



Annual Report

10 | 11

**b-it**

Bonn-Aachen  
International Center for  
Information Technology



Helmut Dockter

## FOREWORD BY THE CHAIRMAN OF THE B-IT FOUNDATION

Since its inception eight years ago, the Bonn-Aachen International Center for Information Technology (B-IT) has pioneered excellence in international graduate education for applied information technology. The key to this success has been a unique cooperation between two leading universities, a young university of applied sciences, and the Fraunhofer society for applied research.



Prof. Dr. Gerhard Barth

The B-IT Master programs excel in many regards. Due to careful selection and intensive education, student success rates are among the highest in North Rhine-Westphalia, ranging up to over 90%. B-IT graduates are not just in great demand by industry, but have also been offered prestigious doctoral fellowships at leading universities worldwide. Quite a few early B-IT master graduates have already completed their doctorates, in some cases with high distinction and awards.

Continuous quality evaluation is an important part of the B-IT strategy. In 2010-2011, the B-IT Master Programs in Life Science Informatics and Media Informatics were first in Europe to receive the EuroInf European quality label, following their re-accreditation by the German ASIIN. In addition, following an intermediate evaluation of the state-funded doctoral research schools in early 2011, Minister Svenja Schulze recently announced continuation of funding of the B-IT Research School for doctoral training.

I invite young talents from all over the world to take advantage of B-IT's internationally renowned graduate programs, and would like to thank the directors, faculty, and students of B-IT for their successful work.

**Helmut Dockter**  
Vice Minister of Innovation, Science and Research NRW, Chairman, B-IT Foundation Council

## The International Advisory Council of B-IT

RWTH Aachen University, University of Bonn, Bonn-Rhine-Sieg University of Applied Sciences, have, in cooperation with the Fraunhofer Board of Management, established an International Advisory Council. Its mission is to ensure the relevance of B-IT's educational efforts for careers in the business world, to monitor B-IT's international competitiveness, and to foster B-IT's development by giving recommendations and guidelines. The rectors of the participating universities have appointed Prof. Dr. Gerhard Barth as Founding President; Barth is well known as founder of the German AI research institute DFKI, as top manager in companies such as Daimler-Chrysler, Alcatel, and Dresdner Bank, and more recently as partner in a consultancy firm. In addition, the council includes five internationally renowned representatives from academia and industry:

- Prof. Dr. Gerhard Fischer, University of Colorado, Boulder
- Prof. Dr. Ossama Khatib, Robotics Lab, Stanford University, Palo Alto
- Prof. Dr. Thomas Lengauer, Max-Planck Institute for Informatics, Saarbrücken
- Prof. Dr. Hermann Maurer, Media Lab, University of Graz



B-IT main building.

## Report by the Scientific Directors

The exploding demand for study places in Germany has also led to record applicant numbers in the international master programs offered by the Bonn-Aachen International Center for Information Technology (B-IT). Fortunately, the scientific success of all the partners – reflected in record numbers of third-party funded research projects – yielded additional lab course spaces and thus allowed us to react to this exceptional demand also with an exceptional acceptance number, growing by almost 30% compared to the previous years despite even stricter selectivity.

Another result making this record intake possible was also the further improved success rate and efficient study times of the three master programs in Media Informatics, Life Science Informatics, and Autonomous Systems, assisted by the again excellent placement record of our graduates in science and industry.

Many B-IT students do not stop with a Master degree but follow up with doctoral studies at well-known universities. By now, early graduates from all three B-IT master programs have succeeded in finishing doctoral degrees and continue their research careers at the post-doctoral level. Moreover, this report shows numerous best paper awards at top international conferences and publications in leading journals by our master and PhD students.

Since late 2008, B-IT also offers its own Research School for doctoral studies in eight areas of applied IT; the number of doctoral scholarships awarded by the B-IT Research School has reached 32 in 2010-2011. Following an intermediate evaluation, funding for the research school was extended to the full initially planned period of five years by the Ministry of Innovation, Science, and Research of North Rhine-Westphalia.

The master programs in Media Informatics and Life Science Informatics also underwent a rigorous evaluation as part of their re-accreditation by the national ASIIN Agency. This did not stop at formal documents, but also included the analysis of exams and theses as well as interviews with faculty and students. For the first time, the new European accreditation agency EQANIE joined an ASIIN evaluation with international reviewers. In September 2011, our master programs were thus the first in Europe to receive the EuroInf quality label during a celebration at Lake Como, Italy.

We would like to extend our cordial thanks to the B-IT Foundation Council led by Chairman Helmut Dockter, Vice Minister of Innovation, Science and Research NRW and Secretary Hans Stender, to the B-IT Advisory Board led by Founding President Gerhard Barth, to the B-IT Faculty and especially the study coordinators Jan Borchers, Martin Hofmann-Apitius, and Gerhard Kraetzschmar, to our assistant directors Alexandra Reitelmann, Jürgen Rapp, Gertraud Peinel, Christoph Quix, Stefan Lüttringhaus-Kappel, Thomas Bode and Iman Awaad, but most of all to the B-IT students for their enthusiasm and excellent cooperation.

This report intends to inform stakeholders, existing and future students and doctoral candidates, as well as the interested public about the B-IT activities in the academic year 2010-2011. Enjoy reading it!

**Armin B. Cremers,**  
University of Bonn  
**Matthias Jarke,**  
RWTH Aachen University and Fraunhofer FIT  
**Kurt-Ulrich Witt,**  
Bonn-Rhine-Sieg University of Applied Sciences



**Prof. Dr. Armin B. Cremers**  
*University of Bonn*



**Prof. Dr. Matthias Jarke**  
*RWTH Aachen University  
and Fraunhofer FIT*

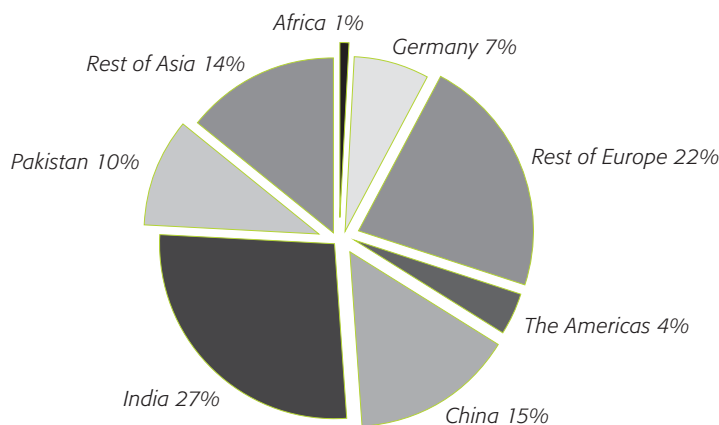


**Prof. Dr. Kurt-Ulrich Witt**  
*Bonn-Rhine-Sieg University  
of Applied Sciences*

## B-IT in Profile

The southwest of North Rhine-Westphalia is one of the largest, most vibrant locations in the European media and telecom industry. It is also one of the most innovative and fast-growing biotech regions in Germany, and there is much interest in the emerging fields of mechatronics and robotics. To make it the optimal place to study for professional work in these fields, the Bonn-Aachen International Center for Information Technology (B-IT) has been established as a joint venture of RWTH Aachen University, University of Bonn, Bonn-Rhine-Sieg University of Applied Science (BRSU) and the research institutes of the Fraunhofer Institute Center Birlinghoven Castle.

B-IT offers highly selective International Master Programs in Applied IT, as well as summer / winter schools for qualified undergraduate computer science students. Most courses take place in the beautiful B-IT building next to the former office of the German Chancellor on the banks of the River Rhine in Bonn. Admission to the B-IT Master Programs is linked to, and conditional upon, placement in research lab courses at the participating Fraunhofer institutes. Students in good standing are offered financial support during these lab courses.



Home Countries of B-IT Students.

The B-IT Universities Institute offers English language Master of Science (M.Sc.) programs in Media Informatics and Life Science Informatics, whereas the University of Applied Sciences offers a Master Program in Autonomous Systems. The Master Programs prepare students for successful international careers that require technical excellence and leadership, creativity and the ability to innovate. B-IT master programs are distinguished by their international orientation (structured according to the European ECTS standard), their focus on IT competence, and the deep integration of teaching and research.

A second goal of B-IT is the optimization and acceleration of existing undergraduate computer science curricula at Bonn University and RWTH Aachen University for selected top students. B-IT's International Program of Excellence (IPEC) pursues this goal by compact course modules delivered in summer and winter schools during the semester breaks. The B-IT Research School offers doctoral training with partial financial support from NRW state.

