Annual Report
2015

b-it Bonn-Aachen
International Center for
Information Technology

Dr. Thomas Grünewald

FOREWORD BY THE CHAIRMAN OF THE B-IT FOUNDATION

Digitalization is a worldwide megatrend with great impact on all key societal challenges. In its digitalization strategy, North Rhine-Westphalia places a special emphasis on graduate education and research training in interdisciplinary fields relevant to these challenges. With three international Master Programs, and accompanying activities from Bachelor to Doctoral level, the Bonn-Aachen International Center for Information Technology (b-it) has pursued this vision since its founding in 2003:

- Media Informatics focus on multimedia Internet, novel user interfaces and social media, IT security, and big data integration for a secure and inclusive society
- Life Science Informatics with strong scientific impact in healthcare, biomedical and biochemical research,
- Autonomous Systems advances robotics in industry and services.

The employer listings in this report show the great demand for b-it graduates in science and industry, both locally and internationally. The international recognition of the b-it endowed professors and directors is reflected in appointments to prestigious senior advisory positions in the EU, the IEEE Robotics society, and by yet another ERC grant. This year, b-it endowed professors acquired over 4 million € external grants for research and doctoral training.

All programs already passed two successful rounds of accreditation and re-accreditation at the national and European level. In 2015, an additional external evaluation confirmed the outstanding success of these programs as a key success factor in the NRW international education strategy. Evaluators recommended

b-it to interact even more strongly with the Bonn-Aachen industry, one of the top IT regions in Europe, and to take even more advantage of the regional strength in Data Science, e.g. the leadership of the Fraunhofer Big Data Alliance.

I would like to take this opportunity to thank the b-it directors, faculty, and students for their excellent work, and look forward to their new initiatives in the coming years.

Dr. Thomas Grünewald
Vice Minister of Innovation, Science and Research NRW, Chairman, B-IT Foundation Council

NEW B-IT DIRECTOR

Founding B-IT director Professor Armin B. Cremers (left) and his successor Professor Stefan Wrobel. Photo: © Dominik Klein

Founding B-IT director Professor Armin B. Cremers has retired. B-IT thanks Professor Cremers for all his relentless efforts in building up B-IT and his highly successful work of the past 12 years! Professor Stefan Wrobel has succeeded Professor Cremers as B-IT director. Professor Wrobel was confirmed on November 11, 2014, as new B-IT director by B-IT Foundation Council.

REPORT BY THE SCIENTIFIC DIRECTORS

In the academic year 2014-2015, the external evaluation confirmed the key b-it strategies

- To offer top-level English language master training in important interdisciplinary fields of information technology to the best international bachelor graduates,
- To involve students from the start in research through unique internships in the Fraunhofer institutes,
- To encourage highschool and bachelor students to enter the promising field of informatics, and to strive for early excellence.

Almost 650 masters graduated from our programs in Media Informatics, Life Science Informatics, and Autonomous Systems. One third to one half of them continue with doctoral studies, partly in b-it-related doctoral schools and projects, partly in well-known international universities such as ETH Zürich, Stanford, or Cambridge. Other graduates directly pursue careers as highly qualified specialists in companies from North Rhine-Westphalia and all over the world. The participating Fraunhofer institutes also support the regional industry by offering continuing education in important current topics such as IT security, usability, and data analytics.

Two long-standing members of our International Advisory Board retired. Our heartfelt thanks go to Professors Gerhard Barth, the Founding President of the Advisory Board since 2003, and Hermann Maurer, one of the internationally most influential media informatics researchers and recently Vice President of the Europeana Academy of Science. We would also like to thank Vice Minister Grünewald for his energetic leadership as the new b-it Foundation Chairman, and our study coordinators and student advisors for their enthusiastic management of the individual programs.

