



INFORMATION TECHNOLOGIES

TABLE OF CONTENTS

AUSTRIAN ACADEMY OF SCIENCES / INSTITUTE FOR INTEGRATED SENSOR SYSTEMS (AT)	60
BUT SPEECH @ FIT (CZ)	60
CENTRE FOR BIOMEDICAL IMAGE ANALYSIS (CZ)	60
CURE CENTER FOR USABILITY RESEARCH AND ENGINEERING (AT)	60
FORSCHUNGSZENTRUM TELEKOMMUNIKATION WIEN GMBH / FTW (AT)	60
GRAPHICS AND VIDEO GROUP: GRAPH@FIT (CZ)	60
HARDWARE-SOFTWARE CO-DESIGN RESEARCH GROUP: LISSOM@FIT (CZ)	60
LABORATORY OF SEARCHING AND DIALOGUE (CZ)	60
NATURAL LANGUAGE PROCESSING RESEARCH GROUP (CZ)	60
SBA RESEARCH GMBH (AT)	60
SZÉCHENYI ISTVÁN UNIVERSITY / FACULTY OF ENGINEERING SCIENCES/ JEDLIK ÁNYOS INSTITUTE OF IT, ELECTRICAL AND MECHANICAL ENGINEERING / DEPARTMENT OF MATHEMATICS AND COMPUTATIONAL SCIENCES (HU)	60
UNIVERSITY OF WEST HUNGARY / FACULTY OF GEOINFORMATICS (HU)	60
VEREIN SOFTNET AUSTRIA (AT)	60
VRVIS CENTER FOR VIRTUAL REALITY AND VISUALIZATION RESEARCH, LTD (AT)	60





INSTITUTE FOR INTEGRATED SENSOR SYSTEMS

RESEARCH GROUP CONTACT

Austrian Academy of Sciences
Viktor-Kaplan-Straße 2
[www.iiss.oeaw.ac.at]

HEAD

THILO SAUTER

PHONE

026222342010-0

E-MAIL

[THILO.SAUTER@OEAW.AC.AT]

DEVISION MANAGER SECURITY & INTEGRABLE NETWORKS

ALBERT TREYTL

E-MAIL

[ALBERT.TREYTL@OEAW.AC.AT]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

MEMS sensors, Resonant and thermal sensors, circuit design, ASIC and FPGA design, sensor networks, clock synchronization, industrial automation, automation networks, security, smart systems.

EXCELLENCE

Integrated (MEMS) sensors for multiple application areas ranging from environmental and medical to automotive and industrial applications. High-accuracy synchronization of distributed processes in real-time networks.

MISSION

The objective of the Institute for Integrated Sensor Systems (IISS) is to investigate concepts and methodologies for smart sensors, their design, interconnection, and application.

Integration is understood as a combination of functional (mechanisms to combine various sensor principles in order to improve accuracy, measurement range, or robustness, but also increase fault tolerance), system (in terms of connecting sensors to higher-level systems), and circuit integration aspects (with respect to miniaturization of the sensor or the components relevant for signal processing). To that end, the institute combines in a multidisciplinary way expertise in the fields of sensor technology, microelectronics, embedded systems, and communication technology. Adequate modeling plays a central role in the analysis and design of sensor systems; methods employed range from the analytical models to extensive numerical analyses.

Research focuses on system design aspects. The objective is to devise transducers, controller and signal processing structures as well as networking solutions optimized for system integration. Specifically interesting are power-aware, robust, networked sensor systems based on active measurement principles exhibiting a high dynamic range. Application fields for such sensor

systems are not confined and may comprise industrial, automotive, environmental, and medical devices.

Co-operation with external partners is of high significance in the definition and implementation of research projects. The institute collaborates with research institutes (both university and non-university) and industrial partners alike. Concrete projects cover problems from automation, medical technology, or test and measurement technology.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

- Thermal sensors
- Resonant sensors
- MEMS sensors
- Material characterization
- Integrated circuit design
- System integration
- Clock synchronization
- Industrial real-time networks
- Sensor networks
- Security for sensor systems and automation systems
- Vertical integration
- Multiphysics and holistic system modelling

MAIN CAPABILITIES

Basic research approach on integrated sensor systems and their applications

- Multidisciplinary research
- Experts from electrical engineering, computer science, physics, integrate circuit design and MEMS technology
- Holistic analysis and design of integrated sensor systems

Specific expertise

- World-leading precision in distributed clock synchronization (sub-ns in Ethernet)
- World-leading localization accuracy in wireless networks (below 10 cm in WLAN)
- Leading experience in security architectures for distributed automation and smart grids

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).

- Ultra-low-power miniaturized thermal flow sensors
- Ultra-sensitive miniaturized MEMS vibration and displacement sensors
- Novel characterization method for thermal parameters of liquids
- Thermal characterization of thin film materials
- Modelling expertise using analytic, computernumeric and FEM methods

FIELDS OF RESEARCH RESULTS

APPLICATION

- Medical devices
- Material science
- Measuring instruments
- Automation devices
- Automotive devices
- Environmental monitoring
- Sensorics

ALUMNI PROFILE

Advanced scientific skills, typically PhD level

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

13/13

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

15/15

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

The institute is equipped with state-of-the-art measurement equipment. This equipment, such as climate chambers, high-end oscilloscopes, test and measurement equipment can be used in cooperation projects.

BUDGET

TOTAL: 2 mil. EUR

PART OF THE TOTAL BUDGET COMING FROM PRIVATE RESOURCES (%): 50 %

PART OF THE TOTAL BUDGET COMING FROM FOREIGN RESOURCES (%): 40 %

MAIN PROJECTS

- **2010–2013:** Distribution Line Carrier: Verification, Integration and Test of PLC Technologies and IP Communication for Utilities (DLC+VIT4IP, EU FP7)
- **2008–2011:** Flexible Wireless Automation in Real-Time Environments (flexWARE, EU FP7)
- **2007–2010:** Embedded Position Determination and Security in Wireless Fidelity Networks (e-WiFi, FFG)
- **2006–2010:** System Capable Flow Sensors (FWF)
- **2006–2009:** Implantable Middle-Ear Microphone (FFG)
- **2011–2012:** Advanced Ethernet for Time-Aware Syntoncity (Ætas, FFG)
- **2005–2008:** Plant Automation Based on Distributed System based Product Oriented Manufacturing Systems for Re-Configurable Enterprises (PABADIS/PROMISE, EU FP6)

ACHIEVEMENTS

- The Institute for Integrated Sensor Systems investigated the principles for infrastructure-based localization of mobile sensors in wireless networks and demonstrated the highest localization precision worldwide under the central premise for practical usability that the mobile devices must not be modified.
- World-leading clock synchronization of distributed systems in the sub-nanosecond range facilitating packet oriented communication networks
- Patented MEMS magnetometer featuring the simultaneous measurement of

two components of the field vector and measurement range of 9 orders of magnitude

- Ultra-low-power calorimetric flow sensor featuring measurement range of 5 orders of magnitude
- Patented manufacturing technology for capacitive MEMS devices yielding ultra-high capacitance

MAIN COLLABORATING PARTNERS

COLLABORATIONS WITH ACADEMIC PARTNERS

Among multiple others

- Technical University of Vienna, Vienna, Austria
- Johannes Kepler University, Linz, Austria
- Technical University of Dresden, Dresden, Germany
- University of Lancaster, Vienna, Lancaster, UK
- Technical University of Sofia, Sofia, Bulgaria
- University of Maribor, Maribor, Slovenia
- CERN, Geneva, Switzerland

COLLABORATIONS WITH COMPANIES

We actually cooperate with more than 20 companies from all over Europe in various projects including SMEs and large industry. Confidentiality and care in public relation activities are very important issues for us and we therefore do not give a list of cooperation partners here.

EXPECTATIONS

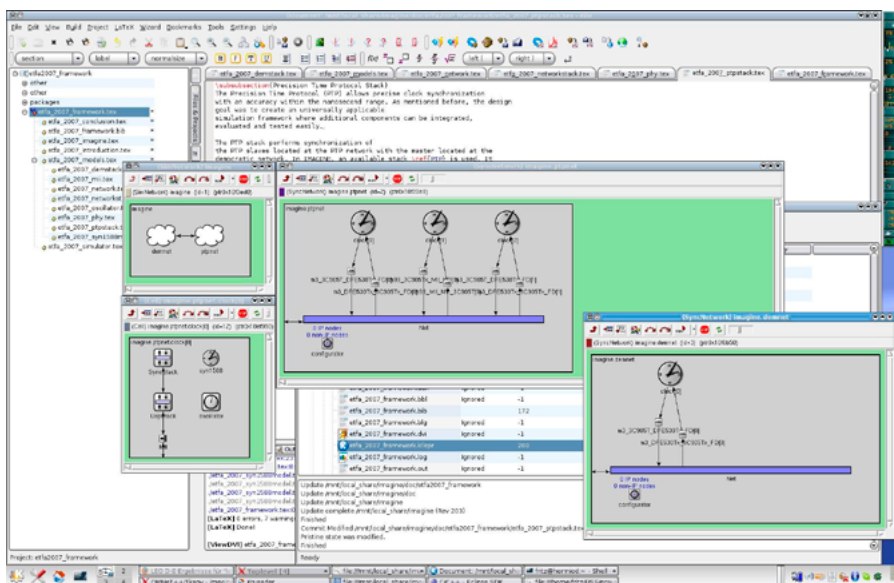
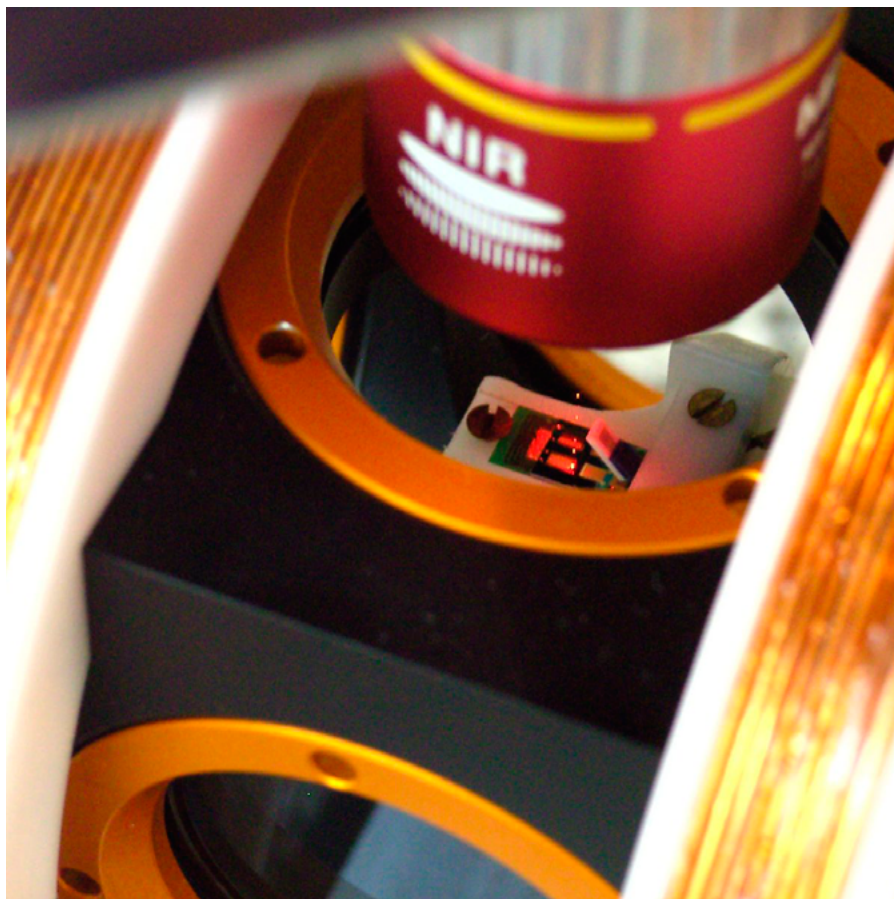
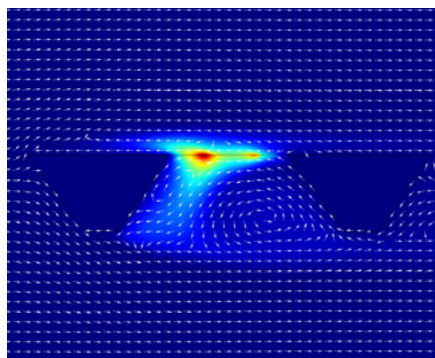
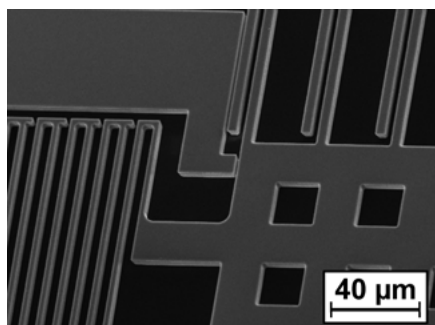
REQUIREMENTS

Our mission is to integrate sensor systems using an holistic approach. As a research institute also majorly dedicated to basic research we are open to many application areas. Past projects have been in medical, automotive and industrial applications. To achieve this holistic approach our partners

are always closely integrated in the project to allow smooth transition from research to innovation at the partner companies.

OFFERS

- Partnership in national and international projects
- Contracted research in the above areas
- Consulting
- Licensing of patents



09/2011



BUT SPEECH @ FIT

/ DEPARTMENT OF COMPUTER GRAPHICS AND MULTIMEDIA
/ FACULTY OF INFORMATION TECHNOLOGY / BRNO UNIVERSITY OF TECHNOLOGY

RESEARCH GROUP CONTACT

Božetěchova 2, 612 66 Brno,
Czech Republic
[speech.fit.vutbr.cz/en]

HEAD

ASSOC. PROF. JAN ČERNOCKÝ

PHONE

+420 541 141 284

E-MAIL

[CERNOCKY@FIT.VUTBR.CZ]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

Speech Processing – speaker and language identification, speech recognition and keyword spotting

EXCELLENCE

- Speaker and language identification, speech recognition, and keyword spotting
- The best phone recognition system in the world
- Feature extraction and acoustic modelling for LVCSR (posterior features, discriminative training and transforms)

MISSION

We aim to strengthen our position in the European Research Area and establish a Centre of Excellence in speech and language research at our Faculty. We wish to ensure professional development of our research staff, providing the means to the mobility of researchers and Ph.D. students. We plan to spread our excellence by organizing international workshops and conferences. We shall increase the technology transfer activities and strengthen our position in current and future EU funded projects. Management of our group will also focus on improving our relationship with our current and future industrial partners.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

- Robust speaker verification technology, including fast scoring
- Robust language recognition technology
- Large vocabulary continuous speech recognition (LVCSR) systems for several languages
- Keyword spotting (both acoustic and based on word/subword speech recognition)
- Indexing and search engine for spoken documents
- Lecture browser with speech indexing and search, available at <http://www.superlectures.com>
- Resources for speech processing (design, collection and validation of speech corpora)

MAIN CAPABILITIES

Cutting edge research, development and testing of advanced algorithms for speech recognition. The accent is on robust techniques for speech, speaker and language recognition. The group extensively investigates data-driven techniques and use of artificial neural networks for speech recognition. From the application point of view, BUT Speech@FIT is known to be close to the users (mainly from the security and defence community), and tailors its technologies to their needs. The group is also known for its open-source software development.

