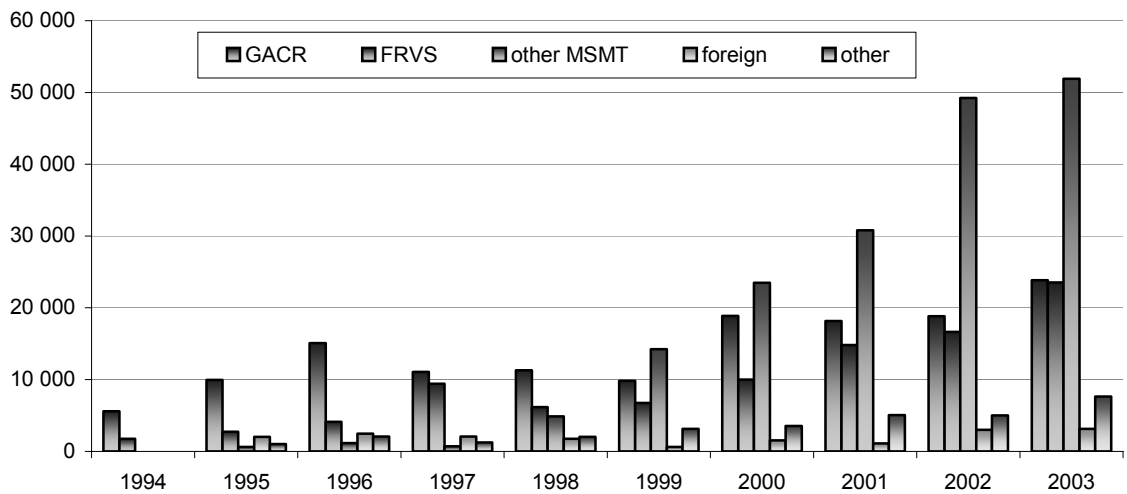
Research and Postgraduate Study

Research

A dynamic development of research activities was observed in 2003, both in terms of funding and quality of research.

In comparison with 2002, funds for research (graph 4) increased by approximately 19%. The total amount was obtained from research plans (25%), grants from the Grant Agency of Czech Republic (GACR, 22%), and projects of the Higher Education Development Fund (FRVS, 21%). There were 5 research plans (and FEEC participated in another one), 49 GACR projects (including participations in projects of other universities), 88 FRVS projects and 6 projects of the Grant Agency of Czech Academy of Sciences. Work was going on in a research centre, and FEEC teams worked on 15 projects of the Ministry of Industry and Trade and 7 projects j supported from sources abroad.

Results of original research and professional work at FEEC were published in one international and two national monographs, eight articles in impact journals and in more than ten articles in renown international journal with the impact factor below 0.5.



Graph 4: Research funds at FEEC (until 2001 FEI) in thousands of CZK in the period 1994 -2003

Research Plans, Research Centre

A brief characteristic of the research plans and the research centre of FEEC is given below. A detailed information on the progress in the research plans and on the activities of the research centre in 2003 as well as an outline for 2004 are offered at FEEC websites - Research, Research plans.

Microelectronic Systems and Technologies
(investigator: Radimír Vrba)

Research was focused on current problems in the design of integrated circuits, diagnostics and testing of IO systems, modelling and simulation of IO and semiconductor structures. The mounting technology for modern concepts of electronic systems was investigated. Research of microsys-

tems, modern principles of IO design, diagnostics of materials and components as well as the design of optoelectronic systems continued.

Participating in the research plan in 2003 were 14 professors, 18 associate professors, 35 lecturers, 53 postgraduate students and a technical staff of 26.

The research results were published in 13 scientific monographs, in 42 papers in scientific and professional international journals, in 291 papers presented at international conferences, seminars, workshops, and in over a hundred national publications. The publications resulting from the research plan were cited in 2 national publications, and the research team received 4 proven responses.

Electronic Communication Systems and Technology

(investigator: Jiří Svačina)

Research was focused on up-to-date electronic circuits for communication systems, on the development of new digital methods for analysis and processing of signals and images, on the technology of processing multimedia signals. Work continued on the development of communication networks of integrated services and high-frequency, microwave and optical structures of communication systems.

In 2003, there were 12 professors, 18 associate professors, 27 lecturers, 102 postgraduate students and a technical staff o 14.

The results achieved in 2003 were published in 12 books, in 42 articles in international scientific and professional journals, in 264 papers presented at international conferences, seminars, workshops, and more than 150 national publications. Eight engineering works were completed, and nine members of the team habilitated or defended their dissertations. The publications resulting from the research plan were cited in 19 foreign and 13 local books, journals, conference proceedings, research reports or lecture notes. The team received over 20 proven responses.

Resources, Accumulation and Optimization of Electric Power Exploitation in Environmental Applications

(investigator: Jiří Kazelle)

Research was focused on several interconnected areas. The first area of interest were electrochemical sources of electric power and enhancement of their utility characteristics, fast charging of accumulators and its impact on the parameters and structure of accumulator mass. Further investigated were transport systems exploiting alternative power sources, fuel cells and materials, lithium-ion batteries and electrochemical ultracapacitors. Another area of interest was optimization of materials for production and distribution of electric power and for diagnostics of materials and facilities for electric energy conversion. The team was also involved in optimization of the operation of photovoltaic energy converters, small power-plants and cogeneration units. Research was carried out of power supply semiconductor converters of extreme parameters, digital control methods of pulse power sources. Application of artificial intelligence in design optimization, identification of parameters and stimulation of the dynamic characteristics of electric machines, properties of special electric machines and low-potential sources and unconventional methods of heat accumulation were investigated.

The research team included 5 professors, 12 associate professors, 17 lecturers, 14 postgraduate students and a technical staff of 9.

The research plan results were published in 2 books, 3 articles in international journals, 50 papers presented at international conferences, seminars, workshops, and in over 60 national publications. Two engineering works were implemented, 4 members of the team habilitated or defended their dissertations. The team received two proven responses.

Automation of Industrial Processes and Technologies

(investigator: Petr Vavřín)

The research plan dealt with application of artificial intelligence methods in adaptive and robust systems of feedback control, modelling and control of robotic systems, industrial computer networks and industrial automation systems. In the focus of interest were the methods and tools of identification, optimization and control of electromechanical systems, modelling of technological processes on the basis on structures determined by differential, difference and functional equations. The techniques of scanning and processing of images in the production process, automatic measurement methods and tools were developed.

Participating in the research plan were 3 professors, 8 associate professors, 16 lecturers, 22 postgraduate students, and a technical staff of 7.

In 2003, the results were published in a book, 8 articles in international journals, 57 papers presented at international conferences, seminars, workshops, and in over 30 national publications. There were 8 engineering works, 3 habilitations and dissertations. The results were published and cited in an international journal.

Information and Control Systems

(investigator: František Šolc)

In the focus of interest was computer vision and image processing in information and control systems, computer-aided control, industrial computer networks and systems of industrial automation. The research plan also involved research of sensors and the development of methods of the digital processing and computer analysis of signals.

The team included 6 associate professors, 9 lecturers, 13 postgraduate students and a technical staff of 4.

The results achieved in 2003 were published in 2 books, 2 articles in international journals, 8 papers presented at international conferences, seminars and workshops and in 9 national publications. Eight engineering works were completed and three members of the team habilitated or defended their dissertations.

Research Centre of Applied Cybernetics

(investigator: Petr Vavřín)

The centre has been involved in research and development of control algorithms using redesigners. New algorithms for sensorless control of motors were developed. With support from Motorola, a Motion Control Laboratory was built

Research was focused on rescue and safety telepresence robotic systems. The team of the Centre was successful in the contest ROBOCUP 2003 in the category RESCUE ROBOT LEAGUE, see www.robobohemia.cz.

Research of computer vision concentrated on various transport problems (identification of passing vehicles according to number plates and exploitation of this information for speed measurement). New results were achieved in the design of circuits (digitization boards and their modification for different types of cameras).

Habilitations and Appointment to Professorship

Two habilitation proceedings were successfully completed in 2003, and there was one appointment to professorship.

Doc. Ing. Vladimír Blažek, CSc.
Power Electrical and Electronic Engineering

Doc. Ing. František Šolc, CSc.
Technical Cybernetics

Prof. Dr. Ing. Zbyněk Raida
Electronics and Communications

Postgraduate Study

In the academic year 2003/04 there are 342 students in the doctoral study programme, 119 full-time students, 134 in the combined form of study, and 9 international students. The numbers of postgraduate students in individual years of study over the past five years are given in Table 3. It is apparent from the table that the number of postgraduate students has been dynamically increasing.

Table 4 shows the numbers of the doctoral programme graduates at individual departments over the past five years. While the number of students is going up, the number of graduates remains the same.

A list of the doctoral programme graduates can be found on FEEC websites, - Study, doctoral study programme, doctoral programme graduates

Table 3: Postgraduate students in the period 1999 - 2003

year	*1999*	*2000*	*2001*	*2002*	*2003*
1st	57	50	64	76	96
2nd	56	56	45	59	70
3rd	43	34	44	44	57
4th	40	40	35	41	31
5th	19	29	38	25	32
6th	37	20	22	33	31
7th	21	41	40	33	25
total	**273**	**270**	**288**	**311**	**342**

Student Creativity

The STUDENT EEICT Conference and Competition was jointly organized by FEEC and FIT on 24 April 2003. The abbreviation conceals the English words *Electrical Engineering, Information and Communication Technologies* indicating the priority areas of research and education at the two faculties.

For the first time an international contest was organized, in which the national winners took part. It took place on 29 May 2003 under the auspices of the Minister of Education.

The students of the Bachelor, Master and Doctoral study programme presented their projects.

The participants of the international competition were the 78 winners of local competitions organized by 10 universities in Germany, Slovakia and the Czech Republic.

Among the 18 winners of the international competition there were 9 students of Brno University of Technology. This proves that our university has a good position among the other universities in the region.

For more information on the competition see FEEC websites – Research, EEICT STUDENT competition.

Table 4: Doctoral programme graduates at FEEC departments in the period 1999 - 2003

	1999	*2000*	*2001*	*2002*	*2003*	*total*
UAMT	2	0	5	2	4	**13**
UBMI	2	2	2	1	1	**8**
UEEN	1	1	0	1	0	**3**
UETE	0	1	3	3	2	**9**
UFYZ	0	0	0	2	0	**2**
UMEL	1	2	4	4	1	**12**
UREL	3	1	4	1	3	**12**
UTEE	1	0	0	0	1	**2**
UTKO	1	3	6	1	11	**22**
UVEE	4	2	3	8	6	**23**
total	**15**	**12**	**27**	**23**	**29**	**106**

External Relations and International Cooperation

International Activities

International activities have been aimed at increasing the prestige of FEEC by presenting results of research projects at international conferences and participating in research and educational projects, by making it possible for our students to study at partner universities abroad, and by offering tuition in English to international students.

Among our priorities is the student and teacher mobility among universities cooperating within the framework of the European Commission programmes. FEEC is one of the most active faculties of Brno University of Technology. There has been a very good cooperation with the BUT Department of International Relations responsible for economic support and organization of international programmes, e.g. the Socrates programme. As a result, 29 students could study abroad in the extent of 128 student/months, and 23 teachers were on lecture stays at the length of 25 weeks.

The interest of FEEC students in the Socrates-Erasmus programme in 2003 is comparable with that in the previous year. Reciprocally, there has been an increased interest of foreign students, particularly from ISTG UJFG Grenoble in study stays at FEEC and in the cooperating industrial companies.

In 2003, the funds from the Development programme of the Ministry of Education doubled to 420,000 CZK, which enabled us to extend the time spent by FEEC students abroad. Moreover, student activities were supported by the amount of 110,000 CZK provided by industrial companies.

In cooperation with the BUT Department of International Relations, FEEC concluded several bilateral agreements and renewed the existing agreements in the Socrates-Erasmus programme. A list of universities cooperating with FEEC on the basis of agreements for the academic year 2003/04 is given in Table 5.

Cooperation of Czech faculties of electrical engineering and ISTG initiated by our traditional partner ISTG – Université de Joseph Fourier in Grenoble continued. The first step was the training of French students in Czech companies.

Cooperation is supported of FEEC departments and academics with institutions abroad based on inter-faculty and Socrates-Erasmus agreements and on newly established contacts. In 2003, the amount of 800,000 CZK was provided in support of these activities.

External Relations

Activities were focused on presentation of FEEC by offering current and specific information to the public on the study programmes and study areas. Information was also given in the media on basic and applied research results and cooperation with industrial companies.

On FEEC websites and Internet ports of other subjects information is given on the research and scientific potential of FEEC departments and workplaces, on research projects, research and development grant projects of the Grant Agency of Czech Republic, Ministry of Education, Ministry of Industry and Trade, and EU projects.

In 2003, new FEEC websites were created in order to offer information to professionals and to the general public. Now two versions of websites are available - external websites containing basic information about FEEC and its activities and internal websites for the academic community of FEEC containing local news. Both versions are available in Czech and English.

Also in 2003, FEEC took part in the annual meeting of the Czech and Slovak faculties of electrical engineering. The meeting dealt with transformation of the study programmes of Czech universities based on the Bologna Declaration and with accreditation of new study programmes. Also discussed was the involvement of the faculties in the 6th Framework Programme, coordination of projects and cooperation with universities from other countries, etc.

Close contacts have been maintained with industrial companies in the Brno region and in other places in the Czech Republic. These contacts are mainly based on cooperation with FEEC departments in specific research tasks, expert's reports and consultancy. The major cooperating companies are Siemens A.G., Honeywell, Rockwell-Allen Bradley ABB-EJG, JULI Motorenwerke, Škoda Volkswagen Mladá Boleslav, Telecom, Motorola, JME, AMI Semiconductor, Schneider Group, Celestica, etc.

Close cooperation of many years has been maintained with the Institute of Instrumentation of the Czech Academy of Sciences in Brno in research projects of joint interest. Some members of the Institute's staff are part-time teachers at FEEC, in the Master and the Doctoral programme. An agreement between FEEC and Academy of Sciences enables the institutes of Academy of Sciences to educate Ph.D. students.

Cooperation has been going on with other institutions as well. The academic staff, mainly from the Department of Mathematics and the Department of Physics have cultivated long-term cooperation with secondary schools in the Brno region in preparing their students for studies at FEEC.

Table 5: Universities which concluded bilateral agreements with FEEC within the programme Socrates-Erasmus for the academic year 2003/04

University	***Country***
Katholieke Hogeschool Brugge-Oostende	Belgium
Katholieke Hogeschool Limburg	Belgium
Aalborg University	Denmark
Technical University of Denmark Lyngby	Denmark
Tampere University of Technology	Finland
ESIEE Amiens	France
Groupe ESIEE Paris	France
Institut Catholique de Paris	France
Institut National des Sciences Appliquées de Lyon	France
Institut National Polytechnique de Grenoble	France
Université Joseph Fourier – Polytechnique de l´Úniversité Grenoble	France
Universitá degli Studi di Roma „La Sapienza“	Italy
Fachhochschule Furtwangen	Germany
Fachhochschule Pforzheim	Germany
Fachhochschule Wiesbaden	Germany
FernUniversität Hagen	Germany
HTWK Leipzig	Germany
Universität Magdeburg	Germany

Instituto Politécnico de Lisboa - ISEL	Portugal
Universidad de Cantabria	Spain
Universidad de Zaragoza	Spain
Universidad Pontificia Commillas Madrid	Spain
Universitat Rovira i Virgili Tarragona	Spain
Malmö University	Sweden
University of Salford	Great Britain
University of Bournemouth	Great Britain
University of Huddersfield	Great Britain

Academic Senate

In 2003, the members of the Academic Senate of FEEC were:

Chairwoman

RNDr. Vlasta Krupková, CSc., UMAT

Academic Staff

Ing. Vladimír Kolařík, Ph.D., chairman, chairman of Legislative Committee, UMEL
Ing. Josef Bradík, Pedagogical Committee, UVEE
Doc. Ing. Jarmila Dědková, CSc., Legislative Committee, UTEE (until 25 February 2003)
Ing. Ivana Jakubová, Pedagogical Committee, UREL
Ing. Jiří Kozumplík, CSc., chairman of Economic Committee, UBMI
RNDr. Vlasta Krupková, CSc., Economic Committee, UMAT
Ing. Vladimír Kutnohorský, CSc., Economic Committee, UVEE (since 25 February 2003)
PhDr. Ludmila Neuwirthová, Pedagogical Committee, UJAZ
Prof. Ing. Petr Pivoňka, CSc., Legislative Committee, UAMT
Ing. Helena Polsterová, CSc., Pedagogical Committee, UETE
Doc. Ing. Ivan Rampl, CSc., Legislative Committee, UTKO
Ing. Petr Toman, Ph.D., Economic Committee, UEEN
RNDr. Naděžda Uhdeová, chairwoman of Pedagogical Committee, UFYZ

Students

Jana Božáková, chairwoman (until 25 February 2003), Legislative Committee (until 25 February 2003)
Miroslav Kuruc, chairman (since 25 February 2003), Economic Committee
Soňa Brudná, Legislative Committee, Pedagogical Committee (since 16 December 2003)
František Drtil, Legislative Committee, Economic Committee
Petra Filipová, Pedagogical Committee (until 15 October 2003)
Kristýna Kubíčková, Pedagogical Committee (until 16 October 2003)
Jan Mertl, Pedagogical Committee, Legislative Committee
Jiří Piškula, Pedagogical Committee (since 16 December 2003)
Ing. Miroslav Zachariáš, representative of postgraduate students, Economic Committee
Tomáš Žabka, Pedagogical Committee (since 17 December 2003)

As three members of the student part of Academic Senate resigned from the membership at the end of 2003, by-elections were held on 10 and 11 December 2003. The new members of Academic Senate are included in the table above.

The Academic Senate held 8 regular meetings, with the average attendance of 85%.

At the first meeting the Academic Senate acknowledged the proposal of the elected Dean to appoint vice-deans with specified responsibilities. The appointed Vice-Dean Jarmila Dědková resigned from the membership in the Academic Senate, and Vladimir Kutnohorský substituted her. The Academic Senate acknowledged the Dean's proposal of the members of Scientific Board.

The Academic Senate discussed and approved the proposal of Rules for admission to the Bachelor study programme for the academic year 2004/05 including combined study, to the follow-up Master programme and the Doctoral programme for the academic year 2003/04.

The Dean's guideline to the Study and Examination Regulations of Brno University of Technology – Study and Examination Regulations for the Doctoral Study Programme was discussed and approved.

The economic report for 2002 was approved as well as the budget for 2003 and allotment of education funds.

Attention was paid to assessment of the newly introduced Bachelor programme, and to organization of a pedagogical conference devoted to this theme.

Discussions at the meetings were always constructive as the proposals were first sent to all members and departments for comments in order to avoid revocations of decisions.

