ANNUAL REPORT

FACULTY OF INFORMATION TECHNOLOGY

BRNO UNIVERSITY OF TECHNOLOGY

Contents

I.

INTRODUCTION

Brno University of Technology is the second largest and second oldest technical university in the Czech Republic. Its origins go back to the mid-nineteenth century, the year 1849, when a German-Czech technical school was established. It was oriented to technical, agricultural and commercial fields of study, with instruction in both Czech and German. Because of political and nationalist disputes, instruction in Czech gradually declined, and therefore the **Czech Technical University was founded in Brno in 1899**. After the end of World War I and the creation of the Czechoslovak Republic, it merged with the German technical college (initially a bilingual school) into the Technical University of Brno (later named after Dr. E. Beneš). In the period between WWI and WWII the school ranked among the best technical universities in Europe.

During WWII the university was closed down, the same as all the other Czech universities, the school buildings were used by the German military, and most of the facilities were destroyed. Immediately after the war, the school activities were resumed. In 1951 the Technical University of Brno was abolished, with some of its departments transferred to the newly established Military Technical Academy. Civilian instruction only continued at the former Faculty of Civil Engineering. However, it soon became obvious that the technical university must be reopened and, beginning with 1956, the school started expanding.

The Faculty of Information Technology (FIT), BUT, came into existence on January 1, 2002, evolving from the former Department of Informatics and Computer Science of the then Faculty of Electrical Engineering and Informatics (FEEI), BUT. The Department of Informatics and Computer Science (DICS) was established at the Faculty of Electrical Engineering, BUT, in 1964 under the name Department of Computer Science. In 1990 it was renamed the Department of Informatics and Computer Science, and in 1992 the Department of Informatics and Computer Science. Further development of the Department was connected with the dynamically evolving area of computer science and its applications, referred to as informatics. The growing demands for experts in this area determined the range and orientation of the instruction, research tasks and joint projects, and also influenced the number of enrolled students and departmental staff. The increasing role of teaching informatics at the Faculty led in 1993 to the Faculty being reorganized as the Faculty of Electrical Engineering and Informatics (FEEI), with separate informatics study plans just after the 1st joint studies semester.

By the end of the millennium, the role of the Department and the proportion of informatics in the teaching at the Faculty exceeded the organizational, technical and financial limits of the Department and the transformation of the Department into a new faculty began.

In 2001, this led at BUT to a number of decisions in connection with the preparations to establish the **Faculty of Information Technology (FIT)** while transforming the parental **Faculty of Electrical Engineering and Informatics** into the **Faculty of Electrical Engineering and Communication (FEEC)**. The Academic Senate of BUT approved the foundation of the new faculty as of January 1st, 2002. The demanding work on preparing for accreditation new study programmes for the two new faculties was crowned with the approval of the new study programmes of the two faculties by the Accreditation Board of the Ministry of Education of the Czech Republic and its consent to the establishment of the new faculty. The programmes for FIT were a new three-year Bachelor's study programme and a follow-up two-year Master's study programme. After its foundation, the faculty experienced rapid development and in 2012 it celebrated the 10th anniversary of its foundation.

At present, BUT is directed by **Prof. RNDr. Ing. Petr Štěpánek, CSc.** Another outstanding figure in the BUT management is **Doc. Dr. Ing. Petr Hanáček**, head of the Department of Intelligent Systems, FIT, who in the years 2005-2008 was vice-chairman and since 2008 chairman of the Academic Senate of BUT. Other FIT members in the Academic Senate are **Doc. Ing. Jiří Kunovský, CSc.**, from the Department of Intelligent Systems, FIT, and **Ing. Karel Koranda,** PhD student, vice-chairman of AS BUT and chairman of the Students Chamber of AS BUT.

Since 2008, **Doc. Ing. Jaroslav Zendulka, CSc.** has been the Dean of FIT. The faculty management consists of:

Doc. Ing. Jaroslav Zendulka, CSc.	Dean
Prof. Ing. Tomáš Hruška, CSc.	Vice-Dean, Creative Activities and PhD studies
Prof. Dr. Ing. Pavel Zemčík	Vice-Dean, External Relations
Ing. Bohuslav Křena, PhD	Vice-Dean, BSc. Education
Doc. Ing. Richard Růžička, PhD	Vice-Dean, MSc. Education
Ing. Zdeněk Bouša	Vice-Dean, Strategic and Campus Development

The autonomous academic bodies of the faculty are the FIT Academic Senate, the FIT Research Board and the FIT Disciplinary Board. The Dean's advisory bodies are the Dean's Advisory Board, Study Fields Boards, Board for Creative Projects, Information System Board, Library Board, and Editorial Board. The Acting Faculty Secretary is responsible for the economic management, operation and development of the faculty, assisted by the relevant departments of the Dean's Office.

The Acting Faculty Secretary is **Ing. Zdeněk Bouša.** The Chairman of the FIT Academic Senate is **Prof. Ing. Lukáš Sekanina, PhD,** member of the Department of Information Systems. The first Vice-Chairman of AS FIT BUT and simultaneously the Chairman of the Chamber of Academics AS FIT BUT is **Ing. Petr Lampa,** head of the Computer Centre FIT BUT. The second Vice-Chairman AS FIT BUT and simultaneously the Chairman of the Student Chamber AS FIT BUT is

the student **Ing. Karel Koranda.** The Trade Union is represented in the faculty management by **Doc. Ing. Josef Schwarz, CSc.** The Study Advisor is **Ing. Miloš Eysselt, CSc.** and the Foreign Mobility Co-ordinator is **Doc. Ing. Dipl.-Ing. Martin Drahanský, PhD**.

The faculty consists of four departments, the Research Centre for Information Technology, and the Computer Centre:

- Department of Information Systems
- Department of Intelligent Systems
- Department of Computer Graphics and Multimedia
- Department of Computer Systems
- Research Centre for Information Technology
- Computer Centre

Study programmes taught at FIT

A Bachelor's study programme in Information Technology of a standard length of three study years (opened for the first time in the academic year 2002/2003):

- Information technology (BIT)

A follow-up Master's study programme in Information Technology of a standard length of two study years, opened at FIT in the academic year 2005/2006, currently with the following study fields:

- Security of information technology
- Bioinformatics and biocomputing
- Information systems
- Intelligent systems
- Management and information technologies
- Mathematical methods in information technology
- Computer graphics and multimedia
- Computer and embedded systems
- Computer networks and communication

A new doctoral study programme Computer Science and Informatics of a standard study length of four years in the form of full-time studies (opened for the first time in the academic year 2007/2008):

- Computer Science and Informatics

The study programmes are consistent with the Bologna Declaration on the Development of Higher Education in Europe, and the structure of study is fully compatible within Europe.

Recent significant awards for the faculty staff and students

Ing. Zdeněk Vašíček was awarded **the Joseph Fourier Prize** in **2011** for his research work in the field of computer science and informatics. Ing. Zdeněk Vašíček won the competition. **Ing. Filip Konečný** won the third place in the competition in **2012**.

The Josef Hlávka Prize for the best students of and graduates from the public universities in Prague and technical university in Brno, and for young talented workers of the Academy of Science of the Czech Republic was awarded to **Ing. Václav Bartoš** in **2011**. In **2012**, the Prize was awarded to **Ing. Ondřej Glembek** and in **2013** to **Ing. Markéta Dubská**.

The Werner von Siemens Prize in the category best pedagogical worker was awarded to **Prof. RNDr Alexander Meduna, CSc.** in **2012**. The Prize for the best diploma thesis in cooperation with Siemens went in **2013** to **Ing. Radek Gajdušek** for his work: CMMI certification in the development of software in agile medium. The work of the supervisor of the diploma thesis, **Doc. RNDr Jitka Kreslíková, CSc.**, was also appreciated.

The Prof. Ing. Jan Hlavička, DrSc. Prize for outstanding results in research activities undertaken within doctoral studies, awarded as part of the Czechoslovak doctoral studies seminar Computer Architectures & Diagnostics, went in 2011 to **Ing. Petr Pospíchal** (1st place in the 1st-year category), **Ing. Zdeněk Vašíček** (1st place in the 3rd- and 4th-year category) and **Ing. Jan Kaštil** (1st place in the 2nd-year category). In 2011, the prize was won **Ing. Viktor Puš** (1st place in the 3rd-year category) and **Ing. Vlastimil Košař** (1st place in the 1st-year category), in 2012 by **Ing. Marcela Šimková** (1st place in the 1st-year category) and in 2013 by **Ing. Jiří Matoušek** (1st place in the 2nd-year category).

International competitions:

- **Humies (Human Competitive Awards in Genetic and Evolutionary Computation) 2011** (GECCO, Dublin, Ireland): the 2nd place was won by **Prof. Ing. Lukáš Sekanina, PhD**, and **Ing. Zdeněk Vašíček** for the evolutionary design and optimization of combinational circuits.
- **Imagine Cup 2011** – the 3rd place was won by the student team WickedTeam (**Ing. David Jozefov, Ing. Rudolf Kajan, Ing. Martin Wilczák, Ing. Michal Zachariáš**) for their game Firefighters: Whatever It Takes! in the Game Design category. In 2013 the Wicked Games team of students made up of **Ing. Michal Zachariáš, Ing. István Szentandrási, Ing. Rudolf Kajan, Ing. Tomáš Milet,** and mentor: **Doc. Ing. Adam Herout, PhD,** won the national round of the Imagine Cup competition for their computer game reSound, which makes use of augmented reality. The winner in the World Citizenship category was another team, the Book Keepers, consisting of **Bc. Roman Jašek, Ing. Roman Janko, Ing. Petr Kučera, Bc. Tomáš Matula,** and mentor: **doc. Ing. Adam Herout, PhD.**
- **the 1st place in the Robotour 2011 competition (Vienna) was won by the student team made up of Bc. Adam Babinec, Ing. David Herman, Ing. Jan Najvárek, Ing. Tomáš Ondráček, PhD** for the support of the development of robots capable of transporting a load quite autonomously.
- **SV-COMP 2012** – verification of programs – the winning team was made up of **Ing. Kamil Dudka, Ing. Petr Müller, Dr. Ing. Petr Peringer,** and **Prof. Ing. Tomáš Vojnar, PhD**, for the Predator tool in the HeapManipulation category.

Diploma thesis competition:

- **ACM SPY** – the diploma thesis competition of Czech and Slovak universities. The winners in 2010 were the work by **Ing. David Herman**, supervised by **Ing. Filip Orság, PhD**, and the work by **Zbyněk Poulíček**, supervised by **Doc. Ing. Adam Herout, PhD**. In 2011 the winning work was by **Ing. Barbora Micenková**, supervised by **Doc. Ing. Adam Herout, PhD**. In 2013 the work by **Ing. Lukáš Kekely**, supervised by **Ing. Jan Kořenek, PhD**, won the second place.
- **Diploma thesis of the year** – the winner in 2010 was **Ing. Ondřej Lengál** in the category Information security, standards of controlling the development of systems, and interdisciplinary approaches; in 2011 the winner in the same category was **Ing. Marcela Šimková** while in 2013 the winners were **Ing. István Mészáros** in the category Cloud services and Datacentre Managed Services, **Ing. Lukáš Kekely** in the category Solutions for enterprise mobility and security, and **Ing. Radek Hrbáček** in the category Enterprise information systems, and other IT jobs.