ACHIEVEMENTS

- Excellent results in NIST Language Recognition Evaluation 2005, 2007 and NIST Speaker Recognition Evaluation 2006, 2008 and 2010
- BUT Speech@FIT researchers are regularly invited to prestigious events, such as JHU summer workshops (already three times; Lukas Burget was the leader of JHU2008's group on speaker verification)

FIELDS OF RESEARCH RESULTS APPLICATION

- Security and defence (analysis of massive amounts of speech recording, speech analytics)
- Call-centres (seeking for individuals and keywords of interest)
- Consumer applications (dictation, personal memories, IP telephony)
- Academic and commercial research (speech recognition tools and toolkits)

ALUMNI PROFILE

Graduates of the group have an overall knowledge of state of the art in speech technologies and are specialized in one or more areas including:

- Speaker recognition
- Language recognition
- Speech transcription, keyword spotting and spoken term detection
- Machine learning (statistical models and neural networks for speech processing)
- Software development and graphical user interfaces

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).

Thanks to participation in international conferences and research workshops, graduates are familiar with and often have strong personal relations with the world's leading academic and industrial laboratories in our field.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

8

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

8

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- Computer Systems with more than 500 CPUs including 3 IBM-Blade centres, all running Linux
- File servers with total capacity of more than 20 Terabytes
- Speech and language databases
- Audio equipment

BUDGET

TOTAL (MIL. CZK/ MIL. EUR)

13/0.52

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

20

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%)

60

MAIN PROJECTS

2009–2013: Lingea-BUT (project FR-TI1/034 – MPO financed by the Ministry of Trade and Industry of the Czech Republic)

2008–2010: MOBIO - Mobile Biometry (EU FP7 IST – 214324)

2007–2010: Overcoming the language barrier complicating investigation into financing terrorism and serious financial crimes (project VD 20072010B16 financed by the Ministry of Interior of the Czech Republic)

2006–2010: DIRAC - Detection and Identification of Rare Audio-visual Cues (EU FP6 IST – 027787)

2006–2009: AMIDA – Augmented Multi-party Interaction with Distance Access (EU-FP6-IST – 033812)

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Johns Hopkins University (Baltimore, MD, US)
- Oregon Graduate Institute (Portland, US)
- McGill University, Department of ECE (Montreal, CA)
- Saarland University (DE)
- Politecnico di Torino (IT)
- Universidad de Zaragoza (ES)
- Bogazici University (TR)
- Indian Institute of Technology Madras, Department of Electrical Engineering (Chennai, IN)
- Technical University of Liberec, Speech Lab (Liberec, CZ)
- University of West Bohemia, Department of Cybernetics (Plzeň, CZ)

COLLABORATION WITH COMPANIES

- Agnitio (ES, ZA)
- CRIM – Centre de Recherche Informatique de Montreal (CA)
- Microsoft Research (Redmond, WA, US)
- Go-Vivace Inc. (Virginia, US)
- SVOX Deutschland GmbH (Münich, DE)
- IDIAP, Research Institute (Martigny, CH)
- Loquendo S.p.A., a Telecom Italia Group Company (Torino, IT)
- Lingea, s.r.o. (Brno, CZ)
- Phonexia s.r.o. (Brno, CZ)
- OptimSys, s.r.o. (Olomouc, CZ)

EXPECTATIONS

REQUIREMENTS

- Obtaining corporate sponsorship of core research

OFFERS

- Joint participation in EU and US-funded projects
- Custom-based research and development
- Licences of production-grade software



04/2011

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).



CENTRE FOR BIOMEDICAL IMAGE ANALYSIS

/ FACULTY OF INFORMATICS / MASARYK UNIVERSITY

RESEARCH GROUP CONTACT

Botanická 68a, 602 00 Brno,
Czech Republic
[<http://cbia.fi.muni.cz/>]

HEAD

ASSOC. PROF. MICHAL KOZUBEK

PHONE

+420 549 494 023

E-MAIL

[KOZUBEK@FI.MUNI.CZ]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

We focus our research and also clinical applications on 2D as well as 3D analysis of fluorescence-stained cells and/or their components observed using optical microscopy. The main aim is to contribute to the understanding of the chromatin organisation in human cell nuclei. Clinical applications are aimed at the study of mechanisms of induction, diagnostics and prevention of deleterious human diseases. We have also studied the function-structure relationship for human genome.

EXCELLENCE

IT Automation of Biomedical Image Acquisition and Analysis using Optical Microscopy

MISSION

To help researchers whose goal is to study the structure and function of cells and their components by providing suitable image acquisition and image analysis tools.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

- Automated acquisition of multi-dimensional image data
- Automated analysis of multi-dimensional image data
- Image segmentation and object reconstruction
- Image registration
- Correction of aberrations and artifacts in light microscopy
- Multiple view imaging using micro-axial tomography
- Optical flow in live cell imaging
- Applications in molecular/cell biology

MAIN CAPABILITIES

We have developed a special experimental equipment and software in the field of optical microscopy – automated image cytometer. We have know-how in all aspects of digital image acquisition and digital image analysis (and also teach related courses). Hence, we can offer services to academic

institutions as well as companies in this area. We are specialized in applied research and we can practise it over a wide spectrum of IT and software products. They can be used for molecular biology, biophysics, biochemistry and many other applications.

FIELDS OF RESEARCH RESULTS APPLICATION

- Research in Life-Science
- Biomedicine
- Biotechnology
- Microscopy

ALUMNI PROFILE

The student gains a comprehensive overview in the field of acquisition and processing of image information starting with simple image modifications using point transforms or linear filters and ending up with sophisticated tools such as mathematical morphology or deformable models. Graduates are able to design and coordinate development of software systems for image information processing in research (e.g., research in molecular biology using microscopy imaging techniques), in medicine (e.g., ultrasound imaging, magnetic resonance, CT) as well as in industry (e.g., fingerprint or retina recognition, processing records of security or traffic cameras).

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

7

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

15

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

Automated optical microscopy equipment (so-called high-resolution cytometry instruments)

BUDGET

TOTAL (MIL. CZK/ MIL. EUR)

10 / 0.40

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

5

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%)

0

MAIN PROJECTS

2006–2011: „Determination of markers, screening and early diagnostics of cancer diseases using highly automated processing of multidimensional biomedical images“ Grant No. 2B06052, Ministry of Education, Youth and Sports)

2005–2010: „Chromosome dynamics and structure during the cell cycle“ (Grant No. LC535, Ministry of Education, Youth and Sports)

2004–2006: „High-resolution cytometry of living cells“ (Grant No. 202/04/0907, Czech Science Foundation)

ACHIEVEMENTS

2008: Launch of our own freely available (GNU GPL licence) image acquisition and analysis package Acquarium (being developed and improved up to now)

2005: 1st place in the national round of the Best of Biotech competition for the best business plan in the field of innovative research in biotechnologies with the project of “High-resolution cytometer”

2001: Czech Patent No. 288693: “Way of the determination of cell properties using the method of high-resolution cytometry and equipment for its realization”

1999: Prize of the Czech Minister of Education TALENT 1998 for work in the field of fluorescence microscopy and promoting interdisciplinary research

1998 – now: Over 50 research papers in journals with an impact factor and over 500 citations (excluding self-citations) to them according to the Web of Science database

MAIN COLLABORATING PARTNERS**COLLABORATION WITH ACADEMIC PARTNERS**

- Institute of Biophysics AS CR (Brno, CZ)
- Faculty of Science, Masaryk University (Brno, CZ)
- Faculty of Medicine, Masaryk University (Brno, CZ)
- Faculty of Information Technology, University of Technology (Brno, CZ)
- Czech University of Technology (Prague, CZ)
- University of Heidelberg (DE)
- University of Uppsala (SE)
- University Hospital (Brno, CZ)

COLLABORATION WITH COMPANIES

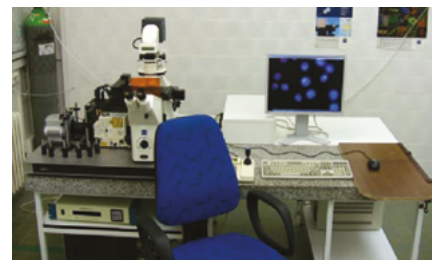
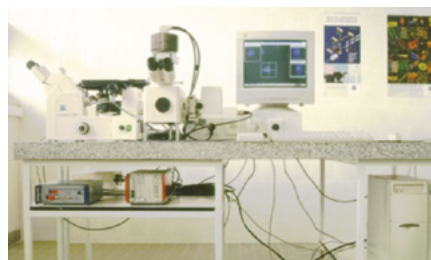
- Camea (Brno, CZ)

EXPECTATIONS**REQUIREMENTS**

We are looking for cooperation with research institutions as well as companies in the field.

OFFERS

We offer know-how in the areas of digital image acquisition and processing in optical microscopy.



04/2011

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).



CURE CENTER FOR USABILITY RESEARCH AND ENGINEERING

RESEARCH GROUP CONTACT

1110 Vienna,
Modecenterstraße 17/2
[www.cure.at]

HEAD

LARS ELLEN SOHN

PHONE

1/7435451-204

E-MAIL

[ELLEN SOHN@CURE.AT]

HEAD

UNIV. PROF. DR. MANFRED TSCHELIGI

E-MAIL

[TSCHELIGI@CURE.AT]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

Human-Computer Interaction (HCI), User Experience Research, User Interface Design, User-Centred Design, Usability Engineering, and Next Generation Interfaces

EXCELLENCE

Human-Computer Interaction Research

MISSION

CURE works in the intriguing field of user-centred design and human-computer interaction. The goal is to align computer technologies to the needs of people in the most suitable way. CURE applies and introduces a wide range of methodologies to analyse and design for the right usability and the optimal user experience (UX) to embrace the users' social, emotional and ergonomic requirements.

CURE's aim is not only to perform basic research, but also to transfer emerging human-computer interaction approaches into specific applications together with partners [applied research]. CURE has been successfully active as project partner and coordinator in more than 300 projects on a national and international level [e.g. FP5/6/7 & AAL Joint Programme]. By cooperating with industry, small and medium-sized companies and research partners, CURE is always on the leading edge of the latest developments and trends, and thus it contributes to the finding of innovative solutions in various application fields.

DEVELOPED TECHNOLOGIES

CURE's work touches peoples' lives at many different places and in many different situations where technology is involved: in the home, in the form of smart home and assistive technologies, on the go, in the form of mobile services and smart phones, and online, in the form of online communities and services. In the coming years, technology promises to further enhance people's lives in a number of ways, for instance

by keeping us healthy (e-health), by including people in the information society (e-inclusion, accessibility, technologies for elderly) and by helping to keep our planet green and alive (design for sustainability). These areas and goals require a sensitive handling of humanity, human values (e.g. our need for privacy and security) and people's dignity. To include and respect all these basic needs and to benefit from the advantages of these technologies at the same time, CURE includes user perspectives ranging from early idea-finding to design, prototyping, and field and lab studies [iterative development and evaluation].

MAIN CAPABILITIES

CURE specialises in the utilisation and development of user experience engineering and user-centred design methods, the study of user experience and its influencing factors, and research of diverse contextual situations as well as the methodological transfer of the attained knowledge into alternative interface design approaches.

FIELDS OF RESEARCH RESULTS APPLICATION

- Ambient Assisted Living
- Mobility & Transport
- Online Communities
- Social Interfaces
- Future Interaction Qualities (Persuasive Interfaces)
- Privacy & Trust
- Accessibility
- e-Inclusion
- e-Health
- Elderly & User Acceptance
- Intelligent Homes & Smart Environments

ALUMNI PROFILE

CURE comprises a highly interdisciplinary team with diverse skills, assembled from a variety of disciplines such as computer science, psychology, media design, sociology, anthropology, didactics, communication science and management science.

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF/POSITIONS (FTE/HC): 8/8

JUNIOR RESEARCH STAFF/POSITIONS, INCL. PH.D. STUDENTS (FTE/HC): 17/22

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- Tobii X60 Eyetracker (EyeTracker) with Tobii Studio 2.3 (Software)
- SMI iView X HED System (mobile EyeTracker)
- Noldus Spectacles Cam
- FlexComp Infiniti Biometrical Measurement (biophysiological measurement)

BUDGET

TOTAL: 2 500 000 EUR

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%): 0 %

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%): 30 %

MAIN PROJECTS

- **2010-2013 (36 months):** uTRUSTit – Usable Trust in the Internet of Things (Coordinator: CURE), Project Number: 258360, Funding Source: European Commission - FP7
- **2010-2013 (36 months):** AIR – Advanced Interface Research (Coordinator: CURE), Project Number: 825345, Funding Source: FFG, Land Salzburg, ZIT
- **2010-2012 (24 months):** C2G – Consumer2Grid, Project Number: 825551, Funding Source: Klimafonds, FFG

- **2010-2012 (24 months):** MARIA – Mobile Assistance for Barrier-Free Public, Transport for Elderly, Migrants, and Illiterates, Project Number: 825228, Funding Source: BMVIT, FFG

- **2007 - 2010 (36 months):** HERMES – Cognitive Care and Guidance for Active Ageing (Coordinator: CURE), Project Number: 216709, Funding Source: European Commission - FP7

ACHIEVEMENTS

RECENT ARTICLES IN SCIENTIFIC JOURNALS:

- Johann Schrammel, Elke Mattheiss, Susen Döbelt, Lucas Paletta, Alexander Almer and Manfred Tscheligi, "Attentional Behavior of Users on the Move towards Pervasive Advertising Media", in: Pervasive Advertising, 2011
- S. Deutsch, G. Begolli, M. Lugmayr, and M. Tscheligi, "Assisted Collection and Organization for Laddering Interview Data," CHI 2011, 2011.
- M. Bechinie, M. Murtiniger, M. Tscheligi, "Social Social Dimensions of the User Experience Consulting Business. 12 social skills user experience consultants should train to be successful in large IT projects", in: User Experience magazine of the UPA, 2010
- S. Döbelt, J. Schrammel, Ö. Subasi, and M. Tscheligi, "Applying the Implicit Association Test for the Evaluation of Persuasive Technology - Implicitly Measuring Attitudes and Attitude Changes," in Proc. Poster Proceedings Persuasive 2010, 2010
- J. Schrammel, E. Ganglbauer, and M. Tscheligi, "Get up, move on! Using Electromyography to Explore the Relationship of Experience and Motion," in Proc. CHI 2010 Workshop on Brain, Body and Bytes: Psychophysiological User Interaction, 2010