For the participating universities, the B-IT programs have also helped pave the way towards a smooth transition from the traditional German diploma system to the Bachelor-Master system following the Bologna accord; for example, the B-IT master programs were the first to be accredited within the participating universities in 2004-2005, and re-accredited in 2010-2011. The success of the B-IT programs is also demonstrated by a very good placement record, both in science and industry.

B-IT is financially supported by a 56 M€ Foundation initiated through the Bonn-Berlin program of the German federal government, as well as by matching NRW state funds. The B-IT Foundation was officially set up in October 2002, and a cooperation treaty was signed by the Rectors of the participating universities and the Fraunhofer Society.

## B-IT PRESENCE IN FACEBOOK

To improve student interaction and marketing to high potentials worldwide, B-IT launched a pilot facebook site in August 2011 (<http://www.facebook.com/bit.institute>). The site was publicized on the occasion of the German Unity Day, October 1-3, 2011 where e.g. Media Informatics faculty member Profes-

sor Stefan Wrobel announced an online experiment during the Fraunhofer exhibition at B-IT (see p. 6). In this context, the site was viewed more than 21,000 times which is comparable to sites in the entertainment sector. Since this kick-off, the facebook page has become a continuously active medium where students and other interested parties communicate in many languages.



*The annual B-IT Welcome Party provides an excellent opportunity for new students from all over the world to meet each other.*

## OFFICERS

### Founding Scientific Directors

*Prof. Dr. Armin B. Cremers,*  
University of Bonn

*Prof. Dr. Matthias Jarke,*  
RWTH Aachen University, Fraunhofer FIT

*Prof. Dr. Kurt-Ulrich Witt,*  
Bonn-Rhine-Sieg University of Applied Sciences

### Coordinators B-IT Study Programs

*Prof. Dr. Jan Borchers*  
(RWTH Aachen University), Media Informatics

*Prof. Dr. Martin Hofmann-Apitius*  
(Fraunhofer SCAI), Life Science Informatics

*Prof. Dr. Gerhard K. Kraetzschmar*  
(Bonn-Rhine-Sieg University), Autonomous Systems

### Assistant Directors/Study Advisors

*Iman Awaad, M.Sc.,*  
Bonn-Rhine-Sieg University of Applied Sciences

*Dr. Thomas Bode,*  
*Dr. Stefan Lüttringhaus-Kappel,*  
University of Bonn

*Dr. Gertraud Peinel,*  
Fraunhofer Institute for Applied Information Technology FIT

*Dr. Jürgen Rapp,*  
RWTH Aachen University

*Dr. Alexandra Reitelmann,*  
University of Bonn

### International Advisory Board

*Prof. Dr. Gerhard Barth,*  
Founding President

### B-IT Foundation Council

*Helmut Dockter (Chairman)*

Vice Minister of Innovation, Science and Research NRW

Chairman, B-IT Foundation Council

*Hans Stender (Secretary)*

Chancellor, Bonn-Rhine-Sieg University of Applied Sciences

*MinDir Dr. Hermann Müller-Solger*

Federal Ministry of Research and Education

*Prof. Dr. Ulrich Buller*

Board of Directors, Fraunhofer-Gesellschaft

*Jürgen Nimptsch*

Mayor, City of Bonn

*Frithjof Kühn*

County Chairman, Rhein-Sieg-Kreis

*Prof. Dr.-Ing. Ernst Schmachtenberg*

Rector, RWTH Aachen University

*Prof. Dr. Jürgen Fohrmann*

Rector, University of Bonn

*Prof. Dr. Hartmut Ihne*

Rector, Bonn-Rhine-Sieg

University of Applied Sciences

*Dr. Ernst Franceschini*

President, Bonn / Rhine-Sieg Chamber of Commerce



## Events and Visits



EQANIE-President H.-U. Heiß and Accreditation Committee Chair handed out the first EuroInf accreditation labels to B-IT representative Stefan Schiffer at a ceremony on Lake Como in September 22-23, 2011.

### **B-IT MASTER PROGRAMS FIRST TO RECEIVE THE EURO-INF QUALITY LABEL**

As first Higher Education Institutions in Europe, RWTH Aachen and the University of Bonn were awarded the Euro-Inf Quality Label for their jointly offered Master's degree programs "Media Informatics" and "Life Science Informatics". Also the Master's degree program "Software Systems Engineering", which is offered exclusively by RWTH Aachen University received the label.

The Euro-Inf Label is awarded by the European Quality Assurance Network for Informatics Education e.V. (EQANIE) to degree programs in the field of informatics. Since April 13th, 2011, the German Accreditation Agency ASIIN is authorized to award the Euro-Inf Label on behalf of EQANIE as a label complementing national accreditation.

RWTH Aachen University and the University of Bonn had undergone a kind of double accreditation in the past winter: Apart from a regular on-site-visit by an ASIIN-team of experts, they received an international team of observers from EQANIE, which had the task of monitoring the work of the ASIIN team and assess its compliance with the Accreditation Criteria developed by EQANIE. The positive "side-effect" of this process was the award

of the Euro-Inf Label to all three Master's degree programs along with the authorization of ASIIN by EQANIE.

### **PUBLIC MANAGEMENT CONFERENCE 2011**

Prof. Thomas Rose organized an expert panel on power break-downs and the impacts on businesses and civil society in cooperation with the Frankfurt School of Finance & Management. The expert panel was part of the Public Management Conference in September 2011 fostering innovative concepts for the public sector. The expert meeting focused on the variety of causes for large-scale and perhaps longer lasting shut-downs of electric power (*Schwarzfall* in German) and the impacts on daily operations and potential escalations due to interdependencies of infrastructures for society.

### **GERMAN UNITY DAY AND NRW DAY CELEBRATED AT B-IT WITH FRAUNHOFER EXHIBITS**

From October 1-3, 2011, Bonn was host to the celebrations of the Day of German Unity and the North Rhine-Westphalia Day. Over 4,000 visitors enjoyed the colourful science exhibition "Zukunft heute erleben" in the B-IT building organized by the six Fraunhofer institutes of the region. The exhibits presented some of the latest approaches and technical solutions of Fraunhofer in the field of information technology as well as security and radar engineering.



Kids and grown-ups alike enjoyed the gesture interaction system developed at Fraunhofer FIT.

## MAX-PLANCK-FORSCHUNGSPREIS-TRÄGER SEBASTIAN THRUN

Sebastian Thrun, a former Ph.D. graduate of B-IT Director Prof. Cremers at the University of Bonn and now as Full Professor at Stanford University the most-cited German computer scientist worldwide, was awarded one of the most prestigious German research awards, the Max-Planck-Forschungspreis 2011. On July 19, 2011, Prof. Thrun visited the B-IT Research School and presented his groundbreaking work on self-driving cars he has been doing to win the worldwide DARPA competition on driverless cars, and to transfer this work to practice within Google Research California.

## FÖRDERPREIS 2010 FOR SEBASTIAN BLUMENTHAL

Sebastian Blumenthal of the Master Program in Autonomous Systems was awarded the Förderpreis for his master thesis: "Best Practice Algorithms in 3D Perception and Modeling".

The award was sponsored by GKN Sinter Metals Components GmbH in Bonn via the Gesellschaft der Förderer der Hochschule Bonn-Rhine-Sieg e.V. The research was done in the EU project BRICS (Best Practice in Robotics), and was supervised by Prof. Dr. Erwin Prassler.

## AFCEA BEST THESIS AWARD 2011

Roland Müller of the Master Program in Autonomous Systems received the AFCEA Studienpreis 2011. AFCEA Bonn e.V. is the German Chapter of the Armed Forces Communication Electronics Association.

Müller received € 3,000 for his master thesis: "An OGC Sensor Observation Service for GPS and Mobile Sensors". It describes the conception, implementation and measuring of a GIS sensor server. Within the context of an emergency support system, emergency forces can utilize up-to-date data compiled by mobile sensors. The supervisor was Prof. Paul G. Plöger.