The best contribution:

Rated as the best papers were:

- **ICN 2010** - „Automated Network-Wide Security Analysis“ by **Prof. Ing. Miroslav Švéda, CSc., Ing. Ondřej Ryšavý, PhD, Ing. Petr Matoušek, PhD, and Ing. Jaroslav Ráb**.
- **ICCGI 2011** – „Porting of C library, Testing of Generated Compiler“ by **Ing. Luděk Dolíhal** and **Prof. Ing. Tomáš Hruška, CSc.**
- **ICONS 2011** – „A Cyber-Physical System Design Approach“ by **Prof. Ing. Miroslav Švéda, CSc.,** and **Prof. Ing. Radimír Vrba, CSc.**
- **RV 2012** – „ANaConDA: A Framework for Analysing Multi-threaded C/C++ Programs on the Binary Level“ for which **Ing. Jan Fiedor** and **Prof. Ing. Tomáš Vojnar, PhD**, were awarded the best paper prize for a paper about the ANaConDA tool.
- **AHS 2013 Best Paper Award** for „Image Filter Evolution on the Xilinx Zynq Platform“went to **Ing. Roland Dobai, PhD**, and **Prof. Ing. Lukáš Sekanina, PhD.**

Doc. Ing. Jaroslav Zendulka, CSc.
Dean

II. Faculty Activities

II.1 Study Programmes

The study at the Faculty of Information Technology is based on a three-level model (the Bachelor's, Master's and doctoral levels) and on the ECTS (*European Credit Transfer and Accumulation System*) credit system, which supports flexibility when setting up individual study plans and supports student mobility. The Bachelor's and the follow-up Master's study programmes are offered in the form of full-time studies only, whereas the doctoral study programme is offered also in the combined form of study.

Every year, up to 800 applicants have the opportunity of obtaining a highly appreciated education in the three-year Bachelor's study programme *Information Technology*, together with the academic degree of **Bachelor** (with the abbreviation **Bc**. coming before the name). In the Bachelor's study programme at FIT there is only one field of study (*Information Technology*), which simplifies the study in a number of ways. Moreover, students can adapt their study programmes to fit their interests by choosing from among the optional subjects. The subjects they can choose from include not only technical subjects but also subjects devoted to languages, economy, management, pedagogy, and humanities. After completing a specified set of optional courses, students can obtain one of the following certificates: Advanced Language Competence Certificate, Certificate in Basic Managerial Competences, Microsoft Certified Professional or CISCO Certified Network Associate.

The Master's study follows up on the bachelor-level university education and develops it. Some 300 graduates from not only FIT but also other schools enter the two-year Master's study program *Information Technology* every year. Since the task of the Master's study programme is to enrich the knowledge obtained in the Bachelor' study programme, a number of fields of study are offered, namely IT Security, Bioinformatics and Biocomputing, Mathematical Methods in IT, Management and IT, Computer and Embedded Systems, and Computer Networks and Communication. A feature of the Master's study at FIT is the relatively high optionality as regards the combination of the subjects studied. Out of the 120 credit points that need to be obtained in subjects studied within the Master's study programme, just over 50 credit points are awarded in subjects that are obligatory in the respective field of study. In the Master's study too, further specialization is possible via choosing appropriate optional subjects, leading to special competence certificates. The most recent of them is the Competence in Providing IT Services Certificate, which was proposed in cooperation with IBM CR.

The third study level, the doctoral study programme, guides students to independent creative scientific and research work. A four-year doctoral study programme, *Computer Science and Informatics,* is offered at FIT. To enhance the theoretical knowledge obtained in the Master's study programme, students choose, with their supervisor's approval, several specialized doctoral courses for their individual study plans. The doctoral State Examination covers not only these courses but also the dissertation topic, which is a major point of discussion. Doctoral students are expected to publish even partial results of their research and establish contacts with the international scientific community. They are regularly involved in FIT research projects. Their teaching activities help them improve the art of presenting and defending the results of their research.

Students can complete part of their studies abroad. Within the LLP/Erasmus programme, the faculty can offer more vacancies at foreign universities than the usual number of applicants and thus all applicants can be placed. The faculty supports study stays abroad via extra scholarships and credit points.

The faculty gives long-term support to excellent students in the form of achievement-based scholarships and by organizing the EECT student conference and competition. The best students can get involved in numerous research projects carried out at FIT. On the other hand, the credit system enables also less competent students or students who, apart from their study, devote their time to other time-consuming activities (such as first-rate sports, temporary or part-time jobs, or family care) to successfully complete their study, for example by extending it by one academic year without having to ask the respective authority for permission. On completion of their study, all BUT graduates are issued the Diploma Supplement free of charge.

The faculty authorities are ready to meet the demands of students who do not want to complete a whole study programme but only want to extend their education in a selected field of study. Any course provided by the faculty can also be taken in the form of life-long education. However, this form of study does not give students the official student status with the related student benefits. This study is paid for in order to cover the respective expenses. The courses that have been successfully completed within the life-long education programme can later be recognized as part of the study leading to a degree award.

Ing. Bohuslav Křena, PhD
Vice-Dean, BSc. Education

Doc. Ing. Richard Růžička, PhD
Vice-Dean, MSc. Education

II.2 Creative Activities

Science and research

Creative activities at FIT are focused on both basic and applied research in the following areas:

Applied evolutionary algorithms, computer architectures and computer system architectures, security, diagnostics, evolvable hardware, hardware/software co-design, formal models, formal verification, information and database systems, intelligent systems, management in software engineering, system modelling and simulation, Petri nets, computer graphics, computer graphics for medicine, computer networks, communication protocols and embedded systems, reprogrammable architectures, high-performance computing, speech processing, and natural language processing. All this in keeping with the priorities resulting from current trends in R&D in the Czech Republic and the European Union and related reforms in the R&D system.

Creative activities concern in particular:

- The solution of international and national projects in cooperation with other science-and-research institutions and industrial partners,
- extensive publishing activities,
- cooperation with other science-and-research institutions in organizing and hosting specialized seminars and conferences,
- membership of faculty staff in international science-and-research organizations, editorial boards of journals, and programme committees at conferences,
- close connection between the professional orientation of individual faculty departments and the dissertations, habilitation procedures and
- Professor appointments.

Doctoral study

Doctoral study at the Faculty of Information Technology is provided in the four-year study programme Computer Science and Informatics. The programme is also offered in English.

In the implementation of doctoral study programmes the following main points appear every year:

- Those interested in the doctoral study programme are invited to come and meet outstanding science and research workers under the motto 'Come and do science at FIT'. The aim is to increase students' awareness of the scientific work done at FIT and their interest in doctoral study.
- In the implementation of the doctoral study programme, FIT closely cooperates with the Faculty of Electrical Engineering and Communication, BUT, and with the Faculty of Informatics, Masaryk University in Brno, when preparing courses, administering Doctoral State Examinations and presenting dissertations for defence.
- The FIT Information System is used to register and check study-related data, and allows students to enrol electronically into the higher years of doctoral study.

- A system of extra grants and financial stimuli has been in force to make students study properly and be motivated to submit their dissertations in the respective last year of the full-time study.
- Students are motivated to be involved in various grant projects (such as doctoral projects of the Czech Science Foundation) and regular specialized seminars conducted at the Departments.

Creative student activities

Student conferences combined with the best-student-work competition in the field of informatics and information technology have been held annually since 1972. After the separation of FEI BUT into the Faculty of Information Technology and the Faculty of Electrical Engineering and Communication, the student competition is held jointly under the title STUDENT EEICT (Electrical Engineering, Information and Communication Technology). Those organizing the competition on behalf of FIT are Doc. RNDr Jitka Kreslíková, CSc., Ing. David Martinek and Mgr. Sylva Sadovská.

The competition usually culminates in a student conference, which is held at the BUT campus Pod Palackého vrchem towards the end of April. Students of the FIT doctoral, Master's and Bachelor's study programmes defend their work in the following sections: Information Systems, Graphics and Multimedia, Computer Systems, and Intelligent Systems.

Section committees are made up of FIT academics and representatives of industries. When the presentations are completed, each committee selects the best work and suggests the financial reward for the authors. The overall evaluation is not based on only the professional level of the work but also on its attractiveness for the industries and on other students' opinion. If successfully reviewed, the contributions are published in the Conference Proceedings.

FIT library

The library of the Faculty of Information Technology is in the oldest and historically most valuable areas in the north-east part of the Carthusian monastery in Královo Pole, in the former reception hall of the new prosecutor's office from the 18th century, and in the old, 17th-century refectory. The whole library area of 688 m^2 is designed as a large study room with functional zoning for individual study and for group work. Entrance to the library is through a hall with a registration desk, an inquiry desk and a locker room. A free selection of books is available here, arranged thematically according to the classification system of the ACM computer company. Other important parts of the library are: a silent library with reference books and journals, a computer study room, two conference rooms for students, a room for group work, a copy room, and a room with books of fiction. The no-public part of the library includes a spacious book depository with compact bookshelves for 20 000 books. Thanks to these facilities, FIT students and academics as well as other BUT staff can make good use of a first-rate information and study centre, serving also as an interesting and inspirational meeting place.

The library is open 43 hours a week. In the whole of the library, students have WiFi access to the Internet. A total of 100 seats are available, 20 of them equipped with computers and terminals.

The library enables access to over 16000 library items. The library stock contains apart from Czech books and journals also unique foreign literature coming from prestigious publishing houses (Springer, Kluwer, Academic Press, O'Reilly, etc.). The library regularly subscribes to first-class foreign journals. Via the BUT network, library users have access to important specialized databases (ACM Digital Library, IEEE Xplore Digital Library, Science Direct, Safari Tech Books Online, etc.) As part of the library service, an e-learning course (IVIG) is available, which provides students with the basics of information literacy.

Prof. Ing. Tomáš Hruška, CSc.
Vice-Dean, Creative Activities and PhD Studies

Bc. Petra Michálková
Head, FIT BUT Library

II.3 External Relations

In the area of external relations, the activities of the faculty have developed in several partial regions, namely the nearest faculty surroundings, the Czech Republic, and foreign countries.

Activities in the faculty surroundings

The faculty holds an Open House Day every year. It is intended in particular for secondary school pupils and for others interested in the study. It attracts comparatively much interest also on the part of the Brno public because the faculty is situated in beautiful historical monastery buildings. That is why the inner courtyard is permanently open to the public. The majority of FIT students are male students. This is not an ideal situation and therefore, thanks to Prof. Ing. Jan M. Honzík, CSc., a "Summer school for girls", designed for girls from secondary schools, has annually been held since 2007. The faculty is anxious to attract female students. Conferences and social events are organized every year, to which representatives of the local government are invited.

Activities in the Czech Republic

In the Czech Republic, the activities are oriented towards cooperation with academic institutions, industrial partners, state administration and local government. Cooperation with academic institutions involves joint projects, exchange of examiners at State final examinations and mutual participation in scientific and field-of-study boards and committees. Good examples of the cooperation can be seen in the centre for competence (jointly with the Czech Technical University in Prague) and a number of other research projects, inclusive of the Centre for Excellence IT4Innovations project of OP Research and Development for Innovation (together with VŠB-TU Ostrava, Ostrava University in Ostrava, Silesian University in Opava, and the Institute of Geonics AS CR).

In addition to participation in specific projects, the cooperation with state administration and local government focuses on improving the study programmes and graduate profiles and on actually working on contracts. This cooperation is striving and further development is expected in connection with envisaged projects within the framework of EU structural funds and other projects.