MAIN COLLABORATING PARTNERS

COLLABORATIONS WITH ACADEMIC PARTNERS

- Eidgenössische Technische Hochschule (ETH) Zürich, Switzerland
- Trinity College Dublin, Republic of Ireland
- Technische Universität Chemnitz, Germany
- Technische Universität Dresden, Germany
- Johann Wolfgang Goethe-Universität, Frankfurt a.M, Germany
- Università Degli Studi di Milano, Italy
- Katholieke Universiteit Leuven, Belgium
- Tilburg University, The Netherlands
- Universidad de Malaga, Spain
- Mazarykova Univerzita Brno, Czech Republic
- Austrian Institute of Technology, Vienna, Austria
- Technische Universität Wien, Vienna, Austria
- FH Joanneum Research, Graz, Austria
- FH Hagenberg, Hagenberg, Austria

COLLABORATIONS WITH COMPANIES

INTERNATIONAL

- Athens University of Economics and Business, Greece
- Communication Interactiva, Spain
- Compaq AG, Ireland
- CRL Central Research Laboratories Ltd., United Kingdom
- CTBTO Preparatory Commission
- DAEDALUS - Data, Decisions and Languages, S.A., Spain
- DEBITEL d.d. Ljubljana, Slovenia
- Deutsche Industrie- und Handelskammer, Germany
- DFS Deutsche Flugsicherung, Germany
- Digital Equipment, UK
- E-One S.A., Greece
- European Dynamics, Greece
- EPO European Patent Office, Germany
- Ericsson Radio Systems, Sweden
- Fraunhofer-IAO, Germany

- Frequentis Network Systems GmbH, Germany
- Gazebo Computers Ltd, United Kingdom
- IBM Entwicklung GmbH, Germany
- IBM, Israel
- IDEC Industrial Development & Education Center, Greece
- IDEO Product Development, UK
- Human factors Research Group (HFRG), Ireland
- HUSAT, UK
- ICL Invia Oyi Technology, Finland
- KULRD, Kath. Universiteit Leuven R & D, Belgium
- Lloyds Register, UK
- MCG Multimedia Communications Group, UK
- Mediargus, Belgium
- Medical Network EMN AG, Switzerland
- MERU Research, Netherlands
- MyNews S.L., Spain
- Nokia Research Center, Finland
- Pixelpark Deutschland, Germany
- PRO-ECO d.o.o. [Ltd], Slovenia
- Radio DJ, Greece
- Radio Hit, Slovenia
- RDI Consultants Ltd, United Kingdom
- SAP AG, Germany
- Serco Usability Services, UK
- SINTEF Unimed Rehab, Norway
- Steganos GmbH (former: Demcom GmbH), Germany
- STET Hellas Telecommunications S.A., Greece
- Technische Universität München, Klinikum rechts der Isar, Germany
- T-Systems Nova GmbH Berkorn, Germany
- Ubicall Communications Europe, Belgium
- University Medical Centre Utrecht, Belgium
- UPM Technical University of Madrid, Spain
- Uminho Universidade do Minho, Portugal
- ZDF Zweites Deutsches Fernsehen, Germany
- Austrian Airlines
- bwin Interactive Entertainment AG
- BMF – Bundesministerium für Finanzen
- Cap Gemini Ernst & Young
- Casinos Austria AG
- Compaq AG
- COPA-DATA GmbH
- Erste Bank der österr. Sparkassen AG
- Ericsson Austria GmbH
- Europay Austria Zahlungsverkehrssysteme GmbH
- Frequentis Nachrichtentechnik GesmbH
- Gebrüder Weiss
- Gemeinde Perchtoldsdorf
- Generali Bank Aktiengesellschaft
- Generali Versicherung AG
- Geodata Ziviltechniker GmbH
- Global Equity Partners
- Hauptverband der österr. Sozialversicherungsträger
- Herold Business Data AG
- International Atomic Energy Association Austria
- Kammer für Arbeiter und Ang. für Wien
- Kapsch AG
- Kleine Zeitung
- Land-, forst- und wasserwirtschaftliches Rechenzentrum GmbH
- Magistrat der Stadt Wien
- Medienhaus & Partner
- Telekom Austria
- ÖAMTC
- ÖBB Österreichische Bundesbahnen
- Österreich Werbung Wien
- Österreichische Kontrollbank AG
- Österreichische Lotterien GmbH
- ORF Österreichischer Rundfunk
- ORF Enterprise GmbH & Co KG
- Philips Design
- Raiffeisen Bank Leasing
- Reed Messe Wien GmbH
- Siemens AG
- SKIDATA AG
- Sony Netservices GmbH
- Statistik Austria
- T-Mobile Austria GmbH
- Umweltbundesamt GmbH

AUSTRIA

- Alcatel AG
- AMS Arbeitsmarktservice Österreich

- VRVis Forschungs GmbH
- Wiener Krankenanstaltenverbund
- Wiener Linien GmbH & CoKG
- Wiener Stadtwerke Holding AG
- Wirtschaftskammer Österreich
- Wohnservice Wien GmbH

EXPECTATIONS

OFFERS

CURE has state-of-the-art and above state-the-art technical features, tools, laboratories and equipment. The User Experience Labs are among the most advanced and biggest in Europe. Furthermore, the multi-sectional background of CURE's employees assures a holistic approach that is highly appreciated by all our partners and clients.

CURE cooperates with industry, small and medium-sized companies and research partners and is always on the leading edge of the latest developments and trends, and thus contributes to the finding of innovative solutions in various application fields.

REQUIREMENTS

CURE's aim is not only to perform basic research, but also to transfer emerging human-computer interaction approaches into specific applications together with partners (applied research).

Apart from project partners with industrial or research background, CURE is always looking to cooperate with end-user organisations in various fields.



09/2011

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).

FTW TELECOMMUNICATIONS RESEARCH CENTER VIENNA

RESEARCH GROUP CONTACT

FTW Telecommunications
Research Center Vienna,
Techgate, Donau-City-Straße 1,
1220 Vienna
[www.ftw.at]

HEAD

PROF. DR. WOLRAD ROMMEL

PHONE

+43/1/505 2830-16

E-MAIL

[ROMMEL@FTW.AT]

HEAD

PROF. DR. HANS PETER SCHWEFEL

PHONE

+43/1/5052830-34

E-MAIL

[SCHWEFEL@FTW.AT]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

Communication Technology with applications
to Telecommunications, Intelligent Transport
Systems, and Intelligent Energy Networks

EXCELLENCE

- Channel Characterization
- Cross-Layer Transceiver Design
- Cooperative Communication
- Network Monitoring
- Quality in Communication Ecosystems
- Information Access
- Context-sensitive interfaces and systems

MISSION

FTW concentrates on research and development
of theories, algorithms and processes for the
intelligent management of future communication
systems under real-time conditions. FTW hereby
strengthens and accelerates the process of aca-
demic discovery for applications in industry and
is highly conducive for the valuable reciprocity
between academia and industry.

DEVELOPED TECHNOLOGIES

- **Channel Characterization:** Understanding the behaviour and developing realistic models of communication channels is a prerequisite to the design and the analysis of transceivers and lower-layer transmission protocols.
- **Cross-Layer Transceiver Design:** This research topic develops a cross-layer design approach for transceivers and lower-layer transmission protocols in future networks. Such a cross-layer approach becomes essential to jointly optimize performance, robustness and energy-efficiency. Particular focus will be given to experimentation with software-defined radio prototypes to guarantee a high degree of adaptability and flexibility of the proposed solutions.
- **Cooperative Communication:** This research topic develops cooperation approaches that are a key enabler of the paradigm shift in

ICT from centralized towards decentralized architectures.

- **Network Monitoring:** The topic of network monitoring develops technologies and approaches to measure the status and performance of the network infrastructure, to observe its traffic and to infer the behavior of its users.
- **Quality in Communication Ecosystems:** Research on communications ecosystems brings together the domains of technology, human behaviour and economics. Quality of service and quality of experience are key parameters for this systemic investigation of communication technology in its respective environment and application context. Therefore, this research topic develops methodologies for the evaluation and enhancement of these key parameters in the different application fields of FTW, taking into account the increasing complexity of related scenarios as well as the future evolution of the underlying communication systems.
- **Information Access:** This research topic develops methodologies for efficient access, aggregation, and processing of distributed information, frequently under real-time constraints.
- **Context-sensitive interfaces and systems:** This research topic develops the interfaces and enablers for situation-aware adaptations of network configurations, applications, and user-interaction. A major contribution of this topic is a closely coordinated cross-competence research effort towards a holistic concept of context-awareness, including semantic technologies, policy-based information processing, machine learning, and advanced human-computer interaction.

MAIN CAPABILITIES

- **Phase I Technology Assessment:** Feasibility Studies, Trend Assessment, Business Impact, Procurement- Vendor neutral expertise
- **Phase II Research Project:** Assessing Technology Potential; Shaping Objectives; Creating new

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).

Service Opportunities through new Algorithms, Methodologies, Systems; Finding out technically feasible solutions through Experimentation & Prototyping

- **Phase III Consulting & Product:** Development Support, Consulting & Engineering; Know how Transfer & Skill Set Transfer to Industry Partner in order to set the path for a speedy & successful product development
- **Phase IV Product Evolution:** Demand-driven: **a)** Product improvement and tailoring **b)** Curiosity driven research project due to new challenges that have emerged during the product tailoring process

FIELDS OF RESEARCH RESULTS APPLICATION

Telecommunications, Intelligent Transport Systems, Intelligent Energy Networks

ALUMNI PROFILE

FTW has a personal development scheme to develop its researchers to Senior and Key Researcher Levels. Seven former Key Researchers of FTW are meanwhile on professor positions at leading international academic institutions.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF/POSITIONS (FTE/HC): 16/19

SENIOR ENGINEERS: 4/4

JUNIOR RESEARCH STAFF/POSITIONS, INCL. PH.D. STUDENTS (FTE/HC): 24/24

JUNIOR ENGINEERS: 8/8

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- Usability Lab; Speech Recognition Lab; Wireline Communication Lab; Software

Defined Radio Lab; Network Monitoring Lab; Service Platform Evolution Lab; Simulation Cluster Lab;

BUDGET

TOTAL: 5.8 Mio EUR

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%): 40 %

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%): 9 %

MAIN PROJECTS

- Realsafe: Real-time, Safety related Traffic Telematics COMET; 01.04.2008-30.09.2009
- PRISM: Privacy-aware Secure Monitoring EU FP6; 01.03.2008-31.05.2010
- MASCOT: Multiple-Access Space-Time Coding Testbed, EU FP6; 01.01.2006-31.12.2008
- SESAME: Semantic Smart Metering: Enablers for Energy Efficiency, FFG COIN; 01.09.2009-30.11.2010
- Wiki Vienna: Building your own city in Virtual Space, WWTF; 01.01.2007-31.12.2009
- BACCARDI: Beyond Architectural Convergence: Charging, Security, Applications, Realization and Demonstration of IMS over fixed and wireless networks, COMET; 01.03.2008-28.02.2010

ACHIEVEMENTS

Transceiver design - wireline: Development of a family of energy efficient spectrum management and scheduling methods. We have furthermore extended these methods to be robust against channel uncertainties that exist in real DSL systems. Transceiver design - wireless: A receiver taking into account imperfect channel knowledge

has been designed for block-fading MIMO OFDM channels. An implementation of an 802.11p transmitter on a SDR platform has been finalized. Architectures and digital algorithms for enhancing the efficiency of RF power amplifiers and data converters have been developed.

- A novel statistical-based Anomaly Detection algorithm has been defined to work with non-stationary distribution time-series. The algorithm was designed from the bottom-up based on data from a real network. Extension to inter-domain implementation, in combination with privacy-preserving techniques, has been initiated.
- First implementation of an OFDMA transmitter and receiver compliant with IEEE 802.11a/g/p developed in GNU-Radio and released made FTW well visible in the GNU-Radio community
- Designed, implemented and experimentally evaluated a disruption tolerant networking overlay for Vehicle-to-Infrastructure communication.
- Development of a policy engine and policy-acquisition tool for semantically annotated rules and information; subsequent application in multiple industrial use-cases both in telco and energy/home domain.
- Development of novel mobile-spatial interaction prototypes, winning several recognized awards (Nokia Ubimedia Mindtrek competition 2008, Pervasive 2010 best video award, Special Prize A1 Application Challenge 2010).
- Design of a holistic QoE evaluation framework: Setup of semi-automatic testbed for QoE user trials for interactive, communication, data and IPTV services

RECENT ARTICLES IN SCIENTIFIC JOURNALS

Between 2008 and 2010, 288 publications were published by FTW employees, of which 46 peer-reviewed journals, 227 conference papers, and

15 books or book chapters. Selected key publications:

- J. Karedal, F. Tufvesson, N. Czink, A. Paier, C. Dumard, T. Zemen, C. Mecklenbräuker, A. F. Molisch, "A geometry-based stochastic MIMO model for vehicle-to-vehicle communications," IEEE Transactions on Wireless Communications, Vol. 8, No. 7; pp. 3646-3657, December 2008.
- F. Ricciato, E. Hasenleithner, P. Romirer-Maierhofer, Traffic analysis at short time-scales: an empirical case study from a 3G cellular network, IEEE Transactions on Network and Service Management, vol. 31, n. 8, pp. 1484-1496, March 2008.
- R. Olsen, M.B. Hansen, H.P. Schwefel: 'Probabilistic models for access strategies to dynamic information elements' Performance Evaluation Vol 67, Iss 1, pp43-60, January 2010.
- P. Fröhlich, A. Oulasvirta, M. Baldauf, A. Nurminen. On the Move, Wirelessly Connected to the World. Communications of the ACM, in print 2010.
- CNRS, Ecole Normale Supérieure de Lyon, Laboratoire de Physique, Lyon France
- Universität Zürich, Institut für Informatik, Zürich Switzerland
- Deutsches Forschungszentrum für Künstliche Intelligenz (DFKI) GmbH, Innovative Retail Laboratory, Germany
- Université catholique de Louvain, Institute of Information and Communication Technologies, Louvain France
- ETH Zürich, Communication Systems, Zürich Switzerland
- University of Edinburgh, The Centre for Speech Technology Research Edinburgh, U.K.
- Eurecom, Sophia-Antipolis France
- University of Zagreb, Faculty of Electrical Engineering and Computing, Zagreb Croatia
- Lund University, Department of Electrical and Information Technology, Lund Sweden
- Politecnico di Milano, Dipartimento di Elettronica e Informazione, Milano Italy
- Stanford University, Department of Electrical Engineering, Department of Mathematics, Smart Grid Research, Modelling & Simulation Group, Palo Alto CA USA
- Technical University of Berlin, Quality and Usability Lab, Berlin Germany
- University of Illinois at Urbana-Champaign, Center for Trustworthy Cyber Infrastructure for the Power Grid, Chicago IL USA
- Technical University of Kosice, Department of Electronics and Communications, Kosice Slovakia
- University of Southern California, Communication Sciences Institute, Los Angeles CA USA
- Universidad del País Vasco, Aholab Signal Processing Laboratory, Bilbao Spain
- University of New Hampshire, Electrical and Computer Engineering Department, Durham NH USA