Campus Development

In 2003, Brno University of Technology issued the document Property Reproduction Plan for the Period 200-2007. The faculty management presented a plan of the envisaged final location of faculty premises. According to the original plan the whole faculty was to be located in the campus Pod Palackého vrchem by 2010 at Technická 2 (Department of Power Electrical and Electronic Engineering, Department of Electrical Power Engineering, Dean's Office and Department of Languages), Technická 8 (Department of Physics, Department of Mathematics), Purkyňova 118 (Department of Biomedical Engineering, Department of Radioelectronics, Department of Telecommunications, Department of Theoretical and Experimental Engineering), the integrated premises (Department of Control and Instrumentation, Department of Electrotechnology, Department of Microelectronics). In the middle of 2003, faculty management accepted the changes in this plan proposed by the management of Brno University of Technology, regarding the difficult situation of the Faculty of Chemistry which is not able to accommodate tuition of the increasing number of students at the faculty. Additional premises will be built for FEEC in the campus Pod Palackého vrchem, and the final accommodation of departments will be the following: Technická 2 (Department of Power Electrical and Electronic Engineering, Department of Electrical Power Engineering), Technická 8 (Department of Mathematics, Department of Physics), Purkyňova 118 (Department of Radioelectronics, Department of Telecommunications), Integrated premises (Department of Control and Instrumentation, Department of Biomedical Engineering, Department of Theoretical and Experimental Engineering), new premises Technická 10 (Department of Electrotechnology, department of Languages, department of Microelectronics, Dean's Office).

Construction of integrated premises continued in accordance with the schedule. Some changes were made in the project as required by the new users of the premises.

Upgrading of the technical equipment of large-capacity lecture rooms, and of the computer and information network continued.

Modernization and Reconstruction at Údolní 53

Emergency reconstructions and repairs were carried out in some buildings. Besides regular maintenance, extensive repairs in building U2 hired by Masaryk University were completed at the beginning of 2003. Emergency repairs in building U4 continued during the year.

Upgrading of Large-Capacity Lecture-Rooms at Technická 8

Upgrading of the technical equipment of large-capacity lecture-rooms T-010, T-020, T-030, was carried out and funded from Programme 333328 of the Ministry of Education. The replaced equipment was used in some smaller lecture rooms. Maintenance repairs, mainly of the toilets, were completed.

Construction Plans

At the end of 2003, a project of reconstruction of the 6th and 7th floor in building A3 was worked out in cooperation with UEEN. Reconstruction works will be started at the end of 2004 or at the beginning of 2005, and UEEN is expected to move into the reconstructed premises in the middle of 2005.

Work on the project of new premises for FEEC in the campus Pod Palackého vrchem was started.

At the end of 2003, architectonic studies were completed for emergency reconstruction at Údolní 53 for improvement of the working environment as well as for new entrance to the premises from the street Údolní.

In the second half of 2003, faculty management placed an order for the project of a large-capacity lecture room for approx. 150 students at Purkyňova 118.

Computer Networks and Information Systems

Priority was given to

- upgrading of servers at premises Brno-centre and Brno-north
- strengthening of the networks of Gb information and communication technologies
- network backup
- development of local computer networks at Údolní 53
- setting up the Department of information Systems Administration
- network administration by the Department
- faculty websites
- faculty information system
- compatibility of orientation systems at the premises of FEEC

Information Systems and Services

A new graphic design and two versions of faculty websites were completed. The first version was designed for the general public and those who are interested in study at the faculty, the second one is available to the staff and students of FEEC. The contents of websites were interconnected with the database of the faculty information system.

FEEC is taking part in setting up the information system of Brno University of Technology within which the information system of FEEC was established on the principle of Internet and Intranet using the XML/XSLT technology, over the central data store of Brno University Technology with the Oracle technology. In addition to the module for research data processing, the module for study administration was put in operation. This module is used by the Study Department, and also by the staff (attributes of subjects, assessment) and by students (electronic enrolment study results) The technology of the module can cope with short-time overloading of the system in certain periods of the academic year (the beginning and end of the semester, the examination period).

Other

Equal Opportunities at FEEC

Equal opportunities for men and women are among the priorities of the European Union, and FEEC is aware of the importance of this issue. Increasing the number of women in technical professions (mainly information and communication technologies) has been highlighted by the Ministry of Education as a target set by the government within the framework of its policy of equality of men and women.

The main task of the advisor for equal opportunities Naděžda Uhdeová is an increased number of female students at FEEC, and consultancy, professional and personal, aimed at removing the barriers female students face when choosing careers in technical fields.

In 2003, FEEC won the FRVS grant ´Consultancy and Information Gender Studies Centre´. The project was aimed at institutionalization of consultancy in mathematics and physics for FEEC female students, at increasing the number of female students in the Master programme by launching campaigns at secondary schools and cultivating the awareness of parents, teachers and students of equal opportunities generally, and of the position and opportunities of women in technical professions in particular.

Institute of Signal and Image Processing

The Institute of signal and image processing is an inter-department body for exchange of information and coordination of the work of departments involved in the processing and analysis of signals and images. The task of the institute is to present the activities and results achieved in the given area to national and international scientific community.

The institute groups the Department of Control and Instrumentation, Department of Biomedical Engineering, Department of Radioelectronics and Department of Telecommunications.

The activities of the institute cover participation in international and national organizations and institutions, publishing activities, research and grant projects, organization of joint local seminars, lectures and international conferences.

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Student Union

As at each university, the Student Union is active at FEEC. It is a democratic, apolitical, professional association of students. Its task is to safeguard the interests of the students within the academic community, to be a respectful partner in negotiations with faculty management, and to take part in the activities of the academic community. In 2003, the Student Union cooperated with faculty management in the effort to maintain communication and provide information to the management on one hand, and to the students on the other.

Department of Control and Instrumentation

Prof. Ing. Petr Vavřín, DrSc.

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Professors

Prof. Ing. Petr Pivoňka, CSc.
Prof. Ing. Petr Vavřín, DrSc.

Associate Professors

Doc. Ing. Ludvík Bejček, CSc.
Doc. Ing. Jozef Honec, CSc.
Doc. Ing. Pavel Jura, CSc.
Doc. Ing. Zdeněk Malec, CSc.
Doc. Ing. František Šolc, CSc.
Doc. Ing. František Zezulka, CSc.

Lecturers

Ing. Luděk Anděra, Ing. Petr Beneš, Ph.D., Ing. Zdeněk Bradáč, Ing. Miloš Čábel, Ing. Miloslav Čejka, CSc., Ing. Luděk Černý, Ing. Jiří Dohnal, Ing. Petr Fiedler, Ing. Marie Havlíková, Ing. Zdeněk Havránek, Ing. Karel Hoder, Ing. Radovan Holek, CSc., Ing. Petr Honzík, Ing. Michal Hrouzek, Ing. Ondřej Hynčica, Ing. Václav Jirsík, CSc., Ing. Ilona Kalová, Ing. Stanislav Klusáček, Ing. Michal Knotek, Ing. Pavel Kučera, Ing. Marek Lisztwan, Ing. Tomáš Macho, Ing. Lubomír Novák, Ing. Michal Polanský, Ing. Miloslav Richter, Ing. Pavel Střítecký, Ing. Soňa Šedivá, Ph.D., Ing. Radek Štohl, Ing. Kamil Švancara, Ing. Petr Vaňous, Ing. Michal Vašina, Ing. Václav Veleba

Postgraduate Students

Ing. Zdeněk Bradáč, Ing. Petr Cach, Ing. Miloš Čábel, Ing. Jiří Čanderle, Ing. Luděk Černý, Ing. Jiří Dohnal, Ing. Leoš Dvořák, Ing. Petr Fiedler, Ing. Pavel Fojtík, Ing. Petr Halva, Ing. Marie Havlíková, Ing. Zdeněk Havránek, Ing. Bohumil Hnilička, Ing. Peter Honec, Ing. Petr Honzík, Ing. Jakub Hrabec, Ing. Petr Hráček, Ing. Michal Hrouzek, Ing. Ondřej Hynčica, Ing. Ilona Kalová, Ing. Stanislav Klusáček, Ing. Michal Knotek, Ing. Lukáš Kopečný, Ing. Michal Krzemien, Ing. Pavel Kučera, Ing. Jaroslav Lepka, Ing. Marek Lisztwan, Ing. Tomáš Macho, Ing. Tomáš Neužil, Ing. Lubomír Novák, Ing. Petr Petyovský, Ing. Michal Polanský, Ing. Ludvík Prášil, Ing. Miloslav Richter, Ing. Ladislav Sládeček, Ing. Pavel Střítecký, Ing. Radek Štohl, Ing. Kamil Švancara, Ing. Soběslav Valach, Ing. Petr Vaňous, Ing. Michal Vašina, Ing. Václav Veleba, Ing. Hynek Vychodils

Administrative and Technical Staff

Lenka Petrová, Petr Redlich, Jan Vodička, Miloš Zbořil

Main Interests

The main areas of interest have been computer vision, robotics and artificial intelligence, measurement technology and industrial automation.

The department is involved in research of advanced information and communication technologies for automation with emphasis on Internet and wireless communication. Special attention is paid to research and development of direct connection of sensors to Internet. Further, research is concerned with distributed real time control and with it connected formal models and specification of control and communication systems.

The department is also involved in research of knowledge database systems, artificial neural networks, expert systems, fuzzy decisions and control in uncertainty conditions, in construction and control of robots in partly structured or completely non-structured environments for application in production and service processes without special adaptation of these processes. Robots are being designed for automatic supervision, rescue, maintenance or repair work.

Another area of interest is measurement of electromechanical systems, sensors and sensor measurement technology, measurement automation, data collection and processing, diagnostic technology and optoelectronics in automation and measurement technology.

The department has had extensive cooperation in the development of up-to-date elements and systems of industrial automation with GMC Blansko – Nürnberg, BD Sensors Bučovice, Compas Žďár nad Sázavou, Autec Brno and BetaControl Brno. In the development and design of measurement technology the department has cooperated with TU of Denmark, Slovak Academy of Sciences, Brüel & Kjaer, and Fisher-Rosemount.

The department provides education in all the above mentioned areas of research and development.

In 2004, the department will continue research of tools for real time image scanning and processing with focus on transport and industrial applications. The objectives are fast and robust algorithms for detection of vehicles, monitoring their trajectories in a limited sector of the road for traffic control and detection of problems. Methods will be developed of optical control of the properties of products and automatic reconstruction of objects focused on fast evaluation of results. Research will be going on of the theory of modelling and control of logic-dynamic systems with distributed incorporated systems.

Cooperation will be extended with the Institute for Automation and Communication Magdeburg, ESIEE Paris Noisy le Grand a Universite J. Fourier Grenoble. New contacts have been established with the workplace for calibration of AE sensors in the National Physical Laboratory in Great Britain, the company TSI System Brno and the major world producer of devices for contactless temperature measurement - the firm Raytek.

Major achievements

A patent application was submitted for the invention 'Measurement of the passage time and the device designed for this measurement' (PV2003-1048) as part of the industrial transport application – system UNICAM-CROSS.

A system was developed for ultrafast visual control of unwoven fabrics (PEGAS Bučovice, PEGAS Znojmo), steam-permeable foils (FATRA Napajedla) with detection of miniature defects, a system of fast control of the surface defects of electronic components (AVX Lanškroun), system for visual inspection of glass bottles (Pivovar Vyškov, Semipalatinsk, Kazakhstan), a system for weld profile measurements in automobile discs, a system for measurement of the volume and area of conductive paste spread over a flat pad (Hayes Lemmerz Autokola Ostrava) and for measurement of the volume and area of conductive paste spread over a flat pad (AVX Lanškroun).

Members of the staff participated in the construction of a rescue robot, which was awarded the first prize of the National Institute of Standards and Technology, USA at the international competition RoboCup in Italy (Luděk Žalud, Lukáš Kopečný and František Šolc). The teachers and students ranked second and third in the European Championships of Football Robots in Ljubljana (B. Honzík, M. Gajdušek, Z. Orság, M. Látal).

The measuring system for determination of the parameters of precise harmonic gearboxes for R.R. Wusam, Zvolen, Slovakia was developed and implemented (Petr Beneš).

Within the framework of the project ´Konsorcia FD-K/104 SENSVISION – Internet access in a process´, a prototype of a unique pressure sensor with the Ethernet TCP/IP interface and Internet control was produced in cooperation with BD Sensors s.r.o. Bučovice. The sensor was exhibited at Industrie Messe Hannover '03, International Trade Fair Brno '03, Pragoregula '03 a AMPÉR '03.

Within the framework of the GAČR 102/03/1097 project ´Industrial automation wireless network Bluetooth´ and the project of the Ministry of Industry and Trade ´Konsorcia FD-K/104 SENSVISION´ a unique pressure sensor was made up using the 'Bluetooth technology´. It was exhibited at the International Trade Fair Brno '03.

Major Research Projects

Automation of Industrial Processes and Technologies – MŠMT 260000013
Investigator: Petr Vavřín

An Environment for the Development, Modelling and Application of Heterogeneous Systems– GAČR 102/01/1485
Investigator: Petr Vavřín

The Industrial Wireless Automation Network Bluetooth– GAČR 102/03/1097
Investigator: František Zezulka

The Development of Methods for Measuring the Parameters of Precise Gearbox – GAČR 102/01/1044
Investigator: Zdeněk Malec

Research of the Behaviour and Control of Non-Conventional Action Robotic elements– GAČR 102/02/0782
Investigator: František Šolc

Research in Information and Control Systems – MŠMT 262200012
Investigator: Jan M. Honzík, co-investigator: František Zezulka

Selected Publications

BENEŠ, P., MAZAL, P., PAZDERA, L. Practical tests of acoustic emission method at Brno University of Technology. *NDT World*, 2003, Vol. 19, No. 1, pp. 20 - 49.

BRADÁČ, Z., ŠVÉDA, M., SAJDL, O., VRBA, R. Data Acquisition System Exploiting Bluetooth Technology. *WSEAS Transactions on Circuits*, ISSN 1109-2734, 2003, Vol. 2003, No. 1, pp. 117 - 119.

CACH, P., FIEDLER, P., ŠVÉDA, M., PROKOP, M., WAGNER, M. A Sensor with Embedded Ethernet. *WSEAS Transactions on Circuits*, ISSN 1109-2734, 2003, Vol. 1, No. 2, pp. 213 - 215.

FIEDLER, P., BRADÁČ, Z., BRADÁČ, F., PROKOP, M., WAGNER, M. Further Evolution of Fieldbuses. *WSEAS Transactions on Computers*, ISSN 1109-2750, 2003, Vol. 2 (2003), No 2, pp. 477 - 480.

Bachelor Programme

Computer Science in Automation (Petr Pivoňka)

Control Theory 1 (Petr Vavřín)

Measurement in Electroengineering (Ludvík Bejček)

Measurement of Physical Quantities (Ludvík Bejček)

Microprocessors (Radovan Holek)

Modelling and Simulation (František Šolc)

Practical Programming in C++ (Jozef Honec)

Programmable Logics Controllers (František Zezulka)

Signals and Systems (Pavel Jura)

Master Programme

Artificial Intelligence (Václav Jirsík)

Bachelor Project (Václav Jirsík)

Binary Control Systems (Zdeněk Malec)

Components of Control Systems (Radovan Holek)

Computer Aided Design (Jozef Honec)

Computer Control (Petr Pivoňka)

Computer Graphics (Jozef Honec)

Computer Integrated Manufacturing (František Šolc)

Construction of Measuring Instruments (Petr Beneš)

Database Systems (Radovan Holek)

Design of Control Systems (František Zezulka)

Digital Analysis and Data processing (Miloslav Čejka)

Electronic Measuring Instruments (Miloslav Čejka)

Electronics for Control and Measuring (Karel Hoder)

Electronics Measurements (Miloslav Čejka)

Expert Systems (Václav Jirsík)

Fuzzy Logic for Control and Modelling (Pavel Jura)

Machine Learning (Jan Žižka)

Means of Automation (František Zezulka)

Measurement in Non-Electrical Quantities (Ludvík Bejček)

Microprocessors (Radovan Holek)

Modelling and Identification (František Šolc)

Modern Theory of Control (Petr Vavřín)

Multivariable Signal Processing (Jozef Honec)

Optoelectronics in Control (Ludvík Bejček)

PCs in Instrumentation (Miloslav Čejka)

Practical Programming in C (Miloslav Richter)

Programmable Logics Controller (František Zezulka)

Programming Artificial Intelligence - PROLOG (Soňa Šedivá)

Semiconductor and Smart Sensors (Petr Beneš)

Sensors of Non-electrical Quantities (Ludvík Bejček)

Servomechanisms (Zdeněk Malec)

Signal Processors in Automation and Measurement (Jozef Honec)

STR1 Linear Control (Petr Vavřín)

STR2 Nonlinear Automatic Control (František Šolc)

Subsystems of PC (Jozef Honec)

System Analysis (Petr Pivoňka)

Systems, Processes, Signals II. (Pavel Jura)

Doctoral Study Programme

Advanced Control Theory and Praxis (Petr Vavřín)

Hierarchical and Decentralized Control (František Zezulka)

Chosen Areas of Optoelectronics (Ludvík Bejček)

Machine Vision (Jozef Honec)

Modern Control Theory (Petr Vavřín)

Optimum System Control and Identification (Jozef Honec)

Reliability and Diagnostics (Zdeněk Malec)

Technical Robotics (František Šolc)

Laboratories

Laboratory of Acoustic Emission (research laboratory, experiments carried out within the framework of student projects, diploma theses and GACR projects, Petr Beneš)

Laboratory of Measurement Automation (instruction in Measurement Automation, experiments for student projects and diploma theses, Miloslav Čejka)

Laboratory of Wireless Communication Technology (research within the projects GACR 102/03/1097, Consorcium FD-K/104 and Research plan MSM 262200022, Zdeněk Bradáč, Petr Fiedler)

Laboratory of Electronic Measurement and Instrumentation (instruction in Measurements in Electrical Engineering and Electronics, Soňa Šedivá, Marie Havlíková)

Laboratory of Intelligent Controllers (instruction in Digital Control Technology, Intelligent Controllers, research into direct implementation of up-to-date control algorithms in real time, Petr Pivoňka)

Laboratory of Measurement of Non-Electrical Quantities (instruction in Measurement of Non-Electrical Quantities and Sensors of Non-Electrical Quantities, experiments within the framework of student projects and diploma theses, Petr Beneš)

Laboratory of Pressure and Flow Measurements (research laboratory, testing track for flow measurements, Ludvík Bejček)

Laboratory of Modern Control Methods (instruction in Means of Automation, Programmable Automatics, Design of Control Systems, Zdeněk Bradáč, Radek Štohl)

Laboratory of Non-Conventional Drives for Robotics (research laboratory, experiments within the framework of student projects and theses and GAČR projects, Petr Vaňous)

Laboratory of Optoelectronics (instruction in Optoelectronics in Measurement and Automation Technology, experiments for student projects and theses, Soňa Šedivá)

Laboratory of Computer Vision - HW (instruction in PC Subsystems, Automation in Engineering, experiments for student projects and diploma theses, Jozef Honec and Soběslav Valach)

Laboratory of Computer Vision - SW (instruction in Programming Computer Graphics, Processing of Multidimensional Signals, experiments for student projects and theses, Jozef Honec)

Laboratory of industrial Communication Buses instruction in Means of Automation, research of imbedded systems, research and development of smart Internet-oriented sensors, Pavel Kučera)

Laboratory of Robotics (instruction in Robotics, Computer-Controlled Production Process, Petr Vaňous)

Laboratory of Rockwell Automation (instruction in Programmable Automatics in the Bachelor programme, training for industrial companies in programmable systems RS Logix, RS View and communication bus DeviceNet, Petr Vaňous)

Laboratory of Control Systems (research laboratory, experiments for student projects and theses, equipped with a set of real models for demonstration of physical systems control, Petr Vaňous.)