Industry board

To further improve the direct cooperation of the faculty with industries, state administration and local government, the Industry board was established at FIT in 2008. Its members include representatives of important local industrial enterprises in the field of IT and important industrial firms with nation-wide operation in technologies, and representatives of important bodies of state administration and local government. The Board's objective is to create a platform for improved communication among institutions. Information on the set-up and activities of the FIT Industry Board can be found at: http://www.fit.vutbr.cz/FIT/PR/.

Activities abroad

As regards FIT activities abroad, they are aimed at cooperation in international projects, with both academic institutions and companies. The projects are mainly within the 7th EU Framework Programme or they are prepared as part of the ARTEMIS or Horizon 20EU initiatives but there are also projects supporting cooperation with the United States or the Russian Federation. Given as good examples of the cooperation can be the IMP-ART project of the 7th EU Framework Programme or ALMARVI from among the ARTEMIS projects.

Teacher and student mobility

As part of the activities abroad, FIT organizes student and teacher exchanges with foreign institutions. Within these exchanges, ca 70 FIT students leave for a one-semester or one-year stay at a foreign university while ca 90 students from foreign institutions come to FIT to study or obtain professional experience. Some 40 FIT teachers teach at foreign universities for a period of one or more weeks and, likewise, foreign teachers come to FIT.

These exchange activities are funded from the ERASMUS EU project and also in the form of direct support from the Ministry of Education, Youth and Sports within the BUT development projects. Teacher and student exchanges are also funded from the faculty budget.

Prominent partners in the Czech Republic with whom the Faculty of Information Technology, BUT, cooperates include:

- ANF Siemens Austria
- ApS Brno
- Artisys Brno
- AutoCont CZ
- AVG Technologies CZ
- BVV (Brno Trade Fairs)
- CAMEA
- CESNET
- Cisco Systems
- Czech Technical University in Prague
- GRISOFT
- ELKO EP
- EGÚ Brno
- EVEKTOR Kunovice
- Faculty of Informatics, Masaryk University, Brno
- St. Anne's University Hospital in Brno
- Honeywell CZ
- IBM CZ
- ICZ

- IDS Scheer CZ
- InterSystems
- INVEA-TECH
- Department of Information and Knowledge Engineering, University of Economics, Prague
- Ministry of Defence of the Czech Republic
- Ministry of the Interior of the Czech Republic
- Faculty of Medicine, Palacký University in Olomouc
- Lingea
- LogicaCMG
- MEDITRONIC
- Microsoft CZ
- Monet+, Zlín
- MP-Soft
- Phonexia
- Faculty of Science, Masaryk University in Brno
- RCK Slavičín
- Red Hat
- Rutronik
- STAVCERT
- UNIS
- Institute of Biophysics, Academy of Sciences of the Czech Republic
- Institute of Information Theory, Academy of Sciences of the Czech Republic, Prague
- VEMA
- 3Dim Laboratory CZ

The Faculty of Information Technology, BUT, cooperates with the following partners abroad:

- Academia Sinica, Taiwan
- AGH University of Science and Technology, Krakow, Poland
- Agnitio, Spain
- Cambridge University, United Kingdom
- Comverse Tel Aviv, Israel
- Department of Mathematics, Faculty of Science, Kyoto Sangyo University, Japan
- Embry Riddle Aeronautical University, Daytona Beach FL, USA
- ESIEE Paris, France
- Fraunhofer Gesellschaft, Institut für Graphische Datenverarbeitung, Darmstadt, Germany
- Gesellschaft für Informatik, Germany
- Harman-Becker, Germany
- IBM Haifa Research Laboratory, Haifa, Israel
- IBM, NY, USA

- IBOK Bratislava, Slovakia
- ICSI Berkeley, CA, USA
- ICT, University of Malta, Msida, Malta
- Infineon, Munich, Germany
- Institut für Informatik, TU Munich, Germany
- Johns Hopkins University, MD, USA
- Lappeenranta University of Technology, Lappeenranta, Finland
- Institute of Mathematics, Slovak Academy of Sciences in Košice, Slovakia
- Microsoft, US, WA, USA
- MIT Lincoln Labs, MA, USA
- Net Technologies, Athens, Greece
- Norwegian University of Science and Technology, Trondheim, Norway
- Nottingham Trent University, United Kingdom
- On Semiconductor, AZ, USA
- ORT Brauge College, Karmiel, Israel
- Rzeszow University of Technology, Poland
- Security Research, Computer Laboratory, University of Cambridge, United Kingdom
- Scapa Technologies Edinburgh, United Kingdom
- Siemens, Germany
- Shmuel Ur Innovations, Israel
- SRI International, CA, USA
- Sungshin Women's University, South Korea
- Stanford University, CA, USA
- STMicroelectronics, Germany
- Technische Universität Wien, Austria
- Texas Instruments, TX, USA
- Universitŕ degli studi di Milano Bicocca, Milan, Italy
- Universitŕ della Svizzera italiana, Lugano, Switzerland
- Université d'Avignon et des Pays de Vaucluse, France
- Université Paris 7 – Denis Diderot/CNRS, Paris, France
- Université Joseph Fourier Grenoble, Grenoble, France
- University of Arizona, Tucson, AZ, USA
- University of Auckland, Auckland, New Zealand
- University of Bristol, Bristol, United Kingdom
- University of Calgary, Canada
- University of Central Florida, Orlando FL, USA
- University of Joensuu, Joensuu, Finland
- University of Oslo, Norway
- University of Passau, Germany

- University of Potsdam, Germany
- University of Pisa, Italy
- University of Surrey, Guildford, United Kingdom
- Uppsala University, Sweden
- University of Valladolid, Spain
- University of York, United Kingdom
- Institute of Informatics, Slovak Academy of Sciences, Slovakia
- VERIMAG, UJF/INPG/CNRS, Grenoble, France

Membership of the faculty staff in international organizations and societies

Faculty academics are members of a number of national and international organization, in particular IGIP, IFIP,ACM, Artemis, IEEE, CSSS, European Biometrics Forum, Gesellschaft für Informatik e.V., BioAPI Consortium, CIS, CSSUG, IAI, ACL, AAAI, Euralex, USENIX, and SAGE.

Prof. Dr. Ing. Pavel Zemčík
Vice-Dean, External Relations

Ing. Michaela Studená
External Relations

II.4 Development, Construction and Premises Allocation

In the years 2002 to 2008, the largest reconstruction and completion of the Carthusian monastery in its modern history took place at a cost of ca CZK 800 mil., initiated by the establishment of the new Faculty of Information Technology, BUT, in 2002. By building the FIT campus, the user requirements and the construction programme were fully implemented. It provided premises and material & technical base for over 2 500 students, the background necessary or both instruction and science, together with complementary services such as accommodation and catering, clubs, exhibition gallery, and a parking lot.

The investment intention was successfully realized almost in all areas, in particular in:

- the faculty construction programme, i.e. ensuring for 2 500 students sufficient space for instruction and the necessary background for departments,
- reconstructing the Carthusian monastery in Královo Pole,
- providing complementary faculty facilities that are not directly connected with instruction but are an important part of the campus (accommodation, catering, clubs, exhibition gallery, parking),
- connecting the two separate areas of faculty premises by a barrier-free communication corridor,
- housing the lighter equipment in the historical buildings while concentrating the heavier technology on new premises,
- building an underground collector to connect technologically the two areas of faculty premises,
- situating the offices of departments, rooms for tuition and seminars, the library, the Dean's Office and accommodation for visiting professors in the historical buildings.

Time-table of preparatory work and construction:

2002	setting up the programme of application and the investment intention
2003-2004	designing, surveying
2004	competitive tendering
2004	October, beginning of construction and reconstruction
2008	completion of construction

Technical data / utility area

total utility area	17 280 m^2
area for teaching	12 323 m^2
complementary services	4 967 m^2

Due to the latest technology used, the faculty premises form one the best equipped BUT facilities.

In 2008, the third stage of the completion and reconstruction of the FIT campus started. The investment plan for the reconstruction of the so-called "little castle" was prepared in compliance with the research plan. The reconstruction proper began in the middle of 2008, with May 2009 as the scheduled term of completion. Also in 2008, preparatory work started on building up the Q grounds reserve in that the volume study was carried out, with the zoning process conducted in April 2009. The building is intended for research activities in the field of security and cooperation with industries.

After difficult negotiations with the European Commission the funding was approved on July 1, 2011, for the "IT4Innovations Centre of Excellence" project of the priority axis "1 OP Research and Development for Innovation", which actually launched the fourth stage of the completion of the FIT campus. The aim was to build a "Research Centre for Information Technology" in the Q grounds reserve. It is a unique project aimed at providing a national centre of excellent research in the area of information technology. The five subjects participating in the project solution include FIT. The construction itself began in December 2011 and was completed in November 2013 at an overall cost of CZK 150 mil. In this way, FIT gained 2 188 m^2 of utility area for research activities and contract research in cooperation with industries. The building has adjustable facilities for research and development, and most advanced technology, which is connected to the supercomputer in Ostrava. On this occasion, the historical cellar space, a first-class piece of national heritage of a total utility area of 522 m^2, was rehabilitated at BUT's expense and with co-funding by the Ministry of Education.

The fourth stage has closed the complex process of building and reconstructing the FIT campus. The historical and modern buildings are connected by a barrier-free passage on the 2nd-floor level. By this step, the building and investment programme has been implemented in both the area of education and the area of science and research.

Ing. Zdeněk Bouša,
Vice-Dean, Strategic and Campus Development

II.5 Academic Senate

The Academic Senate of FIT (AS FIT) is an elected body made up of students and faculty staff, forming the academic community of the faculty. Its activity and competences are regulated by Act 111/1998 Sb. on Higher Education as amended, BUT Statutes, FIT Statutes, and the Rules of Procedure and Electoral Rules of AS FIT. The Academic Senate consists of the Academic Staff Chamber (elected by faculty academics) and the Student Chamber (elected by students of the BSc, MSc, and doctoral study programmes). The term of office of the AS is three years.

Important tasks of the Academic Senate include the election of the Dean, approval of the Vice-Deans, approval of the FIT Disciplinary Board and the FIT Research Board. Another of its tasks is to approve and audit the FIT budget, and this is the responsibility of the Economic Committee of AS, a standing committee elected from among the AS members.

The Legislative Committee of AS FIT is concerned with approving FIT in-house standards and their amendments. These standards have a pronounced influence on the studies, research work and other activities carried out at the faculty. They are, in particular, the Rules of Studies and Examinations, which hold for the whole BUT while each faculty can supplement or amend them by way of Dean's Regulation, which is subject to AS FIT approval. AS FIT also gives comments on changes in the study programmes or on entrance examination rules for bachelor's, master's and doctoral study programmes. It also approves conditions for granting scholarships defined by the Dean's Regulation supplementing the BUT Scholarship Regulations.

AS FIT usually meets once a month. The meetings are public. In addition to approving in-house standards and regulations, AS responds to suggestions by members of the academic community – students and academics. The Chairperson of the Academic Senate is on the Dean's Advisory Board, presents the opinions of the Academic Senate and participates in running the faculty.

The Academic Senate of FIT is the basic element of the autonomous management of the faculty. Through the Academic Senate, the academic freedom and academic rights conferred by law on every university are exercised. The Academic Senate represents the academic community of the faculty at important university, scientific and cultural events.

Prof. Ing. Lukáš Sekanina, PhD
Chairman, AS FIT

II.6 Student Activities

Students at FIT take an active part in the faculty activities. These activities are not limited to the duties given by the respective regulations (e.g. representation in the Senate of AS) or the FIT Statutes. All student activities are carried out under the umbrella of the FIT Student Union.