MAIN COLLABORATING PARTNERS

COLLABORATIONS WITH ACADEMIC PARTNERS

- University of Vienna, Vienna Austria
- Vienna University of Technology, Vienna Austria
- Graz University of Technology, Graz Austria
- Joanneum Research Forschungsgesellschaft GmbH, Graz Austria
- Johannes Kepler University Linz, Linz Austria
- VRVis Research Center for Virtual Reality and Visualization, Vienna Austria
- Aalborg University, Department of Electronic Systems, Aalborg Denmark
- Università degli Studi di Firenze, Dipartimento di Sistema e Informatica, Firenze, Italy

COLLABORATIONS WITH COMPANIES

- A1 Telekom Austria AG, Vienna Austria
- Alcatel-Lucent Austria AG, Vienna Austria
- ASFINAG Autobahnen- und Schnellstraßen-Finanzierungs-Aktiengesellschaft Vienna Austria
- Austria Tech GmbH Vienna Austria
- Dipl.-Ing. Dr. Hermann Bühler GmbH Vienna Austria
- EVN AG Maria Enzersdorf, Lower Austria, Austria
- FLUIDTIME Data Services GmbH Vienna Austria
- Geoconsult ZT GmbH Vienna Austria
- Kapsch CarrierCom AG Vienna Austria
- Kapsch TrafficCom AG Vienna Austria
- Lantiq A GmbH Villach Austria
- nast consulting Vienna Austria
- Nokia Siemens Networks Oy Munich Germany
- RTR Rundfunk und Telekom Regulierungs-GmbH Vienna Austria
- Telekom Austria Group Vienna Austria

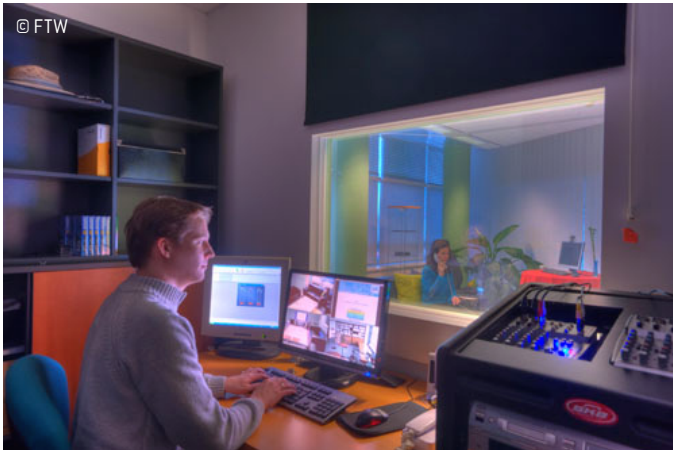
EXPECTATIONS

OFFERS

Over the past 10 years FTW has made the experience that one of its Unique Selling Proposition is that our research center provides expertise in a neutral manner enabling customers and suppliers to work together in shaping innovations, future products and services at a pre-competitive stage.

REQUIREMENTS

Potential partners of our center are companies involved in the ICT application in the 3 markets FTW is active in telecommunications, transport and energy.



THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE_TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).



GRAPHICS AND VIDEO GROUP: GRAPH@FIT

/ DEPARTMENT OF COMPUTER GRAPHICS AND MULTIMEDIA

/ FACULTY OF INFORMATION TECHNOLOGY / BRNO UNIVERSITY OF TECHNOLOGY

RESEARCH GROUP CONTACT

Božetěchova 2,
612 66 Brno
[www.fit.vutbr.cz]

HEAD

ASSOC. PROF. PAVEL ZEMČÍK

PHONE

+420 541 141 217

E-MAIL

[ZEMCIK@FIT.VUTBR.CZ]

HEAD

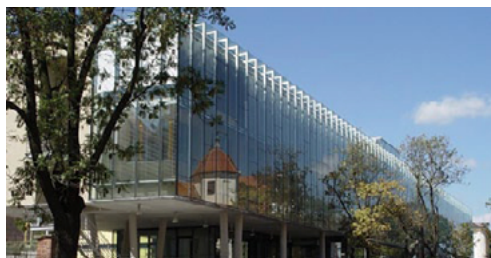
ASSOC. PROF. ADAM HEROUT

PHONE

+420 541 141 178

E-MAIL

[HEROUT@FIT.VUTBR.CZ]



THEMATIC RESEARCH FOCUS

RESEARCH AREA

- General computer graphics algorithms
- Rendering
- Modern methods of interaction in three-dimensional space
- Image processing
- Signal processing
- Computer vision
- Feature extraction
- Machine learning and applications

EXCELLENCE

Image processing and computer vision, object detection, realistic rendering, interaction, machine learning

MISSION

- To provide excellent education as well as research and development in the selected IT areas

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

- Computer graphics and image processing algorithms, algorithms of computer vision including their accelerated versions using embedded systems, DSP, FPGA, and GP-GPU
- Parallel rendering implementation of signal and image processing, vision, and graphics algorithms
- Novel methods of machine learning and their applications to the above algorithms

MAIN CAPABILITIES

BASIC RESEARCH:

Research and applications of algorithms, specifically video processing algorithms (scene detection, video in video search), object detection algorithms (AdaBoost/WaldBoost based), event and motion categorization.

APPLICATION RESEARCH + PROTECTION FORMS:

The detection of faces and body parts in image or video and monitoring of motion, classification of motion, detection of key points, their evaluation and localization, 3D reconstruction, implementation of the above algorithms in mobile platforms, acceleration of the above algorithms

FIELDS OF RESEARCH RESULTS APPLICATION

- Electronics industry
- Telecommunications
- Software
- Computer hardware
- Internet
- IT Security

ALUMNI PROFILE

Graduates operate in the fields of computer graphics and multimedia, human-machine interfaces, image and sound processing and compression, application interfaces for computer graphics and multimedia, and also in other applied computer graphic disciplines, such as computer-aided design and geographic information systems.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

5

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

25

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

Standard computer equipment, computing clusters, programmable hardware and DSP boards

BUDGET**TOTAL (MIL. CZK/MIL. EUR)**

10 / 0.4

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

2

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%):

49

MAIN PROJECTS

2011–2015: VideoTerror - Tools and Methods for Video and Image Processing for the Fight against Terrorism (project funded by the Ministry of Interior)

2011–2014: GenEx – System for support of evaluation of FISH (project financed by TAČR – Technology Agency of the Czech Republic)

2010–2013: SMECY – Smart Multicore Embedded Systems (funded by FP7-ARTEMIS, jointly EU and the Czech Republic)

2010–2013: RECOMP – Reduced Certification Costs for Trusted Multicore Platforms (funded by FP7-ARTEMIS, jointly EU and the Czech Republic)

2006–2011: Centre of Computer Graphics (project financed by the Ministry of Education, Youth and Sports, Czech Republic, programme LC – Basic Research Centres)

ACHIEVEMENTS**JOURNAL PAPERS EXAMPLES:**

- Hanák, I., Herout, A., Zemčík, P.: Acceleration of the Detail Driven Method for Hologram Generation, In: Optical Engineering, Vol. 2010, No. 12345, US, p. 21, ISSN 0091-3286
- Antikainen, J., Havel, J., Jošth, R., Herout, A., Zemčík, P., Hauta-Kasari, M.: Non-Negative Tensor Factorization Accelerated Using GPGPU, In: IEEE Transactions on Parallel

and Distributed Systems (TPDS), Vol. 2011, No. 1111, US, p. 7, ISSN 1045-9219

- Pouli, T., Prazak M., Zemčík, P., Gutierrez, D., Reinhard, E.: Rendering fur directly into images, In: Computers and Graphics, Vol. 34, No. 5, 2010, Elmsford, NY, US, p. 612-620, ISSN 0097-8493
- Herout, A., Hradiš, M., Zemčík, P.: EnMS: Early non-Maxima Suppression, In: Pattern Analysis and Applications, Vol. 2011, No. 1111, DE, p. 10, ISSN 1433-7541
- Havel, J., Herout, A.: Yet Faster Ray-Triangle Intersection (Using SSE4), In: IEEE Transactions on Visualization and Computer Graphics, Vol. 2010, No. 3, US, p. 434-438, ISSN 1077-2626

Over 100 conference papers, 10 journal papers, and 3 book chapters in last 5 years, 3 registered utility models, industrial applications, etc.

MAIN COLLABORATING PARTNERS**COLLABORATION WITH ACADEMIC PARTNERS**

- Faculty of Informatics, Masaryk University (Brno, CZ)
- Most Czech academic institutions

COLLABORATION WITH COMPANIES

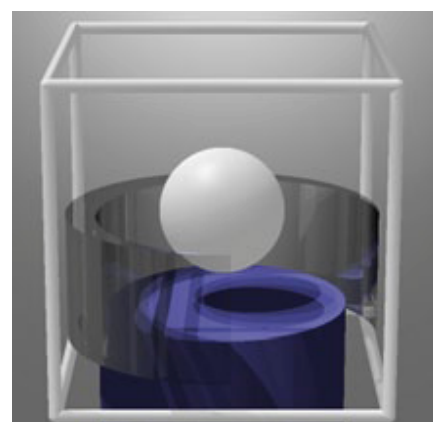
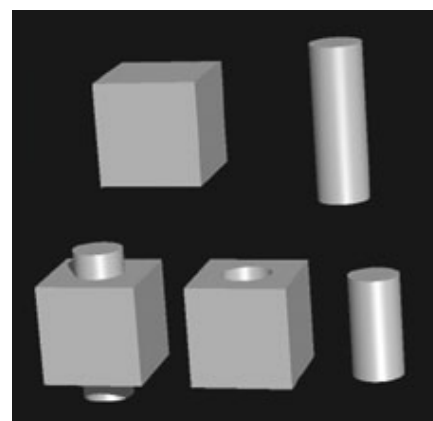
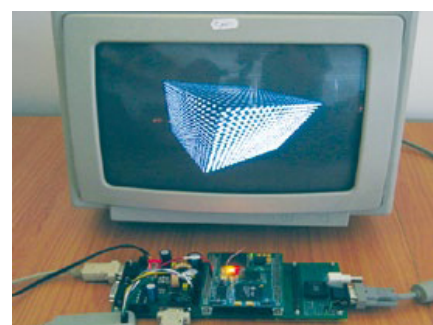
- Honeywell (Brno, CZ)
- Camea (Brno, CZ)
- UNIS (Brno, CZ)
- BALÓNY KUBÍČEK (Brno, CZ)
- Disk/Audiffex (Boskovice, CZ)

EXPECTATIONS**REQUIREMENTS**

Customers to licence the technology, customers for application development, collaboration bodies.

OFFERS

Research and development in the above areas, application development, expertise in the above areas.



04 / 2011

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).



HARDWARE-SOFTWARE CO-DESIGN RESEARCH GROUP (LISSOM@FIT)

/ DEPARTMENT OF INFORMATION SYSTEMS
/ FACULTY OF INFORMATION TECHNOLOGY
/ BRNO UNIVERSITY OF TECHNOLOGY

RESEARCH GROUP CONTACT

Božetěchova 1/2, 612 66 Brno,
Czech Republic
[www.fit.vutbr.cz]

HEAD

PROF. TOMÁŠ HRUŠKA

PHONE

+420 541 141 239

E-MAIL

[HRUSKA@FIT.VUTBR.CZ]

HEAD

KAREL MASARÍK

PHONE

+420 541 141 312

E-MAIL

[MASARIK@FIT.VUTBR.CZ]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

- Automation of hardware/software co-design for embedded systems and Multiprocessor System on the Chip (MPSoC)
- Support for general de-compilation techniques (for example for antivirus companies)

EXCELLENCE

- Hardware/software co-design
- Language for description of microprocessor architectures
- Multiprocessor System on the Chip (MPSoC) design
- De-compilation techniques for various binary formats

MISSION

We hope the automation of HW/SW co-design for the embedded and multiprocessor system is a very perspective area of interest. We would like to participate in the best projects and provide our PhD students and young researchers with opportunities to cooperate with leading partners in our area of interest.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

The goal of the Lissom project is creation and especially implementation of a language for description of microprocessor architecture. For a good applicability of the language, it is necessary to create a development environment, which provides simultaneous development of both software tools and microprocessor hardware. Due to the concurrent work on hardware and software (hardware/software co-design), the total time of the development will be reduced and the developmental cycle will be shortened. The energy consumption of the processor can be also optimized. It is also possible to generate de-compilers for various microprocessor binary codes. The project is concentrated on:

- Development of a fully automated design of a hardware and software for embedded systems
- Design of Multiprocessor System on the Chip (MPSoC) technology for embedded systems
- Integrated development environments for microprocessor development
- Fundamental modification of an existing architecture description languages for the purpose of increasing their modelling skills
- New practices of formal languages and models for the purpose of model simplification
- Description of transformation of microprocessor's model between different languages
- Synthesizable hardware model of microprocessor for industrial microprocessor production

MAIN CAPABILITIES

Basic research

- Formal models of internal processor representation
- New compilation techniques
- Verification techniques
- Model equivalence checking

Application research

- Tools for automation of hardware/software co-design for embedded systems and Multiprocessor System on the Chip (MPSoC) development
- Tools for support of general de-compilation techniques development (for example for anti-virus companies)

FIELDS OF RESEARCH RESULTS APPLICATION

- Embedded systems (smart phones, tablets, game consoles, home digital systems, automotive industry)
- Applications for anti-virus companies
- Generally, all the branches which deal with microprocessor technology

ALUMNI PROFILE

Besides very good knowledge and skills in the general area of information technology, our graduates

specialize in development and applications of information systems, intelligent systems, computer graphics and multimedia, computer and embedded systems, security and networks. Owing to a very good theoretical and wide, universal base of their specialization, a high adaptability in their future professional practice is ensured.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

6

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

14

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- Integrated development environment Codasip® for Application Specific Instruction-set Processors (ASIP) and Multiprocessor System on a Chip (MPSoC) applications. Time savings are accomplished by automation of tasks that would otherwise be done manually, e.g. creation of the toolchain or of the hardware description.