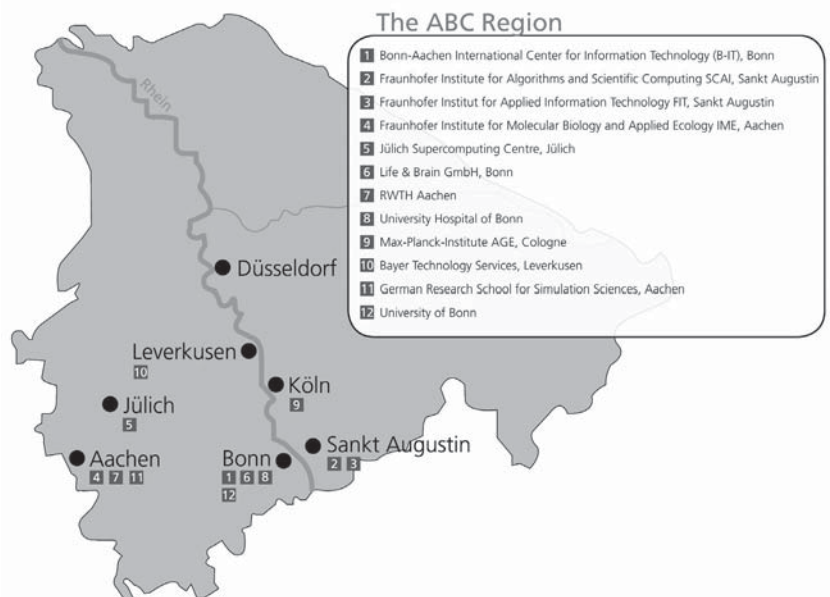
Sebastian Thrun.



The two best thesis award-ees, Roland Müller, Bonn-Rhine-Sieg University, and Jan Gassen, Bonn University with Generalmajor Erich Staudacher, president of AFCEA Bonn e.V., (left) and Dr. Michael Wunder (right), who is responsible for the AFCEA Bonn e.V. Studienpreis.

## ABC OF LIFE SCIENCE INFORMATICS

The 3rd Symposium ABC of Life Science Informatics was held at B-IT December 7, 2010. Like its predecessors, the symposium brought together leading representatives in the Aachen-Bonn-Cologne (ABC) region to optimize cooperation between science and business, including doctoral training.



# Research@B-IT

## IT SUPPORT FOR FIRE FIGHTERS

The research group of Prof. Thomas Rose amplified its research in the context of emergency management. Projects of this group evolve around means for process planning for emergency preparation, impact assessment of hazardous episodes and simulation of emerging technology opportunities for relieve and rescue organizations. For the latter the navigation support LifeNet for fire fighters is based on a wireless network of sensor nodes put in place by the advancing fire fighters to give them orientation on their way back. LifeNet is currently refined by project Profitex in cooperation with several fire brigades and RWTH Aachen's Textile Institute and Center for Learning and Knowledge Management in order come up with a marketable product. Our engineering processes for augmenting fire fighting technologies are built upon FireSim as a simulation-based approach for user-centric prototyping. Project Soconical forwards this simulation framework to assess impacts of new means of ICT support.

## OPEN PHACTS

The research team of Prof. Hofmann-Apitius is part of the "OpenPHACTS" consortium, a project funded by the European commission in the context of the "Innovative Medicine Initiative" (IMI). IMI was initiated as a joint undertaking of the European Federation of Pharmaceutical Research Associations (EFPIA) and the European Commission (EU). The aim of IMI is

to foster closer collaboration between the pharmaceutical industry and academic research. "Open PHACTS" ([www.openphacts.org](http://www.openphacts.org)) aims at creating an "open pharmacological space", a public resource for pharmaceutical data that are of use for both, industrial as well as academic research. Dr. Marc Zimmermann, Deputy Head of the Department of Bioinformatics at Fraunhofer SCAI, is leading the Open PHACTS work packages assigned to University of Bonn; the close collaboration between Fraunhofer SCAI and B-IT is also indicated by the fact that Dr. Zimmermann has now a dual affiliation with the University of Bonn and Fraunhofer.

## LSI GRADUATE YE HU WINS TWO PRIZES FOR HER PHD DISSERTATION AT B-IT

After undergraduate studies at Southeast University Nanjing, China, Ye achieved her master in Life Science Informatics in early 2009. Already in 2011, she defended her PhD thesis within the research group of Prof. Jürgen Bajorath, and won two important prizes: A national award for outstanding self-financed "Chinese Students Study Abroad" from the China Scholarship Council, and the "Bayer Promotionspreis" awarded by Bayer Healthcare. Dr. Yu currently continues postdoctoral research with Prof. Bajorath.



LifeNet – navigation support for fire fighters.



## PROFESSOR HEIKO SCHOOF CO-OPTED FOR THE MASTER PROGRAM OF LIFE SCIENCE INFORMATICS

Professor Heiko Schoof (School of Agriculture of the University of Bonn and Max Planck Institute for Plant Breeding, Cologne) has been co-opted for the Master Program of Life Science Informatics. He has already joined the LSI faculty and will extend LSI courses to the area of green bioinformatics / crop bioinformatics. This opens new vistas for future students and increases their opportunities. The collaboration with Professor Schoof has already become fruitful: Together with him and B-IT Professor Hofmann-Apitius a new Lab course "In Silico Experimentation using eLabs" in collaboration with Manchester University (Professor Carole Goble) was established. The first run of this new lab course was in summer 2011.

## MEDIA COMPUTING GROUP RECEIVES SEVERAL AWARDS

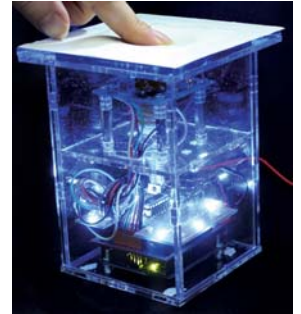
The Media Computing Group, Prof. Jan Borchers' B-IT-endowed Chair at RWTH Aachen University, has remained Germany's leading HCI research group in terms of archival publications at ACM CHI, the premier international conference on Human-Computer Interaction.

Yvonne Jansen, Thorsten Karrer, and Prof. Jan Borchers also received the Best Note and Best Demo Awards for their work on "MudPad", a tactile feedback and haptic texture overlay for touch surfaces, at the ACM Interactive Tabletops and Surfaces (ITS) 2010 conference.

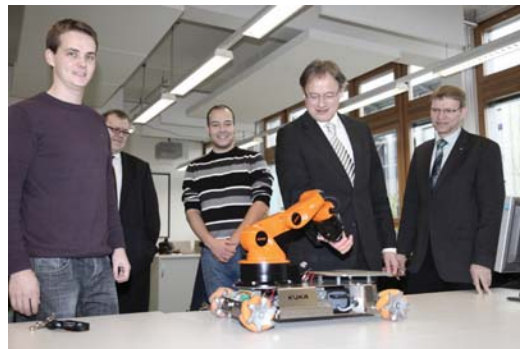
Prof. Borchers's recorded lectures on "Java programming for everyone" and on iPhone application programming topped the list of most frequently downloaded lectures in Apple's prestigious iTunes University lecture series.

## BONN-RHINE-SIEG UNIVERSITY OF APPLIED SCIENCES GETS KUKA YOUTBOT

Bonn-Rhine-Sieg University of Applied Sciences (BRSU) became the first university worldwide to receive a KUKA youBot. This innovative research and development platform from the manufacturer KUKA consists of an omnidirectional base and a manipulation arm with five degrees-of-freedom. The robot is used for research and development of novel algorithms for mobile manipulation, and will be used by BRSU's Master's Program in Autonomous Systems and by EU project BRICS. The youBot has the potential to become a milestone of robotics research and development.



"Mudpad".

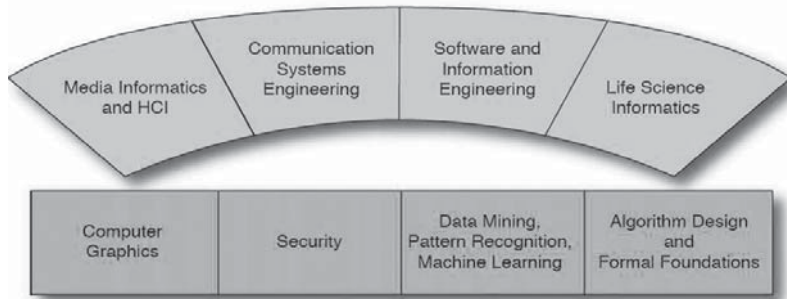


Prof. Dr. Hartmut Ihne, Rector of BRSU, and KUKA youBot.

## MEDIA COMPUTING GROUP PROJECT "AIXPLORER" RAISES 1.5M€ OF FUNDING

Aixplorer is a mobile tourist guide system combining urbanistic-historical and touristic applications into a new and unique experience. The state of NRW funds the 3-year project with a 1.5 million Euro grant through its IKT.NRW program.