Laboratory of Telepresence and Robotics (instruction in Robotics, experiments for student projects and theses, Luděk Žalud)

Department of Biomedical Engineering

Prof. Ing. Jiří Jan, CSc.

Head

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Professors

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Prof. Ing. Jiří Jan, CSc.
Prof. MUDr. Jindřich Vomela, CSc.

Associate Professors

Doc. Ing. Aleš Drastich, CSc.
Doc. MUDr. Václav Chaloupka, CSc.
Doc. Ing. Milan Chmelař, CSc.
Doc. Ing. Ivo Provazník, Ph.D.
Doc. Ing. Jiří Rozman, CSc.
Doc. RNDr. Ing. Jiří Šimurda, CSc.

Lecturers

Ing. Miroslav Dvořák, CSc., Ing. Petr Fedra, Ing. Radovan Jiřík, Ing. Radim Kolář, Ph.D., Ing. Jiří Kozumplík, CSc., Ing. Zoltán Szabó, Ph.D., Ing. Vlastimil Václavík

Postgraduate Students

Ing. Asterios Anagnostoudis, Ing. Milan Blaha, Ing. Radovan Burhan, Ing. David Čermák, Ing. Tomáš Červinka, Ing. Petr Dub, Ing. Adam Filipík, Ing. Martin Hlaváč, Ing. Ladislav Hrubý, Ing. Lukáš Chmelka, Ing. Radim Chrástek, Ing. Josef Jaroš, Ing. Vladimír Kotala, Ing. Libor Kubečka, Ing. Radomír Kurečka, Ing. Vladimír Mahdal, Ing. Karel Matys, Ing. Jan Musil, Ing. Daniel Orel, Ing. Robert Paluch, Ing. Radim Petržela, Ing. Martin Plchút, Ing. Václav Prajzner, Ing. Jaroslav Rohel, Ing. Ivo Říha, Ing. Petr Sadovský, Ing. Daniel Schwarz, Ing. Martin Skokan, Ing. Jan Šandera, Ing. Petr Verner, Ing. Zbyněk Veselý, Ing. Roman Vopálka, Ing. Marek Vyklický, Ing. Jiří Začal, Ing. Miloslav Zadražil, Ing. Michal Závišek

Administrative and Technical Staff

Anna Oujeská, Jaroslav Sedláček

Main Interests

The department is responsible for tuition in basic subjects, mainly processing of signals and images, specialized subjects of biomedical and ecological engineering in the new and the running out Bachelor and Master programmes. The department is involved in basic and applied research of engineering principles in medicine, biology and ecology. The main areas of interest are digital processing and analysis of cardiological and ophtalmological images, particularly 3D ultrasonographic data, digital processing and analysis of the records of the electric activity of ischemic heart, modelling and analysis of the impact of ultrasound on the tissue in impetus diagnosing. The department closely cooperates with the University of Bergen, Norway, the Ophtalmological Clinic of the Fridrich-Alexander-University of Erlangen, Germany, the Medical Faculty of Masaryk University of Brno and the Faculty Hospital in Brno-Bohunice.

In 2004, the department will be involved in research of the methods of restoration of ultrasound images, and will be working on the completion of the grant project on an analysis of cardiological 3D ultrasonic data, and will continue work on the international project on an analysis of ophtalmological images based on multimodal data. Of equal importance is the subsequent development of a unique device for simultaneous optical and electrical recording of heart activity for detection of the by-effects of drugs. The department plans to build a new laboratory for tuition in biomedical subjects focused on experiments and clinic diagnosing, and laboratories for multimodal signals and data. The department has established cooperation with the University of Bergen and the University of Zaragoza aimed at regular reciprocal teacher and postgraduate student mobility. Cooperation with all above mentioned workplaces and environmentalistic institutions will be focused on support of new ways of teaching technical principles in ecology.

Major Achievements

Prof. Jiří Jan, Prof. Milan Šonka (University of Iowa, USA) and Assoc. Prof. Ivo Provazník were invited to prepare and edit the special issue on "Modality-Oriented Medical Image Processing" of the international journal EURASIP Journal of Applied Signal Processing (Hindawi).

Assoc. Prof. Ivo Provazník and his team completed the development of a unique device for optical recording of the electrical activity of the heart muscle based on the principle of an excitation of the fluorescence voltage-sensitive dye. The device is devised for acquisition of experimental data investigated within the framework of the project on research of myocardial ischemia „Optical recording of action potentials and its application in cardiology‘ carried out in cooperation with the Medical Faculty of Masaryk University in Brno.

Four young researchers of the department (Zoltán Szabó, Radim Kolář, Radovan Jiřík and Petr Fedra) obtained, under the supervision of Prof. Jiří Jan, four grant projects of the Grant Agency of the Czech Republic (postgraduate grants), the Grant Agency of Academy of Sciences (junior research grant) and the Ministry of Education (support programme for young researchers) focused on processing of medical images.

Prof. Jiří Jan completed the manuscript of the monograph "Principles of Medical Image Processing, Reconstruction and Restoration" (600 pages) for the publishing house Marcel Dekker, New York. The academic staff of the department had their contributions published in the proceedings of leading international conferences.

The head of the department Prof. Jiří Jan was awarded the Golden Medal of Brno University of Technology for his longlife research and pedagogical work.

Major Research Projects

Analysis and Suppression of Speckles in 3D Medical Ultrasound Images – GA AV B2813303
Investigator: Radim Kolář

Analysis of Medical Ultrasound Data Focused on 3D Imaging in Cardiology– GAČR 102/02/0890
Investigator: Jiří Jan

Deconvolution of Ultrasound Images– MŠMT 1K03017
Investigator: Jiří Jan

Optical Recording of Action Potentials and Its Application in Cardiology- GAČR 102/01/1494
Investigator: Ivo Provazník

An Optical System for Measurement of the Position and Orientation of the Ultrasound Probe for 3D Imaging in Cardiology - GAČR 102/03/D030
Investigator: Zoltán Szabó

Computer Processing of Ophtalmological Images- KONTAKT 01/031
Investigator: Jiří Jan

Processing and Analysis of 3D Ophtalmological Images Focused on the Enhancement of Prevention Glaucom Diagnostics– GAČR 102/03/P153
Investigator: Radim Kolář

Selected Publications

ELBL, L., HRSTKOVÁ, H., CHALOUPKA, V. The Late Consequences Of Anthracycline Treatment On Left Ventricular Function After Treatment For Childhood Cancer. *European Journal of Pediatrics*, ISSN 0340-6199, 2003, Vol. 162, No. 10, pp. 690 - 696.

ELBL, L., HRSTKOVÁ, H., CHALOUPKA, V., NOVOTNÝ, J., MICHÁLEK, J. The Evaluation Of Left Ventricular Function In Childhood Cancer Survivors By Pharmacological Stress Echocardiography. *Neoplasma*, 2003, No. 50, pp. 191 - 197.

HONZÍKOVÁ, N., KRTIČKA, A., NOVÁKOVÁ, Z., ZÁVODNÁ, E. A Dampening Effect Of Pulse Interval Variability On Blood Pressure Variations With Respect To Primary Variability In Blood Pressure During Exercise. *Physiological Research*, ISSN 0862-8408, 2003, Vol. 52, No. 1, pp. 299 - 308.

JAN, J., JANOVÁ, D. Science, Technology and Education of Microscopy (Editor: A. Mendez-Vilas). In: *Complex Approach To Surface Reconstruction Of Microscopic Samples From Bimodal Image Stereo Data*. 2003: Formatex, Badajoz Spain, 2003, pp. 656 - 674 . ISBN 84-607-6699-3

JAN, J., PROVAZNÍK, I. Editorial: Special Issue on Advances in Modality Oriented Medical Image Processing. *Applied Signal Processing*, ISSN 1110-8657, 2003, Vol. 2003, No. 5, pp. 403 - 404.

OZER, M., ERDEM, R., PROVAZNÍK, I. A New Approach to Define Dynamics of the Ion Channel Gates. *Neuroreport*, ISSN 0959-4965, 2003, Vol. 14, No. 18, pp. 1071 - 1073.

Bachelor Programme

Computers and Programming 1 (Ivo Provazník)

Digital Signal Processing and Analysis (Jiří Jan)

Ecology in Electrotechnical Profession (Jiří Rozman)

Doctoral Programme

Advanced Methods of Digital Image Processing (Jiří Jan)

Bioinformatics (Ivo Provazník)

Methods and Systems Used for Ultrasound Diagnostics (Jiří Rozman)

Neural Networks, Adaptive and Optimum Filtering (Jiří Jan)

Spectral Analysis of Digital Signals (Jiří Kozumplík)

Master Programme

Adaptive Signal Processing (Ivo Provazník)

Advanced Signal Processing Algorithms (Jiří Kozumplík)

Bionics (Jiří Kozumplík)

Biophysics (Jiří Šimurda)

Clinical Physiology (Václav Chaloupka)

Digital Image Processing and Analysis (Jiří Jan)

Ecological Engineering (Jiří Rozman)

Environmental Diagnostics (Jiří Rozman)

Expert Systems and Computer-Aided Medical Diagnostics (Ivo Provazník)

Healthcare (Jindřich Vomela)

Human Biology (Nataša Honzíková)

Medical Diagnostic Devices (Milan Chmelař)

Medical Imaging Systems (Aleš Drastich)

Medical Information Systems (Ivo Provazník)

Medical Laboratory Devices (Milan Chmelař)

Nontelevision Imaging Systems (Aleš Drastich)

Medical Systems Design (Karel Jehlička)

Therapeutic Technique (Jiří Rozman)

Laboratories

Laboratory of Bionics (instruction in Bionics, Modeling of Biological Objects and Biology of Man, experiments for student projects, Jiří Kozumplík)

Laboratory of Medical Informatics (instruction in Medical Information Systems, Expert Systems, Adaptive Signal Processing, New Signal Processing Algorithms, Design and Servicing of Medical Systems, operation of a professional hospital information system, Karel Jehlička)

Laboratory of Medical Instrumentation (instruction in Medical Diagnostic Devices, Laboratory Medical Devices and Therapeutic Techniques, implementation of the technical part of student projects, Milan Chmelař)

Laboratory of Medical Diagnostic Systems (instruction in Medical Imaging Systems, Nontelevision Imaging Systems, Ecological Engineering and Environmental Diagnostics, Jiří Rozman, Aleš Drastich)

Laboratory for Digital Image Data Processing (research into digital recording, processing and analysis of images, digitization of static images and videosequences, Zoltán Szabó)

Laboratory of Digital Signal Processing (instruction in Digital Signal Processing and Analysis, Digital Image Processing and Analysis, Computers and Programming 1, Computers and Programming 2, Jiří Kozumplík)

Design and Construction Laboratory (mechanical and electrotechnical support for student projects and diploma theses, Jaroslav Sedláček)

Department of Electrical Power Engineering

Doc. Ing. Antonín Matoušek, CSc.

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Doc. RNDr. Oldřich Coufal, CSc.
Doc. Ing. Evžen Haluzík, CSc.
Doc. Ing. Antonín Matoušek, CSc.
Doc. Ing. Jiří Raček, CSc.

Lecturers

Ing. Petr Baxant, Ph.D., Ing. Jan Gregor, CSc., Ing. Michal Chmela, Ing. Ilona Lázničková, Ing. Milan Ondrášek, CSc., Ing. Jaroslava Orságová, Ing. Petr Toman, Ph.D., Ing. Miroslav Velísek, CSc.

Postgraduate Students

Ing. Michal Bernard, Ing. Ivo Běhunek, Ing. Petr Čambala, Ing. František Decsi, Ing. Jiří Drápela, Ing. David Foltýn, Ing. Jaroslav Heinz, Ing. Michal Chmela, Ing. Radek Javora, Ing. Eva Kadlecová, Ing. Rostislav Kaleta, Ing. René Kameník, Ing. Milan Krátký, Ing. Ilona Lázničková, Ing. Jan Macháček, Ing. Petr Mastný, Ing. Zdeněk Matoušek, Ing. Tomáš Mendl, Ing. Jaroslava Orságová, Ing. Lubomír Petřek, Ing. Zdeněk Procházka, Ing. Jiří Ptáček, Ing. Petr Skala, Ing. Libor Weidinger, Ing. Jiří Uher, Ing. Michal Závodný

Administrative and Technical Staff

Helena Karásková, František Matoušek

Main Interests

The department is responsible for education (in the Bachelor, Master and Doctoral study programme) of professionals in the major areas of power electrical engineering - production, distribution and exploitation of electrical energy, including exploitation of alternative power sources.

Research is mainly focused on lighting and lighting systems, high-voltage networks, electrophysical and thermophysical processes in plasma, switching-arc kinetics, and transport of electrical energy in interconnected power systems.

The present study programme will continue in 2004 and will be focused on subjects covering power electrical engineering.

Within the framework of the research plan, three grant projects of GACR and one GA AV project, work will continue with focus on the development, implementation and analysis of the properties of a simple air thermal collector and its application in thermal-air heating systems. Another focus of research will be optimization of the operation of the solar-system thermal pump in accumulation and exploitation of low-potential heat. Increased attention will be paid to scattered sources of electrical energy, particularly cogeneration units, small hydroelectric and wind-powered plants and photovoltaic energy conversion, including connection of these sources into the power system, and an analysis of their control, reliability and power supply as affected by fluctuations of primary energy from these sources.

Cooperation with industrial companies will continue on the basis of economic contracts. Cooperation with the departments of power electrical engineering of Czech and Slovak technical universities will be maintained, and further cooperation will be started with technical universities from other countries.

It is expected that a contract will be concluded with the company SOLARTEC a.s. on the research, development and testing of cogeneration converters of solar energy into heat and electricity.

Major Achievements

The research results achieved at the department were presented at national and international conferences, particularly at the CIRED Conference in Barcelona.

Student Pavel Ščučka (supervisor Antonín Matoušek) won in the national competition organized by ČEZ a.s. with his diploma thesis ‘Combined Exploitation of renewable sources of electrical energy‘.

In cooperation with the Institute of Plasma Physics of Academy of Sciences of the Czech Republic a plasma laboratory for joint experimental research was built. For this laboratory, the department designed a unique modular gas plasmatron.

An international conference of postgraduate students was organized in 2003, attended by several postgraduates from abroad.

The department carried out research within the framework of four GACR projects, one GA AV project and two postgraduate FRVS projects. The department participated in the research plan MSM 262200010.

Measurements of the progressing optimization of the operation point of photovoltaic converters were performed and evaluated in regard to the real operation conditions, which would result in an average 20% increase in electric energy production.

Major Research Projects

Digital Photography in a New System of Lighting Systems Evaluation– GAČR 102/01/D005
Investigator: Petr Baxant.

Electrophysical and Thermophysical Processes in Low-Temperature Plasma– KONTAKT ME 101
Investigator: Josef Šenk

New Methods of Localization of Earth Contacts in Electric Waves Networks– AVČR KJ B2813304
Investigator: Petr Toman

An Expert System for Illumination in Deteriorated Conditions - GAČR 102/03/1162
Investigator: Petr Baxant

Equilibrium and Kinetics in Switching Arc- GAČR 102/02/1414
Investigator: Oldřich Coufal

Setting Physical, Technical and Technological Limits in Electrical Energy Transport Through Interconnected Power Systems– GAČR 102/03/P033
Investigator: Petr Toman

Selected Publications

BLAŽEK, V., SKALA, P. Urban Medium Voltage Distribution Network with Cross Connection In Conference Proceedings 17th International Conference on Electricity Distribution. 17th International Conference on Electricity Distribution. Barcelona, Spain: CIRED, 2003, pp. 1 – 6.

GREGOR, J., JAKUBOVÁ, I., MENDL, T., SEMBER, V., ŠENK, J. Determination of Basic Parameters of Hot Gas Mixture Free Jet In The 16th Int. Symposium on Plasma Chemistry - Abstracts and Full Papers CD. 16th International Symposium on Plasma Chemistry. Taormina, Italy: Dept. of Chemistry, University of Bari, Italy, 2003, pp. 128 - 132

TOMAN, P., HALUZÍK, E. Location of Single Line to Earth Faults in MV Networks In 17th International Conference on Electricity Distribution. 17th International Conference on Electricity Distribution. Belgium 2003: l'Institut d'Electricité Montefiore, 2003, pp. 3.71 – 7.

Bachelor Programme

Computer Modelling and Simulations (Petr Baxant)

Distribution Equipment (Jaroslava Orságová)

High Voltage and Electric Apparatus (Vladimír Blažek)

Machinery of Power Plants (Jiří Raček)

Technical Mechanics (Jiří Raček)

Master Programme

Advances Power Engineering (Evžen Haluzík)

Applied Programming in Power Engineering (Petr Toman)

Design of Power Engineering 1 (Petr Toman)

Design of Power Engineering 2 (Vladimír Blažek)

Diagnostics and Testing (Petr Baxant)

Ecology (Antonín Matoušek)

Economy of Electrical Power Generation, Transmission and Distribution (Michal Chmela)

Economy of Power Engineering (Michal Chmela)

Electric Energy Transmission and Distribution 1 (Vladimír Blažek)

Electric Energy Transmission and Distribution 2 (Evžen Haluzík)

Electrical Heating and Light (Petr Baxant)

Electrical Power Generation (Antonín Matoušek)

Electrical Power Plants 1 (Antonín Matoušek)

Electrical Power Plants 2 (Milan Ondrášek)

Power Engineering (Milan Ondrášek)

Power Interferences (Oldřich Coufal)

Energy Use (Petr Baxant)

Fittings of Light (Petr Baxant)

High Voltage Technology (Vladimír Blažek)

Lightings Systems (Petr Baxant)

Linear Circuit Application in Power Systems (Evžen Haluzík)

Machinery of Power Plants (Jiří Raček)

Measuring and Regulation in Power Engineering (Milan Ondrášek)

Mechanics (Jiří Raček)

Nuclear Power Plant Operation (Jiří Raček)

Nuclear Power Plants Control (Milan Ondrášek)

Power Engineering in Environment (Antonín Matoušek)

Power Plant Automation (Milan Ondrášek)

Power Plant Operation (Antonín Matoušek)

Power Systems Control (Evžen Haluzík)

Power Systems Development (Petr Toman)

Protections and Automatics (Evžen Haluzík)

Technical Mechanics (Jiří Raček)

Town and Industry Networks (Jaroslava Orságová)

Transient Phenomena in Power Network (Oldřich Coufal)

Unconventional Conversions (Antonín Matoušek)

Doctoral Programme

Application of Chosen Mathematical Methods in Power Engineering (Vladimír Blažek)

Computer Modelling of Power Systems (Evžen Haluzík)

Ecology in Power Engineering (Jiří Raček)

Light and Lighting Systems (Petr Baxant)

Low Temperature Plasma in Electrical Engineering (Oldřich Coufal)

Power Plants Control (Antonín Matoušek)

Solar Energy Utilization (Jan Grego)

Specific Problems of Power Plants (Antonín Matoušek)

State Estimation of Power Systems Security (Evžen Haluzík)

Thermodynamics of Electric Arc Plasma (Oldřich Coufal)

Laboratories

Power Plant Laboratory (instruction in Power Plants 1 and 2, Automation of Power Plants, diploma theses and special research projects on small sources, Jaroslava Orságová)

Protective Devices Laboratory (instruction in Protection and Automatics in Networks, diploma theses, preparation of measurements in real networks, research in this area, Petr Toman)

Laboratory of Electric Power Transmission (instruction in Electric Power Transmission and Distribution 1 and 2, Urban and Industrial Networks, Energetic Interferences, and research in this area, Vladimír Blažek)

Laboratory of Non-Conventional Energy Conversion (instruction in Non-Conventional Energy Conversion, Bachelor projects and diploma theses, Antonín Matoušek)

Lighting Technology Laboratory (instruction in Electric Light and Heat, Lighting Systems, Operation of Lighting Systems, diploma theses and technical light measurements for research and industrial applications, Petr Baxant)

Solar Energy Laboratory (research of complex exploitation of solar energy, research and development and testing of working models in real operation conditions, equipped with automatic data collection, Jan Gregor)

Department of Electrotechnology

Doc. Ing. Josef Jirák, CSc.