Matthias Jarke,
RWTH Aachen University and Fraunhofer FIT
Kurt-Ulrich Witt,
Bonn-Rhein-Sieg University of Applied Sciences
Stefan Wrobel,
University of Bonn and Fraunhofer IAIS

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

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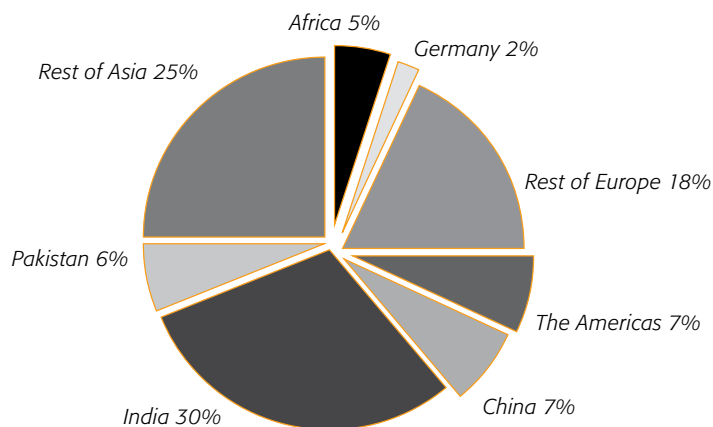*Bonn-Rhein-Sieg University of Applied Sciences*

Prof. Dr. Stefan Wrobel
University of Bonn and Fraunhofer IAIS

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.

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.

Home countries of new B-IT students.

Honors and Awards

PROF. JARKE RE-APPOINTED TO CONNECT ADVISORY FORUM

The new EU commission has appointed Prof. Matthias Jarke for a second period of office as a member of the CONNECT Advisory Forum (CAF). CAF is mandated to provide strategic advice on the Information and Communication Technology section within its research program HORIZON 2020, especially the calls for 2018-2019 and related technology regulation issues. The CAF2 kickoff meeting was held at the European ICT 2015 conference in Lisbon, Portugal, October 19-20, in the presence of Commissioner Günter Oettinger and Director General Viola.

PROF. JARKE APPOINTED TO IT-SUMMIT PLATFORM "INNOVATIVE BUSINESS DIGITALIZATION"

Minister of Economics Sigmar Gabriel has appointed Prof. Matthias Jarke to the committee of the platform "Innovative Digitalization of Business" within the IT Summit Process conducted since the Informatics Year 2006 by the German government. The committee brings together about 20 leaders from large and small companies, business associations such as BITKOM, BitMi, or BDI, and representatives from public bodies, to advise on strategies to promote digitalization of German and European businesses beyond the specific industrial context defined by the parallel platform "Industry 4.0".

PROF. DR. ERWIN PRASSLER ELECTED VICE PRESIDENT OF THE IEEE ROBOTICS AND AUTOMATION SOCIETY (IEEE RAS)

During his term of office from 2016 to 2017, he will be responsible for Industrial Activities. The IEEE Robotics and Automation Society is the largest professional association of robotics scientists and engineers worldwide with around 11,000 members. For the first time since its establishment 30 years ago, the society will have German members in the executive committee (Prof. Dr. Martin Buss from Technical University München has been appointed vice president for Conference Activities).

BEST STUDENT PAPER AWARD FOR MAS STUDENTS SUNDARAM AND LUDWIG

Two Autonomous Systems students, Ashok Meenakshi Sundaram and Melanie Ludwig, have won the best student paper award at the International Conference on Information and Communication Technologies for Ageing Well (ICT3AgeingWell) in Lisbon. The paper "On Modeling the Cardiovascular System and Predicting the Human Heartrate under Strain" assesses analytical and AI-learned models of the cardiovascular system and compares their predictive power. These models are used for operating intelligent training systems, which adapt the training level according to the expected reaction of the patients' cardiovascular system. Thus, the training sessions become more effective and overexertion can be avoided. This work was supervised by Matthias Füller, Prof. Dr. Alexander Asteroth and Prof. Dr. Erwin Prassler.