# B-IT Research School



Prof. Dr. Holger Fröhlich.

The B-IT Research School complements the successful international B-IT master programs with a structured doctoral training. A key aspect of our approach is that the B-IT Research School does not just support the scholarship students but also the 150-200 project researchers from the projects of RWTH Aachen, the University of Bonn, the Fraunhofer institutes in Birlinghoven, and the University of Applied Sciences Bonn-Rhine-Sieg. We thus close the gap between our Master Programs and our large research projects such as the UMIC Excellence Cluster, the Collaborative Research Centers and Focused Doctoral Programs, the EU- and BMBF-funded cooperation projects and direct industrial projects.

## NOVEL DOCTORAL TRAINING CONCEPT

The B-IT Research School clusters the doctoral candidates across participating institutions in eight key themes where the region is highly competitive internationally. Each area is coordinated by one or two internationally known researchers and organizes its own program of regular research seminars, where the doctoral candidates present their research, and of compact courses in which international visitors join the local faculty to train the candidates in latest scientific status and methods of their fields, but also in soft skills around project management, writing and presentation techniques, and general scientific methodology. The course program is organized such that project researchers are

not hindered in their normal duties. Conversely, internship programs offer the more theoretically oriented students the opportunity to obtain experience in larger research projects.

## HIGH-QUALITY RESULTS

Up to the academic year 2010-2011, a total of 32 doctoral scholars from 13 countries could be supported; meanwhile the first doctoral theses have been submitted. From the start, several of the scholarships have been co-financed by industry or other organizations.

An important success indicator of the B-IT research school is the impressive number of publications in highly reputed conferences and journals. It increased in 2010 by a factor of 4 to 54 publications. This equates to nearly 3 papers per scholar present in the full year 2010.

Research quality is further underlined by several best paper awards at leading conferences such as CHI and ECML-PKDD, and competitions such as TREC-CHEM.

In 2011, an intermediate evaluation of the NRW Research Schools was conducted by the Ministry of Innovation, Science, and Research. Based on the very positive results, funding for the B-IT Research School has been extended to the full planned five-year period.

## CHINA SCHOLARSHIP COUNCIL AWARDS PHD SCHOLARSHIP AT B-IT RESEARCH SCHOOL

Ms Shanshan Zhang, graduate of Tongji University Shanghai, has been awarded a highly prestigious scholarship from the China Scholarship Council, to pursue her PhD with Prof. Armin B. Cremers at the B-IT Research School, based on her excellent performance in the extremely competitive selection process.

## STEFFEN KIRCHHOFF WINS NRW YOUNG SCIENTIST AWARD IN APPLIED INFORMATICS



In 2011, the B-IT Research School participated in the Young Scientist Award Contest, a joint initiative of nine International NRW Research Schools and the Ministry of Innovation, Science, Research and Technology of North Rhine-Westphalia. In each school's research field, a prize of \$1,500 is awarded to the best publication by a bachelor, diploma or master student before graduation. The 2011 award in the field of Applied Informatics goes to Steffen Kirchhoff, diploma student at the chair of data exploration and management (Prof. Thomas Seidl) at RWTH Aachen University, for his paper "Modelling Image Similarity by Gaussian Mixture Models and the Signature Quadratic Form Distance" at the top international conference on Computer Vision, the IEEE-ICCV 2011 in Barcelona.

## BLOCK LECTURE ON "NETWORK MONITORING, ADVANCED ATTACK DETECTION AND PREVENTION"

In December 2010 Dr. Robin Sommer and Dr. Christian Kreibich gave a three-day compact course at the B-IT Research School. The two researchers from the ICIR Research Center at UC Berkeley gave an introduction into the principles of network intrusion detection and the respective challenges in this field. About thirty students attended this event which has been organized by the Chair of Communication and Distributed Systems.

## OUTSTANDING BIOINFORMATICS JOURNAL PUBLICATION BY B-IT SCHOLAR PAURUSH PRAVEEN

B-IT Professor Fröhlich and B-IT Research Scholar Paurush Praveen published together with Achim Tresch (University of Munich) a paper in the top journal "Bioinformatics" on "Fast and Efficient Dynamic Nested Effects Models". The paper was chosen as a special talk for the "highlight track" at the joint meeting of the 19th International Conference on Intelligent Systems for Molecular Biology and 10th European Conference on Computational Biology 2011 in Vienna.

## B-IT PHD SCHOLAR HARSHA GURULINGAPPA WINS PRESTIGIOUS RESEARCH COMPETITIONS

Harsha Gurulingappa, PhD student in B-IT Research School, has won the TREC-CHEM Challenge 2010 in the area of chemical Information Retrieval. The runner-up was the University of Berkeley, followed by the University of York. In addition, Harsha Gurulingappa placed third (in a field of 22 participants) at "I2B2 challenge" (text mining in electronic patient records) held in 2010 at the University of Albany, USA.

## B-IT PHD SCHOLAR BRIGITTE BODEN WINS BEST PAPER AWARD AT ECML-PKDD

Stephan Günnemann, Brigitte Boden, and Thomas Seidl received the Best Paper Award in Data Mining at the ECML-PKDD 2011 Conference held in Athens, Greece, September 5-9, 2011, the leading European Conference in the fields of Machine Learning and Data Mining. The paper was titled "DB-CSC: A density-based approach for subspace clustering in graphs with feature vectors".



Steffen Kirchhoff.

## Master Program in Media Informatics



*Prof. Dr. Jan Borchers,  
Media Computing*



*Prof. Dr. Thomas Rose,  
Media Processes*



*Prof. Dr. Otto Spaniol.*

Computer scientists with an applied focus have been in great demand in the past, and this is expected to continue for the foreseeable future. Graduates of the Master Program in Media Informatics will be well-prepared for the challenges faced when working in computer systems engineering and for creative work with audio-visual media. The Aachen – Bonn – Cologne region is home to many prospective employers, including global players such as Philips, Microsoft, Telekom, Vodafone, Bertelsmann Group, as well as many television stations including RTL, WDR etc.

While a Bachelor degree in Computer Science typically qualifies to participate in large software projects, the Master degree provides the qualifications for project leadership. Graduates of the program in Media Informatics can be expected to be technically innovative, to work as system architects, and to manage large projects. Students who excel during their master program will also have the necessary qualification to pursue a doctoral degree in Germany or abroad. The Excellence Research Cluster “Ultra-Highspeed Mobile Information and Communication (UMIC)” offer an exceptional research environment for the students.

The Master Program in Media Informatics educates the students to successfully meet the novel technical and economic challenges at the intersection of computer science, software engineering, next-generation communication systems, and the media. It is offered as a joint program of RWTH Aachen University and University of Bonn. The program is characterized by a significant portion of lab courses embedded in research of the participating Fraunhofer Institutes for Applied Information Technology FIT and for Intelligent Analysis and Information Systems IAIS.

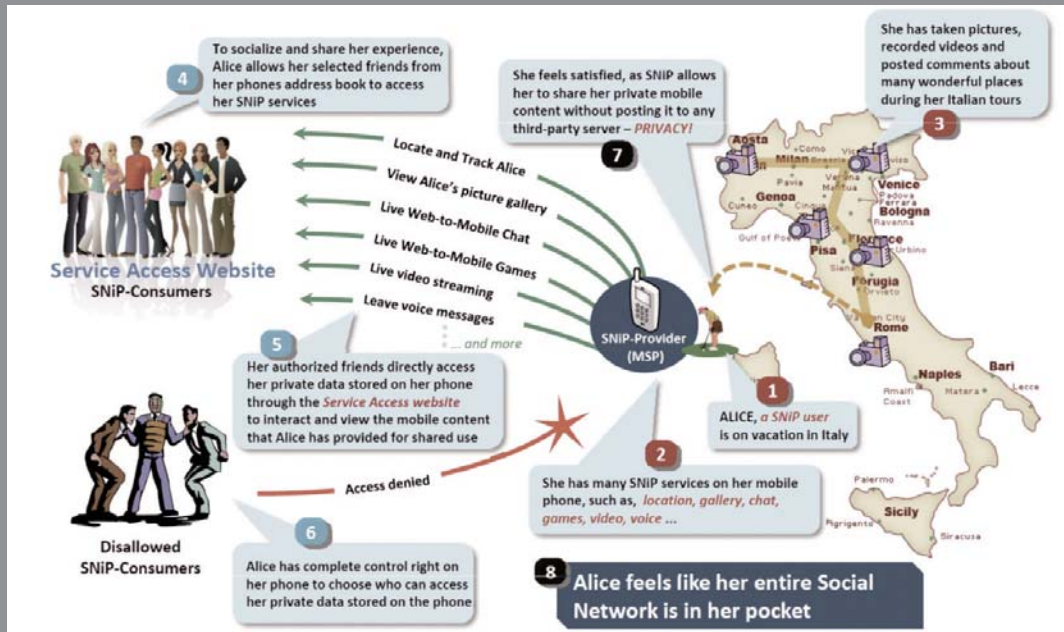
The degree is conferred by RWTH Aachen University. Cooperation partners from industry and media research contribute to a rich teaching program. The course contents are structured according to the ECTS (European Credit Transfer System) and consist of three main blocks: Computer Science and its mathematical foundations, Multimedia Technology, Media Science and business aspects. Major topics include: Internet Infrastructures, Data Communication, Digital Interactive Media, Management of Information, Computer Graphics, Animation, Visualization, Speech/Image/Video Processing, Game Design, Security and Cryptography, Designing Interactive Systems, Cooperative Work Environments, E-Business, Knowledge Management, Virtual and Augmented Reality, and Software Engineering.