Members of the Student Union are not only students elected to the Academic Senate but also other students, who would like to share their experience and opinions. It is from among these members that student representatives are delegated to sit on various committees and boards.

The Student Union also organizes lectures on topical themes given by experts for the whole academic community at FIT, and it has also introduced the tradition of student prom balls. It has become a custom for students to participate in events organized by the Dean's Office (such Open House Day) and help present the faculty to the public and potential future students.

Ing. Karel Koranda
Chairman, Student Chamber AS FIT

III. DEPARTMENTS

III.1 Department of Information Systems

The Department of Information Systems is primarily responsible for teaching courses in the MSc study field Information Systems, which embraces such areas as programming, formal languages and compilers, database and information systems, computer networks, formal specifications, internet and distributed applications. The aim is to make students familiar with the theory, technologies and procedures used in the development of information systems, and to teach them to develop such systems while applying advanced development tools and technologies. In addition, the Department also offers a number of basic courses in the BSc programme Information Technology, and in the PhD programme Information Technology, and provides selected course also in other fields of MSc study.

The scientific and research activities of the Department include the areas of database technology, implementation of information systems, management of software projects, theory of formal languages, their processing and compilers. The main areas of interest are the following:

- object modelling, object-oriented database systems, database design,
- acquisition of knowledge from databases,
- formal specification of reactive and real-time systems,
- computer networks and communication protocols,
- implementation of information systems,
- software metrics and management of software projects,
- formal languages and compilers,
- functional systems and type systems.

In the majority of courses, instruction is complemented with projects or laboratory exercises where students acquire hands-on skills and experience of the latest software packages and software projects, and learn the basics of teamwork and project management.

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Trchalík Roman, Mgr.

Assistant Lecturer
Ráb Jaroslav, Ing.
Lampa Petr, Ing.

Technical Staff
Ilčík Ondřej, Ing.
Máčel Lukáš, Ing.
Potěšil Josef, Ing.
Vašíček Libor, Ing.

Research groups at the Department of Information Systems

The research activity of the Department focuses in particular on the areas of formal languages and automata with applications in reverse engineering and HW-SW co-design, and also on knowledge acquisition and data mining. Also in the focus are areas of the specification and verification of networks and embedded or communicating systems and their models. Last but not least, information systems and management in software engineering are also the subject of research in the Department.

Formal Models Research Group

The group was informally set up when FIT was established, based on previous experience of research in the area of formal languages and automata. The group was founded by Prof. Meduna, who had gained considerable experience during his stay in the US and has been leader of the group to date. The main areas of interest are formal grammars and automata and the languages they generate or receive, with a view to the comparative expressive strength of these languages. Members of the group have sufficient knowledge and experience to be able to design and implement the processing of a formal language even on the context level. They are working or they worked on TAČR, GAČR and FP7 EU projects. The design activities of the group are enhanced by foreign contacts (Prof. Mauduit from the Université de la Mediterranee (Aix Marseille II), Prof. Álvarez from the University of Valladolid, and Prof. Sciortino from the University of Palermo).The group has had remarkable success with several monographs on various topics, e.g. Meduna, A., Zemek, P.: Regulated Grammars and Automata, New York, US, Springer, 2014, p. 694, ISBN 978-1-4939-0368-9.

Hardware-Software Co-design Research Group

The group was set up shortly after FIT was established, based on previous experience of research into and development of formal language compilers. The group was founded by Prof. Hruška, who gained much experience of the development of formal language compilers when working on a number of projects. He is still the leader of the group. The group's areas of main interest are languages for the description of architectures and, in particular, research in the area of automatic creation of tools and generation of hardware from the universal description of the target architecture. Members of the group have sufficient knowledge and experience to be able to create, based on the target architecture model, tools for programming and debugging on the target architecture, just like a decompiler. The group is working or worked on TAČR, GAČR and FP7 EU projects. In the research, members of the group draw on their cooperation with commercial subjects.

Information and Database Systems Research Group

The group was set up before FIT was established, based on previous experience of research in the area of database systems. The group was founded by Doc. Jaroslav Zendulka, who is today the leader of the group. The group relies on its members' wide experience of various systems of database control and database systems in general. Since the establishment of FIT the research has been extended to cover knowledge acquisition and data mining in various fields, including, for example, bioinformatics or mining in image and video data, which belong to the group's main areas of interest today. Other areas of interest are huge data processing and semantic web. Members of the group have sufficient knowledge and experience to be able to recognise and obtain the key knowledge from various types of data. The group is working or worked on TAČR, GAČR, MVČR and FP7 projects.

Nes@FIT Research Group

The group was set up at the time of FIT establishment, based on previous experience of research in the area of networks and embedded systems. The group was founded by Prof. Švéda, who had gained the necessary experience in previous places of work and who is still the leader of the group. The main areas of interest of the group are the analysis (also mathematical) and specification of networks and communicating systems, increased reliability and security of the software of embedded systems, wireless communication and sensor networks. Members of the group have sufficient knowledge and experience to be able to analyse network operation, design network protocols with a view to the required properties, configure and specify networks with various properties. The group is working or worked on TAČR, GAČR, MŠMT, and MV ČR projects. In the Czech Republic, the group cooperates with Prof. Jiří Koziorek and Dr. Vilém Srovnal from VŠB-TU Ostrava, abroad with Prof. Andrew Kornecki from the Embry Aeronautical University, FL, US, Prof. Avelin Gonzalez from the University of Central Florida, Orlando, FL, US, and Prof. Jean-Marc Thiriet from the Université Joseph Fourier, Grenoble, France. The group's greatest success can be seen in winning the "best paper" award at the ICONS 2011, ICONS 2010 and ICONS 2008 conferences for papers in the areas of the design and application of computer networks and their protocols, networks of embedded systems, and cybernetic-physical systems.

Equipment

The Department of Information Systems is equipped with computation tools for solving problems in the area of knowledge acquisition and data mining and also in the area of reverse engineering and HW-SW co-design. In addition, it can make use of the most advanced computers in the laboratories of the FIT Computer Centre. The Department has at its disposal specialized hardware from the area of computer networks, which includes:

- Cisco routers of the 2911, 28X1,1841, 2600, and 1700 series
- Catalyst switches 3560, 2960,and 2950
- Net analysers OptiView, EtherScope, BlueScope, LinkRunner, Pro, Spirent, NetTool Pro, FlowMon and various cable testers
- Access points and equipment of VoIP exchanges, inclusive of ports and IP phones.

III.2 Department of Intelligent Systems

The Department of Intelligent Systems guarantees and provides instruction in courses in the following three fields:

The field Security of Information Technology is focused on understanding the principles of the appearance of security risks in information technology, their preventive treatment and their control. Students are made familiar with the basic security principles and grasp the sense of security measures in large information systems. They absorb the principles of solving new procedures leading to the design, installation, operation and maintenance of secure information systems. In obligatory courses they enhance the knowledge they acquired in the bachelor study courses, in particular in the areas of security of information systems, cryptography, data transfer, coding, and biometric systems. Optional courses make it possible for them to concentrate on acquiring more profound theoretical foundations in the area of formal specifications and verification or on more practical aspects such as the creation of embedded systems and hardware, management of software or computer networks and communication.

The field Intelligent Systems is concerned with theories, technologies and procedures used in the development of intelligent systems. Students are taught to develop such systems, using modern tools, methods and technologies. In obligatory courses they extend the knowledge gained in the bachelor study courses, in particular as regards working with inaccurate and incomplete information. Optional courses together with the technical project and the diploma thesis enable students to individually narrow down their specialization to various theoretical and application areas. Graduates in the field are qualified for the research, development and construction of most diverse intelligent systems. Thanks to the good theoretical education and broad universal foundations in this application-oriented field of study the graduates are highly adaptable to meet the requirements encountered in their professional practice, even in other areas of information technology.

The field Mathematical Methods in Information Technology is intended to make students familiar with profound mathematical foundations of information technology and make them understand, apply and further develop advanced technologies based on these foundations. In obligatory courses, students enhance in particular their knowledge of mathematics and theoretical foundations of informatics and learn about their advanced applications in selected areas of information technology. Specifically, these are the area of compilers, methods of automated analysis, verification and testing of the correctness of computer systems, the area of challenging scientific/technical calculations, the area of modelling, simulation and optimization, and the area of the application of the theory of games in support of rational strategic decision-making in conflict situations (e.g. in economy, security, etc.). Optional courses together with the technical project and the diploma thesis enable students to individually narrow down their specialization to various theoretical and application areas. Being equipped with profound theoretical knowledge and being familiar with various ways of applying it, graduates will be able to apply in practice various advanced modern technologies, inclusive of those just being developed, which makes them qualified to work in companies (or company divisions) oriented towards research, development and application of new information technologies with pronounced mathematical foundations. Graduates will also be well prepared for potential doctoral studies.

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Jarošová Dagmar, Mgr.

Research groups at the Department of Intelligent Systems

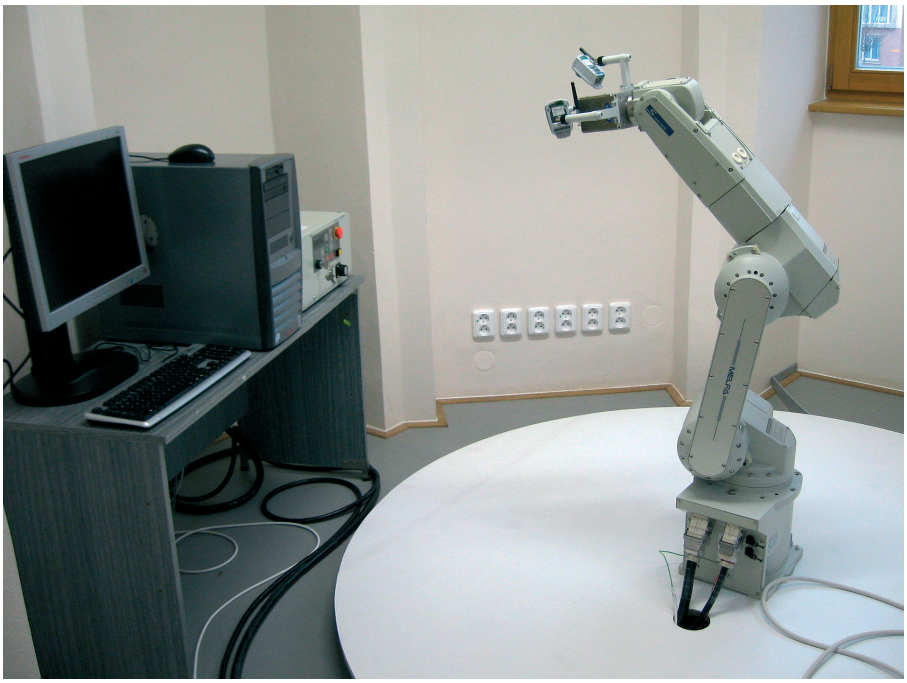
The science and research activity of the Department is primarily focused on problems of the security of intelligent systems (biometric systems, robotics and wireless sensor networks). Other areas of research include interface design, application of parallelism, simulation and prototyping of various configurations. Of much significance is also the research into techniques of automated formal analysis as well as dynamic analysis and testing of both software and hardware.