Head

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Professors

Prof. Ing. Rudolf Autrata, DrSc.
Prof. Ing. Jiří Kazelle, CSc.
Prof. Ing. Pavel Procházka, CSc.

Associate Professors

Doc. RNDr. Milan Calábek, CSc.
Doc. Ing. Miroslav Cenek, CSc.
Doc. Ing. Josef Jirák, CSc.
Doc. Ing. Karel Liedermann, CSc.

Lecturers

Ing. Petr Bača, Ph.D., Ing. Zdeněk Buřival, CSc., Ing. Svatopluk Havlíček, CSc., Ing. Petr Kahle, Ing. Petr Křivák, Ph.D., Ing. Jiří Maxa, Ing. Vítězslav Novák, Ph.D., Ing. Helena Polsterová, CSc., Ing. Zdenka Rozsívalová, Ing. Marie Sedlaříková, CSc., Ing. Jiří Starý, Ing. Jiří Špinka, Ing. Jiří Vaněk, Ph.D.

Postgraduate Students

Ing. Ivo Beran, Ing. Patrik Boček, Ing. Vladimír Brzokoupil, Ing. Pavel Černoch, Ing. Radek Drnovský, Ing. Jan Dvořák, Ing. Martin Frk, Ing. Miroslav Haman, Ing. Vítězslav Hekerle, Ing. Petr Hrnčiřík, Ing. Karel Hruška, Ing. Roman Kameník, Ing. Martin Kocian, Ing. Ondřej Krejza, Ing. Pavel Nečesal, Ing. Vilém Neděla, Ing. Jan Rychnovský, Ing. Tomáš Stranyánek, Ing. Martin Vojtek, Ing. Petr Wandrol, Ing. Luděk Schneider, Ing. Jaroslav Skřivánek, Ing. Karel Smékal, Ing. Jiří Starý

Administrative and Technical Staff

Jarmila Bartošková, Jaroslava Hlavsová, František Kořínek, Rudolf Krásenský, Dagmar Prosová

Main Interests

The department provides tuition in the subject Materials and Technical Documentation in the first year of the Bachelor study programme and in subjects focusing on production processes, electrotechnical materials, printed circuit technology and surface mounting, diagnostics and reliability of electrotechnical materials and production, and design in the Bachelor and the Master programme. Research is focused on basic and applied research of renewable electrical energy sources and their exploitation in alternative transport by electric and hybrid vehicles, detection of signal electrons and methods of environmental scanning electron microscopy, lead-free soldering and diagnostics of electrotechnical materials. The department maintains cooperation with Technische Universität Wien, Universität Ulm – Zentrum für Sonnenenergie – und Wasserstoff-Forschung, École Polytechnique de Montréal, the laboratory of surface analysis methods Nanolytics in Feldkirchen, Austria, Institute of Instrument Technology, Institute of Anorganic Chemistry and Institute of Physical Chemistry of Academy of Sciences of the Czech Republic, with the firm CINK hydroelectric plants Karlovy Vary, ČAS-Service Znojmo, EPRONA a.s. Rokytnice n. Jizerou, ROTOKOV Křidlůvky u Znojma. Within the framework of the programme KONTAKT the department cooperates with the National Institute of Chemistry, Ljubljana.

In 2004, research will continue in all above mentioned areas. Research will be started of gel electrolytes and their application in lithium-ion batteries, of electrocatalysts for fuel cells and of thin-layer electrodes for electrochromic systems. The research is based on the long-term research plan ‘Resources, Accumulation and Optimization of Electric Power Exploitation in Environmental Applications‘, GACR and GAAV projects, and is supported by the ALABC Consorcium, USA. In 2004, the department is going to organize the 5th Advanced Batteries and Accumulators International Conference 2004, Brno, the 6th International Meeting on Electrochromism (jointly with Institute of Chemistry, Academy of Sciences) and the conference on Chemical sources of renewable energy (jointly with ČES). Upgrading of laboratory facilities will continue. The quality of tuition will be increased due to the new library, free access to the CAD laboratory connected with Internet and new subjects offered in the Bachelor and the Master study programme.

Major Achievements

Assoc. Prof. Miroslav Cenek completed the Czech-Austrian project ’Increased electrical energy exploitation in charging electric vehicles from small hydroelectric plants‘ ECOTRANS E!2521, solved in the period 2002/03 within the framework of the programme EU EUREKA. The project was presented on 9 December 2003 in the Austrian Parliament as an example of a fruitful cooperation in the EU project EUREKA, resulting in a higher quality of the environment and saving of electrical energy, and is fully in accordance with the European Union support of renewable energy sources.

The department organized the 4th ABA (Advanced Batteries and Accumulators), International Conference 2003, Brno 15–19 June 2003 (Marie Sedlaříková).

Assoc. Prof. Josef Jirák and his team completed research of two unique detectors for the environmental scanning electron microscope (ESEM), the segmented detector and the scintillation detector for detecting signals of real secondary electrons in ESEM. The results were presented at three international conferences.

Young members of the staff Petr Křivák and Vítězslav Novák won junior research grants of GA AV focused on chemical sources of electrical energy. Undergraduate and postgraduate students obtained five FRVS projects.

Within the framework of a FRVS project, an interactive library was established in cooperation with the Department of Microelectronics, connected to the Intranet of Brno University of Technology, to the databases of the Central Library, and with access to electronic information available at the Department of Electrotechnology and at the Department of Microelectronics.

Another laboratory was established for laboratory exercises in material subjects in the Bachelor and the Master programme, mainly those concerned with semiconductor and dielectric materials.

Major Research Projects

Direct Charging of Electric Vehicles from Hydro-Electric Power Plants Using Fast Charging Equipment – EUREKA E!2521 ECOTRANS
Investigator: Miroslav Cenek

Complex Study of the Internal Resistance of Lead Accumulator in Situ– AVČR B 2813305
Investigator: Petr Křivák

Preparation and Properties of Aprotic Gel Polymer Electrolytes– AVČR IAA 4032002
Investigator: Jiří Vondrák

Study of Active Mass and Contact Layers in Lead Accumulator Electrodes in Situ– GAČR 102/02/0794
Investigator: Milan Calábek

Detection Methods and Systems in Boundary Conditions of Environmental Scanning Electron Microscopy– GAČR 102/01/1271
Investigator: Rudolf Autrata

Transport, Solvatation and Sorption of Ions in Gel Polymer Electrolytes– GAČR 104/02/0731
Investigator: Marie Sedlaříková

Composite Electrode Materials Deposited on Ion Exchanging Membranes– AVČR KJB 4813302
Investigator: Vítězslav Novák

Resources, Accumulation and Optimization of Electric Power Exploitation in Environmental Applications – SRČR MSM 262200010
Investigator: Jiří Kazelle

Selected Publications

AUTRATA, R., JIRÁK, J., SCHNEIDER, L. Usage of Segmental Ionization Detector at Environmental Conditions. *Microscopy and Microanalysis*, 2003, Vol. 9, No. 3, pp. 142 - 143.

AUTRATA, R., ROUBALÍKOVÁ, L., WANDROL, P., JIRÁK, J. Study of Surface Tooth Treatment using Low-Vacuum Scanning Electron Microscopy. *Microscopy and Microanalysis*, 2003, Vol. 9, No 3, s. 428 - 429.

AUTRATA, R., SCHAUER, P. Optimization of Poly-(Methylphenylsilylene) Specimens for Cathodoluminescence Measurement. *Microscopy and microanalysis*, 2003, Vol. 9, No. 3, pp. 156 - 157.

VONDRÁK, J., REITER, J., VELICKÁ, J., KLÁPŠTĚ, B., SEDLAŘÍKOVÁ, M., NOVÁK, V. Thermodynamics and Digital Simulation Of Intercalation Processes. *Journal of Solid State Electrochemistry*, ISSN 1432-8488, 2003, Vol. 7, No. 6, pp. 361 - 367.

VONDRÁK, J., SEDLAŘÍKOVÁ, M. Editorial: International Meetings on Advanced Batteries and Accumulators. *Journal of Solid State Electrochemistry*, ISSN 1432-8488, 2003, Vol. 2003, No. 8, p. 1.

VONDRÁK, J., SEDLAŘÍKOVÁ, M. Hydrogen - Oxygen Fuel Cell. *Journal of Solid State Electrochemistry*, ISSN 1432-8488, 2003, Vol. 2003, No. 8, pp. 5 - 7.

VONDRÁK, J., SEDLAŘÍKOVÁ, M., VELICKÁ, J., KLÁPŠTĚ, B., NOVÁK, V., REITER, J. Gel Polymer Electrolytes Based on PMMA. III. PMMA Gels Containing Cadmium. *Electrochimica Acta*, ISSN 0013-4686, 2003, Vol. 48, No. 8, pp. 1001 - 1004.

Bachelor Programme

Diagnostics and Testing (Josef Jirák)

Electrotechnical Materials and Production Processes (Jiří Kazelle)

Materials and Technical Documentation (Josef Jirák)

Quality Management and Checking (Helena Polsterová)

Reliability in Electrical Engineering (Helena Polsterová)

Doctoral Programme

Accumulators and Protection of Environment (Miroslav Cenek)

Diagnostics of Semiconductor Materials and Structures (Josef Jirák)

Electron Spectroscopies (Luděk Frank)

Chemical Sources of Electric Energy in Electrotechnical Practice (Milan Calábek)

Methods of Measurement in Electrochemical Power Sources (Jiří Vondrák)

Optoelectronics - Materials and Technology (Rudolf Autrata)

Master Programme

CAD 1 (Pavel Procházka)

CAD 2 (Jiří Maxa)

CADDS5 Advanced Modelling (Jiří Maxa)

CADDS5 Basic 3D Modelling (Jiří Maxa)

Climatotechnology in Electrical Engineering (Karel Liedermann)

Computer Aided Scheme Systems (Vítězslav Novák)

Design of Production Systems and Logistic (Jiří Špinka)

Design View (Jiří Maxa)

Diagnostics and Testing in Electrical Engineering (Josef Jirák)

Ecology in Manufacturing (Miroslav Cenek)

Fundamentals of Reliability in Electrical Engineering (Helena Polsterová)

Graphic Systems 1 (Petr Bača)

Graphic Systems 2 (Pavel Procházka)

Manufacturing of Power Devices (František Veselka)

Printed Circuits and Surface Mount Technology (Jiří Starý)

Production Processes (Jiří Kazelle)

Reliability of Power Devices and Systems (Helena Polsterová)

SEMA Materials in Electrical Engineering (Karel Liedermann)

SMEI Materials in Electrical Engineering (Karel Liedermann)

Special Materials (Karel Liedermann)

Laboratories

Air-Conditioned Laboratory of Dielectric Materials with Highly Stabilized Environment (research of dielectric properties of electroinsulating materials, measurements at stabilized temperatures and relative air moisture, Svatopluk Havlíček)

Laboratory of Dielectric Materials (research, instruction and diploma theses in the field of dielectric properties of electroinsulating materials, Svatopluk Havlíček)

Electron Microscopy Laboratory (laboratory exercises in Diagnostics and Testing in Electrical Engineering, research of signal detection in environmental scanning and electron microscopy, of the structure of accumulator mass and surfaces of electrotechnical materials, namely insulators, Josef Jirák)

Laboratory of Electrotechnical Materials I (laboratory exercises in Materials and Technical Documentation, Petr Křivák)

Laboratory of Electrotechnical Materials II (instruction in measurement and computer modelling of the parameters of semiconductor and dielectric materials in Electrotechnical Materials and Electrotechnical Materials and Manufacturing, Zdenka Rozsívalová)

Laboratory of Electrotechnical materials III (laboratory for work on Bachelor and diploma theses, and for doctoral students, Zdenka Rozsívalová)

Laboratory of Chemical Power Sources (research of lead accumulators, Milan Calábek)

Ion Laboratory (research, instruction and diploma theses in the field of measurement of ion concentration, Svatopluk Havlíček, Zdeněk Buřival)

Laboratory of System Design and Surface Mounting Technology (laboratory instruction in Printed Circuits and Surface Mounting, Jiří Starý)

Laboratory for Research of Accumulator Batteries for Electric Vehicles (long-term testing of Ni-Cd accumulator batteries, alternative transport, Miroslav Cenek)

Laboratory for Research of Photovoltaic Cell-Accumulator Battery Systems (Jiří Vaněk)

Computer Systems Laboratory (instruction in subjects concerned with reliability in electrical engineering, computer–aided projecting of electrotechnical manufacturing and logistics, computer-aided design of printed circuits, Helena Polsterová)

CAD Laboratories (instruction in Materials and Technical Documentation, in subjects focused on parametric design and ‘ large CAD systems’, and systems for schema design, Petr Bača)

Joint Laboratory of Surface Mounting Technology (with UMEL) (instruction in Printed Circuits and Surface Mounting, Microelectronic Practice, development in mounting technology, diploma theses, Jiří Starý)

Department of Physics

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Prof. Dr. Ing. Josef Šikula, DrSc.

Associate Professors

Doc. Ing. Lubomír Grmela, CSc.
Doc. RNDr. Pavel Hruška, CSc.
Doc. RNDr. Milena Kheilová, CSc.
Doc. Ing. Karel Liedermann, CSc.
Doc. RNDr. Marian Štrunc, CSc.

Lecturers

RNDr. Milada Bartlová, Ph.D., Ing. Jitka Brüstlová, CSc., RNDr. Pavel Dobis, CSc., Mgr. Mojmír Dočekal, Ph.D., RNDr. Eva Hradilová, Ing. Pavel Koktavý, CSc., Ing. Jiří Majzner, Mgr. Dana Otevřelová, Ing. Vlasta Sedláková, RNDr. Naděžda Uhdeová, Ing. Petr Sadovský, RNDr. Oldřich Veverka, RNDr. Vladimír Zdražil

Postgraduate Students

Mustafa M. Abdalla Ahmed, Ing. Martin Bláha, Salem Omar Saeid El-Fakhri, Ing. Štěpán Hefner, Ing. Petr Létal, Ing. Jiří Majzner, Mgr. Dana Otevřelová, Ing. Petr Sedlák, Ing. Vlasta Sedláková

Administrative and Technical Staff

Eva Biskupová, Mgr. Mojmír Dočekal, Lenka Horká, Miroslav Sadovský

Main Interests

The department provides tuition in the basic courses of the Bachelor programme Physics I, Physics II, Physics for Information Technology, and Physics III in the running out Master programme. The department is also responsible for tuition in four subjects of the Doctoral programme.

The department is involved in the basic and particularly applied research of the physical parameters of materials and semiconductors and dielectric materials. The main areas of interest are noise spectroscopy, measurement of non-linearities and design of quality and reliability indicators for assessment of particular technological stages in mass production. Other areas of interest are local spectroscopy, topography, photoluminiscence of semiconductor surfaces, and dielectric relaxation spectroscopy. The department cooperates with the leading European and Japanese laboratories of noise spectroscopy and nanooptics.

In 2004, the department will be preparing new subjects for the Master programme. In the autumn of 2004 the conference New Trends in Physics will be organized. Research projects on electromagnetism, acoustic and nanometrology will be completed.

The Czech laboratory of electronic noise will take care of four postgraduate students. Research will continue of multi-level RTS noise, of nonlinearities in thick-layer resistors and of optimization of the signal-noise ratio in acoustic and electromagnetic emission sensors, The laboratory of nanotechnology will supervise three postgraduate students. Research will be focused on the surfaces and interfaces of semiconductor materials with quantum structure to be used in communications and photonics. The laboratory of dielectric spectroscopy will be involved in research of new sophisticated material systems for investigations of dielectric phenomena and insulations taking place with regard to the diagnostics of dielectric sensors.

Cooperation will be developed with partner organizations in the Czech Republic and abroad.

Major Achievements

Prof. Josef Šikula headed the steering committee of the 17 ICNF Conference which took place in Prague 18 - 22 August 2003. The leading world researchers in the areas of fluctuation processes in materials, electronic components and biological systems participated in the event. The pre-conference event ARW NATO was for the first time held at Brno University of Technology, Faculty of Electrical Engineering and Communication from 14 to 16 August 2003. The topic of the NATO workshop was noise in electronic components of nanometric dimensions. The presented contributions were published in proceedings edited by Prof. Josef Šikula.

Prof. Pavel Tománek was co-editor of the proceedings Photonics, Devices and Systems II published by SPIE, USA. He was invited to edit the 2/2003 issue of the Československý časopis pro fyziku (Czechoslovak Journal for Physics) devoted to probe microscopes.

The team of the Czech laboratory for research of electronic noise, which is the only one in the Czech Republic, completed the design and implementation of a meter of non-linearities, which was developed for manufacturers of electronic components, and can be used as one of the possible non-destructive reliability testers to be employed directly during the technological process of the preparation of components.

In 2003, the department participated in five grant GACR projects (the chief investigators were from the Department of Physics), two international KONTAKT projects, one COST project and one INGO project. The GACR projects were concerned with non-linear defectoscopy of solid matter, irreversible processes in dielectrics and processes affecting transport of energy in arc discharge with liquid stabilization.