Following the retirement of long-year Media Informatics study coordinator Prof. Dr. Dr. h.c. Otto Spaniol in the summer of 2010, Prof. Jan Borchers was appointed as his successor. Many thanks for seven years of excellent service to Prof. Spaniol!

28 Media Informatics students have completed their degree in the academic year 2010-2011. The graduates quickly found interesting positions either as doctoral students in Germany and abroad, or in attractive companies. The incoming class of 2011 comprises 50 students from 32 countries.

Media Informatics students were unusually successful in obtaining competitive prestigious scholarships and 18 students received a scholarship this year. Eight incoming students were pre-selected for participation in the prestigious Erasmus Mundus program European Master of Informatics we are conducting jointly with the universities of Edinburgh (UK) and Trento (Italy).





## PHD WITH DISTINCTION AWARDED TO MI ALUMNUS FAHAD AIJAZ

B-IT Media Informatics Alumnus Fahad Aijaz (M.Sc. 2006) defended his dissertation on "Mobile Server Platform: Architectures and Protocols for Future M2M Ecosystems" with the highest grade "summa cum laude" in spring 2011 within the UMIC Excellence Cluster at RWTH Aachen University. Supervisors were Prof. Dr. Bernhard Walke (Communication Networks) and Prof. Dr. Matthias Jarke. A prototypical application, "Social Network in the Pocket (SNiP)", demonstrated many advanced social network features, but unlike the leading products such as facebook or studyVZ, keeps all data on your own devices, thus maintaining full data ownership and privacy. SNiP was tested by over 1,000 users in Europe, China, and the US as one of the top-ten among 128 entries in the worldwide Ericsson Application Award competition and finally won 4th prize. Dr. Aijaz is now System Architect Automotive with Vodafone Group Services, Germany

### Diana Cerbu

Software Engineer, Capgemini, Berlin, Germany



After attaining my Bachelor degree in Romania, I was glad to be admitted in the Media Informatics program. Thanks to the program, I've had the great opportunity to write my master thesis with one of the greatest

mentors in the Environment Understanding department at Daimler AG. Moreover, I gained international and cultural experience and, most importantly, friends from all over the world. I will encourage everyone to follow an international program. Unlike the majority of my colleagues, I have chosen to work after my graduation in the industry, which I find very exciting.

### Yaowen Wu

Country Manager China, Plinga GmbH, Berlin, Germany



Plinga is a German social game publisher. It publishes many casual and social games on plenty of European social networks, cooperated with Asian and North American social network industry. As country

manager for China I am doing business development and product management between Plinga and Chinese game developers. The Media Informatics program provides me a great platform to pursue my master study, and leads me to the social network area. As MI is not only offering many interesting and high quality lectures, but also tightly cooperating with Fraunhofer, I was lucky to do some research work and finish my master thesis in the Visual and Social Media group of Fraunhofer IAIS who gave me many valuable and outstanding knowledge, suggestions and enlightening. Besides, I also got my first publication and participated in the ICPR2010 in Istanbul.

### List of employers of MI Alumni:

**Business:** Ableton AG, Adecco Engineering & IT, Adecco Phaholyothin Recruitment Ltd., Avedas AG, Bank of Mexico, Bertelsmann AG, Bombardier Inc., Brainloop AG, BTC Business Technology Consulting AG, Capgemini, CAS GmbH, CBC Cologne Broadcasting Center GmbH, COMNEON GmbH, Deutsche Telekom AG, Dynevo GmbH (Bayer), Ericsson AG, European Computer Telecoms AG Finantix Srl, Forth corporation, Fox Chase, Huawei, IdeaObject Softwares (Pvt) Ltd., IP Labs, iPharro Media GmbH, IW-One AG / QSC AG, Kisters AG, Lakshmi Technology and Engineering Industries Ltd., LHS Telekommunikation Lycos, Mastercard, Microsoft, NAVTEQ, Next Level Integration GmbH, Novartis, Oando Plc, Plinga GmbH, PricewaterhouseCoopers AG, Qiagen GmbH, Recomind GmbH, Samsung Electronics, SAP AG, sd&m AG, Siemens AG, Siemens Healthcare AG, Solutions 4 Media, Sytel Reply GmbH, T-Systems, Teleca, Tessella plc, Vodafone AG, Werum Software & Systems, Workplace Systems, Xerox Research Centre Europe

**Universities & Research:** B-IT, B-IT Research School, Bahria, Czech Technical, Chinese Academy of Science, ETH Zürich, FGAN, Fraunhofer FIT, Fraunhofer IAIS, Research Center Jülich, RWTH Aachen, Swiss Federal Institute of Technology, University of Agder, of Arab American Jenin, of Asia and the Pacific, of Atma Jaya Yogyakarta, of Augsburg, of Bonn, of Duisburg-Essen, of Edinburgh, of Engineering & Technology Peshawar Pakistan, of Hamburg, of Heidelberg, of Stuttgart, of the West Indies, of Trento, TU Eindhoven, TU Darmstadt, TU Munich.

## Master Program in Life Science Informatics



*Prof. Dr. Jürgen Bajorath,  
Life Science Informatics*



*Prof. Dr. Martin Hofmann-  
Apitius, Life Science Infor-  
matics*

The Master Program in Life Science Informatics (LSI) is offered by the University of Bonn and RWTH Aachen University in cooperation with the Fraunhofer Institutes of Scientific Computing (SCAI) and Applied IT (FIT). The degree is conferred by the University of Bonn. This interdisciplinary program educates the participants to successfully master the novel technical and economic challenges at the crossroads of biotechnology, medicine, pharmaceuticals and computer science. The curriculum consists of three main blocks: Computer Science and Mathematics for life scientists; Basic principles of Life Science Informatics; Biology of the cell and systems biology.

Major topics include biomedical database systems, data mining and machine learning, statistical genetics, drug design, medical imaging and visualization, computational neuroscience, computational modeling of regulatory and metabolic networks, cheminformatics, bioinformatics, molecular modeling, molecular biology, pharmaceutical chemistry, biotechnology and systems biology. The program emphasizes a profound understanding of biological structures (such as proteins, nucleic acids, genes, metabolic, neural networks and organisms) as well as the appropriate application of methods of computer science to this field. It also includes training designed to sensitize students to the ethical implications of emerging biotechnologies. This combination will enable the successful students to understand biological or medical problems and to find appropriate and valid solutions that bioinformatics can offer.

The program is characterized by a significant share of research lab courses embedded in both basic and applied research of the participating Fraunhofer Institutes FIT and SCAI as well in labs of CEMBIO (Center for Molecular Biology) and LIMES (Life and Medical Sciences Research Biocenter Bonn). The

final six months of the program are dedicated to the master thesis which can be done in cooperation with industry.

Graduates of the program are well prepared for the typical professional tasks in applied data analysis, systems biology and data modeling, in industrial functional genomics, drug design and pharmacology. The Aachen – Bonn – Cologne – Düsseldorf region is home to many prospective employers, including excellent academic institutes and research driven companies. The regular and well attended meetings of the LSI Series “The ABC of Life Science Informatics” in the years 2008-2010 have contributed to strengthen ties with regional scientists of the region. Several interesting master thesis have been carried out in collaboration with them. The interaction and collaboration with companies could be extended to companies such as Merck KGaA. LSI Students were also instrumental in this process. This has increased the visibility of the program considerably, not only in the region but on a larger geographical scale.