MARIE S. CURIE INNOVATIVE TRAINING GRANT

Within EU Horizon 2020 Program, a Marie S. Curie Innovative Training Grant for the funding scheme European Industrial Doctorates was awarded for the BIGCHEM (Big Data in Chemistry) proposal originating from the Helmholtz-Institut Munich and the B-IT. The Grant has a volume of 2.55 million €and will support an international training network involving five universities, the Helmholtz Center, and two large pharma companies that is focused on chemoinformatics and drug discovery applications.

Autonomous Systems students Matias Valdenegro has won 1st place, AFCEA Bonn e.V. Studienpreis 2015, Koblenz.

Best Paper Award: PhD student Can Sun and Prof. Rose received the Best Paper Award for their paper entitled "A System Framework for Complexity Measurement and Evaluation on the Example of Supply Chain" at BU-STECH 2015, Nice, France, which represents joint work with supply chain experts of Infineon. Can Sun graduated from B-IT in 2012 where she studied Media Informatics.

Events and Visits

B-IT's Prof. Jan Borchers demonstrating a navigation vest to Federal minister Prof. Johanna Wanka. The vest, developed by a group of Borchers' students, uses vibration to warn a blind person wearing it against obstacles in her way.

B-IT EXHIBITS IN THE 'LIGHT CARES' EXHIBITION IN THE BMBF FOYER

On Oct. 12, 2015, Federal minister Prof. Johanna Wanka opened the 'Light Cares' exhibition in the BMBF building in Berlin. There, inventors, designers and all sorts of creative people presented DIY projects that show how lighting technology and photonics can help make everyday life of handicapped people easier. B-IT's Prof. Jan Borchers guided Prof. Wanka through the exhibition. One of the exhibits he presented was a haptic vest developed by a group of his students. It uses a depth camera controlling a matrix of 128 small vibrators to render images of what is ahead onto the chest of visually impaired people.

Another B-IT exhibit in the BMBF foyer is an interactive installation dubbed ROBOLED. ROBOLED features a robotic arm that types on an iPad. The resulting text is sent to a high-tech Philips Organic LED (OLED) wall where it is displayed. The OLED wall is a

ROBOLED exhibit, BMBF building, Berlin.

"closed" commercial product without open interfaces to talk to it, except for the iPad app that provides access to a limited number of demos on the wall's built-in computer. With its steampunk aesthetics, the ROBOLED project illustrates in a playful way the potential of high-tech industry collaborating with the Maker movement, and the difficulties of getting open access to technology interfaces to enable DIY experimentation and innovation.

PROF. JARKE PRESENTS KEYNOTE TALK AT 650 YEAR CELEBRATION OF THE UNIVERSITY OF VIENNA

Founded in 1365 by Archduke Rudolph, the University of Vienna is the oldest university in the (currently) German-speaking countries. As part of the 650th anniversary celebration, Prof. Matthias Jarke presented a keynote talk on history and challenges of the University of Vienna's Computer Science Faculty, where he had chaired the Scientific Advisory Board since its founding in 2005.

In two additional keynotes, Prof. Mike Williams, formerly chief curator of the Silicon Valley computer museum in Mountain View, and Pulitzer Prize Winner Douglas Hofstadter, Indiana University, went further back into the history of mathematics and informatics in Vienna, highlighting accomplishments by early researchers in Vienna and especially the fundamental results of Kurt Gödel.

ROBOCUP GERMAN OPEN: SILVER FOR THE B-IT BOTS

Neither rail strike nor car breakdown could stop the b-it bots from taking part in the 2015 RoboCup German Open which took place in Magdeburg. The team members were Oscar Lima, Shehzad Ahmed, Santosh Thoduka, Alexander Moriarty, Ashok Sundaram und Arka Mallick and their coaches Prof. Dr. Paul Plöger, Prof. Dr. Gerhard Kraetzschmar, Frederik Hegger and Nico Hochgeschwender.