The main areas covered by the international KONTAKT projects (the main investigators are Prof. Šikula and Prof. Tománek, respectively) are noise in HEMT components for global communication and study of local optical and electrical characteristics of semiconductors. Cooperation was started on the basis of these projects with the MEISEI universities in Tokyo and Osaca

where unique technological facilities can be used for experimental research.

A majority of the academic staff of the department took part in the research plan MSM 2600022 – MIKROSYT. There were three FRVS research and education grants, the subject of one postgraduate grant was the design of acoustic emission sensor.

Assoc. Prof. Lubomír Grmela and Pavel Dobis were responsible for fulfilment of two contracts on advances in the technology of solar cells and on enhancement in characteristics of tantalium capacitors.

Assoc. Prof. Marian Štrunc as a member of the editorial board responsible for the translation of the textbook Halliday, D., Resnick, R., Walker, J.: Fyzika cooperated in completion of the 2nd edition of the book.

Major Research Projects

Detection of Fissures in Solids by Electromagnetic Emission – GAČR 102/02/D073
Investigator: Pavel Koktavý

Electromagnetic and Acoustic Emissions in Solids– GAČR 103/01/1058
Investigator: Josef Šikula

Irreversible Processes in Electroinsulating Materials for High Temperatures – GAČR 102/03/0621
Investigator: Pavel Koktavý.

Nanostructures: Optical and Electrical Properties – COST OC 523.40
Investigator: Pavel Tománek

Non-Linear Ultrasonic Defectoscopy of Solids– GAČR 205/03/0071
Investigator: Josef Šikula

Semiconductors - Local Optical and Electrical Properties– KONTAKT ME544
Investigator: Pavel Tománek

Membership in the Steering Committee of the European Optical Society (EOS)– INGO LA031
Investigator: Pavel Tománek

The Study of Processes Influencing Radial Transport of Energy in a Liquid-Stabilized Electric Arc– GAČR 202/02/1027
Investigator: Milada Bartlová

Selected Publications

BENEŠOVÁ, M., DOBIS, P., TOMÁNEK, P., UHDEOVÁ, N. Local measurement of optically induced photocurrent in semiconductor structures. *Proceedings of SPIE*, ISSN 0277-786X, 2003, Vol. 5036, pp. 635 - 639.

KOŠŤÁLOVÁ, D., GRMELA, L., TOMÁNEK, P., BRÜSTLOVÁ, J. Photoluminescence scanning near-field optical microscopy in GaAlAs/GaAs quantum wells. *Proceedings of SPIE*, ISSN 0277-786X, 2003, Vol. 5036, No. 5036, pp 640 - 644.

ŠIKULA, J., SEDLÁKOVÁ, V., GRMELA, L., VRBA, R., MELKES, F., ROCAK, D., BELAVIC, D., TACANO, M., HASHIGUCHI, S. Current density distribution, noise and non-linearity of thick film resistors. *Capacitor and Resistor Technology*, ISSN 0887-7491, 2003, Vol. 2003, No. 4, pp. 112 - 116.

ŠIKULA, J., VRBA, R., GRMELA, L., ZEDNÍČEK, T., SITA, Z. Breakdown characteristics and low frequency noise of niobium based capacitors. *Capacitor and Resistor Technology*, ISSN 0887-7491, 2003, Vol. 2003, No. 4, pp. 53 - 59.

TOMÁNEK, P., BENEŠOVÁ, M., DOBIS, P., KOŠŤÁLOVÁ, D., GRMELA, L., KAWATA, S. Near-field optical diagnostics of carrier dynamics in semiconductor with superresolution. *Physics of low-dimensional structures*, ISSN 0204-3467, 2003, Vol. 2003, No. 3/4, pp. 131 - 137.

UHDEOVÁ, N. Consultancy and Information Gender Studies Centre at Brno University of Technology. *Ingenieurpädagogik*, ISSN 0724-8873, 2003, Vol. 49, No. 9, pp. 565 - 568.

UHDEOVÁ, N., HRADILOVÁ, E. Physics in the new curricula at the FEEC BUT. *Ingenieurpädagogik*, ISSN 0724-8873, 2003, Vol. 49, No. 9, pp. 386 - 389.

Bachelor Programme

Physics 1 (Pavel Dobis)

Physics 2 (Milena Kheilová)

Seminar of Physics (Eva Hradilová)

Master Programme

Fundamentals of Experimentation with PC (Lubomír Grmela)

Fundamentals of Optoelectronics (Pavel Tománek)

Maple in Technical Physics; both (Pavel Hruška)

Physics 1 (Pavel Dobis)

Physics 2 (Milena Kheilová)

Physics 3 (Milena Kheilová)

Doctoral Programme

Modern Aspects of Optics (Pavel Tománek)

Physics of Semiconductor Interfaces and Structures (Pavel Hruška)

Selforganisation Processes in Nonequilibrium Nonlinear Systems (synergetics) (Marian Štrunc)

Stochastic Processes in Solids (Josef Šikula)

Laboratories

Czech Electronic Noise Research Laboratory (research of low-frequency noise, noise spectroscopy, development of non-destructive diagnostic methods and indicators of the reliability of materials and microelectronic components, instruction in Physics of Semiconductors, Structures and Interfaces and Noise Spectroscopy , Josef Šikula)

Laboratory of Dielectric Spectroscopy (research of dielectric relaxation spectroscopy, monitoring molecular dynamics of dielectric materials, instruction in Non-Destructive Diagnostics of Materials, Semiconductors and Dielectrics, Karel Liedermann)

Laboratory for Physics (instruction in Physics I, Physics II, Physics for Information Technology, Pavel Dobis)

Laboratory of Nanometrology (contactless investigation of material surfaces with transversal superresolution by means of near-field scanning microscopy, instruction in Fundamentals of Optoelectronics, Modern Aspects of Optics, Pavel Tománek)

Department of Languages

PhDr. Milena Krhutová, Ph.D.

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Lecturers

Mgr. Marie Bartošová, Mgr. Ladislav Baumgartner, PaedDr. Alena Baumgartnerová, PhDr. Marcela Borecká, M. A. Kenneth Froehling, PhDr. Milena Krhutová, Ph.D., PhDr. Dagmar Malíková, Mgr. Jana Malíková, Mgr. Jana Matoušková, PhDr. Ludmila Neuwirthová, Mgr. Jaroslav Trávníček, Mgr. Danuše Zavřelová

Administrative and Technical Staff

Hana Vondráčková

Main Interests

As a new Bachelor programme was introduced at FEEC in 2003, the Department of Languages was faced with the requirement for increased pedagogical activity. Besides tuition in the new study programme, the department was responsible for teaching in the running out programmes started at the former Faculty of Electrical Engineering and Computer Science. There was an increase in tuition by more than 30% in 2003 while the range of offered courses remained unchanged at all levels and specializations, and in all taught languages.

Research at the department focused on professional English and standardization of language skills based on the European Reference Framework. The department cooperated in GACR and FRVS projects with the Faculty of Arts of Masaryk University, in the research plans solved at FEEC and FIT, in Leonardo da Vinci projects. The results were published and presented at international conferences. The extent of tuition will be maintained in 2004 as tuition will continue in several study programmes at two faculties. Attention will be paid to professional language and to courses for students less advanced in English, while highly advanced courses in general English will not be offered. This is in accordance with the new concept of language teaching focused on professional language. The new concept will enable our students to attain the level given by the European Reference Framework for those who need to communicate in English in their profession. Language software will be made accessible on Intranet for self-study.

Research will be focused on contrastive research of professional English for electrical engineering and on specification of language standards for the Bachelor, Master and Doctoral programme graduates in accordance with the European Reference Framework. Materials are being developed for language teaching within the framework of the Leonardo da Vinci project in cooperation with the Faculty of Mechanical Engineering and international partners. Their research results will be published within the framework of research plans.

Major Research Results

The following papers were published in international journals and in proceedings of international conferences:

Neuwirthová, L. Foreign Language Standards at a Technical University. 32nd Symposium of the international association for engineering education, Karlsruhe, Germany: 2003, pp. 246-248, ISBN 3-00-012081-5.

Krhutová, M. The Language of Electrical Engineering. 32nd Symposium of the international association for engineering education, Karlsruhe, Germany: IGIP, 2003, pp. 228-458, ISBN 3-00-012081-5.

Borecká, M. An Innovated ESP Course in Reading Skills for Tertiary Education. International Conference iNEER, Valencia, Spain, 2003, ISBN 84-600-9918-0.

Malíková, D. What Do They Actually Need? – Integration of Languages in the Engineering Curricula. International conference iNEER, Valencia, Spain, 2003, ISBN 84-600-9918-0.

Neuwirthová, L. Scientific Literacy and Teaching ESP. IATEFL ESP SIG Newsletter, ISSN 1026-4032, Vol. 23, No. 7/2003.

The academic staff of the department participated in the following projects:

Malíková, D. Leonardo da Vinci CZ/02/B/F/LA-1340437 – Writing Professional English.

Malíková, D., Neuwirthová, L., Krhutová, M. Microelectronic systems and technology, investigator Professor Radimír Vrba.

Borecká, M. Information and control systems, investigator Professor Jan M. Honzík, FIT BUT.

PhDr. Milena Krhutová, Ph.D. defended the dissertation: The Language of Electrical Engineering as a Special Province.

Selected Publications

NEUWIRTHOVÁ, L. Scientific Literacy and Teaching ESP. *IATEFL ESP SIG Newsletter*, ISSN 1026-4032, 2003, Vol. 23, No. July 2003, pp. - 7.

Bachelor Programme

Business English (Dagmar Malíková)

English for Bachelors- Intermediate 1 (Jaroslav Trávníček)

English for Bachelors- Intermediate 2 (Ludmila Neuwirthová)

Everyday Conversation in English (Kenneth Froehling)

English for Bachelors 1 (Jaroslav Trávníček)

English for Bachelors 2 (Ludmila Neuwirthová)

English for Bachelors- pre-Intermediate 1 (Alena Baumgartnerová)

English for Bachelors- pre-Intermediate 2 (Alena Baumgartnerová)

German for Advanced Students (Ladislav Baumgartner)

German for Beginners (Ladislav Baumgartner)

German for Intermediate Students I (Ladislav Baumgartner)

German for Lower-Intermediate (Ladislav Baumgartner)

Listening (Jaroslav Trávníček)

Preparatory Course for CFC in English (Jana Matoušková)

Preparatory Course for State Exam in German (Danuše Zavřelová)

Professional English for Electrical Engineering and Information Technology (Ludmila Neuwirthová)

Reading Skills (Marcela Borecká)

Master Programme

Business English (Dagmar Malíková)

English Everyday Conversation (Kenneth Froehling)

German for Advanced Students (Ladislav Baumgartner)

German for Beginners (Ladislav Baumgartner)

German for Intermediate Students I (Ladislav Baumgartner)

German for Lower-Intermediate (Ladislav Baumgartner)

Headway Pre-Intermediate (Marie Bartošová)

Headway Upper-Intermediate (Kenneth Froehling)

Listening (Jaroslav Trávníček)

New Headway Intermediate (Jana Matoušková)

Preparatory Course for CFC in English (Jana Matoušková)

Preparatory Course for State Exam in German (Danuše Zavřelová)

Professional English for Electrical Engineering and Information Technology (Ludmila Neuwirthová)

Reading Skills (Marcela Borecká)

Russian for Beginners (Alena Baumgartnerová)

Spanish for Beginners (Marcela Borecká)

Spanish for Lower-Intermediate Students (Marcela Borecká)

Doctoral Programme

English for the State Doctoral Exam (Milena Krhutová)

English for Postgraduates (Dagmar Malíková)

Department of Mathematics

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Prof. RNDr. Jan Chvalina, DrSc.
Prof. RNDr. František Melkes, CSc.
Prof. RNDr. František Neuman, DrSc.

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Doc. RNDr. Jaromír Baštinec, CSc.
Doc. RNDr. Jaroslav Bayer, CSc.
Doc. RNDr. Zdeněk Šmarda, CSc.
Doc. RNDr. Josef Zapletal, CSc.

Lecturers

RNDr. Lubomir Bajgar, RNDr. Mgr. Břetislav Fajmon, Ph.D., RNDr. Petr Fuchs, Ph.D., Mgr. Jan Koláček, RNDr. Edita Kolářová, RNDr. Martin Kovár, Ph.D., RNDr. Vlasta Krupková, CSc., Mgr. Irena Růžičková, RNDr. Svatopluk Švarc, CSc., Mgr. Marie Tomšová

Administrative and Technical Staff

Tomáš Harwot, Marie Krejčířová

Main Interests

The department is responsible for tuition in mathematical subjects in the new and the running out Bachelor and Master study programme, including a number of courses at FIT.

Research has been concerned with mathematical models described by differential, difference and integral-differential equations. Within the framework of discrete approach, actions of algebraic structures are studied on state spaces of discrete systems, topological hyperstructures including dynamic systems. In applications, algorithms for automatic generation of some parts of discretization networks were designed, and the potential effective application of the Taylor series methods were studied with regard to so called 'stiff 'systems' and extensive systems of equations. The department maintains close cooperation with the research centre 'Computer Science' in Daghstuhl, Germany, City College in New York and technical universities in Klagenfurt, Austria, Dresden, Germany, Kiev, Ukraine, Žilina, Slovakia.

In 2004, the department will be involved in research of the description of dynamic systems with focus on stability and control. Analysis of linear and non-linear models will be focused on the dependences of these models on the reverse delay and on random errors including topological algebras and inter-connection between representation of discrete and electronic processes. Cooperation with all international partners will continue, and should result in a number of scientific papers, and in completion of a monograph.

Two computer rooms will be established, each equipped with 25 computers with mathematical software for solution of application problems in the new Bachelor, and subsequently the follow-up Master programme.

Major Achievements

Prof. Josef Diblík successfully defended the project of Czech-Chinese cooperation Me 423 „Oscillation theory for functional differential equations".

Prof. Josef Diblík and Prof. František Neuman co-organized the international conference 'Differential Equations and Applications' , Žilina, 2003.

Assoc. Prof. Jaromír Baštinec and Prof. Josef Diblík co-organized the international conference 'Difference Equations and Applications', Brno, 28 July-1 August 2003.

Prof. Josef Diblík co-organized the international conference 'Dynamical Systems Modelling and Stability Investigations', Kiev, Ukraine, 27-30 May 2003.

Prof. Josef Diblík a Prof. Jan Chvalina co-organized the second International mathematical workshop, Brno, 20 November 2003.

Assoc. Prof. Jaromír Baštinec and Prof. Jan Chvalina were co-organizers of the international conference 'XXI. International Colloquium on the Acquisition Process Management', Vyškov , 22 May 2003.

The academic staff of the department published a number of original papers in prestigious journals abroad and presented their results at leading international conferences. The high quality of their work can be proven by numerous citations (approx. 80) in national and international journals and proceedings of international conferences as well as in monographs.

Major Research Projects

Differential Equations and Dynamic Equations on "Time Scales" – GAČR 201/04/0580
Investigator: Josef Diblík

Qualitative Theory of Solving Differential Equations – GAČR 201/01/0079
Investigator: Ondřej Došlý

Set Theoretical and Categorial Methods in Topological and Algebraic Structures– GAČR 201/03/0933
Investigator: Miroslav Hušek

Oscillation Theory for Functional Differential Equations – KONTAKT ME 423
Investigator: Josef Diblík

Selected Publications

BAŠTINEC, J., DIBLÍK, J. Asymptotic Formulae for a Particular Solution of a Linear Nonhomogeneous Discrete Equations. *Computers and Mathematics with Applications*, ISSN 0898-1221, 2003, Vol. 45, No. 1, pp. 1163 - 1 169.

BENDITKIS, D., DIBLÍK, J., KHUSAINOV, D. Weak delay in systems with an aftereffect. *Functional Differential Equations*, ISSN 0793-1786, 2003, Vol. 9(2002), No. 9, pp. 385 - 404.

DIBLÍK, J. Asymptotic Behaviour of Solutions of Systems of Discrete Equations via Liapunov Type Technique. *Computers and Mathematics with Applications*, ISSN 0898-1221, 2003, Vol. 45, pp. 1041 - 1057.

DIBLÍK, J., KHUSAINOV, D. Stability of an autonomous system with right-hand side in the critical case. *Nonlinear Dynamics and Systems Theory*, ISSN 1562-8353, 2003, Vol. 2(2002), No. 2, pp. 145 - 156.

KOVÁR, M. At most 4 topologies can arise from iterating the de Groot dual. *Topology and its Applications*, ISSN 0166-8641, 2003, Vol. 2003, No. 130, pp. 175 - 182.

KOVÁR, M., JAFARI, S., NOIRI, T. Properties of thetas-US spaces. *Acta Mathematica Hungarica*, ISSN 0236-5294, 2003, Vol. 101, No. 1-2, pp. 155 - 161.

Bachelor Programme

Mathematical Seminar (Petr Fuchs)

Mathematics 1 (Jan Chvalina)

Mathematics 2 (František Melkes)

Mathematics 3 (Břetislav Fajmon)

Selected Parts from Mathematics (Zdeněk Šmarda)

Master Programme

Advanced Numerical Methods (František Melkes)

Differential Equations in Electrical Engineering (Josef Diblík)

Integral Transforms (František Melkes)

Mathematical Statistics and Econometry (Josef Zapletal)

Matrix Calculus (Jaroslav Bayer)

Operations Research (Josef Zapletal)

Orthogonal Systems of Special Functions (Svatopluk Švarc)

Probability and Mathematical Statistics (Jaromír Baštinec)

Probability and Statistics (Josef Zapletal)

Multiple Integral and Differential Equations (Zdeněk Šmarda)

Doctoral Programme

Algebra, Combinatorics, Graphs (Václav Havel)

Complex Variable in Electrical Engineering (Josef Diblík)

Differential Equations in Electrical Engineering (František Melkes)

Discrete Processes in Electrical Engineering (Josef Diblík)

Global transformations of functional equations (František Neuman)

Impulse Functions, Applications in Electrical Engineering (Zdeněk Šmarda)

Logic (Václav Havel)

Numerical Solutions of Fields (František Melkes)

Operations Analysis (Josef Zapletal)

Statistical Methods of Data Processing (Josef Zapletal)

Variational Calculus, Applications in Electrical Engineering (Zdeněk Šmarda)

Department of Microelectronics

Prof. Ing. Vladislav Musil, CSc.

Head

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Professors

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Prof. Ing. Jaromír Brzobohatý, CSc.
Prof. Ing. Vladislav Musil, CSc.
Prof. Ing. Radimír Vrba, CSc.

Associate Professors

Doc. Ing. Arnošt Bajer, CSc.
Doc. Ing. Pavel Legát, CSc.
Doc. Ing. Ivan Szendiuch, CSc.
Doc. Ing. František Urban, CSc.