BUDGET

TOTAL (MIL. CZK/ MIL. EUR)

6 / 0.24

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

20

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%)

30

MAIN PROJECTS

2011–2013: Improving Security of the Internet by Using System

for Analyzing of Malicious Code Spreading (TA01010858, financed by the Technology Agency of the Czech Republic)

2011–2013: System for Support of Platform Independent Malware Analysis in Executable Files (TA01010667, financed by the Technology Agency of the Czech Republic)

2010–2013: SMECY-Smart Multicore Embedded SYstems (ARTEMIS JU 100230, financed by Artemis JU)

2009–2013: System for programming and realization of embedded systems (FR-TI1/038, financed by the Ministry of Industry and Trade of the Czech Republic)

ACHIEVEMENTS

- 2011 Příkryl Zdeněk, Křoustek Jakub, Hruška Tomáš, Kolář Dušan, Masařík Karel, Husár Adam: Design and Simulation of High Performance Parallel Architectures Using the ISAC Language, In: GSTF International Journal on Computing, roč. 1, č. 2, 2011, Singapur, SG, s. 97-106, ISSN 2010-2283
- 2011 Příkryl Zdeněk, Křoustek Jakub, Hruška Tomáš, Kolář Dušan: Fast Just-In-Time Translated Simulation for ASIP Design, In: 14th IEEE International Symposium on Design and Diagnostics of Electronic Circuits and Systems, Cottbus, DE, IEEE CS, 2011, s. 279-282, ISBN 978-1-4244-9753-9
- 2010 Příkryl Zdeněk, Křoustek Jakub, Hruška Tomáš, Kolář Dušan, Masařík Karel, Husár Adam: Design and Debugging of Parallel Architectures Using the ISAC Language, In: Proceedings of the Annual International Conference on Advanced Distributed and Parallel Computing and Real-Time and Embedded Systems, Singapore, SG, GSTF, 2010, s. 213-221, ISBN 978-981-08-7656-2
- 2009 Příkryl Zdeněk, Masařík Karel, Hruška Tomáš, Husár Adam: Fast Cycle-Accurate Interpreted Simulation, In: Tenth International Workshop on Microprocessor Test and Verification: Common Challenges

and Solutions, Austin, US, ICSP, 2009, s. 9-14, ISBN 978-0-7695-4000-9

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Institute of Information Theory and Automation (Prague, CZ)
- Czech Technical University (Prague, CZ)
- Collaboration with companies
- AVG Technologies CZ (San Mateo, CA)
- ApS Brno (Brno, CZ)
- AVG Technologies CZ (Brno, CZ)
- CAMEA (Brno, CZ)
- CHIPINVEST (Brno, CZ)
- Vema (Brno, CZ)

EXPECTATIONS

OFFERS

- Partnership in (mainly) international projects in the above described area
- Codasip® System applications which demand microprocessors description in co-operation with software/hardware generators capabilities
- Modelling and generation of tools for automation of hardware/ software co-design for embedded systems and Multiprocessor System on the Chip (MPSoC)

REQUIREMENTS

- Partnership in (mainly) international projects in the above described area
- Research cooperation with other academic and commercial institution
- Testing of functional properties of the Codasip® System



04/2011

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).



LABORATORY OF SEARCHING AND DIALOGUE

/ FIRST DEPARTMENT OF NEUROLOGY

/ FACULTY OF MEDICINE / MASARYK UNIVERSITY

RESEARCH GROUP CONTACT

Botanická 554/68a,
602 00 Brno, Czech Republic
[lsd.fi.muni.cz]

HEAD

PROF. PAVEL ZEŽULA

PHONE

+420 549 497 992

E-MAIL

[ZEZULA@FI.MUNI.CZ]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

- Digital data processing, large-scale data collections, parallel processing, performance

EXCELLENCE

- New methods for extensible and scalable similarity search in digital data

MISSION

We want to be a workplace of research at international level, educating excellent IT specialists and successfully cooperating with companies.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

Similarity has been a central notion throughout our lives – it is a main concept in human perception, speech or face recognition, object classification, memory, and many others. As almost everything we see, read, hear, write or measure can now be in digital form, the group is trying to develop computer tools to manage similarity. To this objective, we assume a very universal concept of similarity that is based on the mathematical notion of metric space. In this concept, data collection is seen as objects together with a method to measure similarity between pairs of objects.

OUR SOFTWARE TOOLS ARE BASED ON THE FOLLOWING THREE DEVELOPMENT PILLARS:

- Extensibility – they can be used practically on data of any type – we only have to define how to measure “similarity between pairs of objects”. Examples of similarity concepts that can be managed include various aspects of image visual descriptors (shapes, colours, combination of shapes & colours), similarity of video sequences, face recognition, similarity of biometric data such as fingerprints or iris scan, etc.
- Scalability – they are efficient even for very large databases. Designs offer various search

structures including distributed mechanisms that are suitable for fast processing of large datasets and are mostly based on peer-to-peer principles

- Infrastructure independence – the search technologies can run on various HW infrastructures including large-scale distributed computer clouds. Migrating the search engine to different hardware can be used for performance tuning (response time and query throughput)

MAIN CAPABILITIES

BASIC RESEARCH

We have developed several generic search methods and published papers in the top scientific conferences and most prestigious scientific journals. We have also build prototypes and tested their performance on very large collections of data. Basic software tools are publicly available.

APPLICATION RESEARCH + PROTECTION FORMS

Our open-source software for non-text similarity searching has been applied by Pixmac and Profimedia photo selling sites. The fastest developing application area concerns security. In general, the application areas include:

- Information retrieval
- Multimedia indexing and searching (images, audio, video, etc.)
- Classification and recommender systems
- Large-scale biometric identification problems
- Biological sequence processing, etc.

FIELDS OF RESEARCH RESULTS APPLICATION

- ICT (Information and Communication Technologies) - software, internet, IT security, ecommerce
- Security (Biometric identification).

ALUMNI PROFILE

The students gain a comprehensive overview in the field of acquisition and processing of image information starting with simple image modifications using point transforms or linear filters and ending up with sophisticated tools such as mathematical morphology of deformable

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).

models. Graduates are equipped with knowledge and skills that enable them to solve challenging research and development problems in computer science and lead research teams engaged in the development and subsequent implementation of new technologies in the field of modern computer science. Graduates can work in academic and also industrial sectors, which occupy higher positions that require nontrivial management, analytical and technical skills.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

5

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

8

BUDGET

TOTAL (MIL. CZK/ MIL. EUR)

7.5 / 0.3

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

10

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%)

0

MAIN PROJECTS

2009-2011: Searching in Large Multimedia Databases (project GA201/09/0683 financed by the Czech Science Foundation)

2006-2008: Search on Audio-visual content using Peer-to-peer Information Retrieval (project IST 045128 financed by the 6th Specific RTD Programme, European Union)

2004-2006: Network of Excellence on Digital Libraries (project IST 507618 financed by the 6th Specific RTD Programme, European Union)

ACHIEVEMENTS

- Metric similarity search (M-tree, VLDB 1997), the most cited article about similarity searching;
- Springer US, 2006, Similarity Search: the Metric Space Approach - the first book on similarity searching;
- IBM Shared University Research Award 2008 on Web-scale Similarity Search in Multimedia Data

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Faculty of Mathematics and Physics, Charles University in Prague (Prague, CZ)
- Max-Planck-Institut für Informatik (Saarbrücken, DE)
- Institute of Information Science and Technologies, Italian National Research Council (Pisa, IT)

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE (LAUSANNE, CH)

COLLABORATION WITH COMPANIES

- IBM Haifa Research Lab (Haifa, IL)
- Picsearch AB (Stockholm, SE)
- Telenor ASA (Oslo, NO)
- Javlin (Prague, CZ)
- Bull.cz (Prague, CZ)

EXPECTATIONS

REQUIREMENTS

From our potential partners, we mainly expect cooperation on definition of similarity search problems and specification of effectiveness of search - which is domain (application) specific. We are interested in partners with credible business models that would lead to the development of profitable products. We are also interested in research partners to define common projects and submit proposals for grants.

OFFERS

- Software and software support for similarity search execution, as needed for numerous contemporary digital data collections, such as multimedia, biometric, biological, chemical, statistical, or other scientific data
- Cooperation on common projects which need a similarity search
- Share of know-how through consultancy



04/2011

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).



NATURAL LANGUAGE PROCESSING RESEARCH GROUP

/ DEPARTMENT OF COMPUTER GRAPHICS AND MULTIMEDIA
/ FACULTY OF INFORMATION TECHNOLOGY / BRNO UNIVERSITY OF
TECHNOLOGY

RESEARCH GROUP CONTACT

Božetěchova 2, 602 00 Brno,
Czech Republic
[<http://www.fit.vutbr.cz>]

HEAD

ASSOC. PROF. PAVEL SMRŽ

PHONE

+420 541 141 282

E-MAIL

[SMRZ@FIT.VUTBR.CZ]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

Natural language processing

EXCELLENCE

- Knowledge mining from very large semi-structured data
- Cognitive ergonomics and human-machine interaction
- Multimedia semantics

MISSION

As a part of the human-machine interaction group that combines excellence in speech processing, image and video understanding and knowledge systems, we aim at strengthening our position in international research. We strive to participate in the best projects and to provide PhD students and young researchers opportunities to cooperate with leading figures in our area of interest.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

- Knowledge extraction components for various domains
- Social media streams analysers
- Semantic annotation technology for text and multimedia

MAIN CAPABILITIES

Research and development of context-aware knowledge-based systems that employ semantic web technologies and/or multimedia processing to overcome limits of today's solutions.

FIELDS OF RESEARCH RESULTS APPLICATION

- Knowledge management in large and medium-sized enterprises
- Technology-enhanced learning systems based on advanced content processing
- Open government and public service projects pursuing the topic of open data

ALUMNI PROFILE

In the course of their Ph.D. studies, our graduates come to know state-of-the-art natural language processing techniques as well as general machine-learning methods. They also learn from cooperating with key centres dealing with knowledge technologies, meet colleagues and establish contacts in the area.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

4

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

6

BUDGET

TOTAL (MIL. CZK/MIL. EUR)

12/0.48

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

0

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%)

80

MAIN PROJECTS

2011–2013: DECIPHER-Digital Environment for Cultural Interfaces; Promoting Heritage, Education and Research (FP7 ICT 270001, financed by the European Commission)

2010–2013: R3-COP-Robust & Safe Mobile Co-operative Autonomous Systems (ARTEMIS JU 100233, financed by the ARTEMIS Joint Undertaking)

2010–2012: TA2-Together Anywhere, Together Anytime (FP7 ICT 214793, financed by the European Commission)

2010–2012: M-Eco-Medical Ecosystem- Personalized Event-based Surveillance (FP7 ICT 247829, financed by the European Commission)

2010–2013: eSonia-Embedded Service Oriented Monitoring, Diagnostics and Control: Towards the Asset-aware and Self-Recovery Factory (ARTEMIS JU 100223, financed by the ARTEMIS Joint Undertaking)

ACHIEVEMENTS

- Knowledge extraction modules used in the intranet knowledge sharing system in Sun/Oracle
- Social media analysis module which proved to provide faster epidemiology-relevant event detection than traditional indicatorbased surveillance (early detection of Norovirus outbreak at Carl von Ossietzky Universität Oldenburg in Lower Saxony)

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Dublin Institute of Technology (Dublin, IE)
- University of Sheffield (Sheffield, GB)
- Open University (Milton, GB)
- Salzburg Research (Salzburg, AT)
- Austrian Institute of Technology (Vienna, AT)
- Universität Koblenz-Landau (Koblenz, DE)
- Gottfried Wilhelm Leibniz Universität Hannover, L3S Research Center (Hannover, DE)
- IDIAP Research Institute (Martigny, CH)
- CWI – Centrum voor Wiskunde en Informatica (Amsterdam, NL)
- National Technical University of Athens (Athens, GR)
- Centre for Research and Technology HELLAS (Thessaloniki, GR)
- Aalborg University (Aalborg, DK)
- Tampere University of Technology (Tampere, FI)

COLLABORATION WITH COMPANIES

- British Telecom (London, GB)

- Alcatel-Lucent Bell (Antwerp, BE)
- Yahoo! (Barcelona, ES)
- Hellenic Aerospace Industry (Athens, GR)
- Vodafone (Athens, GR)
- Telefónica (Madrid, ES)
- Oracle (Prague, CZ)
- Logica (Aalborg, DK)
- Thales Italia (IT)
- Siemens (Munich, DE)
- Fraunhofer (Nürnberg, DE)
- TNO (Amsterdam, NL)
- Philips (Eindhoven, NL)
- Hermia (Tampere, FI)
- UNIS (Brno, CZ)
- Honeywell (Brno, CZ)

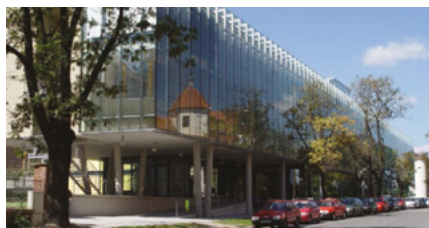
EXPECTATIONS

OFFERS

- Partnership in European projects
- Design and development of modern knowledge-sharing platforms
- Licences of information extraction modules

REQUIREMENTS

- Industrial partners providing challenging use-cases in knowledgebased technologies
- Academic partners with a track in international research projects



05/2011

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).



SBA RESEARCH GMBH

RESEARCH GROUP CONTACT

Favoritenstraße 16/2
1040 Vienna, Austria
[www.sba-research.org]

HEAD

MARKUS KLEMEN

PHONE

+43 1 505 36 88

E-MAIL

[MKLEMEN@SBA-RESEARCH.ORG]

HEAD

EDGAR WEIPPL

PHONE

+43 1 505 36 88

E-MAIL

[EWEIPPL@SBA-RESEARCH.ORG]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

Information Security:

- Governance, Risk and Compliance,
- Data Security and Privacy,
- Secure Coding and Code Analysis, and
- Hardware and Network Security

EXCELLENCE

IT Security [i.e. work and research on Digital Forensic, Secure Coding, Penetration Testing, Web 2.0, Cloud Computing, Social Networks etc.]

MISSION

With its vision “to provide science for better security”, SBA Research aims to become the premiere research centre for IT security in Austria. SBA Research brings together the best national academic institutions and corporations and cooperates with leading universities and research institutions throughout the world. Our research addresses the needs of large corporations as well as small and medium-sized enterprises and private individuals. Over the past three and a half years our research results had a major impact on R&D in our partner companies. Their representatives estimated an increase of 30 percent in their research intensity. Our main goal is to perform basic research in IT security with a clear orientation towards the practical use by our industry partners and the general public. We incorporate our partners' own R&D efforts and contribute our basic research perspectives. The majority of our projects are highly interdependent, and projects commonly span several distinct areas. Our research program is designed as an integral approach to cover all important layers of security in information technology: the organizational layer (including the human factor), the business process layer, the logical layer, and the network and infrastructure layer. In brief, our overall goal is to expand the successful work of the centre in crucial fields of research and to develop more secure and more robust IT systems in the foreseeable future. We strive to establish security as an enabling factor in Austria's IT-driven businesses and to move away from a reaction-

driven arms race in which defenders constantly lag one step behind.