This year, 18 students successfully graduated with master theses. Top students again received excellent offers from institutions such as Max Planck Research Schools and Cambridge University UK. The superb response to the program in the previous years made it possible to refine the call for new students and to optimize the selection process for incoming students. Now, the application process consists of two steps. Students who passed an online application procedure were admitted to interviews carried out face-to-face in Bonn or via Skype. About 60 interviews with applicants from all over the globe were held from a total of 133 applications. Thirty students, a record number of students since the program’s introduction, will begin their studies in Life Science Informatics in winter semester 2011/2012.

## LSI LECTURE SERIES 2011

B-IT professors Holger Fröhlich and Martin Hofmann-Apitius organized the annual Life Science Informatics Lecture Series. This year, it centered on "Computational Methods in Systems Biology". Various excellent researchers gave interesting talks, including Dr. Florian Markowitz from Cambridge University (UK), Professor Jordi Mestres University Pompeu Fabra, (Spain) and Professor Stein Aerts from the Katholieke Universiteit Leuven (Belgium). The summer lecture series had complemented a preceding lecture series with talks focused on "Algorithms in Bioinformatics", including among others lecturers from Swiss Federal Technical University of Zurich and – again – Professor Jordi Mestres.

## LSI SUCCESS STORIES

### Olga Ivchenko

graduated with a degree in physics from the Saint Petersburg State University in 2008 and joined LSI in the same year. She was part of the B-IT "Work Study Program", which offers students a research assistantship in one of the groups participating in the program. Ms Ivchenko joined the group of B-IT Professor Hofmann-Apitius. She graduated in 2010 with a Master thesis and published a paper entitled "PLIO: an ontology for formal description of protein-ligand interactions" in a top journal of the area, in "Bioinformatics" as first author. Ms Ivchenko has meanwhile joined the German Center for Cancer Research in Heidelberg for her PhD research.



### Shweta Bagewadi



graduated from Visveswaraiyah Technological University in Bangalore, India, in 2007 and then gained some work experience at Cognizant PVT, India. She joined LSI in 2009. In 2010 Ms Bagewadi went to an internship to the Merck KGaA in Darmstadt which she did to highest acclaim. She will continue her work under the guidance of B-IT Professor Hofmann-Apitius with this company in the context of her Master thesis. Her excellent performance during the internship also strengthened the scientific collaboration with Merck thereafter. The collaboration was extended and now includes Mr Harsha Gurulingappa, member of B-IT Research School in the group of B-IT Professor Hofmann-Apitius and former LSI student.

### Ashutosh Malhotra



joined B-IT in 2009, graduating from Jaypee College of Information Technology in Noida (Deemed University), India, with a Scholarship within the Scholarship Plus program of the University of Bonn. The Scholarship Plus program addresses students from countries of emerging markets. Mr Malhotra meanwhile carries out his Master thesis in the group of Professor Hofmann-Apitius in the area of knowledge discovery of neurodegenerative diseases. Mr Malhotra also produced and directed two student movies, one of which was premiered at the Welcome Party to B-IT students in October 2010.

### List of employers of LSI Alumni:

B-IT Research School  
Cambridge University, UK  
European Bioinformatics Institute, Cambridge, UK  
Fraunhofer Institute SCAI  
Galileo Press  
German Center for Cancer Research (DKFZ) Heidelberg  
Leaf Bioscience s.r.l., Italy  
Max Dellbrück Center Berlin  
Max Planck Institute for Biophysical Chemistry  
Max Planck Institute for Plant Breeding Research  
Max Planck Institute for the Biology of Ageing  
Max Planck Institute Tübingen  
National Technical University of Singapore, Singapore  
Philips  
Research Center Jülich  
RWTH Aachen  
University of Bonn  
University of Cologne  
University of Luxembourg  
University of Oxford, UK  
University of Tübingen  
University of Utrecht



## Master Program in Autonomous Systems



*Prof. Dr. Gerhard Kraetzschmar,  
Autonomous Systems*



*Prof. Dr. Paul-Gerhard Plöger,  
Autonomous Systems*



*Prof. Dr. Erwin Prassler,  
Autonomous Systems*

The Master Program in Autonomous Systems is offered by the B-IT Applied Science Institute (b-itAS) in the Department of Computer Science at the Bonn-Rhine-Sieg University of Applied Sciences. b-itAS cooperates closely with the Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS in implementing the program, which started in winter 2002. The program is managed by three professors (Gerhard Kraetzschmar, Paul G. Plöger, Erwin Prassler), two teaching and research associates (Iman Awaad and Anastassia Küstenmacher) and researchers, who have been recruited in due course of the two European research projects XPERO and BRICS, namely Björn Kahl, Nico Hochgeschwender, Jan Paulus, Michael Reckhaus, and Azamat Shakhimardanov.

Students get a solid theoretical background in Autonomous Systems. Examples of lectures are Autonomous Mobile Robots, Control and Systems Theory, Robot Manipulation, Learning and Adaptivity, Hardware-Software Co-design of Embedded Systems, and Probabilistic Reasoning, Computer Vision, and Planning and Scheduling. The students may specialize in fields like System Design, Navigation, Sensors and Modeling, Computer Vision or Manipulation. The courses are combined with research projects conducted at IAIS or other approved institutions. The b-itAS program has been accredited by ASIIN in 2006.

In the academic year 2010-2011, 18 students were admitted from 187 applications. Eight students completed their degree; around half of them continued with doctoral studies or other research positions.

The three professors of the program are actively involved in many scientific activities, including memberships in technical committees of IEEE or in the RoboCup Federation

trustee board, numerous program committees of workshops and scientific conferences like IROS, ICRA, ICMA, AAMAS.

Recently the MAS program initiated cooperation with Prof. Dr. A. Yuschenko of the Department of Robotics at Moscow State Technical University Bauman. This activity is sponsored by the International Bureau of the German Ministry of Science and Education BMBF within the frame of the "German-Russian Year of Education, Science and Innovation". The first activity to be jointly conducted is a special session on the conference on "Extreme Robotics" which took place in November 2011. In February 2012 there will be a public student tournament on a pick and place challenge using a set of youBots, a desktop version of a mobile manipulator which were recently acquired by BRSU. In May 2011, the first "German Russian Symposium on Robotics" will take place at Automatica in Munich. Both partners strive for a solid, sustainable contact and ultimately aim for a double degree course in future.

Prof. Kraetzschmar took a sabbatical in the winter semester 2010/2011 in order to concentrate on research on software engineering for robotics, one of the areas that his research group focuses on within the EU-funded project BRICS. Aside from participating in many BRICS-related meetings and several conferences (IROS, SIMPAR) during his sabbatical, he also visited Prof. Kent at the University of New Brunswick in Fredericton, Canada and Prof. Ubbo Visser at the University of Miami in Florida, USA, to discuss possible cooperation. Upon invitation by Dr. Brian Gerkey, chief software architect of the well known robotics software frameworks Player/Stage/Gazebo and ROS, he also visited Willow Garage Inc. and interviewed a representative set of ROS developers and interns about software engineering issues in robotics.



## THE B-IT-BOTS WIN AGAIN

Three years running the b-it-bots have competed very successfully with Johnny, their robot. In six tournaments they were always among the three best teams and in 2009 were world champions. This year the b-it-bots have retired their champion Johnny Jackanapes and are now competing with robot Jenny instead. Jenny, the "daughter" of Johnny, is equipped with the latest sensor system and a top class manipulator. The KUKA Lightweight robot arm has been mounted on to the Care-O-Bot III that was developed by the Fraunhofer IPA in Stuttgart. It has got an omnidirectional actuator and can therefore move forward and turn on its own axis simultaneously.

At its first competition, the RoboCup German Open in April 2011, Jenny grabbed a spot on the podium coming in at third place – a success that was repeated during the much tougher competition the RoboCup World Championships 2011 in Istanbul. The test runs of the first round did not go according to the team's wishes. Nevertheless, they made it to the next level, together with 11 other teams from the original 25 competing teams. After the initial warm-up Jenny and the whole team were placed third in the final round of five teams and could hold onto this successful result.