Lecturers

Ing. Martin Adámek, Ing. Daniel Bečvář, Ing. Jaroslav Boušek, CSc., Ing. Jan Břínek, Ing. Petr Cach, Bc. Miloš Drlík, Ing. Zuzana Grosmanová, Ing. Edita Hejátková, Ing. Petr Hub, PhDr. Jarmila Jurášová, Ing. Vladimír Kolařík, Ph.D., Ing. Zdeněk Kozáček, Ing. Radek Kuchta, Ing. Břetislav Mikel, Ing. Radovan Novotný, Ing. Robert Pasz, Ing. Zdeněk Petruželka, Ing. Roman Prokop, Ing. Milan Recman, CSc., Ing. Marek Salaquarda, Ing. Josef Šandera, Ing. Dušan Veverka, Ing. Miroslav Zachariáš

Postgraduate Students

Ing. Martin Adámek, Ing. Zdeněk Bartoň, Ing. Daniel Bečvář, Ing. Jaromír Bílek, Ing. Jindřich Bulva, Ing. Lukáš Daněk, Ing. Jan Drobek, Ing. Lukáš Fujcik, Ing. Tomáš Gubek, Ing. Jiří Háze, Ing. Miroslav Hora, Ing. Jaroslav Kadlec, Ing. Pavel Karásek, Ing. Ahmad Khateb, RNDr. Jan Krejčí, Ing. Radek Kuchta, Ing. Karel Malysz, Ing. Radim Maršálek, Ing. Vít Matoušek, Ing. Filip Mika, Ing. Břetislav Mikel, Ing. Feras Moualla, Ing. Radovan Novotný, Ing. Vít Ondruch, Ing. Robert Pasz, Ing. Radomír Plachejda, Ing. Jan Prášek, Ing. Tomáš Procházka, Ing. Roman Prokop, Ing. Ondřej Sajdl, Ing. Khatib Sameh, Ing. Michal Skočdopole, Ing. Jiří Stehlík, Ing. Josef Šandera, Ing. Pavel Šteffan, Ing. Petr Tomiczek, Ing. Michal Vitovský, Ing. Miroslav Zachariáš

Administrative and Technical Staff

Ing. Petr Cach, Jarmila Fučíková, Petra Jedličková, Ing. Dušan Veverka, Jan Žaloudek

Main Interests

The department is responsible for tuition in basic subjects, mainly electronic components and electronic circuits as well as subjects specialized in the design of integrated circuits and microelectronic technology in both the new and the running out Bachelor and Master study programmes.

Research activities are focused on basic and applied research of integrated circuits and sensors. The main areas of interest are the design of switching current circuits and evaluation of signals from chemosensors and biosensors, mainly gases and pesticides.

The department has had a close cooperation (study stays of students) with Bournemouth University, Great Britain and with KHBO Oostende, Belgium. Cooperation in research has been established with the firm BVT Technologies in Brno, the firm Autoflug, Hamburg, the ISEP University in Paris (Prof. B. Sviezeny), and with the research laboratory IMEC-KHBO in Belgium.

In 2004, the department will be involved in research of the methods of the design of integrated circuits in current mode, and will complete the EU grant project on the sensor systems of aircraft fuel tanks. It is also expected that the prototype of a portable device for analysis of heterogeneous substances in fruit and vegetables will be completed as well as the first stages of the EU project on remote monitoring of temperature in transport cooling boxes.

The laboratories of microelectronic technologies and vacuum techniques will be moved into new premises. The laboratory for Design of electronic instrumentation systems focused on experimental research and self-study will be reconstructed. Particular attention will be given to study stays abroad.

Major Research Results

The members of the department participated in two projects of the 5th framework programme of EU, in six GACR projects, three projects of cooperation with industry (MPO) and a number of FRVS projects.

In September 2003, the department organized an international conference Electronic Devices and Systems EDS2003 where 65 contributions on microelectronics and technology were presented.

Prof. Jaromír Brzobohatý and Prof. Jiří Pospíšil presented a new concept of modelling non-linear dynamic systems. It was proven that a further research of the modelling of non-linear dynamic systems with functional blocks and of the development and optimization of the state models of these systems is prospective. This area of interdisciplinary character receives worldwide attention as it is proven by the previously invited publication in the prestigious international journal 'International Journal of Chaos and Bifurcation in Applied Sciences and Engineering', which is still being cited in prestigious international journals.

Prof. Dalibor Biolek added a new active element CDTA (Current Differencing Transconductance Amplifier) to the theories of active frequency filters working in the current mode, and made a presentation on its principle and basic applications at the European Conference, ECCTD2003 in Krakow and at international conferences WSEAS on Corfu and in Tenerife.

Major Research Projects

ANTOPE New Methods of Instrumentation Toxicity Analysis for Integrated Toxicity Measurements in Foodstuff Industry and Verification on a Prototype of Pesticide Toxicity Analyzer– MPO FD-K2/53
Investigator: Radimír Vrba

ECOFRIDGE Ecological Refrigeration - EUREKA CRAF1999-72067
Investigator: Radimír Vrba

Identification of the Parameters of the Models of Semiconductor Structures– GAČR 102/03/0720
Investigator: Milan Recman

Intelligent Microsensors and Microsystems for Measurement, Control and Environment– GAČR 102/03/0619
Investigator: Radimír Vrba

Micro- and Nanostructures in Microelectronic Technology – GAČR 102/04/P162
Investigator: Jaromír Hubálek

The Methodology of New Technology Design of Analogue Integrated Circuits– GAČR 102/03/0721
Investigator: Vladislav Musil

New Principles and Working |Blocks for Design of Integrated Circuits– GAČR 102/02/1312
Investigator: Jaromír Brzobohatý

SENSVISION – Internet Connection to a Process – MPO FD-K/104
Investigator: Radimír Vrba

SMARTFUEL – EUREKA G4RD-CT-02-769
Investigator: Jaromír Brzobohatý

New Generation Pressure Sensor – PROGRES FF-P/112
Investigator: Radimír Vrba

Special Sensors for Research of Ionized Gases– GAČR 102/02/1311/A
Investigator: Vladislav Musil

Development of Microelectronic Mounting Technology for 3D Circuits and Systems – GAČR 102/04/0590
Investigator: Ivan Szendiuch

Research of a Bus and Its Components for Public City Transport– MPO FD-K/111
Investigator: Radimír Vrba

Research of Microelectronic Systems and Technologies– SRČR MSM 262200022
Investigator: Radimír Vrba

Selected Publications

BIOLEK, D., BIOLKOVÁ, V. Computational Methods in Circuits and Systems Applications. In: *Universal Biquads using CDTA Elements for Cascade Filter Design*. 1st edition. USA: 2003. pp. 232 - 236. ISBN 960-8052-88-2

BIOLEK, D., BIOLKOVÁ, V. Order of Z-Domain Model of Switched Circuit. *WSEAS Transactions on Circuits*, ISSN 1109-2734, 2003, Vol. 6, No. 1, pp. 111 - 113.

BIOLEK, D., BIOLKOVÁ, V. Tuneable ladder CDTA-based filters. *WSEAS Transactions on Circuits*, ISSN 1109-2734, 2003, Vol. 6, No. 1, pp. 121 - 123.

BIOLEK, D., BIOLKOVÁ, V., OLŠÁK, M. Computational Methods in Circuits and Systems Applications. In: *Optimization of Elliptic Leap-Frog CDBA-Based Filters.* 1st edition. USA: 2003. pp. 221 - 225. ISBN 960-8052-88-2

CACH, P., FIEDLER, P., ŠVÉDA, M., PROKOP, M., WAGNER, M. A Sensor with Embedded Ethernet. *WSEAS Transactions on Circuits*, ISSN 1109-2734, 2003, Vol. 1, No. 2, pp. 213 - 215.

HÁZE, J., VRBA, R. Errors and Their Cancellation in ADC Using Switched Capacitors Technique In *WSEAS Transactions on Circuits*. WSEAS International Conferences: SEPADS 2003, AIKED 2003, ISPRA 2003 and EHAC 2003. Athens: Greece, 2003, pp. 111 – 113.

HUBÁLEK, J., KREJČÍ, J. Correction Factors of IDEs for Precise Conductivity Measurements. *Sensors and Actuators B: Chemical*, ISSN 0925-4005, 2003, Vol. B, No. 1-3, pp. 46 - 51.

LLOBET, E., IVANOV, P., VILANOVA, X., BREZMES, J., HUBÁLEK, J., MALYSZ, K., GRACIA, I., CANÉ, C., CORREIG, X. Screen-printed nanoparticle tin oxide films for high-yield sensor systems. *Sensors and Actuators B: Chemical*, ISSN 0925-4005, 2003, Vol. 96, No. 1, pp. 94 - 104.

MIKA, F., RYŠÁVKA, J., LOPOUR, F., ZADRAŽIL, M., MULLEROVÁ, I., FRANK, L. Computer Controlled Low Energy SEM. *Microscopy and microanalysis*, 2003, Vol. 9, No. 3, pp. 116 - 117.

SKOČDOPOLE, M., VRBA, R. Methods of current mode analog-to-digital converter design. *WSEAS Transactions on Circuits*, ISSN 1109-2734, 2003, Vol. 2003, No. 1, pp. 114 - 116.

VRBA, R., ŠVÉDA, M. Integrated Smart Sensor Networking Framework for Sensor-Based Appliances. *IEEE Sensors Journal*, ISSN 1530-437X, 2003, Vol. 3, No. 5, pp. 579 - 586.

Bachelor Programme

Analogue Electronic Circuits (Dalibor Biolek)

Design of Analog Integrated Circuits (Daniel Bečvář)

Diagnostics and Testing of Electronic Systems (Milan Recman)

Digital Circuits and Microprocessors (Radimír Vrba)

Electronic Devices (Jaromír Brzobohatý)

Management Minimum (Pavel Legát)

Microelectronic Practicals (Josef Šandera)

Modelling and Computer Simulation (Vladimír Kolařík)

Master Programme

Analogue and Digital Circuits (Radimír Vrba)

Analogue Circuits (Jaromír Brzobohatý)

Computers in Practical Management (Jaromír Hubálek)

Czech Language 1 (Jarmila Jurášová)

Czech Language 2 (Jarmila Jurášová)

Czech Language 3 (Jarmila Jurášová)

Czech Language 4 (Jarmila Jurášová)

Design of Analogue CMOS Circuits (Vladislav Musil)

Design of Digital CMOS Circuits (Vladislav Musil)

Design of Electronic Instruments (Radimír Vrba)

Digital Circuits (Radimír Vrba)

Digital Circuits and Microprocessors (Pavel Legát)

Electronic Devices (Jaromír Brzobohatý)

Electronic Instruments Construction and Production (Vladislav Musil)

Management Minimum (Pavel Legát)

Manager Minimum (Pavel Legát)

Manufacturing of Electronics Devices (Ivan Szendiuch)

Microelectronics (Jaromír Brzobohatý)

Microprocessors Technology (Jaroslav Boušek)

Modelling and Simulation (Vladimír Kolařík)

Optoelectronics, Optical Communications and Nets (František Urban)

PC Technology and Communication (Vladimír Kolařík)

Quality Control (Jaromír Hubálek)

Vacuum Technology (Jaroslav Boušek)

Doctoral Programme

Electronics Systems Technology (Ivan Szendiuch)

Interconversion of Analogue and Digital Signals (Radimír Vrba)

Microelectronics and Management (Ivan Szendiuch)

New Circuit Principles for IC Design (Jaromír Brzobohatý)

Nuclear Magnetic Resonance for Material Diagnostic (Karel Bartušek)

Opto-Electronic Transmission Systems and Networks (František Urban)

Simulation of Digital Integrated Circuits (Vladislav Musil)

Laboratories

Laboratory of Biosensors (research laboratory, Jaromír Hubálek)

Laboratory of Electronic Components II and III (instruction in Electrotechnical Components, Jaroslav Boušek)

Laboratory of Microelectronic Technology (casing of thick films, soldering surface mounting, instruction in Microelectronic Technology, student projects, Ivan Szendiuch)

Electronic Instruments and Systems Design Laboratory (instruction in Digital Circuits and Microprocessors, Electronic Systems, student projects, Radek Kuchta)

Integrated Circuits Design Laboratory (instruction in Design of Analog Integrated Circuits and Design of Digital Integrated Circuits, student projects, Roman Prokop)

Optoelectronics and Laser Laboratory (instruction in Optoelectronics, implementation of the technical part of student projects, František Urban)

Vacuum Technology Laboratory (instruction in Vacuum Technology and Cryotechnology, Jaroslav Boušek, Josef Šandera)

Computer Laboratory I and II (numerical exercises, student self-study, work with Internet, Petr Hub)

Joint Laboratory of Electron-Beam Lithography: Department of Microelectronics and Institute of Instrumentation Technology, Academy of Sciences, Brno (research laboratory, Vladimír Kolařík)

Department of Radioelectronics

Prof. Ing. Jiří Svačina CSc.

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Prof. Ing. Jiří Pospíšil, DrSc.
Prof. Dr. Ing. Zbyněk Raida
Prof. Ing. Václav Říčný, CSc.
Prof. Ing. Jiří Svačina, CSc.
Prof. Ing. Vladimír Šebesta, CSc.

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Doc. Ing. Miroslav Kasal, CSc.
Doc. Ing. Jaromír Kolouch, CSc.
Doc. Ing. Zdeněk Nováček, CSc.
Doc. Ing. Vlastislav Novotný, CSc.
Doc. Ing. Milan Sigmund, CSc.
Doc. Ing. Otakar Wilfert, CSc.

Lecturers

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Administrative and Technical Staff

Květuška Bílá, František Horký, Jaroslav Novák, Bohuslava Raidová, Petra Šípová, Aleš Vanžura

Main Interests

Tuition at the department is focused on fundamentals of radio-electronics, both the theory and applications, mainly in radio communications, instrumentation electronics, high-frequency and microwave technology, acoustic and image electronics and signal processing. The department provides education in more than 40 subjects of the Bachelor and the Master programme. For the other departments of the faculty the department provides education in areas covering analog, pulse and digital circuits and systems, computer-aided analysis and design of electronic circuits, video technology, high-frequency and microwave technology, aerials and propagation of electromagnetic waves, the theory of signals and information.

The main research interests are the theory of electronic circuits and systems, application of electronic circuits and systems, signal processing and application, electromagnetic waves, aerials, microwaves and optoelectronics.

The department also provides tuition in various courses of the Third Age University at Brno University of Technology as well as in special courses of lifelong education for other institutions in the Czech Republic and other countries.

In 2004, the department will continue education and research in the above mentioned areas, including special areas of communications and wireless communication.

Major Achievements

A satellite receiver was developed and implemented at the department for the multichannel transponder with slow PSK transmission and omnidirectional access for the US Naval Academy, Maryland, USA. As part of the PCSAT2 device the receiver will be installed at the international cosmic station ISS.

A major reconstruction was completed and continuous operation secured of the telemetric and command station for the AMSAT experimental satellite Phase3D. The station is one of the eight world command centres of this satellite, and the only one fully automatic and accessible through the Internet for the other members of the international control team.

The 13th Czech-Slovak conference RADIOELEKTRONIKA 2003 was held on 6 and 7 May 2003, organized in cooperation with the Czech-Slovak section of IEEE, the Czech and Slovak centre of IEE and the committee of URSI. There were over 150 participants from 7 countries in five oral and one poster section.

A special five-day education course 'Computer Speech-Signal Processing' for 34 students from the University of Applied Sciences in Pforzheim (Germany). The study materials were prepared and taught in German.

Independent comparative full-area measurement of GSM mobile networks of all operators on the territory of Prague and the entire Czech Republic (on the basis of a contract with T-Mobile Czech in cooperation with the Faculty of Electrical Engineering, Czech Technical University in Prague) was carried out.

A unique education and research laboratory of digital video and TV technology was established within the framework of the FRVS project 2238/2003.

Major Research Projects

Electronic Circuits in Non-Conventional Modes and Their Applications– GAČR 102/01/0228
Investigator: Tomáš Dostál

Matrix Methods of Approximate Symbolic Analysis– AVČR KJB 2813301
Investigator: Zdeněk Kolka

Methods of Measuring the Efficiency of Electromagnetic Shielding of Tiny Metal Boxes in the Low-Frequency Domain– ST 20032003002I

Investigator: Jiří Svačina

Methods, Structures and Components of Wireless Electronic Communication– GAČR 102/03/H109
Investigator: Vladimír Šebesta

Time-Domain Modeling of Microwave Structures– GAČR 102/01/0571
Investigator: Zbyněk Raida

Modern Methods of the Design and Application of Electronic Circuits – GAČR 102/03/H105

Investigator: Jiří Pospíšil

Design and Application of New State Models of Dynamic Systems– GAČR 102/01/0229
Investigator: Stanislav Hanus

Novel Methods for Broadband Vector Measurements- GAČR102/01/0573
Investigator: Zbyněk Raida, Zbyněk Škvor, Czech Technical University

Novel Approach and Coordination of Doctoral Education in Radioelectronics and Related Disciplines – GAČR 102/03/H086
Investigator: Zbyněk Raida

Research of Electronic Communication Systems and Technologies– SRČR MSM 262200011
Investigator: Jiří Svačina

Selected Publications

DOSTÁL, T. MASTORAKIS, N. E.: Computational Methods in Circuits and Systems Applications. Chapter: *Universal N-order ARC Filters Using Current Conveyors and Multi-output Current followers*. 1st edition. Athens: WSEAS Press, 2003. pp. 207 - 210 . ISBN 960-8052-88-2

DOSTÁL, T., POSPÍŠIL, J., MICHÁLEK, V., HANUS, S. MASTORAKIS, N. E.: Computational Methods in Circuits and Systems Applications. In: *Current Mode State Models of Third-Order Dynamical Systems*. 1st edition. Athens: WSEAS Press, 2003. pp. 243 - 246 . ISBN 960-8052-88-2

KOLKA, Z., VLK, M. Recent Advances in Intelligent Systems and Signal Processing. In: *Combined Approach to Symbolic Analysis.* Ed. Athens: WSEAS Press, 2003. pp. 31 - 34 . ISBN 60-8052-87-4

MARŠÁLEK, R., JARDIN, P., BAUDOIN, G. From Post-Distortion To Pre-Distortion For Power Amplifiers Linearization. *IEEE Communication Letters*, ISSN 1089-7798, 2003, Vol. 2003, No. 7, pp. 308 - 310.

POSPÍŠIL, J., KOLKA, Z., HANUS, S., BRZOBOHATÝ, J. Recent Advances in Intelligent Systems and Signal Processing. In: *Generalized Reference State Model of Piecewise-Linear Dynamical Systems*. Ed. Greece: WSEAS Press, 2003. pp. 31 - 34 . ISBN 960-8052-87-4

RAIDA, Z. Modeling EM Structures in the Neural Network Toolbox of MATLAB. *IEEE Antennas & Propagation Magazine*, ISSN 1045-9243, 2003, Vol. 44, No. 6, pp. 46 - 67.

RAIDA, Z., NOVÁČEK, Z., GOŇA, S., NAVRÁTIL, V., POMĚNKA, P., URBANEC, T., MICHÁLEK, V., OTEVŘEL, V. A Multimedia Textbook of EM Theory and Techniques. *Automatika*, ISSN 0005-1144, 2003, Vol. 43, No. 3-4, pp. 163 - 168.