DEVELOPED TECHNOLOGIES

Our research program reflects our three main goals of (1) protecting information assets, (2) enabling new services by providing proper security, and (3) providing education and awareness methodologies, concepts and content for security. Based on our research work over the last three years, we have identified four major areas that are still in need of intensive basic research:

- **(1) Governance, Risk, and Compliance (GRC):** This area addresses organizational IT security research problems. In the area of GRC we have bundled issues related to risk management, compliance, and user awareness for SMEs. We have already achieved significant results in these fields in the past, and believe it should be further explored in the years to come. For instance, our security ontology needs to include additional standards and mapping rules between them to allow semiautomatic reasoning about different adoption strategies.
- **(2) Data Security and Privacy:** This area deals primarily with the logical layer of IT security. There are several important projects in this area: Firstly, our successful e-health privacy research, which has already led to a patented procedure and a stable proof of concept prototype. These results need to be closely examined for large-scale suitability, robustness against external and internal attacks, structural or logical weaknesses in the architecture, and applicability to specific scenarios. Secondly, our new project Digital Preservation deals with problems that arise in the context of long-time storage of digital data, which we see as an emerging challenge for the future. Thirdly, we will develop new enterprise rights management (ERM) approaches and solutions for the protection and authentication of confidential documents and company files (explicitly avoiding research related to the content industry's largely futile

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).

attempts to protect multimedia content). The overall, unifying research challenge we see in this area is primarily to address the conflicting requirements of privacy, ERM, and digital preservation.

■ (3) Secure Coding and Code Analysis:

This area addresses three very closely related research questions that cannot be treated separately: In Secure Coding, we research methods and solutions for developing software that is inherently more secure. In Code Analysis, we continue our extremely successful research in the area of malicious code detection. One result of this research, Anubis, is already widely used by security organizations all over the world, such as the Australian and Japanese computer emergency response teams (CERTs). In another project, Pathfinder, we develop next generation malicious code detection methods. Open research issues include the improved stealthiness of the platform, an improved coverage of the execution path analysis, and research into botnet economics. One interesting related research issue is data leakage prevention. Digital Forensics encompasses aspects of secure coding and code analysis, such as time-line reconstruction and the analysis of concurrency control and recovery (CCR) libraries in database forensics. Moreover, digital forensics is an emerging field in digital preservation.

■ (4) Hardware and Network Security:

In this area, we address the problem of developing tamper-resistant devices for various purposes, such as voting machines or banking equipment, and we conduct in-depth analysis of potential weaknesses of cryptographic hardware, specifically cryptographic computer chips. We have already achieved significant results in this area, which will help to design more secure hardware modules and integrated circuits in the future. We also include aspects of

the Future Internet, which will have a significant impact on the requirements for security research, such as virtualization, cloud computing, Software as a Service (SAAS), or IPv6.

MAIN CAPABILITIES

- Methods for privacy protection
- Digital Forensics for Web 2.0

FIELDS OF RESEARCH RESULTS APPLICATION

- Finance
- Health
- Industrial production
- Energy

ALUMNI PROFILE

Excellent knowledge of information security with one specialization in either technical security, software security, organizational security or hardware security.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF/POSITIONS (FTE/HC): 7/11

JUNIOR RESEARCH STAFF/POSITIONS, INCL. PH.D. STUDENTS (FTE/HC): 35/50

BUDGET

TOTAL: 3.000.000 EUR

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%): 50 %

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%): <5%

MAIN PROJECTS

- K-Ind - Projects
- COMET – K1-Competence Center
- PIPE (FIT-IT) - Pseudonymization of Information for Privacy in e-Health

- INFORM (FIT-IT) - Internet forensics suitable for Web 2.0 and cloud computing
- Secure 2.0 (FIT-IT) – Securing Information Sharing on Web2.0
- Silicon Malware (KIRAS) – Hardware-based Malware
- TIMBUS (FP7) – Digital Preservation for Business Processes
- INMOTOS (CIPS) - Modeling ICT-critical Infrastructure and contingency plans

ACHIEVEMENTS

RECENT PUBLICATIONS

- Sebastian Schrittwieser and Stefan Katzenbeisser, "Code Obfuscation Against Static and Dynamic Reverse Engineering," in Information Hiding Conference 2011, 2011.
- Daniel Abouakil and Johannes Heurix and Thomas Neubauer, "Data Models for the Pseudonymization of DICOM Data," in Proceedings of the 44nd Hawaii International Conference on System Sciences, 2011, p. 157.
- Markus Huber and Martin Mulazzani and Edgar R. Weippl and Gerhard Kitzler and Sigrun Goluch, "Friend-in-the-middle Attacks: Exploiting Social Networking Sites for Spam," IEEE Internet Computing: Special Issue on Security and Privacy in Social Networks, 2011.
- S. Fenz, A. Ekelhart, "Verification, Validation, and Evaluation in Information Security Risk Management";
- IEEE Security & Privacy, 9 (2011), 2; 58 – 65.
- Markus Huber and Martin Mulazzani and Edgar R. Weippl and Gerhard Kitzler and Sigrun Goluch, "Friend-in-the-middle Attacks: Exploiting Social Networking Sites for Spam," IEEE Internet Computing: Special Issue on Security and Privacy in Social Networks, 2011
- Mark Strembeck, "Scenario-Driven Role Engineering," IEEE Security and Privacy, vol. 8, iss. 1, 2010.

- Johannes Heurix and Thomas Neubauer, "A methodology for the pseudonymization of medical data," International Journal of Medical Informatics, vol. 80, iss. 3, pp. 190-204, 2010
- A. Baumgrass, M. Strembeck, S. Rinderle-Ma: Deriving Role Engineering Artifacts from Business Processes and Scenario Models, In: Proc. of the 16th ACM Symposium on Access Control Models and Technologies (SACMAT), Innsbruck, Austria, June 2011
- U. Bayer, C. Kruegel, E. Kirda, Improving the efficiency of dynamic malware analysis, Proceedings of the 2010 ACM Symposium on Applied Computing, 1871-1878, 2010.
- The University of Texas at San Antonio (San Antonio/TX, US)
- Universidad de Málaga (Málaga, ES)
- University of Regensburg (Regensburg, DE)
- Karlstad University (Karlstad University, SE)
- Kingston University London (London, UK)
- University of Kent (Canterbury, UK)
- University of Malaysia (Kuala Lumpur, MY)
- University of Plymouth (Plymouth, UK)

MAIN COLLABORATING PARTNERS

COLLABORATIONS WITH ACADEMIC PARTNERS

- University of Technology, Institute of Software Technology and Interactive Systems (IFS), and the Institute of Information Systems, Distributed Systems Group (Vienna, AT)
- University of Technology, Institute of Applied Information Processing and Communication (IAIK) (Graz, AT)
- University of Vienna, Department of Knowledge Engineering (DKE) (Vienna, AT)
- University of Economics and Business, Institute for Information Systems and New Media (Vienna, AT)
- EURECOM (Sophia Antipolis, FR)
- Fraunhofer Institut, TU Darmstadt (Darmstadt, DE)
- Katholieke Universiteit (Leuven, BE)
- Purdue University (West Lafayette/IN, US)
- Royal Holloway/University of London (London, UK)
- Technische Universität (Darmstadt, DE)
- The State University of New Jersey, Rutgers, CIMIC – Center for Information Management, Integration and Connectivity (Newark/NJ, US)
- Anovis it-services and trading gmbh (Vienna, AT)
- Avedos business solutions (Vienna, AT)
- Braincon Handels-GmbH (Vienna, AT)
- Bravestone Information Technology GmbH (Graz, AT)
- Bundesrechenzentrum GmbH (Vienna, AT)
- Conect Event Management (Vienna, AT)
- CYAN Networks Software GmbH (Vienna, AT)
- Factline Webservices GmbH (Vienna, AT)
- Fenz Software GmbH (Pinkafeld, AT)
- Gesundheit Österreich GmbH (Vienna, AT)
- Gibodat (Linz, AT)
- Hewlett-Packard GmbH (Vienna, AT)
- LG Nexera (Wien, AT)
- NIC.at Internet Verwaltungs- und BetriebsGmbH (Salzburg, AT)
- Österreichische Computer Gesellschaft (OCG) (Vienna, AT)
- Procom-Strasser (Klosterneuburg, AT)
- Raiffeisen Informatik GmbH (Vienna, AT)
- Security Research Sicherheitsforschung GmbH (Vienna, AT)
- SVA - Austrian Social Insurance Authority for Business (Vienna, AT)
- Theobroma Systems Design und Consulting GmbH (Vienna, AT)
- UC4 Senactive Software GmbH (Wolfsgraben, AT)
- Underground_8 Secure Computing GmbH (Linz, AT)
- Vertretungsnetz (Vienna, AT)
- XiTrust Internetsicherheitslösungen GmbH (Graz, AT)

EXPECTATIONS

OFFERS

We offer research and development for all information security related projects (e.g. software security for industrial production lines, organizational security in finance...)



09/2011

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).

DEPARTMENT OF MATHEMATICS AND COMPUTATIONAL SCIENCES

/ FACULTY OF ENGINEERING SCIENCES / JEDLIK ÁNYOS INSTITUTE OF IT,
ELECTRICAL AND MECHANICAL ENGINEERING

RESEARCH GROUP CONTACT

Egyetem tér 1.,
Győr H-9026
[math.sze.hu]

HEAD

ZOLTÁN HORVÁTH, PHD

PHONE

+36 96 503 464
+36 20 446 9841

E-MAIL

[HORVATHZ@SZE.HU]
[HORVATHZ14@GMAIL.COM]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

- Mathematical modeling; setting up mathematical models for industrial and other applications
- Development and application of numerical methods for applied research in engineering
- Numerical solution and qualitative analysis of differential equations
- Parallel computing. High performance computing (HPC)
- Finite element methods (FEM). Boundary element methods (BEM). Meshfree methods
- Development of high order methods for computational fluid dynamics (CFD)
- Industrial application of FEM and CFD methods
- Numerical modelling of continuum-mechanics
- Interpolation techniques
- Operations research: theory and applications.
- Optimization of production scheduling
- Non-linear and global optimization
- Automated optimization for complex simulations
- Mathematical methods of decision making
- Machine learning, collaborative filtering
- Logical game programming

EXCELLENCE

The Department of Mathematics and Computational Sciences strives to achieve excellence in various areas including:

- computational simulation of industrial processes (CFD, FEM),
- high performance computing (HPC) for industry, both with commercial and in-house codes,
- optimization (global optimization, discrete optimization: scheduling of production lines),
- numerical methods: theory, algorithms and implementation for HPC,
- data mining, collaborative filtering.

MISSION

The mission of the Department of Mathematics and Computational Sciences is to provide, in equally important extent and in a consistent way

- quality education in mathematics and computer science for engineering and economics students,
- strong research in applied mathematics and related fields, inspired highly by applications,
- industrial and economic applications, typically based on research results.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

The main findings of the department are as follows:

- development of the Parmod software framework for simulation of fluid flow and related problems in HPC environment (on CPU-clusters and GPU-cluster), using high order numerical methods,
- advanced engineering simulations by the Industrial Simulation Research Group of the department,
- scheduling optimizer software for production planning, which runs on many core systems,
- machine learning software library,
- research papers in the field of applied mathematics and computer sciences.

MAIN CAPABILITIES

Fields where R&D results can be applied, from advanced research in physical sciences to engineering applications.

FIELDS OF RESEARCH RESULTS APPLICATION

- Theoretical results in basic research of mathematics, applied mathematics and computational sciences, aiming industrial applications.
- Advanced methods and codes for production planning, FEM and CFD applications and optimization.

ALUMNI PROFILE

Alumni are specialized in different branches of IT. The numerous experts in computational simulations in the industry are outstanding.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

15

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

8

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- Special commercial software: Hypermesh, Abaqus, MD Nastran, Ansys Fluent, Matlab, Maple, GAMS, RAD Studio
- In-house developed software: Parmod (HPC framework for CFD)
- In-house developed codes: production scheduler in HPC; research code for collaborative filtering
- Special hardware: GPGPU and FPGA workstations; IBM iDataPlex cluster (240 cores and 960 GB RAM in total), IBM SMP computer (64 cores and 1TB RAM accessible for each core), GPU cluster (4 Tesla M2050 GPGPU)

MAIN PROJECTS

2009-2011: Simulation and Optimization – Basic Research in Numerical Mathematics Specifically for Complex Physical Processes and Production Systems at the Széchenyi István University with a newly Created International Research Team

Type: TÁMOP 4.2.2-08

Budget: \$1.500.000

Abstract: Inspired by our previous engineering work for automotive industry, namely computational wind-tunnel simulation with acoustic computation of the noise induced by gaps of the external mirrors; shape optimization of diesel intake ports with automated objective function evaluation; production line scheduling algorithms), the goal of the project is to perform basic and aimed basic research

for simulation and optimization of complex physical systems. Another key feature of the project that the hardware the development of simulations, based on fast, modern hardware for complex physical and production systems.

Tasks, performed by the Department:

Developing of parallel programming methodologies and preparing simulations - based on the methodologies - with its own codes, mathematical modelling of physical processes, and numerical analysis of mathematical models.

2010-2013: Positive Numerical Solution of Differential Equations

Type: Faculty Initiated Collaboration by KAUST

Duration: 2010-2013

Collaborators: KAUST, Széchenyi István University, University of Massachusetts-Dartmouth, CWI Amsterdam

Abstract: Positivity is one of the most common and most important characteristics of mathematical models, yet it is very difficult to preserve numerically. In fluid flow problems, for instance, densities, pressures, and concentrations are always positive, and is the depth of water. However, numerical discretizations of the equations describing such flows frequently generate negative values. This leads to meaningless solutions and, in many cases, to outright failure of the computation. While some progress has been made in recent years, the existing theory generally does not apply to realistic situations, or prescribes step-sizes that are too small for practical use.

This project seeks to improve the existing theory positivity and strong stability preserving discretizations, and to develop robust positivity preserving methods for realistic applications. Building on recent work of the PIs, a theory of positivity preserving methods will be developed for initial value problem ODEs. This theory will

be used to develop optimized numerical methods. The methods will then be applied to complex applications including combustion chemistry, multicomponent compressible flows, and electrical discharges.

2009-2010: Computational simulation of multi-disc wet break system for heavy duty tractors.