Christian Müller, Frederik Hegger, Sven Schneider and Jose Ruiz, all students from the Master of Autonomous Systems Degree Program, were part of the team in Istanbul, as well as the research associates Nico Hochgeschwender, Jan Paulus and Michael Reckhaus. The b-it-bots are supervised by the professors Gerhard K. Kraetzschmar and Paul G. Plöger and supported by the Bonn-Aachen International Center for Information Technology (b-it). Also part of the team were research associates Florian Weißhardt, Alexander Bubeck and Ulrich Reiser from Fraunhofer IPA, who have all contributed to this marvelous success.

## PHD SCHOLARSHIP FOR ANASTASSIA KÜSTENMACHER

Anastassia Küstenmacher, an alumnus of the Master Program in Autonomous Systems, was one of two students who were presented with special university-funded scholarships to work on their PhD by the Bonn-Rhine-Sieg University of Applied Sciences (BRSU) equal opportunities commissioner Annegret Schnell. For a duration of three years she will receive a monthly stipend of € 1,000 that will help her pursue her PhD research in addition to her current work as a research associate in the program.

Prof. Dr. Hartmut Ihne, the president of BRSU, welcomed this special recognition of the young academics, since one of the important goals of the university's new development strategy is to enhance staff capacity. The funding model of the Equal Opportunities Commission seeks to advance mid-level faculty. The funds for the scholarships come from the structural funds of the federal state of North Rhine-Westphalia. The awardees will be active participants of the recently founded graduate institute that will soon commence its work.

Ms Küstenmacher is writing her PhD thesis in the field of robotics within the context of the B-IT cooperation at RWTH Aachen. Her advisor there is Prof. Gerhard Lakemeyer, and the BRSU supervisor is Prof. Paul Plöger. Her topic is: "Diagnosis of unknown faults for mobile manipulators".



*Prof. Dr. Hartmut Ihne, Rector of BRSU, and Anastassia Küstenmacher.*



*b-it bots team 2011.*



*Jenny with trophy.*

# International Program of Excellence in Computer Science



*Prof. Dr. Joachim von zur Gathen, Computer Security*



*Prof. Dr. Stefan Kowalewski, Embedded Systems*



*Prof. Dr. Christian Bauckhage*

The International Program of Excellence in Computer Science (IPEC) at B-IT offers compact courses primarily during the semester break and at the highest educational level. This results in faster studies and advanced quality in selected subject areas. These courses apply to a limited number of highly qualified students of the University of Bonn, the RWTH Aachen University and, in the future, other German or foreign universities.

Undergraduate IPEC courses are planned in a way that the time required for the bachelor degree will be reduced up to one year. Additionally there are cross-cutting courses that accelerate the master studies at the B-IT as well as regular summer and winter schools that are designated for selected topics of computer science. These courses are held in cooperation with international guest scientists. Applications of foreign students are welcome.

The expected impact of the Program of Excellence is not limited to a significant acceleration of undergraduate and graduate studies in conjunction with an international visibility. It also brings together outstanding students with internationally noted scientists and with fellow students from abroad and activates new forms of encouraging competition among students. The IPEC courses usually comprise a mix of lecture classes, seminars, and lab courses, such that students can make best use of the compressed time schedule. Currently, this part of the program is being restructured as to provide an "honors class" supplement to the top 10% bachelor students in Aachen and Bonn, loosely linked to the Deutschlandstipendium program initiated by the federal and state ministries of Research and Innovation.

## CONFERENCE SEMINAR "MOBILE SECURITY"

In the winter term 2010/11 the B-IT group for Computer Security (cosec) held a seminar on "Mobile Security", supervised by Daniel Loebenberger and Yona Raekow. The cosec group decided to run the regular master-level seminar in an entirely new mode, by moving from weekly slots to a conference style seminar. The seminar provided the students with the opportunity to dive into the interesting world of mobile security, as well as gathering first hand experience of academic life.

In the beginning of the semester there were about 30 interested students from which the supervisors selected 16 via an application process. The selected students prepared research quality papers on various topics in mobile security, submitted them via the conference management tool EasyChair and were assigned three papers of their peers for reviewing. After the reviews were distributed to the corresponding authors, the topics were presented in a research conference style.

The event took place in February 2011 at B-IT. Each topic was presented in a 30 minute talk followed by a 15 minute discussion. Due to the excellent quality of the papers, the group decided to invite external guests to attend the two-day event.

## COSEC AT DEUTSCHLANDFEST 2011: VISKY FOR ALL

On three days in October 2011 the B-IT group for Computer Security (cosec), in cooperation with Deutsches Museum Bonn, Forschungsmuseum Alexander Koenig, the Institute of Computer Science of the University of Bonn and the initiative "Bundesweit Informatiknachwuchs fördern", held a booth at the "Deutschlandfest 2011" in Bonn, where Visual Cryptography was presented. Visual Cryptography is a possibility to encrypt pictures. It was invented by Naor & Shamir (1994) to demonstrate cryptography. Based on the one-time pad it offers a provably, completely secure way to transmit secrets. Despite its seeming toy-nature there are serious applications for example for electronic voting in the meantime.

At the booth, located in Museum Koenig, the visitors had the facility to get an encrypted picture of themselves. Either the picture was taken manually or automated by a robot, which was driving around on a table. After the picture was taken, a VisKy was produced via cosec's online implementation of Visual Cryptography (<http://cosec.bit.uni-bonn.de/science/visky/>). The visitors received two transparent slides, where each alone is just random noise, but laid one upon the other they show the original picture. Moreover the principle of Visual Cryptography could be explained to the interested visitors with the help of a demonstrative and vivid poster.

On the three days there were 8,000 visitors to the Museum Koenig and 420 VisKy pictures were given out. The feedback of the visitors was throughout good.

## SCHÜLER-KRYPTO 2011

On two days in February 2011, 239 high school students, as well as 15 teachers met for the tenth Schüler-Krypto to learn @ bit on secret messages, encryption and decryption. At this tenth Schüler-Krypto for the first time a participant reappeared as a tutor: Baran Demir was one among the 26 helpers that made also this year's edition a success.

After a one hour introduction to the topic by Michael Nüsken the students got to the nitty-gritty. Everybody was asked to take up the role of James Bond and program RSA on the laptop built-in to Bond's BMW Z8. We used MuPAD on it, a computer algebra system which among many other things is capable of calculating with arbitrarily large numbers. After lunch everybody decrypted answers from Moneypenny, set up a public-key infrastructure and exchanged encrypted messages with each other. As a sidetrack, in a game-like setting the students could experimentally find out how the main step in the encryption and decryption of RSA, namely the modular exponentiation, can be executed in a jiffy. And finally everybody could take home her personal visual cryptogram.

Last but not least we celebrated the jubilee with a laser and light show in the lunch break presented by Matthias Frank from the laser and light lab. And there was a cake.



At this place we would like to send again thanks to all supporters and helpers that made Schüler-Krypto a success story over all those years, and enabled us to advertise cryptography, computer science and university life to high school students and teachers.



*Picture taking robot.*



*Explaining VisKy.*



*Bond's Thursday crew.*

## B-IT Universities Institute

ABC – three letters that stand for a veritable “magic triangle”: the region between Aachen, Bonn and Cologne, which is not only economically strong, but also a leader in science, education and research. The large number of research establishments based here make the area one of Europe’s biggest and most important science landscapes. Almost 10 per cent of all German students – around 130,000 people – are studying at the Rheinisch-Westfälische Technische Hochschule in Aachen, the Rheinische Friedrich-Wilhelms-Universität Bonn and the Universität zu Köln, which together constitute one of the most important higher education locations in Europe. The three ABC institutions are closely linked and collaborate in many fields of teaching and research.

### UNIVERSITY OF BONN

The University of Bonn is a research-oriented university with currently 30,000 students. Its research tradition of 200 years is closely linked to the names of Hermann von Helmholtz, Heinrich Hertz and Friedrich August Kekulé who carried out seminal work at the University of Bonn. This strong academic tradition has been continued until present with the more recent Nobel laureates Wolfgang Paul and Reinhard Selten. Bonn cooperates with numerous other universities and research institutions around the globe. The specializations it has developed enjoy worldwide recognition. More than 5,000 students from 130 countries are enrolled in Bonn. Their presence underlines the international character of the university and enriches both academic and social life in Bonn. Living up to its long tradition as a classical university with a full range of academic disciplines, the University of Bonn offers nearly a hundred different first degree programs. Students can choose from a wide and modern spectrum of subjects that allows a multiplicity of combinations.