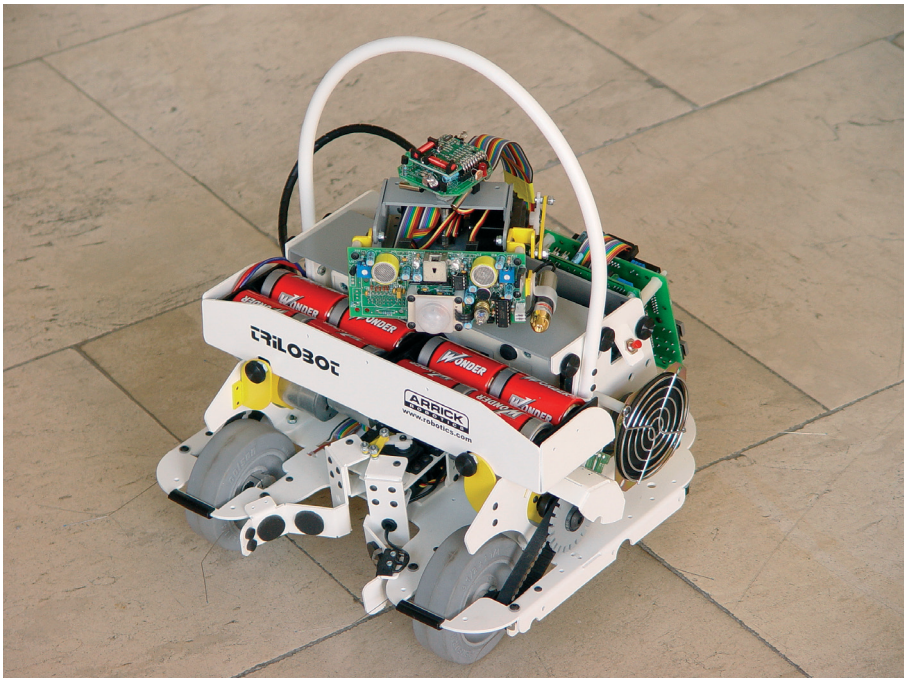
Security Research Group

The group was set up on the basis of previous experience of research into the security of information systems and related areas. The group's main areas of interest include research into the security of information systems, biometric systems and other topics related to security. In the area of biometric authentication the research focuses on determining the quality of fingerprints with the purpose of extending the methodology of testing biometric systems. For example, the effect of skin diseases is investigated, which can influence the recognition of fingerprints. The research also covers the development of new methods and facilities for the 3D hand geometry recognition, and methods of testing the liveness of a biometric carrier (a finger or hand). The group is also engaged in the area of air traffic security (gliders and small aircraft) and cooperates with the Aviation Department of FME BUT. Algorithms for security monitoring camera systems are under development, which are designed for picture stabilization. In the area of the security of information systems work is focused on the security of communication protocols, attacks on side-channels in cryptographic devices, sensor and wireless networks, and research into systems safeguarding privacy in real applications and reputation systems. The group is also concerned with the security of other wireless networks such as the GSM networks.

Automated Analysis and Verification Research Group - VeriFIT

The group for automated analysis and verification (VeriFIT) was founded and is led by Prof. Ing. Tomáš Vojnar, PhD. The group focuses on research into methods of automated formal analysis and verification as well as dynamic analysis and testing of computer systems.




TRILOBOT
WONDER
ARRICK

The group's object of interest is both theoretical research in the above areas and development of prototype verification tools and their testing in appropriate case studies. In the area of formal analysis and verification the group concentrates in particular on static analysis and verification of infinite-state programs (programs with unrestricted dynamic data structures, unlimited parallelism, parameters, etc.), making use of the theory of automata, logics and graphs. In the area of dynamic analysis and testing the group targets in particular errors in the synchronization of parallel programs in Java and C/C++. It is also concerned with formal analysis and verification of hardware. The group participates in a number of Czech and international research projects (GAČR, COST, Kontakt II, Barrande, and various EU projects) and closely cooperates with top-class Czech and foreign workplaces (Uppsala University, LIAFA Paris, VERIMAG Grenoble, Academia Sinica, IBM Haifa, University of Passau, Red Hat, etc.). The group has obtained several prestigious international awards such as the best paper award of the ETAPS'10 Conference Association given by the European Association for Theoretical Computer Science (EATCS) or the best paper award of the ETAPS' 13 Conference Association given by the European Association of Software Science and Technology (EASST).

Intelligent Systems Research Group – IntSys

The groups was formed in the early 1990s by Doc. F. V. Zbořil, who has been its leader to date. The original title NeurNet reflected the group's initial orientation to neural networks alone. The research activity gradually opened up and today it embraces both theoretical and practical problems of intelligent systems. Theoretical research focuses on an area that is referred to as soft-computing, in particular various soft-approaches and their combinations (neural networks, genetic algorithms, fuzzy sets, rough sets, Bayesian networks, and chaos) and problems of multi-agent systems. Application research is aimed at artificial agents (hw/robots and sw/softbots) and their communities, in particular research into the behaviour of individual agents and their groups. In the area of robotics the research concentrates on localization, map generation and travel planning. Agent principles are examined and implemented in wireless sensor network environment. The group's most significant result is the design and implementation of the WSageNt multi-agent platform for wireless sensor networks with the GDEfALLL support tool, which is used in the development of agents in the ALLL language – it enables generating, storing and reading agents and then sending them to wireless sensor networks.

Modelling and Optimization Research Group

The group is engaged in the research into methods and tools for modelling and optimization of systems, inclusive of problems of computer-aided theory of systems and system design using formal models, simulation, analysis, and verification. Attention is centred on heterogeneous systems, control systems, sensor systems, parallel and distributed systems, reflective, learning and adaptive systems, multi-agent systems, optimization techniques, and simulator architectures. Members of the group have had interesting results in the area of theory and application of DEVS and Petri nets of diverse types such as hybrid Petri nets, object-oriented Petri nets, and multi-level models based on reference Petri nets. These results are regularly published and discussed at conferences such as EUROCAST, ICSEA and Petri Nets in Software Engineering. Regarded as significant results of applied research can be the complex model of

electric power market in Central Europe, and the optimizer of production schedules in industrial enterprises. These products have been produced in cooperation with industrial partners EGU Brno, a. s., and UNIS, a. s., and have been deployed in the Czech Republic.

High Performance Computing Research Group

The group was formed in 2002, based on experience of research and cooperation with practice, and has since then been led by Doc. Jiří Kunovský. The main area of interest lies in highly accurate and fast solutions to homogeneous differential equations, ordinary and partial differential equations, stiff systems, extensive systems of algebraic equations, inclusive of real-time simulations. The corresponding implementations are also solved (hardware and software – as a follow-up to MATLAB). The principal research topics are the creation of dynamic mathematical models from fundamental principles, programming of parallel systems and selection of numerical integration methods ensuring high accuracy and stability of numerical calculation. The group cooperates with a number of Czech and foreign societies and university institutions – University of Auckland (Prof. J. Butcher),University of Pelloponese (Prof. T. Simos), ETH Zurich (Prof. R. Jeltsch), University of Geneva (Prof. Hairer), Imperial College of London (Prof. J. Cash), University of Glamorgan (Prof. K. Al-Begain), Applied Dynamics International (J. Baynham), Rapid Data Ltd. (B. Havranek), University of Roma (Prof. Maceri), University of Vienna (Prof. Breitenecker, Prof. Kozek), University of Michigan (Prof. Howe), and University of Lyngby (Prof. Thompsen).

Security Technology Research and Development Group (STRaDe)

The group came into existence in 2006. Today it is led by Doc. Martin Drahanský. The group's main areas of interest are biometric systems (for example, fingerprints, life detectors, 3D face and thermal face images, 2D/3D hand geometry, eye properties), military and police camera systems, robotic and sensor systems. The group can boast of close cooperation with industrial enterprises and applicability of its results, while individual members of the group are involved in software, hardware and firmware aspects of projects.

Equipment

The Department of Intelligent Systems has two laboratories. One of them is the laboratory of biometric systems. It is equipped with the following: automated optical microscope Olympus BX61, electron microscope Phenom G2 Pure, non-mydriatic fundus camera Canon CR-1for taking pictures of retina, thermal camera AGA thermovision 110, signal analyser Rohde & Schwarz FSQ8, thermal camera FLIR ThermaCAM E300, face recognition device A4Vision, enrolling station ES2.2, A4Vision facereader FR3.3, Multimodal Biometric Terminal and Face 302, computer for FRA4Vision Advantech FRc-3.26276, dactyloscopy devices, liveness rate tester, system for hand geometry recognition Handkey II IR Recognition System, tablet for signature recognition Tablet Wacom Intuos3 A3 Wide DTP, vein recognition device Hitachi Finger VEIN BIOMETRIC SCANNER, palm vein sensor PalmSecure Fujitsu, iris recognition device Authenticam BM-ET100US, Iribio iris mouse and OKI IrisPass-M (EQ5016) Qritek, fingerprint sensors Bergdata FCAT 100, BioLink UM MB3.5, BMF EZF 650, Identix Biotouch 500, LES650 USB Scanner, Lumidigm Venus, Touchless Biometric Systems, Multimedia terminals S900,

PlusID 60, PlusID 75, PlusID 90, Sagem MSO 300, Secugem HFDU02A, Suprema SFM3000-FL, Suprema SFM3010-FC, Suprema SFM3050-TC1, Suprema SFR 3000, Suprema SFR300-S, TST Biometrics BiRD3, Veridicom 5th Sense PRL, Waldso Fingerprint Lock L2000, and ZK Evaluation Board v. 1.0.

The other laboratory is the laboratory of robots. It is equipped with the following: eleven Trilobot robots, two Robosapien robots, one Lynxmotion robot, two Surveyor robots and a Surveyor wifi stereo-camera, robotic toy car Trueno, two quadcopters based on the Arduino platform, two Kinect sensors, two Asus Xtion Pro sensors, two Raspberry Pi boards including a camera module, ten Logitech web cameras, diverse sensors and detectors (pressure sensors, CO+LPG gas detector, photo-resistors, temperature sensors). A separate laboratory workplace is equipped with a Mitshubishi Melfa RV-6SL robotic arm with a Schunk PG70 jaw gripper and a camera system with six Axis cameras.

III.3 Department of Computer Graphics and Multimedia

The Department of Computer Graphics and Multimedia offers courses in the Master's study programme Computer Graphics and Multimedia, which covers the principles of computer graphics and multimedia, processing of speech signals, man/computer communication interfaces, image and sound processing and compression, application interfaces for programming computer graphics and multimedia, and fundamentals of application areas. The Department also provides instruction in the courses Signals and Systems, Basics of Computer Graphics, Design of User Interfaces, and Classification and Recognition in the Bachelor's study programme Information Technology, the course Computer Graphics in other Master's study programmes, and several courses (primarily Classification and Recognition) in the doctoral study programme.

The Department participates in EU framework programmes of research support, appearing as partner in over fifteen projects within the 4th – 7th framework programmes. Obtaining several projects from the ARTEMIS initiative of the 7th framework programme is another important achievement. The Department is currently preparing a number of projects for the new EC programme Horizon 2020. It has also been successful in projects supported by the US government. The Department was and is supported by the US. The Department is currently preparing a number of projects for the new EC programme Horizon 2020. It has also been successful in projects supported by the US government. The Department was and is supported by the US Air Force Research Laboratory, European Office of Aerospace Research & Development (EOARD), DARPA agency, and the IARPA initiative.

The Department also coordinates or participates in several important projects supported within the Czech Republic (GAČR, FRVŠ, MŠMT, MPO, Ministry of the Interior, GA AV ČR) and is supported by industrial enterprises. A number of spin-off companies were established at the Department such as Camea, 3DimLaboratory, Phoenixia, and Replaywell.