Type: IJTTR, Regional University Knowledge Center for Vehicle Industry, Győr, Hungary

Abstract: The aim of the project was to develop a mathematical model and perform FEM simulations for the development process of multi-disc break systems for RÁBA Axle Ltd. Within the project, new mathematical model was developed for solving the difficulties with the complex flow of the oil-air mixture; validated simulations were performed based on this model.

ACHIEVEMENTS

SELECTED PAPERS:

- Z. Horváth, M. Liebmann, Performance of CFD Codes on CPU/GPU Clusters. AIP Conf. Proc., September 30, 2010, Volume 1281, ICNAAM 2010: International Conference of Numerical Analysis and Applied Mathematics 2010; doi:10.1063/1.3498230, pp. 1789-1792.
- Manfred Liebmann, Craig C. Douglas, Gundolf Haase, Zoltán Horváth, "Large Scale Simulations of the Euler Equations on GPU Clusters," 2010 Ninth International Symposium on Distributed Computing and Applications to Business, Engineering and Science, ISBN: 978-0-7695-4110-5 2010, pp.50-54.
- Horváth, Z., Morauszki, T., Tóth, K. „CAD-based Optimization and Applications in automotive Engineering". Proceedings of 8th EUROSIM Conference, Ljubljana, Slovenia. 2007. In B. Zupančič, R. Karba and S. Blažič (eds.), Proceedings of the

6th EUROSIM Congress on Modelling and Simulation, pp. 1-8, Ljubljana, Slovenia, 2007. ISBN: 978-3-901608-32-2.

- Horváth, Z., Morauszki, T., Tóth, K. „Automated CAD-based CFD-Optimization and Applications in Diesel Engine Design” CD-ROM Proceedings of European Automotive CFD Conference (EACC) 05-06 July 2007 Frankfurt, Germany
- Z. Horváth, Positivity of Runge-Kutta and diagonally split Runge-Kutta methods. Applied Numerical Mathematics [28]2-4 (1998) pp. 359-369.
- Z. Horváth, On the positivity step size threshold of Runge-Kutta methods. Applied Numerical Mathematics, Vol. 53/2-4 pp. 341-356 [2005].
- K. Szócs, M. András, Z. Horváth, T. Gergye, Multi-disc wet brake system for heavy duty tractors. In: Proceedings of the 22nd International Automotive Conference with Exhibitions, 14-16 April, 2009. Beograd, Serbia, Ed. C. Duboka.
- Cs. Gáspár, Multi-level meshless methods based on direct multi-elliptic interpolation. J. Comput. Appl. Math. 226, No. 2, 259-267 [2009].
- Cs. Gáspár, Meshfree Vectorial Interpolation Based on the Generalized Stokes Problem. In: Meshfree Methods for Partial Differential Equations V. Eds: Griebel, Schweitzer. Springer-Verlag, pp. 65-80. 2011.
- G. Takács et al., Matrix factorization and neighbour based algorithms for the Netflix Prize problem, Proc. of the 2008 ACM Conference on Recommender Systems (RECSYS'08), pp. 267-274, Lausanne, Switzerland, 2008.
- G. Takács et al., Investigation of various matrix factorization methods for large recommender systems, Proc. of the 2nd KDD Workshop on Large Scale Recommender Systems and the Netflix Prize Competition, Las Vegas, Nevada, USA, 2008.
- G. Takács et al., Scalable collaborative filtering approaches for large

recommender systems, Journal of Machine Learning Research, vol. 10, pp. 623-656, 2009.

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- King Abdullah University of Science and Technology (KAUST) (Thuwal, SA)
- Lehigh University (Bethlehem, PA, USA)
- University of Graz (Graz, AT)
- Eötvös Lóránd University (ELTE) (Budapest, HU)
- Budapest University of Technology and Economics (Budapest, HU)
- Technical University of Vienna (Vienna, AT)
- University of Massachusetts-Dartmouth, MA, USA
- CWI (Center for Mathematics and Computer Science) (Amsterdam, NL)

COLLABORATION WITH COMPANIES

- Rába Vehicle Industrial Holding Inc. (Győr, HU)
- Audi Hungaria Motor Ltd. (Győr, HU)
- Schefenacker Automotive Parts in Ungarn (SAPU) (Mosonszolnok, HU)
- OTP Bank Nyrt. (Budapest, HU)
- HTech Inc. (Concord, MA, USA)

EXPECTATIONS

REQUIREMENTS

The department is open for project-based collaborations.

OFFERS

- Expertise in the fields above.
- Experienced management staff.
- Experience in international collaboration (contracts, knowledge of technical details).

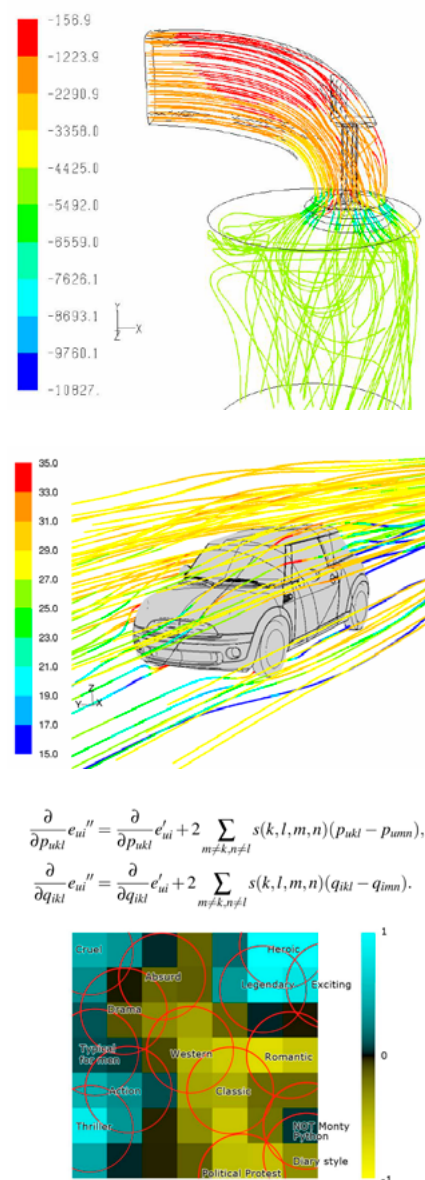


Figure 1: Features of movie *Constantine*



UNIVERSITY OF WEST HUNGARY

/ FACULTY OF GEOINFORMATICS

RESEARCH GROUP CONTACT

H-8000 Szekesfehervar,
Pirosalma u. 1-3., Hungary
[www.geo.info.hu/english/]

HEAD

DR. TAMAS JANCSON, VICE-DEAN, PHD.

PHONE

+36 30 508 0634

E-MAIL

[T.JANCSON@GEO.INFO.HU]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

- Organization of data acquisition in spatial informatics
- Measurement and processing of laser scanning data
- Design and development of Geographic Information Systems (GIS)
- Expert services of GIS at self-governments
- Measuring of dimensions of industrial machines, construction using geodetic methods
- Motion and deformation survey of terrain and other artificial objects
- Application of GNSS technology with high accuracy
- Quality control and accuracy assessment of digital maps
- Research in the field of digital terrain models
- Photogrammetric measurements (terrestrial, aerial photos and laser scanners)
- Classification of satellite images using remote sensing evaluation methods

EXCELLENCE

- Photogrammetric measurements (terrestrial, aerial photos and laser scanners)
- Measurement of industrial facilities and machines with geodetic instruments
- Setup of GIS, application development
- GIS of monuments and architectural objects
- Environmental monitoring using GIS and remote sensing techniques
- Environmental impact studies
- Organizing of learning courses
- Development of distance and e-learning web portals

MISSION

To utilize our experiences and results in the private and governmental sector covering the research fields of geoinformatics including GIS, geodesy, photogrammetry, remote sensing and land management.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

- New methods in GPS positioning
- 3D modelling based on photographs
- Automatic quality control of digital terrain models
- 3D city modelling based on terrestrial laser scanning
- Development of geospatial databases and services
- Urban planning and land management technologies

MAIN CAPABILITIES

Measuring technology, research & development

- The instrumentation and the professional experiences make us capable to complete the following special tasks:
- Mapping,
- 3D modelling with photogrammetric and laser scanning technology,
- Quality control and deformation examination based on photos and geodetic measurements,
- Geodetic measurements of industrial constructions, TQM measurement of production process,
- Environmental monitoring and impact assessment.

FIELDS OF RESEARCH RESULTS APPLICATION

- Construction - civil engineering: geodetic measurements in civil engineering
- Measuring instruments: laser scanners, digital cameras, GNSS (GPS)
- Hazard management: mapping and classification of satellite and aerial images, expert studies
- Agriculture: land management, cadastral mapping
- Automotive industry: deformation measurement, TQM based on photos and geodetic measurements, 3D modelling in reverse engineering
- Renewable energy: planning of the location of windmills, mapping and GIS

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).

- Software: database management, learning portals
- Geographic Information Systems: design and development
- 3D modelling: terrain, buildings and other artificial objects

ALUMNI PROFILE

Degree in Land Surveying and Land Management (BSc):

Our aim is to train experts equipped with problem-solving, IT and communication skills, with fluency in at least one foreign language, extensive knowledge of natural, technical, legal, economic, and management sciences, and the ability to use their intelligence and skills in the domain of geoinformatics, land management, property and land law. Graduates will have a general overview of the various fields of land surveying (terrain interpretation and data acquisition); remote sensing technologies; spatial data processing; spatial information services; related legal and economic issues; urban management; and about property registration matters of the administrative and financial spheres. At the same time they will have expertise in specific areas, enabling them to apply their skills practically to surveying, processing, land registration, planning and information-services with the use of modern technologies, either individually or as the leader of a work group.

Degree in Public Administration Management (BA):

Our aim is to train experts to understand the methodology, the aims and practical techniques of public administration, the basics of political sciences and law, the methods of legislation and jurisdiction, and the functions and management of the institutions of the legal system.

With their basic knowledge of related social sciences they will be able to solve management tasks, to make public

administration decisions, to execute them and to organise the work of municipal bodies and that of other public authorities. They will have sufficient experience to continue their training at MA level. When launching the specialisation, our intention was to modernise and develop the property registration branch according to practical requirements. The focus of our course, accredited in the year 2000, was preparation not only for property registration jobs, still essential today, but also for jobs in public administration in a general sense, as well as in the financial sector, where banks and the world of economy and business also need specialists, and we satisfy this need with the development of our education.

MSc Degree in Land Management: The aim of the training is to graduate professionals at decision making and executive levels who are able to plan in a complex way, to resize the given area for agricultural aims to facilitate the harmony between production site capabilities and utilization. Instead of the scattered parcels, these agricultural properties become economically productive, thus meeting the interests of farmers.

Land managers will be prepared to form such economically cultivated lands, family farms, reasonably used land structures, where the circumstances of agricultural productivity, the working terms and the agricultural conditions develop, approaching the optimal quality of life. The MSc course for Land Management Engineers is an interdisciplinary training course where society, the economy and the environment have become a complex unit resulting such professionals who are able to improve the life conditions of rural regions and at the same time protect the environment. This way the population will get quality agricultural products, the market relations of the agriculture and the support capacity

will rise. The knowledge of land management engineers organically fits in among and necessarily completes the knowledge of the engineers in rural development, agriculture and urban management.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

36

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

10

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- Traditional instruments used in surveying
- Total stations used in geodesy and surveying
- GPS systems
- Evaluation instruments used in photogrammetry
- Laboratory of Digital Photogrammetric Workstations
- Photogrammetric Digital Camera with high precision and resolution
- GIS laboratories

BUDGET

TOTAL: 2 million CZK

PART OF THE TOTAL BUDGET COMING FROM PRIVATE RESOURCES (%): 20 %

PART OF THE TOTAL BUDGET COMING FROM FOREIGN RESOURCES (%): 80 %

MAIN PROJECTS

- Creation of Digital Terrain Models in city Szekesfehervar, Hungary
- Control measurements at the Aluminium Company of Alcoa Hungary (www.alcoa.com/hungary):

- control measurements of crane rails
- geodetic measurements of presses and rolling machines (axis and position)
- Construction measurements in Cottam, England
- control measurement of gas transfer and filtering system (dimensions),
- measurement of constructional elements.

ACHIEVEMENTS

Please, visit: [www.geo.info.hu]

- NODE - Networked Organization of Distance Education (SOCRATES, 2001-2003) - distributed courseware meta-database
- UNIPHORM - MULTI-COUNTRY PHARE project (1997-98) - short distance learning course for professional development in GIS and services for the OGIS environment
- eduGI - Reuse and sharing of e-Learning courses in GI Science education (2006-2007) - "Data Acquisition and Integration" learning module
- Nature GIS - A European thematic network for Protected Areas/Nature Preservation and Geographical Information (IST, 2002-2005) – Guidelines, edited by Ioannis Kanellopoulos, 2005, Italy, ISBN 92-894-9399-2

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Clark University (Worcester, MA, US)
- Intern. Institute for Aerospace Survey and Earth Sciences (Enschede, NL)
- Catholic University of Leuven, (Leuven, BE)
- GIS Intern. Group Genova (Genova, IT)
- University of Applied Sciences, (Karlsruhe, DE)
- University of Salzburg, (Salzburg, AT)
- BOKU (Vienna, AT)

- Slovakian Technical University (Bratislava, SK)
- The Faculty of Sciences, Department of Topography, University of Alba Iulia, (Alba Iulia, RO)
- The Faculty of Architecture and Constructions, Department of Land Survey and Cadastre from/ University of Oradea (Oradea, RO)
- Fujian Normal University, (Fuzhou, CN)
- Spatial Information Research Centre (SIRC) of. Fujian Province (Fuzhou, CN)
- Fuzhou University, (Fuzhou, CN)
- Institute of Remote Sensing Applications, Chinese Academy of Sciences (IRA, CAS), China
- University of Geodesy and Cartography (Moscow, RU)

COLLABORATION WITH COMPANIES

- Institute of Geodesy, Cartography and Remote Sensing (FÖMI) (Budapest, HU)
- Aluminium Company of Alcoa (Szekesfehervar, HU)

EXPECTATIONS

REQUIREMENTS

Research offers in area of GIS, GNSS, Photogrammetry, Remote Sensing, Land Management and cadastre mapping.

OFFERS

Infrastructure, research and development in GIS, GNSS, Photogrammetry, Remote Sensing, Geodesy, Land Management. Studies in environmental monitoring. Mapping. Research in cadastre surveying. Compilation and development of e-learning portals.



09/2011

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).