### RWTH AACHEN UNIVERSITY

RWTH Aachen University was founded as a Polytechnic in 1870 with considerable support from local industry. In 1948 it was established as Rheinisch-Westfälische Technische Hochschule Aachen (RWTH), the Institute of Technology of the State of North Rhine-Westphalia. Today, RWTH is one of the most renowned technical universities in Europe with around 30,000 students. RWTH offers more than 65 first degree programs in Science, Engineering, Economics, Medicine and Arts and more than 20 graduate programs in Science and Engineering. The specific strength of RWTH’s engineering education is the combination of education and advanced research. RWTH’s engineering departments closely cooperate with national and international industries. Most of the engineering professors at RWTH held positions in industry before they became RWTH faculty members. The RWTH master programs educate engineers who are keen to engage in R & D, innovation, and entrepreneurship. In 2007, RWTH Aachen was elected as one of nine “elite universities” within the German excellence program. Under this program, RWTH receives a total of ca. 180 Mio. € for its strategic development, three excellence clusters, and a Graduate School. B-IT faculty are involved in two excellence clusters and the graduate school as well as the central strategy proposal.



*The spacious Hofgartenwiese is a major summer attraction on the University of Bonn campus.*





Entrance of Birlinghoven Castle.

The Birlinghoven Castle campus is one of the largest and most influential computer science research sites in Germany. About 500 researchers work in the IZB institutes. That represents a quarter of the Fraunhofer ICT Group, Europe's largest IT research organization. The institutes collaborate closely with the European ERCIM network of national IT research centers as well as with leading research establishments in the USA, Eastern Europe and Asia. Three IZB institutes contribute to the B-IT master programs Media Informatics and Life Science Informatics:

## FRAUNHOFER FIT

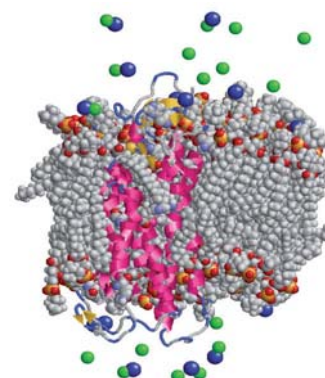
FIT, the Fraunhofer Institute of Applied Information Technology, investigates human-centered computing in a business or engineering process context. The usability and usefulness of information and cooperation systems is optimized in their interplay between human work practice, organization and process. In Life Science Informatics the institute focuses on protein analysis, visual support for navigation in micro surgery, and assistive information technology. In Media Informatics innovative information visualization systems, mixed and augmented reality environments for industrial planning, pervasive gaming applications, and value chains for public-sector information services are main research topics.



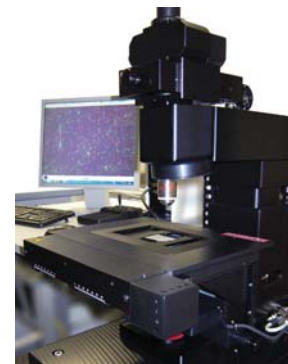
Underwater treasure quest: As a demonstrator Fraunhofer FIT created the world's first mobile underwater AR game. Its main component is a waterproof display in front of a diver's mask. The display lets the diver see his or her real underwater environment plus additional virtual objects.

## FRAUNHOFER SCAI

The Fraunhofer Institute for Algorithms and Scientific Computing (SCAI) engages in computer simulations in product and process development and is a strong partner in industry. The Department of Bioinformatics is doing applied research and development in the field of: Information Extraction / Semantic Text Analysis, Applied Chemoinformatics and Data-grid / Grid Infrastructure. Complementary to the data- and knowledge-driven approaches taken in the Department of Bioinformatics, the Department of Simulation Engineering focuses on chemical engineering by means of multi-scale simulations. Through gaining a deep understanding of the microscopic behaviour and mechanism of chemical systems, material and drug development is improved.



Fraunhofer SCAI: Membrane-embedded receptors, like the prototypic rhodopsin shown above, are pharmaceutically most interesting. The aim is to gain control over cellular response by designing new drugs.



Prototype of a TopoScan microscope. TopoScan is a modular hardware-software platform for the automated high content analysis of biological samples. Its unique software-driven architecture combines two properties within one system: Streamlined workflows with minimal intervention for the reproducible acquisition and analysis of high content assays.

## B-IT Applied Science Institute

### **BONN-RHINE-SIEG UNIVERSITY OF APPLIED SCIENCES (BRSU)**

Founded in 1995, the Bonn-Rhine-Sieg University of Applied Sciences significantly extends the range of applied research and teaching in the greater Bonn area. It specializes in business administration, natural sciences, engineering and computer science, strongly encouraging cooperation with industrial partners and a focus on use-driven and interdisciplinary research and teaching.

The three campuses at Sankt Augustin, Rheinbach and Hennef are well equipped with modern laboratories, studios, workshops and facilities for cooperative research. By 2011, the six departments accommodate more than 5,600 students and about 131 faculty members.

The Department of Computer Science offers a Bachelor and a Master program in Computer Science and in cooperation with the Departments of Business Administration a Bachelor program in Business Information Systems. The Master program Autonomous Systems is offered by the b-it Applied Science Institute, a cooperation between the Department of Computer Science and the Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS.



*Campus of the Bonn-Rhine-Sieg University of Applied Sciences.*

### **FRAUNHOFER IAIS**

At Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS, research experts explore and develop innovative systems designed to analyze data and to make information available. On the one hand, the IAIS teams realize application solutions in the fields of data mining, business intelligence or high-resolution management for optimizing products, services and processes. On the other hand, the institute's scientists develop systems that use innovative forms of media presentation to help make large amounts of data accessible (knowledge extraction, interactive exploration, knowledge management, media analysis and visualization).

The institute's research and development activities are defined by the business areas Marketing, Market Research & Media Analysis, Business Planning & Controlling, Digital Media Asset Management, Process Intelligence, Preventive Security, Spaces for High-Tech Experience, Media Production and Adaptive Robotics. Within these business areas, the IAIS experts develop innovative and service-oriented IT solutions for customers from commerce and industry, e.g. trade, media, telecommunications or energy industries as well as for partners from the public sectors.

The Institute's scientific research focuses on Machine Learning, Multimedia Pattern Recognition, Visual Analytics, Process Intelligence and Adaptive Robotics. Fraunhofer IAIS and its staff of approximately 250 combine to create a comprehensive industry sector knowledge database encompassing all of the engineering sciences, in particular IT, but also Mathematics, Natural Sciences, Business Studies, Geo Sciences and Social Sciences.

# General Information

## GENERAL ADMISSION REQUIREMENTS

- A first university-level degree (B.Sc., B.Eng.), as specified for the individual programs, with grades well above average is required. The Graduate Record Examination (GRE) is strongly recommended;
- All courses are held in English, thus fluency in English is vital. It is evaluated on the basis of TOEFL 550 paper-based, 213 computer-based, or IELTS 6.0;
- Working knowledge of German is necessary to take up some of the culture that the Aachen – Bonn – Cologne region has developed over the last 2,000 years. Therefore, a basic German language course is offered before start of the program and during the first year.
- Admission is coupled to placement in the Fraunhofer lab courses and therefore strictly limited. Application deadline has been March 1 for Fall admission but may change from year to year; check [www.b-it-center.de](http://www.b-it-center.de) for current admission details.

## FEES AND FINANCES

A student union fee of about 200 Euro per semester covers student activities, subsidized meals, and free public transportation in the whole state of North Rhine-Westphalia.

A student's monthly expenses, including study material, will be about 720 Euro. B-IT does not offer formal scholarships but several student assistantships are available on a competitive basis. For information on funding from German sources please contact the DAAD – German Academic Exchange Service [www.daad.de](http://www.daad.de).

## STUDYING IN BONN

Most of the teaching in B-IT is concentrated in Bonn and its eastern neighbor, Sankt Augustin. Newcomers to Bonn soon grow very fond of the city – a fact confirmed by thousands of students and academics, German and foreign, who have come here to learn, teach or research. Since the German Bundestag moved its seat and parts of the Federal Government to Berlin in 1999, Bonn attracted a number of international organizations, especially United Nations bodies, and some major corporations. Among others, Deutsche Telekom and Deutsche Post have their headquarters there. Now Bonn is evolving into an internationally recognized science region – with the university as one of the dynamic forces driving this change. In addition, Bonn offers a wide variety of attractions and amenities. The city's most famous son, Ludwig van Beethoven, is the star attraction of a lively and varied arts and culture scene. The city boasts an opera house, several theatres, concert halls and other venues, as well as a range of fascinating museums.





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