SIGMUND, M. Voice Recognition by Computer. 1st edition. Marburg: Tectum Verlag, 2003. pp. 1 - 109 . ISBN 3-8288-8492-X

SVAČINA, J. Analytical Models of Width-Limited Microstrip Lines. *Microwave and Optical Technology Letters*, ISSN 0895-2477, 2003, Vol. 36, No. 1, pp. 63 - 65.

Bachelor Programme

Analogue Electronic Circuits (Tomáš Dostál)

Audiofrequency Electronics (Vlastislav Novotný)

CAD of Electronic Circuits (Zdeněk Kolka)

Computers and Programming 2 (Zbyněk Raida)

Electrical Filters (Tomáš Dostál)

Electronic Instruments Feeding (Vlastislav Novotný)

Electromagnetic Compatibility (Jiří Svačina)

Electronic Practice (Marta Krátká)

EM Waves, Antennas and Lines (Zdeněk Nováček)

Pulse and Digital Techniques (Jaromír Kolouch)

Radio and Mobile Communication (Aleš Prokeš)

Signals and Systems (Vladimír Šebesta)

Special Electronic Devices and Their Applications (Jiří Svačina)

Master Programme

Analog Circuits and Converters (Tomáš Dostál)

Antennas and Radio Waves Propagation (Zdeněk Nováček)

Audiofrequency Electronics (Vlastislav Novotný)

CAD in HF and Microwave Techniques (Zbyněk Raida)

CAD of Electronic Circuits (Zdeněk Kolka)

Communication Theory (Vladimír Šebesta)

Community Antenna Television (CATV) (Václav Říčný)

Electromagnetic Compatibility (Jiří Svačina)

Electronic Circuits and Filters Design (Tomáš Dostál)

Electronic Circuits Theory (Jiří Pospíšil)

Electronic Instruments Feeding (Vlastislav Novotný)

Electronics (Jaromír Kolouch)

EM Waves and Lines (Zdeněk Nováček)

HF and Microwave Techniques (Stanislav Hanus)

Microcomputers for Instrumental Applications (Václav Michálek)

Microprocessor Techniques (Václav Michálek)

Object Oriented Programming in Pascal (Zbyněk Raida)

Optoelectronics (Otakar Wilfert)

Photonics and Optical Communications (Otakar Wilfert)

Programmable Logic Devices (Jaromír Kolouch)

Pulse and Digital Techniques (Jaromír Kolouch)

Pulse and Nonlinear Circuits (Jaromír Kolouch)

Quantum and Laser Electronics (Otakar Wilfert)

Radars and Navigation (Jiří Šebesta)

Radio Links Design (Zdeněk Nováček)

Radio Receivers and Transmitters (Aleš Prokeš)

Radio Relay and Satellite Communication (Miroslav Kasal)

Special Electronic Devices and their Applications (Jiří Svačina)

Speech Signal Analysis and Synthesis (Milan Sigmund)

Systems, Processes and Signals 1 (Vladimír Šebesta)

Television Technique (Stanislav Hanus)

Videotechnology (Václav Říčný)

Wireless and Mobile Communications (Stanislav Hanus)

Doctoral Programme

Electromagnetic Waves in Communications (Zdeněk Nováček)

Methods for Modeling and Analysis of Electronic Circuits (Zdeněk Kolka)

Modelling of Chaos in Electronic Circuits (Jiří Pospíšil)

Modern Analogue Filters (Tomáš Dostál)

Neural Networks and Fuzzy Systems (Vladimír Mikula

New Methods of Audio Signal Processing (Vlastislav Novotný)

Numerical Methods in Electrical Engineering (Zbyněk Raida)

Optimization in Electrical Engineering (Zbyněk Raida)

Photonics and Optical Communications (Otakar Wilfert)

Selected Problems of TV Technique (Václav Říčný)

Selected Topics of Digital Techniques (Jaromír Kolouch)

Selected Topics of Digital Wireless Communication (Aleš Prokeš)

Selected Topics of Signal Analysis (Vladimír Šebesta)

Selected Topics of Wireless and Mobile Communication Systems (Stanislav Hanus)

Signal Processing in Instrumental Applications (Miroslav Kasal)

Special Topics of HF and Microwave Techniques (Jiří Svačina)

Special Types of Functional Blocks and some Applications (Jiří Pospíšil)

Speech Signal Processing for Speaker Recognition (Milan Sigmund)

Laboratories

Laboratory of Analog Circuits (instruction in analog technology, Ivana Jakubová)

Laboratory of Antennas and EM Field (research and instruction in EM fields, antennas and design of radio communication systems, Zdeněk Nováček)

Laboratory of Digital and Microprocessor Techniques (instruction in digital and microprocessor techniques, Viera Biolková)

Laboratory of Microwave Techniques (research and instruction in microwave techniques and special components, Jiří Svačina)

Laboratory of Mobile Communication and HF Techniques (research and instruction in mobile communications and HF techniques, Stanislav Hanus)

Laboratory of LF Applications (instruction in LF electronics and power supply of electronic devices, Vlastislav Novotný)

Laboratory of Optoelectronics and Photonics (instruction in optoelectronics, photonics and optical communications, Otakar Wilfert)

Laboratory of Signals and Data Transmission (research and instruction in signals, systems and data transmission, Aleš Prokeš)

Laboratory of Radio Relay and Satellite Communication (instruction in radio relay and satellite communication, radiolocation and navigation, Miroslav Kasal)

Laboratory of TV and Video Techniques (instruction in TV techniques, video techniques and cable distribution systems, Tomáš Kratochvíl)

Personal Computer Educational Laboratory (three computer rooms for instruction in electronic circuits, signals and systems, in special areas of radioelectronics and communications, Zdeněk Kolka)

Research Laboratory of Digital TV and Video Techniques (research of digital and compression methods of image processing, devices for video techniques , Václav Říčný)

Research Laboratory Experimental Satellite Communication (research and development of laser optical subsystems for satellite communication and navigation, telemetric and command stations of the P3D satellite of the international organization AMSAT, Miroslav Kasal)

Research Laboratory of Optical Communications (research and development of laser optical atmospheric connections and optical communication systems, Otakar Wilfert)

Research Laboratory of Digital Signal Processing (research of digital signal processing, processing of speech signals and digital radio techniques, Vladimír Šebesta)

Research Laboratory of Numerical Methods (research of the methods of analysis, design and optimization of microwave planar structures and antennas, Zbyněk Raida)

EMC Pre-Compliance Test Laboratory (laboratory for pre-compliance testing of interference emissions and electromagnetic resistance, Jiří Svačina)

Department of Telecommunications

Prof. Ing. Kamil Vrba, CSc.

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Doc. Ing. Vladimír Kapoun, CSc.
Doc. Ing. Karel Němec, CSc.
Doc. Ing. Ivan Rampl, CSc.

Lecturers

Ing. Miroslav Balík, Ph.D., Ing. Radim Číž, Ing. Ivo Herman, CSc., Ing. Ladislav Káňa, Ing. Dan Komosný, Ph.D., Mgr. Otakar Kříž, Ivo Lattenberg, Ph.D., Ing. Jiří Mišurec, CSc., Ing. Karol Molnár, Ph.D., Ing. Zoltán Nagy, Ing. Vít Novotný, Ph.D., Ing. Jiří Schimmel, Ing. Petr Sysel, Pavel Šilhavý, Ph.D., Ing. Vladislav Škorpil, CSc., Ing. Václav Zeman, Ph.D.

Postgraduate Students

Ing. Mansour M. Abaid, Ing. Petr Berka, Ing. Lubomír Cvrk, Ing. Jan Čermák, Ing. Radim Číž, Ing. Václav Eksler, Ing. Miroslav Gregořica, Ing. Martin Habr, Ing. Pavel Hofírek, Ing. Aleš Holec, Ing. Marek Huczala, Ing. Petr Hujka, Ing. Jan Jagoš, Ing. Pavel Kania, Ing. Vítězslav Krčmář, Ing. Jiří Krejčí, Ing. Václav Křepelka, Ing. David Kubánek, Ing. Petr Kubíček, Ing. Tomáš Lukl, Ing. Jiří Macola, Ing. Vladimír Malenovský, Ing. Martin Mareš, RNDr. Vladimír Mazálek, Ing. Tomáš Miklánek, Ing. Pavel Moučka, Ing. Galal Abdo Awad Murshed, Ing. Zoltán Nagy, Ing. Michal Olšák, Ing. Ondřej Pavelka, Ing. Martin Plšek, Ing. Karel Polák, Mgr. Pavel Rajmic, Ing. Kamil Říha, Ing. Omer M. Salih, Ing. Khaled M. Shakhtur, Ing. Jiří Schimmel, Ing. Michal Soumar, Ing. Lubomír Starý, Ing. Jan Stavárek, Ing. Radomír Svoboda, Ing. Petr Sysel, Ing. Martin Sýkora, Ing. Radek Šponar, Ing. Richard Štefíček, Ing. Miroslav Štěpán, Ing. Abdelgawad Taher, Ing. Jorge Truffin, Ing. Stanislav Uchytil, Ing. Milan Vajdík, Ing. Martin Vítek, Ing. Martin Vondra, Ing. Jaroslav Vrána, Ing. Vít Vrba, Ing. Radek Zezula,

Administrative and Technical Staff

Magda Lounková, Jitka Lukešová, Jitka Macháčková, Pavel Novotný, Zdeněk Procházka

Main Interests

The main research interests are up-to-date multimedial services via mobile and wireless networks. The research teams at the department were involved in research projects on basic and applied research funded by over 26 mil. CZK Several members of the department participate in the projects of the Ministry of Industry and Trade dealing with basic and applied research. within the framework of five projects of the Ministry of Industry and Trade close cooperation was established with VÚSH a.s., ApS Brno and DISK Multimédia. The practical outcomes of this research are e.g. the development of the wireless IP phone, new multimedia and hypermedia services, up-to-date coding technology, development of the digital processing of speech signals.

A young prospective team deals with the problems of the quality of services in solid and wireless communication networks. In cooperation with Budapest University of Technology and Economics cooperation has been expanding in research of network services for new generation mobile networks. Research of peer-to-peer services for the firm Nokia has started.

In the area of software multipoint videoconferences the department is engaged in applied research and development of unconventional large-area representation of videoconference participants, including the design and implementation of a hardware unit with control software. The multinational company VCON involved in the development of videoconference systems has shown interest in this representation system. Work has started on the development of user-friendly videoconferences.

In cooperation with transport companies, applied research has been going on of data transmission via power lines. Data transmission from a moving vehicle using (short and long range) electrical and radio signals was performed, including the development of internal communication in mass transport.

Major Achievements

In 2003, the academic staff of the department received prestigious international awards for several packages of software modules for special digital music real-time effects ‘Simple Audio Plug-In Pack I‘, ‘Stomp’n FX 1‘ and ‘Stomp’n FX 2‘, and for applications for real-time processing of music signals ‘RT Player Pro‘ and ‘GT Player‘ IBM PC a Apple Macintosh platforms, and for a multichannel digital music effect ‘VL2- Multichannel Valve Interface‘ for multiprocessor systems of the digital signal processors for TC Powercore and SoundArt Chameleon. The journals KEYBOARD (USA), DTM Magazine (Japan), Keyboards Journal (Germany) Muzikus, Music Store, Computer Music Journal (UK), for example, published positive responses to these products.

A new research and instruction laboratory of multimedia and hypermedia communications was built for research and verification by experiments of new multimedia communication technologies, The laboratory is equipped with 13 highly powerful computers Pentium 4 – 2,4 GHz with full multimedia equipment including 21’’ monitors, web cameras Kodak and sound cards SoundBlaster Live with amplifiers and headphones. For the purposes of multimedia communication the laboratory is equipped with a software videoconference system of the firm VCON containing the server Multimedia Exchange Manager (MXM) for administration of users and audiovisual calls, multi-point unit MCU for videoconference with nine participants and software videoconference clients vPoint. The dedicated videoconference station MediaConnect 9000 can be used for research of the transmission of live audiovisual data including long-distance sharing of applications using interactive multicasting. The research workplace is also equipped with a positioning rotational camera and large-area representation device consisting of four 18’’ LCD monitors for representation of the videoconference participants. Part of the laboratory is the workplace for 3D representation using an up-to-date autostereoscopic display.

Major Research Projects

Analysis of xDSL Transmission Parameters Using Computer Models of Real Network – GAČR 102/03/0762
Investigator: Karel Němec

Applied Digital Speech Separation in Communication Technologies– MPO FD-K/125
Investigator: Kamil Vrba

Implementation of new voltage and current conveyors in filtering and non-filtering circuits – GAČR 102/02/P067
Investigator: Vít Novotný

Applied Research of Technologies for Multimedia and Hypermedia Services– MPO FD-K/040
Investigator: Kamil Vrba

Interactive Branch Library– LI 002008
Investigator: Kamil Vrba

Communication Protocols in Non-Stationary Data Networks– GAČR 102/03/1033
Investigator: Ivo Herman

Non-linear Methods of Speech Enhancement – COST OC 28753
Investigator: Zdeněk Smékal

New Methods of Service Quality Assurance in New Generation Networks - GAČR 102/03/0560 - GAČR 102/03/0560
Investigator: Vladimír Kapoun

Limits for Broad-Band Signal Transmission on the Twisted Pairs and Other System Co-existence – GAČR 102/03/0434
Investigator: Vladislav Škorpil

Symbolic, Semisymbolic, and Numerical Methods of Analysis, Design, and Optimization of Electrical Circuits – GAČR 102/01/0432
Investigator: Dalibor Biolek

Synthetic Elements with Higher-Order Immitance Using Nonconventional Active Circuit Elements – GAČR 102/02/P130

Investigator: Ivo Lattenberg

The Development and Application of New Active Elements UCC, UVC, MOTA – GAČR 102/03/1465
Investigator: Kamil Vrba

Research of New 2D Image Processing Methods Used for Accurate Gauging of Dimensions in Building Industry and Their Verification on Prototype of 2D Tester– MPO FD-K2/01
Investigator: Kamil Vrba

Selected Publications

KOMOSNÝ, D., VAJDÍK, M. Integration of IP and Trunked Radio Network. *WSEAS Transactions on Communications*, ISSN 1109-2742, 2003, Vol. 2, No. 2,3, pp. 194 - 198.

KOMOSNÝ, D., VAJDÍK, M., HERMAN, I. Short-range Data Transmission Using Inductive Method. *WSEAS Transactions on Communications*, ISSN 1109-2742, 2003, Vol. 2, No. 2,2, pp. 190 - 193.

LATTENBERG, I., VRBA, K. Computational Methods in Circuits and Systems Applications. Chapter: *Synthetic immitance element with gyrator for filter realization*. 1st edition. Corfu, Greece: WSEAS, 2003. pp. 217 - 220 . ISBN 960-8052-88-2

ŠKORPIL, V. Recent Advances in Communications and Computer Science. In: *Virtual Network Creation on an ATM Multimedia Environment*. Athens: WSEAS Press, 2003. pp. 327 - 330 . ISBN 960-8052-86-6

ŠKORPIL, V., ŠŤASTNÝ, J. Design of Powerful Digital Servo-controller. *WSEAS Transactions on Circuits*, ISSN 1109-2734, 2003, Vol. 2, No. 4, pp. 644 - 647.

ŠKORPIL, V., ŠŤASTNÝ, J. New Application for the Edge Detection Algorithm. *WSEAS Transactions on Computers*, ISSN 1109-2750, 2003, Vol. 2, No. 2, pp. 355 - 359.

ŠŤASTNÝ, J., ŠKORPIL, V. Analysis of Methods for Edge Detection. *International Journal Híradastechnika*, ISSN 0018-2028, 2003, Vol. 58, No. 12, pp. 48 - 56. Scientific Association for Infocommunications HTE Budapest

VRBA, K., ČAJKA, J. Application of the General Four-port Second-kind Current Conveyor for Universal Filter Design. *Technology Interface*, ISSN 1523-9926, 2003, Vol. 5, No. 1, pp. 1 - 6.

Bachelor Programme

Analog Technology (Kamil Vrba)

Audioengineering (Ladislav Káňa)

Communication Technology (Ivo Herman)

Data Communication (Karel Němec)

Design of Electronic Devices (Kamil Vrba)

Transmission Media (Miloslav Filka)

Digital Signal Processing (Zdeněk Smékal)

Network Architecture (Vít Novotný)

Practical Exercises in Information Networks (Karol Molnár)

Terminal Equipments (Vít Novotný)

Master Programme

Accesses and Transport Networks (Vladimír Kapoun)

Analog Circuits (Kamil Vrba)

Audioengineering (Ladislav Káňa)

Communications Networks and Engineering (Ivo Herman)

Cryptography (Václav Zeman)

Data Communication (Karel Němec)

Design and Technology of Electronics Devices (Kamil Vrba)

Digital Audio Signal Processing (Jiří Mišurec)

Digital Exchanges (Vladimír Kapoun)

Digital Filters (Zdeněk Smékal)

Digital Signal Processors (Zdeněk Smékal)

Digital Transmission Systems (Vladislav Škorpil)

High-Speed Communications Systems (Vladislav Škorpil)

Integrated Networks (Vít Novotný)

ISDN Services (Vladislav Škorpil)

Microprocessor Techniques in Telecommunications (Jiří Mišurec)

SADP A/D and D/A Converters (Kamil Vrba)

Sensor Systems (Ivan Rampl)

Studio and Music Electronics (Ladislav Káňa)

Telecommunication Devices Maintenance (Vladislav Škorpil)

Telecommunications Optical Networks (Miloslav Filka)

Telecommunications Systems (Karel Němec)

Telematic and Multimedia Services (Kamil Vrba)

Terminal Equipments (Vít Novotný)

Transmission Lines (Miloslav Filka)

Doctoral Programme

Active Current-Mode Elements (Ivan Koudar)

Digital Signal Processors (Zdeněk Smékal)

Integration of Telecommunication Networks and Services (Vladimír Kapoun)

Modern Network Technologies (Karol Molnár)

Sensor Information Systems (Ivan Rampl)

Speech Analysis and Synthesis (Robert Vích)

Telecommunications Media for Information Transmission (Miloslav Filka)

Laboratories

Laboratory of Analog Techniques (research of non-conventional current-mode circuits, Kamil Vrba)

Laboratory of Wireless Computer Networks and XoIP (operation in wireless computer networks, Karol Molnár, Vít Novotný)

Laboratory of Digital Music Studio (instruction and research of the synthesis, analysis, processing and reproduction of music signals, Zdeněk Smékal)

Laboratory of Electroacoustics, Studio and Music Electronics (instruction and research of electro-acoustics, studio and music electronics, Ladislav Káňa)

Laboratory of Coherent Imaging (research of coherent 2D and 3D imaging and subsequent digital image analysis, Kamil Vrba)

Laboratory of Multimedia Services (research of the design and provision of multimedia communication services including digital processing of multimedia data, Zoltán Nagy)

Laboratory of Optical Transmission (instruction, measurements and research of optical transmission, Miloslav Filka)

Laboratory of Data Transmission (instruction in Data Communication, research of modems, modelling the properties of access networks and end devices, Karel Němec)

Laboratory of Access Networks (instruction and research of end devices in networks, efficiency of access networks, service quality evaluation, Vladimír Kapoun, Vít Novotný, Karol Molnár)

Laboratory of Sensor Systems (measurements of the properties of sensors and intelligent sensors, Ivan Rampl)

Laboratory of Telecommunication Systems (instruction in Telecommunication Systems, research of news transmission, Karel Němec)

Laboratory of High-Rate Communication Systems (instruction and research of high-rate information transmission, Vladislav Škorpil)

Laboratory of Analog Techniques and Digital Converters (instruction and research of 'mixed mode' circuits, Kamil Vrba)

Laboratory of Acoustic Signal Processing (research of the design, optimization and implementation of algorithms for acoustic and speech signal processing, Miroslav Balík)

Computer Laboratory (instruction in fundamentals of communication technology and networks , Ivo Herman)

Motorola Research Laboratory of Signal Processing (research and development of applications using digital signal processors, instruction in Signal Processing, Digital Filters and Acoustic Signal Digital Processing, Zdeněk Smékal)

Department of Theoretical and Experimental Electrical Engineering

Ing. Pavel Fiala, Ph.D.