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Andrla Petr, Ing.
Chalupníček Kamil, Ing.
Prustoměrský Milan, Ing.
Žižka Josef, Ing.

Research groups at the Department of Computer Graphics and Multimedia

Research activities of the department are primarily focused on general computer graphics algorithms and imaging algorithms, processing and recognition of speech signals, animation and 3D visualization, modern methods of man-computer interaction, image and signal processing, processing and visualization of medical data, and on dynamic models and control systems for aviation.

Speech Processing Research Group – Speech@FIT

The Speech@FIT research group was formed in 1997 at the Faculty of Electrical Engineering and Communication, BUT, and it joined the Department of Computer Graphics and Multimedia in January 2002, when the Faculty of Information Technology was established. Prof. Hynek Heřmanský is the consultant of the group, Doc. Jan Černocký is in charge of the group activities, and Dr. Lukáš Burget is the research coordinator. The group mainly specializes in speaker and language identification, language recognition and keyword detection. The successes scored by the group include the best phoneme recognizer in the world, and outstanding placing in the NIST (US National Institute of Standards and Technology) evaluation in the area of language and speaker recognition. The group is also known for its work in the area of extracting speech markers and in the area of acoustic modelling for speech recognition with a large vocabulary (markers based on neural networks, discriminative training and transformation). Members of the Speech@FIT research group are regularly invited to attend prestigious events such as Johns Hopkins University summer research workshops. The Speech@FIT research group is also engaged in the development of open-source software. Its STK toolkit, PHNREC phoneme recognizer and TNet for training neural networks are used in many leading laboratories. The group participates in the development of a new-generation toolkit of speech processing KALDI http://kaldi.sourceforge.net/ and has organized a number of international specialized events.

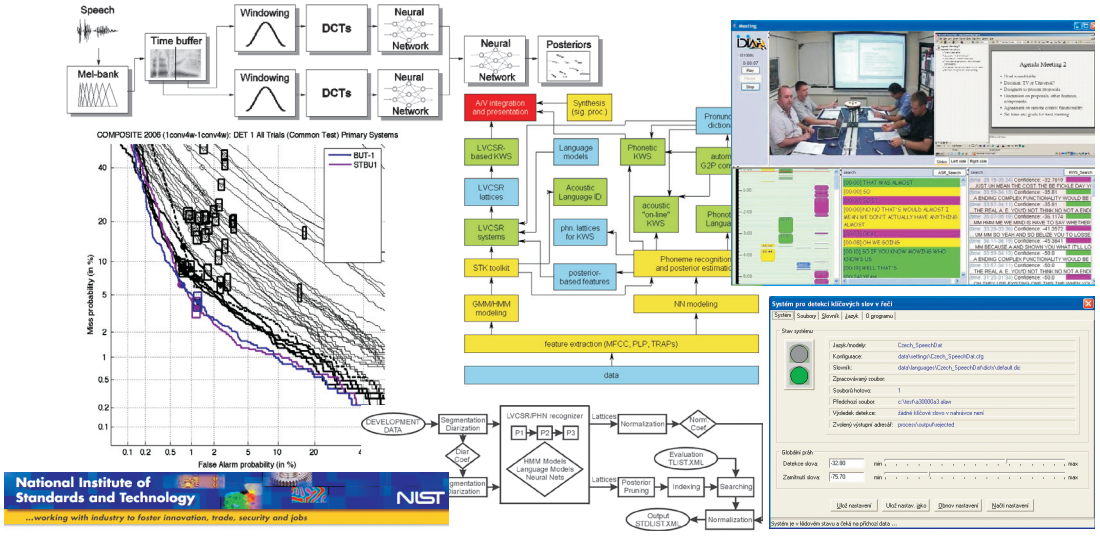
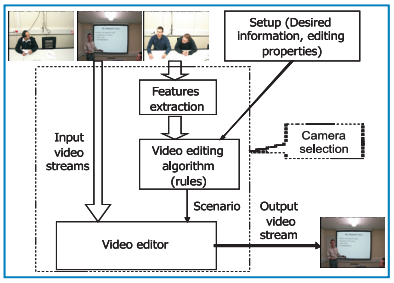
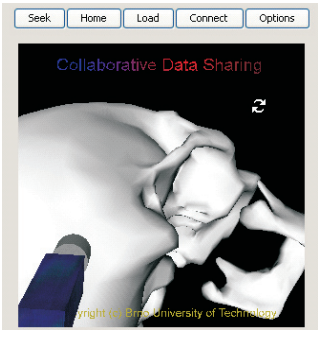
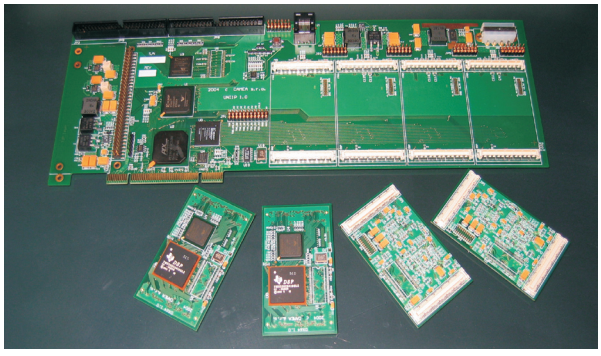


Image and Video Processing Research Group – Graph@FIT

The group was formed in 1996 at the former Department of Informatics and Computer Science, FEI, which later came to be the nucleus of the Faculty of Information Technology, BUT. The initiative to form the group came from Prof. Pavel Zemčík, who is currently a Vice-Dean of FIT. The group is currently lead by Doc. Adam Herout, deputy head of the department, a man of vast experience of publishing and with international contacts. The group's main areas of interest are 3D graphics such as realistic scene visualization, precise shadows, methods for scene modelling, processing of images and video-sequences, with focus on object detection in images and video, synchronization and summarization of video-sequences, and methods of "augmented reality". The group further devotes attention to specialized research areas such as "markers in images", images with high dynamic resolution, and also application and acceleration of methods in hardware. The group participates in a number of national and international research projects, and cooperates on international level with institutions in the United Kingdom, France, Finland, etc. Members of the group have sufficient knowledge to be able to design and build complex, high-performance and reliable systems for computer graphics and for image and video processing.







Robotics Research Group – Robo@FIT (jointly with Department of Intelligent Systems)

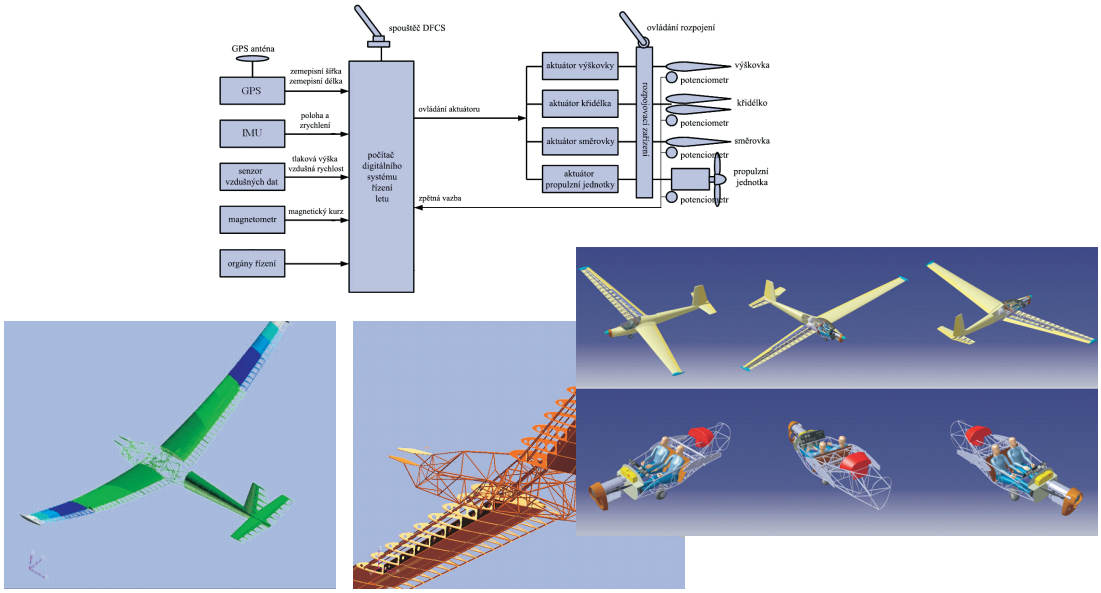
The group was formed in 2013 by interlinking selected research activities of the Department of Intelligent Systems and the Department of Computer Graphics and Multimedia. The leader of the group is Dr. Filip Orság (DIS) and his deputy is Dr. Vítězslav Beran (DCGM). Research consultants include in the first place Doc. Frantisek V. Zbořil (DIS) and Prof. Pavel Zemčík (DCGM). The group has successfully participated in solving European robotic projects (R3-COP, SRS). The Robotics Research group at FIT focuses on the development of advanced methods of autonomous intelligent systems and mobile platforms, sensory data processing and fusion, design of dynamic 3D environment models, intelligent decision-making and mission planning, administration of knowledge, multi-agent systems and advanced interaction of man with robotic systems.

Knowledge Technology Research Group – Knot@fit

In spite of being one of the youngest groups at DCGM FIT, the group for natural language processing has succeeded in starting cooperation with foremost foreign teams and participating in international research. The main areas of interest are information extraction from texts, machine learning in the area of language processing, knowledge discovery from biomedical materials, uncertain information in ontologies, and machine translation. The group is led by Doc. RNDr. Pavel Smrž, PhD, who was responsible for the KiWi and the WeKnowIt projects, worked in the W3C group Uncertainty Reasoning for the World Wide Web Incubator Group, is the Czech representative on the ISO/TC37/SC 3 and 4 international committees (sub-committees Systems for the management of terminology, knowledge and content, and Management of language sources) and evaluator of European projects in the ICT, FERT, Erasmus Mundus, and ESF programmes.

Flight Control and Simulation Research Group – Aeroworks

The aim of the concerted activity is to find innovative solutions for the purpose of actively enhancing the security of air operations in general aviation. Specific areas of the group's interest are the design of automatic/assisted flight control systems and precision modelling of the dynamics of aircraft in flight. Emphasis is placed on the implementation of new security elements that integrate the protection of flight envelope and incorporate new approaches into the process of automatic flight control. The research and development activity is oriented such that it supports the improvement of useful and operational properties of aircraft and the reduction of ecological burden by way of optimizing the flight operations. The group is led by Ing. Peter Chudý, PhD, MBa. The group cooperates closely with the representative of Czech aircraft industry - the company Evektor in Kunovice.



Equipment

The department is equipped with computation tools for large-scale scientific calculations and employs, among others, the Blade centre with over 2400 processor cores, and in peak operation another 120 computers of the FIT Computer Centre. It has at its disposal over 200 TB of disk space for processing large quantities of speech, image and multimedia data. The special HW and SW of the department include:

- 3D Minolta VIVID 800 scanner for automatic scanning of the shape of objects of 1 x 1 x 1 m in size, with the computer operated by a turntable for handling the objects being scanned. The scanner is connected to a Silicon Graphics Octane workstation.
- CAMEA DX6 board with DSP TI C 6711and FPGA Virtex E-300 for accelerating graphics calculations.
- CAMEA UNI1-P-VUT board (2x) with DSP TI C6416 (2 x 4) and FPGA Virtex II-500 for accelerating the processing of scanned image.
- Facility for recording meetings, equipped with a HDTV video-camera, hyperbolic mirror (for 360° shots), four microphones, and high-quality sound card.
- "Stereo" data/video projection facility and a pair of large-area LCD displays for demonstration purposes.
- Z310 rapid prototyping machine (3D printer) (made by the Z-corporation) for the production of 3D models of human tissue based on data from medical diagnostics imaging devices (CT/MR).