VEREIN SOFTNET AUSTRIA

RESEARCH GROUP CONTACT

Inffeldgasse 16b/2,
8010 Graz, Austria
[www.soft-net.at]

HEAD

BERNHARD PEISCHL

PHONE

0043 316 873 57 12

E-MAIL

[BERNHARD.PEISCHL@SOFT-NET.AT]

HEAD

JALAL RAZI

PHONE

0043 1 240 400

E-MAIL

[JALAL.RAZI@CIRQUENT.AT]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

Test automation, software quality assurance,
test case generation, integration of test tools,
automated debugging

EXCELLENCE

Test case generation, software debugging

MISSION

Bringing software technology into practical ap-
plications, software quality improvement, cost
reduction in software development

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

Req. Eng. in the enterprise 2.0 context, integration
of test tools, model-based testing, end-user
programming, defect forecasting, debugging

MAIN CAPABILITIES

Model development for testing and debugging,
tool integration, forecasting of error densities,
code analysis, test- and software quality
dashboards, GUI testing

FIELDS OF RESEARCH RESULTS APPLICATION

Financial industries, insurances, logistics,
automotive,, industrial automation,
telecommunications

ALUMNI PROFILE

Software engineering, requirements engineering,
system analysis, agile development, software
architecture, testing methods

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF/POSITIONS

(FTE/HC): 1

JUNIOR RESEARCH STAFF/POSITIONS, INCL. PH.D.

STUDENTS (FTE/HC): 13

BUDGET

TOTAL: ca. 4.000.000 EUR

**PART OF THE TOTAL BUDGET FROM PRIVATE
RESOURCES (%):** 60 %

**PART OF THE TOTAL BUDGET FROM FOREIGN
RESOURCES (%):** 0 %

MAIN PROJECTS

- Technoweb 2.0
- An Integrated Test Automation Framework
- Continuous IT Quality Management
- Re-Usability of Quality Efforts
- Test Support for End User Programming
- Continuous Defect Forecasting and Detection

ACHIEVEMENTS

RECENT ARTICLES IN SCIENTIFIC JOURNALS:

- [1] Ahsan, S. N.; Afzal, M. T.; Zaman, S.; Gütl, C.; Wotawa, F.: Mining Effort Data from the OSS Repository of Developer's Bug Fix Activity. - in: Journal of IT in Asia, 2010.
- [2] Nica, M.; Peischl, B.; Wotawa, F.: Constraint-based configuration of embedded automotive software. - in: International journal of mass customization, 2010.
- [3] Weighlofer, M.; Fraser, G.; Wotawa, F.: Using Coverage to Automate and Improve Test Purpose Based Testing. - in: Information and software technology (2009) vol, vol 51, 11, S. 1601 – 1617.
- [4] Weighlofer, M.; Aichernig, B.; Wotawa, F.: Fault-Based Conformance Testing in Practice. - in: International journal of software and informatics 3 (2009) 2-3, S. 375 – 41.
- [5] H. Hlavacs, K.A. Hummel, R. Weidlich, A. Houyou, H. de Meer, Modelling energy efficiency in distributed home environments. Int. J. Communication Networks and Distributed Systems 4-2 (2010), pp. 161-182.
- [6] Bernhard Peischl, Markus Zanker, Mihai Nica and Wolfgang Schmid, Constrained-based Recommendation for Software Effort

Estimation, To appear in the Special Issue of the Journal of Emerging Technologies in Web Intelligence, Academy Publisher.

- [7] Andreas Beer, Johannes Gärtner, Nysret Musliu, Werner Schafhauser, Wolfgang Slany. An AI-based break-scheduling system for supervisory personnel. IEEE Intelligent Systems, 25(2):60-73, 2010.
- [8] Markus Triska, Nysret Musliu. An Improved SAT Formulation for the Social Golfer Problem. To appear in Annals of Operations Research, 2010.
- [9] Markus Triska, Nysret Musliu. Solving the Social Golfer Problem with a Greedy Heuristic. To appear in Annals of Operations Research, 2010.

- SailLabs GmbH (Vienna, Austria)
- Siemens AG (Vienna, Austria)
- Software Competence Center Hagenberg (SCCH) (Hagenberg, Austria)
- UMA GmbH (Vienna, Austria)
- Ximes GmbH (Vienna, Austria)

EXPECTATIONS

OFFERS

improvement of software testing processes, introduction of software testing techniques, introduction of model-based testing, value-based software engineering, test tool integration, software dashboards, agile software development

MAIN COLLABORATING PARTNERS

COLLABORATIONS WITH ACADEMIC PARTNERS

- Technical University Graz, Institute for software technology (Graz, Austria)
- University of Innsbruck (Innsbruck, Austria)
- University of Vienna, Department of Distributed and Multimedia Systems (Vienna, Austria)
- Center of Usability Engineering and Research (CURE) (Vienna, Austria)

COLLABORATIONS WITH COMPANIES

- Arctis Softwaretechnologie GmbH (Inzing, Austria)
- ATOS (Vienna, Austria)
- AVL List GmbH (Graz, Austria)
- Cicero Consulting GmbH (Klagenfurt, Austria)
- Cirquent GmbH (Vienna, Austria)
- FOON GmbH (Graz, Austria)
- Kämmerer GmbH (Graz, Austria)
- Kapsch CarrierCom AG (Vienna, Austria)
- Kapsch TrafficCom (Vienna, Austria)
- Mobilkom AG (Vienna, Austria)
- Ranorex GmbH (Graz, Austria)

09/2011

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).



VRVIS CENTER FOR VIRTUAL REALITY AND VISUALIZATION RESEARCH, LTD

RESEARCH GROUP CONTACT

Donau-City-Straße 1,
1220 Vienna
[www.vrvis.at]

HEAD

DI GEORG STONAWSKI

PHONE

+43 (0)1 20501 30100

E-MAIL

[STONAWSKI@VRVIS.AT]

THEMATIC RESEARCH FOCUS

RESEARCH AREA

Visual Computing, Rendering, Visualization, Visual Analysis

EXCELLENCE

All of the above

MISSION

Visual computing (visualization, rendering, visual analytics, computer vision and virtual reality) has already become a key technology for industry and society. The clear preparation of an ever increasing amount of data as well as the creation of digital clones from real objects are enabling an efficient handling of information. New fields of research, production- and operation methods are realized which would have been unthinkable only a few years back.

VRVis is Austria's leading research company in the field of Visual Computing. Together with the Institute for Computer Graphics at the Vienna University of Technology and the Science Academie of Austria - Visualization Group VRVis forms one of the largest computer graphics research groups in Europe.

Currently VRVis employs about 50 highly qualified researchers at TechGate in Vienna. It is an active partner for research initiatives of the federal government and the City of Vienna. Its higher aim is to strengthen the innovation and competitiveness of Austria.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

RENDERING:

Rendering deals with creating images of objects as they appear in the real world, often with a strong emphasis on realism or interactive display algorithms. This is in contrast to visualization, where the focus lies on the graphical representation of abstract or processed data,

to enhance the understanding of situations that cannot be directly observed. Examples of rendering applications are virtual prototyping, architectural planning and reconstruction.

The rendering research group at VRVis addresses many problems associated with state of the art rendering tasks:

Acquisition – With methods like laser range scanning or photographic reconstruction, it has become feasible to capture very large areas with amazing detail. VRVis has significant experience with these processes and the associated challenges, including error detection, merging of partial acquisitions, data classification and simplification.

Scalability – Modern rendering systems are expected to display very large scenes with ease. These models are often in excess of several hundred megabytes, necessitating advanced resource management and highly efficient algorithms. The rendering system developed at VRVis is capable of displaying extremely large models – such as the entire city of New York – including highly detailed textures in real time.

Semantics – In addition to just displaying a model “as is”, it is often desirable to add some semantic information to identify or highlight specific parts for visual analysis. Handling semantic information has been an integral part of the rendering system at VRVis throughout its design and development, making it easy to adapt it to the specific requirements of new applications.

Interaction – Many applications do not simply provide a static scene, but require various levels of interaction. This could be a simple switch between several scenarios for an easy, direct comparison of design alternatives, or actually interacting with the model itself at any level, from repositioning parts to actually modifying its geometry and surface parameters. The highly flexible data structures at the basis of the VRVis rendering system allow its adaptation to

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).

these demands without any impact on its rendering performance.

VISUALIZATION:

Visualization is the science that enables human users to get insight into highly complex data in a visual way, exploiting the extremely high bandwidth of the human visual system to communicate information more effectively than is possible with non-visual means. We focus on interactive visualization that employs state-of-the-art computer graphics to generate images in real time, thus providing users with a maximum of flexibility and possibilities for data exploration.

Visualization can be used to obtain or communicate knowledge from a variety of different data sources and types, such as scientific data, medical data, or also general abstract information. In this research area, we focus on scientific visualization, including the traditional branches of flow visualization, medical visualization, and volume visualization.

Two of the most fundamental problems in visualization are handling the sheer size of the data generated by state-of-the-art acquisition techniques (e.g., Computed Tomography or Electron Microscopy) or simulation (e.g., Computational Fluid Dynamics), and the way in which human users can still be enabled to work with data of this complexity in an effective manner. We therefore perform research on widening the applicability and possibilities of scientific visualization via scalable, semantic approaches, which scale to massive data (terabytes to petabytes) and at the same time allow users to work in their own domain and terminology (e.g., fluid simulation, medicine, or neurobiology).

Cutting-edge research in these areas results in novel enabling technologies with

a wide variety of applications in natural sciences and engineering disciplines, such as medicine, biology (e.g., neurobiology, molecular biology), geography and seismology, meteorology, nondestructive testing and materials research, fluid simulation and engine design, and many more.

VISUAL ANALYSIS:

Visual analysis is the science of analytical reasoning facilitated by interactive visual interfaces as defined by Thomas and Cook in 2006. It is based on interactive visualization, but it is much more. It is an integrated approach which combines visualization, (semi-)automatic data analysis techniques and human factors. Visual analysis meets one of the most important challenges of the modern information age: how to effectively utilize the huge amount of data generated and acquired by modern computer systems, how to efficiently extract useful information out of it. Visual analysis is an enabling technology which can be utilized in almost all fields of research and in almost all business domains.

The VRVis was one of the first institutions that recognized the need of interactive visual analysis for engineering applications. Modern engineering is unimaginable without simulation. The data amount modern simulation technology produces is simple not comprehensible using conventional methods only. Engineers and scientists need new tools in order to cope with increasing complexity and amount of the data. Interactive visual analysis helps them to understand complex systems and complex physical processes. They can produce more efficient engines, more efficient medicine, or better understand natural processes.

We have several projects ranging from the basic research on interactive visual

analysis up to application research projects on interactive visual analysis for engineering applications at VRVis. We are also part of the VisMaster EU FP7 Coordination Action, which traces a new path for the visual analysis research in Europe. Many application partners from various industries and many researchers in various fields of visual computing make VRVis a perfect institution for research on visual analysis. We will keep our focus on engineering applications and we will expand to additional application areas in the future.

MAIN CAPABILITIES

- Austrian leader in applied research for Visual Computing
- Highly optimized rendering engine for the interactive depiction of large landscapes
- Medical visualization for volume data and segmentation
- Tools for interactive visual analysis (Visplore, ComVis)

FIELDS OF RESEARCH RESULTS APPLICATION

Visual Computing is used in many different areas including automotive industries, medical applications, infrastructure management, design optimizations, lighting design, etc.

ALUMNI PROFILE

People working at VRVis are highly motivated researchers with degrees in computer science.

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- 3D Beamer
- Barco Table
- Specialized 3D and rendering equipment

BUDGET

TOTAL: 4,000.000,- EUR

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%): 45 %

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%): 5 %

MAIN PROJECTS

- 2000 - 2008 VRVis Kplus (TIG, FFG)
- 2008 - 2010 VRVis Center (VSÖE, ZIT)
- 2010 - 2017 VRVis COMET (FFG)

ACHIEVEMENTS

- Jurypreis Staatspreis Multimedia
- Mercur prize
- IEEE Vis Contest winner
- 2 patents

MAIN COLLABORATING PARTNERS

COLLABORATIONS WITH ACADEMIC PARTNERS

- Vienna Technical University, Vienna, Austria
- Graz Technical University, Graz, Austria
- University of Bergen, Bergen, Norway
- ETH Zürich, Zurich, Swiss
- Harvard University, Boston, USA
- KAUST University, Jeddah, Saudi Arabia

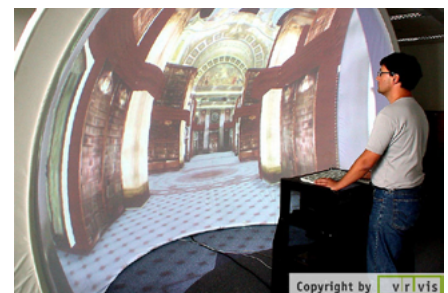
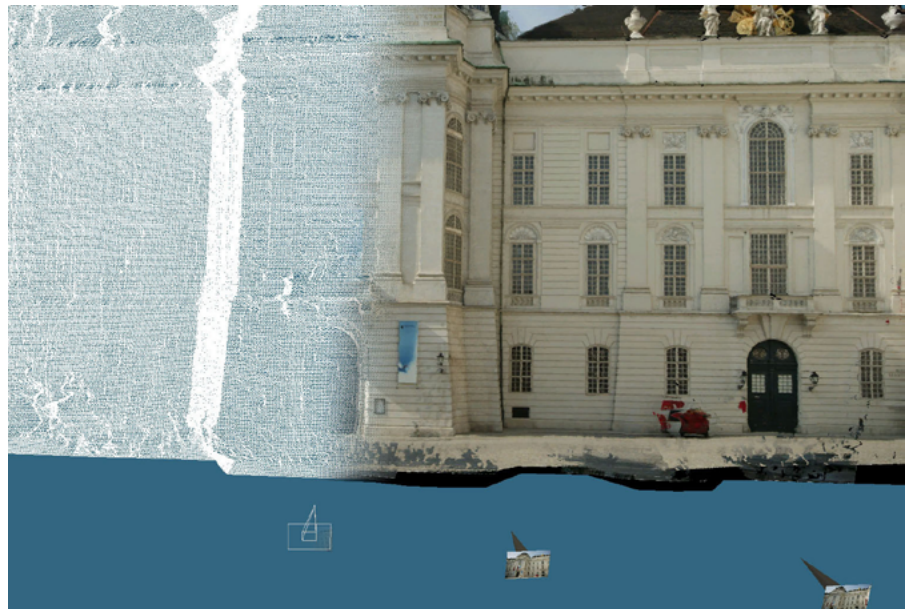
COLLABORATIONS WITH COMPANIES

- AVL, Graz, Austria
- AGFA, Vienna, Austria
- NVIDIA, USA
- OEBB, Vienna, Austria

EXPECTATIONS

OFFERS

Research in Visual Computing: making useful images out of data. Getting information out of data



09/2011

THIS SME INNOVATION GUIDE HAS BEEN DEVELOPED WITHIN THE CENTROPE TT PROJECT AND WAS FUNDED BY THE CENTRAL EUROPE PROGRAMME (EUROPEAN REGIONAL DEVELOPMENT FUND).