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Doc. Ing. Jarmila Dědková, CSc.
Doc. Ing. Pavel Kaláb, CSc.
Doc. Ing. Jiří Sedláček, CSc.

Lecturers

Ing. Karel Bartušek, DrSc., Ing. Pavel Fiala, Ph.D., Ing. Eva Gescheidtová, Ing. Eva Kadlecová, CSc., Ing. Miloslav Steinbauer, Ing. Miroslav Veselý

Postgraduate Students

Ing. Radek Kubásek, Ing. Pavel Londák, Ing. Miloslav Steinbauer, Ing. Zdeněk Zapletal, Ing. Martin Zlomek

Administrative and Technical Staff

Eva Cupáková, Václav Hauer, Veronika Raabová

Main Interests

The department is involved in research in three areas of interest. The first one is the basic and applied research of numerical methods and applied mathematics (L. Dědek, J. Dědková, L. Brančík, J. Sedláček, P. Fiala). The second area involves basic and applied research of metrology and measuring methods (K. Bartůšek, E. Gescheidtová, J. Rez, Steinbauer, P. Fiala, E. Kadlecová). The third area is focused on experimental and applied electrical engineering and electronics (M. Kaláb, P. Fiala, M. Steinbauer, E. Kadlecová).

The department provides tuition in courses of the Bachelor, Master and Doctoral study programme. The subjects involve synthesis of mathematical and physical knowledge and its application in modern electrical and electronic engineering. The department maintains and extends cooperation with universities in Poland, France and Germany.

In 2004, research of numerical methods as well as research, design and development of experimental special devices, measuring methods and unique instrumentation.

The concept of a gravity microgenerator will be completed in cooperation with the Department of Power Electrical Engineering and EADS München. Research will continue of the pulse microwave generator in cooperation with the company PROTOTYPA a.s. Further continued will be cooperation with this firm in research on the microwave relativistic source VIRKÁTOR as well as research of the measurement of ultrashort pulses with PROTOTYPA a.s, VTUPV Vyškov, Academy of Sciences of the Czech Republic, and TESLA Vršovice, Prague.

Research of the measurement of magnetic induction of ultrashort pulses with PROTOTYPA a.s., the basic and applied research of numerical methods, interpretation and modelling, reconstruction of biomedical signals, metrology and measurement, technology of processing time and image signals for MR tomography. Cooperation in these areas will be maintained with Institute of Instrument Technology, Czech Academy of Sciences, as well as cooperation in research of up-to-date methods of analysis and synthesis of analog and digital electronic circuits and blocks.

Major Achievements

A new optimization algorithm for the Poisson's equation was developed and published.

Further developed were unique prototypes of the pulse power generator PGV-I and the sensor of pulse power Pn=250MW, t=10ns.

The academic staff of the department worked on the project of Academy of Sciences 'Generation and Measurement of Magnetic Fields for in vivo MR localized spectroscopy' (K. Bartušek, E. Gescheidtová), the GACR project „Electric Impedance Tomography in Loss Environment" (Libor Dědek), and the GACR project 'Simulation and Optimization of Integrated Electronic Systems Regarding Signal Integrity' (Lubomír Brančík). There also was one FRVS project (Eva Kadlecová, Pavel Fiala).

The department cooperated with the companies PROTOTYPA a.s, VOP-026 s.p. Štenberk, division VTUPV Vyškov, Academy of Sciences of the Czech Republic, Institute of Instrumentation Technology Brno, Academy of Sciences Prague, ABB EJF Brno, Technical University Pardubice, Military Academy Brno, TESLA Praha-Vršovice, T.E.S.L.A. s.r.o Pardubice on LG9 projects monitored by NATO – APPM2.

Major Research Projects

Electric Impedance Tomography in Loss Environment– GAČR 102/03/1108
Investigator: Libor Dědek

Gradient Magnetic Fields Generation and Measuring for In Vivo MR Spectroscopy – AVČR IAA 2065201
Investigator: Karel Bartušek

Concept and Analysis of the Model of Power Microwave Generator of Electromagnetic Pulses– MPO FD
Investigator: Pavel Fiala

Simulation and Optimization of Integrated Electronic Systems Focused on Signal Integrity– GAČR 102/03/0241
Investigator: Lubomír Brančík

Selected Publications

DĚDEK, L., DĚDKOVÁ, J., VALSA, J. Optimization of Perfectly Matched Layer for 2D Poisson's equation with Antisymmetrical or Symmetrical Boundary Conditions. *COMPEL The International Journal for Computation and Mathematics in Electrical and Electronic Engineering*, ISSN 0332-1649, 2003, Vol. 22, No. 3, pp. 520 - 534.

Bachelor Programme

Electrical Engineering 1 (Lubomír Brančík)

Electrical Engineering 2 (Jiří Sedláček)

Safety in Electrical Engineering (Miloslav Steinbauer)

Seminar of Electrical Engineering (Jarmila Dědková)

Master Programme

Electrical Engineering 2 (Libor Dědek)

Electrical Installations (Pavel Kaláb)

Electromagnetism (Libor Dědek)

Measurements in Electrical Engineering (Jiří Rez)

Doctoral Programme

Algorithms for Simulation of Electrical and Electronic Networks (Lubomír Brančík)

Computer Methods of Filter Design and Optimization (Jiří Sedláček)

Field Computation in Power Engineering (Libor Dědek)

Magnetic Measurements and Technical Applications (Jiří Rez)

Laboratories

Computer Laboratory (instruction in Computers and Programming 2, Miloslav Steinbauer)

Electromagnetism Laboratory (computer exercises, Miloslav Steinbauer)

Laboratory for Electrical Engineering I, II (laboratory exercises, Miloslav Steinbauer)

Laboratory for Measurement in Electrical Engineering (Václav Hauser)

Research Laboratory for Modelling and Optimisation of Fields in Electromechanical Systems (unique technical problems, Pavel Fiala)

Research Laboratory for Magnetic Measurements (using electromagnetic methods in non-destructive testing of products , Jiří Rez)

Department of Power Electrical and Electronic Engineering

Doc. Ing. Čestmír Ondrůšek, CSc.

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Prof. Ing. Karel Hruška, DrSc.
Prof. Ing. Jiří Skalický, CSc.

Associate Professors

Doc. RNDr. Vladimír Aubrecht, CSc.
Doc. Ing. Bohuslav Bušov, CSc.
Doc. Ing. Josef Koláčný, CSc.
Doc. Ing. Josef Lapčík, CSc.
Doc. Ing. Čestmír Ondrůšek, CSc.
Doc. Dr. Ing. Miroslav Patočka
Doc. Ing. Zdeněk Vávra, CSc.
Doc. Ing. František Veselka, CSc.

Lecturers

Ing. Josef Bartl, CSc., Ing. Josef Bradík, Ph.D., Ing. Petr Dohnal, Ing. Zdeněk Feiler, PhD., Ing. Marie Horná, CSc., Ing. Petr Huták, PhD., Ing. Bohumil Klíma, Ing. Petr Král, Dr. Ing. Hana Kuchyňková, Ing. Vladimír Kutnohorský, CSc., Ing. Ladislav Suchomel, Ing. Jaromír Vaněk, CSc., Ing. Pavel Vorel, PhD., Ing. Jaromír Vrba, CSc.

Postgraduate Students

Ing. Vladimír Benada, Ing. František Blažek, Ing. Petr Budiš, Ing. Tomáš Cibulka, Ing. Ivan Civín, Ing. Dalibor Červinka, Ing. Petr Dohnal, Ing. Salem S. Elfard, Ing. Petr Frank, Ing. Pavel Gajdůšek, Ing. Petr Hemerka, Ing. Jiří Hnízdil, Ing. Aleš Honzák, Ing. Jiří Hovadík, Ing. Zdeněk Jánský, Ing. Martin Jarmara, Ing. Emil Kalina, Ing. Tomáš Kerlin, Ing. Jiří Klíma, Ing. Marek Klimeš, Ing. Patrik Konečný, Ing. Michal Koudelka, Ing. Martin Kovařík, Ing. Zdeněk Langr, Ing. Martin Maňa, Ing. Tomáš Matucha, Ing. Salou Moussa, Ing. Lucie Munduchová, Ing. Radim Peřina, Ing. Jaroslav Pozdník, Ing. Martin Prajza, Ing. David Procházka, Ing. Lubomír Přikryl, Ing. Luboš Sikora, Ing. Radek Stupka, Ing. Marian Sztula, Ing. Pavel Štorek, Ing. Zdeněk Šťáva, Ing. Filip Štěpančík, Ing. Radek Trávníček, Ing. Pavel Tureček, Ing. Ferdinand Urban, Ing. Jiří Valenta, Ing. Ondřej Vítek, Ing. Zdeněk Wolf, Ing. Miroslav Zemánek

Administrative and Technical Staff

Josef Daněk, Zdeněk Koráb, Alena Šmídková

Main Interests

The department participates in tuition in the first year of the Bachelor study programme and in teaching specialized subjects in Power Electrical and Electronic Engineering in both the previous and the new Bachelor study programme and in the previous Master study programme. These subjects cover electrical machines, devices, drives, power and control electronics. The department is involved in research of theoretical modelling of radiation energy transport in thermal plasma, low-voltage electrical machines for automotive industry, optimization of the design and identification of the parameters of electric machines using artificial intelligence, development of special machines as startergenerators, controlled magnetic bearings, levitation systems, electronic energy converters with extreme parameters, exploitation of ultracapacitors in cooperation of electronic converters, accumulators and electrical machines in electric traction. The department cooperated with a number of universities, e.g. Technical University Gliwice, RWTH Aachen and industrial companies e.g. Siemens Elektromotory Drásov, Magneton Kroměříž, OEZ Letohrad.

In 2004, basic research will continue of the calculation of emission energy transport in water-stabilized plasmatron. Also planned, within the framework of the 6th Framework EU programme, is the construction of a microgenerator for aircraft industry, optimization of the design of asynchronous machines using artificial intelligence, controlled magnetic bearings, special electronic converters and exploitation of ultracapacitors in traction technology.

Major Achievements

Under the leadership of Assoc. Prof. František Veselka a new design was proposed of the collector system of electrical machines. The workplace for the study of the sliding contact was opened, and damping winding for enhanced commutation of electrical machines was designed.

The team of postgraduate students supervised by Assoc. Prof. Čestmír Ondrůšek created, for the company Siemens Drásov, a program for optimization of the design of synchronous machines based on artificial intelligence.

The team led by Prof. Vítězslav Hájek completed an innovation of the dc motor for wipers in utility vehicles and buses, which was verified in laboratory including electronic control of rotations. A laboratory sample of the 14 V/140 A alternator was designed and verified.

The team led by Assoc. Prof. Miroslav Patočka and Pavel Vorel created, within the framework of a project of the Ministry of Industry and Trade, the design of the power system of a modular source for the company EPRONA, a.s.

The department organized three international conferences ‘XVth Symposium on Physics of Switching Arc‘, ‘Low Voltage Electrical Machines‘ and ’Selected Parameters of Electrical Machines and Drives‘.

Major Research Projects

Axial Starter Actuated by Permanent Magnet– MPO FD-K/123
Investigator: Vítězslav Hájek

Asynchronous Motors with External Rotors– MPO FD-K/126
Investigator: Vítězslav Hájek

Diagnostics of Electromagnetic Properties of Electrical Machines Using Vibration and Acoustic Fields – GAČR 102/01/1291
Investigator: Ivan Jakš

Electrical Pumping Device for NC Working Machines – MPO FF-P/094
Investigator: Vítězslav Hájek

Empirical Models for Multiparametric Evaluation of Quality Parameters – GAČR 102/03/P124
Investigator: Josef Bradík

Microwave Generators of Electromagnetic Pulses– MPO FD-K/042
Investigator: Bohumil Král

Electronic Elements in Design of Small-Calibre Guns – MPO FD-K/045
Investigator: Bohumil Král

Revitalization of the Laboratory for Testing Firearms and Ammunition– MPO FD-K/043
Investigator: Bohumil Král

Development of a Universal Breech of Ballistic Measurement Devices according to NATO and C.I.P. standards– MPO FD-K/044
Investigator: Zdeněk Hořák

Research of Power Electrical Low-Voltage Brushless Drives for Car Technology – GAČR 102/00/D013
Investigator: Pavel Vorel

Enhancement of Selected Parameters of Electrical Low-Voltage Machines– GAČR 102/03/0813
Investigator: Vítězslav Hájek

Selected Publications

KUCHYŇKOVÁ, H. Compatibility of Data Transfer between CAD Applications. *Radioengineering*, ISSN 1210-2512, 2033, pp. 58 - 62

Bachelor Programme

Automobile Electric and Electronic Systems (Vítězslav Hájek)

Computer Aided Design (Hana Kuchyňková)

Computer Science in High Power Engineering (Vladimír Aubrecht)

Control Electronics (Miroslav Patočka)

Control Theory (Jiří Skalický)

Electrical Drives (Josef Koláčný)

Electrical Machines (Čestmír Ondrůšek)

Microprocessor Technology for Drives (Miroslav Patočka)

Doctoral Programme

Advanced Control of Electrical Drives (Jiří Skalický)

Electric Machines for Motor Vehicles (Vítězslav Hájek)

Electric Microdrives (Josef Koláčný)

Electromechanics (Čestmír Ondrůšek)

Optical Plasma Diagnostics (Ladislav Peška)

Power Electromechanical Systems (Miroslav Patočka)

Power Electronics (Miroslav Patočka)

Theory of Inventive Problem Solving (Bohuslav Bušov)

Topical Conditions of Testing and Certification in CR and EU (Karel Hruška)

Master Programme

AC Controlled Drives (Jiří Skalický)

Automobile Electric and Electronic Systems (Vítězslav Hájek)

Computer Aided Design (Hana Kuchyňková)

Computer Control of Drives (Petr Huták)

Computers in High Power Engineering (Hana Kuchyňková)

Connection and Protection of Indoor Installations (Jaromír Vaněk)

Control Elements of Electrical Drives in Power Engineering (Miroslav Patočka)

Control Theory 1 (Jiří Skalický)

Design of Electrical Drives (Jiří Skalický)

Design of Electrical Machines and Apparatus (Zdeněk Vávra)

Economy and Management (Vladimír Kutnohorský)

Electric Equipment for Motor Vehicles (Vítězslav Hájek)

Electric Machines for Motor Vehicles (Vítězslav Hájek)

Electric Stations (Zdeněk Vávra)

Electrical Apparatus (Zdeněk Vávra)

Electrical Drives I (Josef Koláčný)

Electrical Drives II (Jiří Skalický)

Electrical Machines 1 (Čestmír Ondrůšek)

Electrical Machines 2 (Čestmír Ondrůšek)

Electrical Microdrives (Josef Koláčný)

Electromechanical Systems (Čestmír Ondrůšek)

Electrotechnical Inspection and Supervision (František Veselka)

Fundaments of Logistic and Management (Bohumil Klíma)

International Cooperation of Quality Assurance (Karel Hruška)

Laboratory Courses of Electrical Drives (Josef Koláčný)

Materials in Heavy Current Engineering (Vladimír Kutnohorský)

Measurement in Heavy Current Engineering (Vítězslav Hájek)

Microcomputer Control of Electrical Drives (Jiří Skalický)

Micromachines (Vítězslav Hájek)

Microprocessor Technology (Miroslav Patočka)

Nondestructive Testing and Monitoring (Karel Hruška)

Power and Control Electronics (Jaromír Vrba)

Power Electronics 1 (Jaromír Vrba)

Power Electronics II (Miroslav Patočka)

Power Electronics III (Miroslav Patočka)

Principles of Power Electronics (Miroslav Patočka)

Protection Electric Devices (Jaromír Vaněk)

Protection in Heavy Current Engineering (Jaromír Vaněk)

Quality Assurance and Metrology (Karel Hruška)

Regulate and Quality Control (Karel Hruška)

Reliability and Diagnostics (Karel Hruška)

Technical Requirements for Production Evaluation (Karel Hruška)

Technological Processing (Vladimír Kutnohorský)

Theory of Inventive Problem Solving - TIPS (Bohuslav Bušov)

TIPS-Theory of Inventive Problem Solving (Bohuslav Bušov)

Laboratories

Laboratory of Automotive Electrical Machines (research of alternators, starters and low-voltage motors, Vítězslav Hájek)

Laboratory of Electric Arc (optical diagnostics of switching arc in high-voltage switches , Zdeněk Vávra)

Laboratory of Electrical Drives (research of non-linear dynamic systems with change of parameters, Josef Koláčný)

Laboratory of Electrical Apparatus (research of switching devices, Jaromír Vaněk)

Laboratory of Electrical Machines (research of commutation of electrical machines, measurement of medium-power motors, magnetic bearings, automated measurements, Čestmír Ondrůšek)

Laboratory of Holographic Interferometry (special optical stand for holographic interferometry for e.g. diagnostics of vibrations of torque machines, Vladimír Aubrecht)

Laboratory of Fractional Horse Power Electrical Machines (measurements of DC motors and high-revolution commutator universal motors, Josef Lapčík)

Laboratory of Microprocessor Techniques (control of converters for ecological transport systems using digital signal processors, Bohumil Klíma)

Laboratory of Power Engineering Electronics (research of DC/DC converters, alternators and low-voltage brushless drives, Pavel Vorel)

Laboratory of Special Diagnostics and Fast Process Recording (digital high-speed camera scanning of fast processes and equidensitometric evaluation of records, Vladimír Aubrecht)

Laboratory of Power Electronics (research of pulse transducers , Miroslav Patočka)

Laboratory of Quality Assurance and Testing (non-destructive diagnostics and monitoring, expressing uncertainty of measurement in NDT, research of empirical models for multiparametric evaluation of quality parameters, Josef Bradík)

High-Voltage Laboratory (research of high-voltage switching phenomena, Zdeněk Vávra)