- Prototype facility for 3D printing by digital printing technology.
- Speech and text databases (since 2004, the faculty has been a member of the Linguistic Data Consortium).
- PR2 robot – complex robot for personal robotics application, equipped with two arms and jaw grippers and a set of sensors.
- Mobile robotic platforms (terrestrial and aerial) for in-door and out-door application (PatrolBot, Pioneer 3-AT, AscTec Pelican).
- Set of modern sensory devices (Velodyne HD Lidar HDL-32E, Hokuyo, IMU+GPS 3DM-GX3-45-USB-SK1, and the like).
- SimStar simulator of small sports aircraft.
- Multimedia laboratory for the study of user interfaces in aviation (Boeing 737 cabin).

III.4 Department of Computer Systems

The Department of Computer Systems provides instruction in courses of Master's study fields Computer and Embedded Systems, and Bioinformatics and Biocomputing.

In the field Computer and Embedded Systems students are made familiar with theoretical aspects of behaviour description, methodology of behaviour modelling, design, design verification, and testing of computer systems; they learn the principles of synthesis and analysis of basic functional computer units and digital devices. They are also made acquainted with the construction and working of large computer systems, with emphasis on multi-processor, reconfigurable and distributed systems. They will come to understand formal specifications and their application in the design of embedded systems, they will be able to apply advanced techniques and algorithms for rapid design and implementation of typical applications.

In the field Bioinformatics and Biocomputing, students will learn about advanced algorithms for the processing, analysis and presentation of biological data coming in particular from the areas of genomics and proteomics. Students will learn, on the one hand, how to apply these algorithms to the solution of specific problems in practice and, on the other hand, to create new effective algorithms. They will be made familiar with databases of biological data that are in standard use. They will be able to apply the knowledge obtained by the study of biological systems to the design and implementation of novel computer systems inspired by biological processes. The department also provides instruction in a number of fundamental courses in the bachelor's study programme Information Technology.

The research activity of the department comprises the architecture of hardware and software tools of embedded systems, reconfigurable systems, adaptive systems, diagnostics and testing of digital systems, and biology-inspired computing systems. The department's main areas of interest are:

- application-specific architectures (high-performance embedded systems, on-chip multi-processor systems, prediction and debugging of the performance of parallel applications),
- FPGA-based reconfigurable architectures (with applications in the area of gigabit networks, bioinformatics),
- biology-inspired hardware,
- applied evolutionary algorithms,
- utilization of polymorphic gate in digital technology,
- diagnostics, testability of digital systems, fault-tolerant systems.

In the majority of courses, instruction is complemented with projects or laboratory exercises, in which students acquire practical skills in and experience of the latest software products and hardware tools (workstations, multiprocessor systems, workstation bundles, RT OS, FPGA design systems, computer peripherals). In highly demanding projects, IBM BladeServer clusters are made use of.

Staff

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Kotásek Zdeněk, Doc. Ing., CSc.

Deputy Head of Department

Sekanina Lukáš, Prof. Ing., PhD

Secretary

Gaďorková Marie, Ing.

Professor

Dvořák Václav, Prof. Dr.Sc.
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Associate Professor

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Kotásek Zdeněk, Doc. Ing., CSc.
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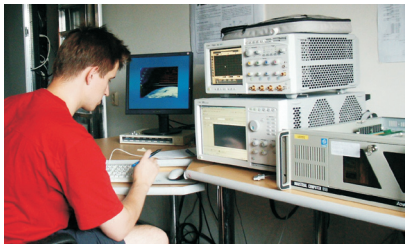
Assistant

Šimek Václav, Ing.

Technical Staff

Voženílek Jan, Ing.



Research groups at the Department of Computer Systems

The research activity of the department covers the architecture of hardware and software tools of embedded systems, reconfigurable systems, adaptive systems, diagnostics and testing of digital systems and biology-inspired computing systems. The department's main areas of interest are: application-specific architectures (high-performance embedded systems, on-chip multiprocessor systems, prediction and debugging of the performance of parallel applications), FPGA-based reconfigurable architectures (with applications in the area of gigabit networks, bioinformatics), biology-inspired hardware, applied evolutionary algorithms, diagnostics, testability of digital systems, fault-tolerant systems.

Computer Architecture Research Group – CA@FIT

The group was formed in 2002 based on the previous experience of research into computer architectures. The group was founded and is led today by Prof. Václav Dvořák, a respected man of science with many years' practice and rich publication activities. The group is interested in all aspects of the architecture of present-day computer and digital systems, inclusive of theory, design, implementation, power requirement, and performance prediction. The main areas of interest of the group are architectures of contemporary processors, massively parallel accelerators, and application-specific systems including the design of high-performance applications with low communication overheads. The group is working on the BrainWave project (SoMoPro, application of supercomputer systems in neurosurgery), on the COST CZ project "Unconventional design techniques for digital circuits with own reconfiguration", and partially on the IT4Innovations project. The group cooperates with the PRACE international agency (allocations on supercomputer systems within Europe), the Australian National University, and with University College London. The greatest success scored by the group was gaining the SoMoPro project, the COST LD14055 national project, and participation in the international COST ICI208 Action.

Diagnostics Research Group

The group was founded in 2000 by Doc. Zdenek Kotásek, who is currently the group leader and has for long been involved in this field. The group's main areas of interest are: design of fault-tolerant systems and their implementation in FPGA, verification of failure resistance and creating a platform for these purposes, means of injecting failures into FPGA, methods for accelerating function verification, application potentials of outputs of function verification tools for the purposes of testing the failure resistance of electronic and electro-mechanical systems, reliability of OS-controlled embeddable critical systems. Members of the group regularly contribute papers to foreign publications such as IEEE Symposium on Design and Diagnostics of Electronic Circuits and Systems (DDECS) or at the Euromicro Conference on Digital System Design (DSD) and in foreign journals such as 'Microprocessors and Microsystems' or 'Computing and Informatics'.

Applied Evolutionary Algorithms Research Group

The group was formed in 2004 on the basis of previous experience of research into evolutionary algorithms using probabilistic models (EDA).The group was founded by Doc. Schwarz. The

group's main areas of interest are: standard and advanced genetic algorithms, EDA evolutionary algorithms and their application to the design of collective communications, acceleration of particle swarm operation (PSO) techniques and differential evolution (DE) techniques on graphic cards and supercomputers, and DE applications in water-supply-and-distribution optimization. A new topic is the application of cupola theory in EDA algorithms and the design of unsolicited mail filtering. The most outstanding success was the publishing of a paper dealing with the acceleration of genetic algorithm on GPU graphic cards at the EvoStar 2010 conference in Spain, with 61 international citations.

Evolvable Hardware Research Group

The group, which was founded and is currently lead by Prof. Lukáš Sekanina, is engaged in research into biology-inspired computation methods and their applications in the area of the design of computer systems. The topics involved include, in particular, evolutionary circuit design, adaptive hardware based on field programmable gate arrays (FPGA), approximate computation, Cartesian genetic programming, and cellular computation systems. International cooperation leading to joint publications and student exchanges has been established with the University of Oslo, University of York, the Centre of Industrial Electronics, and Universidad Politécnica de Madrid. On the national level, the group cooperates with the Faculty of Informatics of Masaryk University and the Faculty of Information Technology of ČVUT Prague. The most significant successes of the group include two silver medals awarded in the competition Human competitive awards in genetic and evolutionary computation (Humies) in 2008 and2011, and the best paper award at the NASA/ESA AHS conference in 2013.

Accelerated Network Technologies Research Group – ANT@FIT

The group was formed in 2009 on the basis of the just developing cooperation with the CESNET association and successive formation of a team of researchers with experience of hardware acceleration and security of computer networks. The group was founded by Dr. Jan Kořenek, who had led for a long time the hardware development group within the Liberouter project, is the founder of the successful spin-off company INVEA-TECH, and has much experience of solving a number of European and national projects. The group is primarily concerned with the monitoring and security of computer networks. It focuses not only on the detection of security incidents but also on the acceleration of time-critical operations necessary in processing network data for constantly growing capacities of network lines. To accelerate the processing of network traffic, acceleration cards with FPGA technology are employed, together with platforms containing on a single chip, in addition to the FPGA logic, also powerful processor cores. The group participates in the NetFPGA project running at Stanford University, took part in the development of one of the first 100 Gb acceleration cards, and cooperates, in the form of contractual research, with a number of commercial subjects. Members of the group are regularly appreciated for their work.

Accelerated Network Technologies Research Group in the area of bioinformatics

The group was formed in 2009 under the leadership of Dr. Tomáš Martínek. The group's main area of interest embraces the design of algorithms for analysis of biological data, in particular sequences of DNA or proteins. In the area of DNA sequences analysis the group focuses on

the detection of specific secondary structures such as palindromes, tandem repeats, triplexes or quadruplexes. Selected algorithms with emphasis on fast data processing or interactive searching of databases are subsequently accelerated using the FPGA technology. The most significant outputs of the group include the best paper award at the FCCM conference and two papers in Bioinformatics, a journal with high impact factor.

Equipment

Being heavily oriented towards the hardware area, the Department of Computer Systems has at its disposal a whole range of instrumentation and computational tools that are made use of in research or development activities and also find appropriate application in instruction. For challenging computations in the area of evolutionary methods, parallel algorithms or hardware simulation, workstation bundles and IBM BladeServer clusters can be employed within the FIT Computer Centre. The special hardware in the department includes:

- Modular server with up to four high-performance GPU cards deployed (e.g. GTX580), with access by members of the group as well as students as part of instruction or research.
- Acceleration card with 100GbE interface, PCI Express gen.3 x16interface, SRAM and DRAM memories and high-performance FPGA Virtex-7 of GT series.
- Experimental servers (5 pcs) provided with acceleration cards NetFPGA and COMBO, high-performance FPGA chips, QDR SRAM memory, PCI Express interface, and 10-Gbit ports.
- Special hardware tester for verifying the properties of network devices, which enables packet communication to be generated at full 10 Gb/s bitrate.
- Set of a four-channel digital oscilloscope Agilent Infiniium DSO90254 2.5 GHz and a logic analyser Agilent 16823 (102 channels) with digital signal generator (48 channels), which can be interconnected in the case of more complex measurements.
- Programmable power system Agilent N6702B, with the possibility of deploying up to four high-acccuracy power modules that can be interconnected and configured.
- Agilent Serial Protocol Tester XC for PCI Express bus (4x), which in addition to analysis also enables communication to be generated as required.
- Tabor WW2074 arbitrary analog signal generator with four independent channels and remote control via the Ethernet interface.
- High-accuracy Agilent 34410A digital multimeter, 6 ˝ digit, for the measurement of diverse circuit quantities, LX1 interface, probes for components with fine pitch leads.
- BeeProg2 universal programmer of integrated circuits (such as microcontrollers, FLASH memories, etc.) with support of a wide range of components and 4 pcs ASIX Presto programmer with support of currently used types of microcontroller.
- Workplace for prototyping printed circuit boards, inclusive of computer-controlled LPKF ProtoMat S-62 cutter, LPKF Mini Contac RS plating systems, and LPKF Multipress S for multilayer printed circuit boards.

- Workplace for printed circuit boards comprising equipment for soldering paste feeding, semiautomatic Essemtec Expert FP station with optical system for QFN or BGA circuits, SMD-207 reflow furnace, and Pace MBT 301 E-SD soldering station.
- 20 pcs workplace for embedded systems with a kit for HC08 and Coldfire V1 microcontrollers, CyclonePro debugging interface, ML506 board with FPGA Virtex-5, kit with DM6446 DSP processor, signal generator and four-channel digital oscilloscope.
- Approximately 200 pcs teaching FITkit, and 560 pcs of its innovated version designated Minerva (finished in 2013) for the support of technically oriented courses and work on BP or DP projects at FIT.

III.5 Research Centre for Information Technology

The research Centre for Information Technology forms part of the **IT4Innovations Centre of Excellence**, a unique project the aim of which is to build a national centre of excellent research in the area of information technologies. The Faculty of Information Technology, BUT, participates in this project along with the principal applicant, VŠB-TU Ostrava and other partners, namely the Ostrava University in Ostrava, the Silesian University in Opava, and the Institute of Geonics, AS CR.

FIT participates in the solution of the project by way of leading two research programmes – Recognition and Presentation of Information from Multimedia Data, and Secure and Reliable Architectures, Networks and Protocols. The main objective of FIT in solving the project is to foster cooperation with industries.

Staff

Head of Department

Hruška Tomáš, Prof. Ing., CSc.

Researcher

Hruška Tomáš, Prof. Ing., CSc.

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Přikryl Zdeněk, Ing., PhD
Chavez Plascencia Alfredo, Ing., PhD

Research Plan

Poledňová Pavla

Project Manager

Buriánková Iveta, Ing.
Kavková Michaela, Mgr.

Technical Staff

Ondráček Tomáš, Ing., PhD
StarkaTomáš, Ing.

Research groups at the Research Centre for Information Technology

The Recognition and Presentation of Information from Multimedia Data Research Group (VP7)

The group, working within the framework of the research programme, was formed in 2012 with the aim of participating in the **IT4Innovations Centre of Excellence** project. The group is led by Prof. Dr. Ing. Pavel Zemčík. The group is involved in systematic examination of the processing of multimedia data with a view to their properties on the level of signals produced

by diverse sensors. The emphasis is in the first place on the analysis of image, video and speech, knowledge acquisition from documents and multimedia data, imaging, visualization and modelling, inclusive of modelling human tissues, acceleration in special hardware, and techniques of semantic web, formal languages and grammars. The programme is focused on new procedures and knowledge in the above areas, which will not only help improve the parameters of existing applications but should also enable the creation of quite new applications that could not be realized up to now for both technical and economic reasons. Information about up-to-date results with the portfolio of the research programme is currently updated on IT4I web pages.

The Secure and Reliable Architectures, Networks and Protocols Research Group (VP8)

The group, working within the framework of the research programme, was formed in 2012 with the aim of participating in the **IT4Innovations Centre of Excellence** project. The group is led by Prof. Ing. Lukáš Sekanina, PhD, The group focuses on the reliability and increased security of information technologies. From the viewpoint of security and reliability, research into information technologies currently covers a wide spectrum of problems, from solving purely mathematical problems (e.g. in cryptographic algorithms or in formal verification) to applied research (e.g. authentication) making use of knowledge from a whole range of areas of science (e.g. biomedicine). New methods and approaches are being examined and developed to provide security of computer systems against attacker, timely detection and identification of attacker, elimination of threats, etc., and to provide reliable computer systems that have minimum faults and are capable of reconfiguring and correcting themselves. The above research and applications involve not only software but also hardware, for which it is necessary to ensure resistance to attacks, security and reliability. This concerns, for example, special embedded systems and their networks which are in wireless communication with the surroundings and which too must be secured against intentional or unintentional abuse. Information about up-to-date results with the portfolio of the research programme is currently updated on IT4I web pages.

Equipment

As part of the project, a high-performance supercomputer will be purchased, which should be put into operation in 2014 and should rank among 100 most powerful computers in the world. This supercomputer will be situated in Ostrava.

A new building was built for the Research Centre for Information Technology, FIT, with adjustable workrooms for researchers and developers, with computer facilities matching the goals set and with connection to the supercomputer in Ostrava. This building is connected to the present infrastructure of the faculty and was completed in March 2014.

III.6 Computer Centre

The Computer Centre is an autonomous part of the Faculty of Information Technology. It guarantees the operation of the network and computer node, computer laboratories, fixed and wireless computer networks, phone VoIP networks, information systems, network printers, audio and video technologies, and computers and other computing facilities of the faculty. The computer laboratories of the Computer Centre serve as universal computer laboratories for all faculty departments, being used for both scheduled teaching and for working on projects, diploma theses and research tasks. In addition to the scheduled teaching hours, FIT students have access to all the laboratories all days, inclusive weekends.

Staff

Head of the Centre
Lampa Petr, Ing.

Deputy Head of the Centre
Čejka Rudolf, Ing.

Computer Centre Operation
Dupalová Helena

System Integrator
Gaďorek Petr, Ing.

Information System Administrator
Michal Bohumil, Ing.

Computer Network Administrator
Lampa Petr, Ing.

OS Administrators
Čejka Rudolf, Ing.
Kašpárek Tomáš, Ing.

A-V Facilities Administrator
Skokanová Jana, Mgr.

Technical Staff

Computer technology:	Kreslík František, Ing.
A-V facilities:	Juříček Zdeněk, Sr.
Technical problems:	Halas Jaromír
	Kreslík Martin
	Vrška Luděk

Computer Centre service: Habrdová Stella
Nečasová Milena
Pagová Ywetta
Samsonová Radomíra

Equipment

Since the completion and reconstruction of the faculty premises in Božetěchova Street in the summer of 2006, the Computer Centre has occupied the new buildings L, M, N, and O. A new network node, servers and the necessary support facilities, i.e. laboratory of servers, stores and a workshop, are placed in the basement of the building L while offices and further laboratory and service rooms are on its ground floor. Computer pavilions M, N and O, with a central entrance and reception desk are designed for students. Each pavilion has been planned for 120 workstations, the overall capacity is 300 seats (one floor is taken up by the cloakroom).

The new network node in the building L has been built with a view to further development and expected increased computing capacity. The room with the node is cooled from a central redundant cooling source and is backed up from a redundant stand-by source of up to 150 kW, and for the case of long-term power failure a 261 kW local supply generator is available. The network node forms the backbone of the gigabit computer network of the faculty and it is also an important node of the metropolitan BUT gigabit network. Concentrated in the network node are all the optic fibre cables from the distribution centres of individual buildings on the faculty premises as well as the optic fibre cables of the metropolitan BUT network.

A total of eighteen 19'' cabinets have been prepared for the installation of servers. Each cabinet contains a distributed KVM switch, a patch panel of structured cabling with 24 Cat6 ports and up to 6 separately fused 230V/16A sockets, five of them connected to the stand-by source and the supply generator. The servers are mostly connected to the backbone switch via a 1 Gb/s link. The critical servers are provided with redundant sources and RAID-5/6 disk arrays, which are fault-tolerant in case one or two disks fail. In addition, the server files are regularly backed-up (incrementally every day) on tape libraries, namely Oracle StorageTek SL150 LTO-5 with a capacity of 225 TB (450 TB with compression) and Overland NEO 4200 LTO-3 with a capacity of 48 TB (96 TB with compression).

The computer network of FIT has been built on the 1/10 Gb/s Ethernet technology, with switching on the 3rd-layer level. The central element of the whole network is the fully redundant modular switch Extreme Networks Black Diamond 8810 with 10 modules with a total of 240 ports of 1 Gb/s and 56 ports of 10 Gb/s. The faculty computer network is linked to the metropolitan network and to the national network CESNET2 for science and research at a bit rate of 10 Gb/s. The distribution centres in the buildings are connected via 10 Gb/s links or by redundant optical links two times 1 Gb/s. Further redundancy level in the network is provided by a stand-by switch/router, which is mainly used for VoIP telephony but in the case of the failure of the main switch it provides the connection of critical servers through the VRRP and MSTP protocols.

Teaching and research laboratories

- Laboratories with PCs, 64-bit Windows 7/Linux systems (180 workstations)
- Three non-scheduled computer laboratories (60 workstations)

Special instrumentation and computers

- Five IBM BladeCenter servers, each with 60 modules HS22 with 26/12 core processors Intel Xeon 2.33 and 2.93 GHz, 12 and 36 GB RAM and 146 GB disks. The modules are linked through internal gigabit switches, each with the capacity of a full-scale server with 10 GbE uplink connection to the backbone.
- Three Dell M1000e blade servers, each with 40 modules M620 with 28/16 core processors Intel Xeon 2.6 GHz, 64 GB RAM and 300 GB disks.
- Two HP DL785 G5 research servers, 4 core processors AMD Opteron 2.3 GHz, 128 GB RAM, 143 GB disk.
- Twenty-four SuperMicro research servers, with two 6/12 core processors Intel Xeon 2.3 GHz, 32 to 128 GB RAM, and a disk capacity of 1 to 8 TB.
- Sixteen SuperMicro research servers with 4/8-core processors Intel Xeon 2.5 GHz, 24 to 48 GB RAM, and a disk capacity of 1 to 2 TB.
- Six SuperMicro file servers with RAID-5/6 disk arrays with a total capacity of 150 TB for storing and processing speech signals.
- Eight SuperMicro video-servers with RAID-5/6 disk arrays with a total capacity of 145 TB.
- Twenty-two faculty servers (web, e-mail, FTP, News, file servers, authentication servers).
- Overland NEO 4200 back-up tape library with two LTO-3 drives, with a capacity of 96 TB.
- A3 HP LaserJet 8150, A4 HP LaserJet 4350 network printers and Xerox Phaser 6300 colour printers

Software

- Microsoft operating systems and application software within the Campus 3 licence.
- Sun Grid Engine for solving jobs on clusters.
- Database server and Oracle 9i/10i developer kit (within Oracle's academic programme).
- Microsoft Visual Studio and Microsoft Project development environments within the MSDN Academic Alliance licence.
- Caché post-relational database system (a gift from the InterSystems Corporation as part of the "Caché Campus Program".
- Object-oriented CASE Paradigm Plus system by Computer Associates.
- OrCAD Caddence Design System.
- Mentor Graphics ModelSim design system for FPGA and ASIC
- Adobe Photoshop, Acrobat Distiller and Premiere, Autodesk 3D studio, Caligari True Space.
- GNU open software, Mozilla, TeX, Linux, FreeBSD, MySQL, Apache, PhP5, etc.

IV.

Conclusion

Following the expansive development launched in 2002, the Faculty of Information Technology is today, ten years later, in a very good shape both from the viewpoint of students' interest and achievements and from the viewpoint of personnel quality and technical facilities. Thanks to the direct financial support by the Ministry of Education, Youth and Sport and by BUT, the faculty is in a very good position also as regards the quality and number of buildings at its disposal.

The main goals for the coming period consist in maintaining and improving the quality of teaching and research, developing the capacities for cooperation with industries and, last but not least, remaining attractive to potential students because good students are the main interest of the faculty and a key precondition for faculty activities and development.

Doc. Ing. Jaroslav Zendulka, CSc.
Dean

Prof. Dr. Ing. Pavel Zemčík
Vice-Dean, External Relations