INDUSTRIAL WORKSHOP WITH PFIZER

Professor Jürgen Bajorath organized a student workshop focusing on research topics from the pharma industry. He states "This workshop was envisioned to widen the students' horizon and promote their awareness for industrial research alongside research in academia." This very well attended workshop was held by Dr. Veerabahu Shanmugasundaram, Director & Head of Computational Analysis and Design, Center of Chemistry Innovation & Excellence, World Wide Medicinal Chemistry, Pfizer Pharma Therapeutics Research & Development. Dr. Shanmugasundaram presented various drug discovery approaches targeting multi-drug resistant bacterial infections. He also discussed technical and leadership skills needed for a successful career in the large pharmaceutical industry.

BRONZE MEDAL FOR THE B-IT BOTS AT WORLD CUP IN CHINA

The b-it bots RoboCup@Work team proudly brought home another trophy, coming in 3rd place, from this year's World Championships in Hefei, China. Congratulations to Oscar Lima, Shehzad Ahmed, Santosh Thoduka, Alexander Moriarty, Ashok Sundaram, Arka Mallick, Padmaja Kulkarni and Deebul Nair as well as their coaches Frederik Hegger, Jose Manuel Sanchez Lozz and Prof. Dr. Gerhard Kraetzschmar. The b-it bots are not expected to take too much time off after celebrating their success, because the next goal is already set: A place on the podium in the 2016 World Cup which will take place in Germany!

In the middle of the photo (with laptop) Dr. Veerabahu Shanmugasundaram, right of him Professor Bajorath and the participating Life Science Informatics students.

Master Program in Media Informatics

*Prof. Dr. Jan Borchers,
Media Computing*

*Prof. Dr. Thomas Rose,
Media Processes*

List of employers of MI Alumni:
Universities & Research: B-IT, B-IT Research School, Centro Nacional de Investigaciones Cardiovasculares, CERTH, Charité Berlin, Chinese Academy of Science, COSBI, Czech Technical, ETH Zurich, Fraunhofer FGAN, FIT, FKIE, FOKUS and IAIS, FSU Jena, Hasso-Plattner-Institut, HHI Berlin, Imperial College, INRIA, Institute of Molecular Medicine, Karlsruhe Institute of Technology (KIT), K. U. Leuven, Max Planck, National University of Computer & Emerging Sciences, National University of Ireland Maynooth, Research Center Jülich, Robert Bosch Foundation, RWTH Aachen, Suez Canal University, Swiss Federal Institute of Technology, Uniklinik Aachen, Uniklinikum Bonn, Universidad Tecnologica de Panama, Universitätsspital Basel, University Clinic Carl Gustav Carus; Universities of Agder, Arab American Jenin, Asia and the Pacific, Atma Jaya Yogyakarta, Augsburg, Bahria, Bonn, Cambridge, Düsseldorf, Dresden, Duisburg-Essen, Edinburgh, Engineering & Technology Peshawar Pakistan, Ghent, Göttingen, Hamburg, Hasselt, Heidelberg, Houston, Oldenburg, Ireland, Maynooth, Johannes Kepler, Kiel, Leipzig, Mainz, Münster, Paris, Rotterdam, Sud, Stuttgart, Tilburg, Tirana, Toronto, Trento, Tübingen, Waterloo, Western Australia, West Indies, Zurich; TU Eindhoven, TU Darmstadt, TU Munich

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)" offers 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 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, and Media Science and business aspects. Major topics include: Internet Infrastructures, Data Communication, Digital Interactive Media, Management of Information, Computer Graphics, Animation, Visualisation, 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.

In the academic year 2014-2015, 30 Media Informatics students successfully completed their studies. 37 applicants were selected from 270 applicants to start their Media Informatics master studies; a 43% share of female beginners and 14 different countries of origin demonstrate the contribution of b-it study programs to the parent universities' diversity goals.

NEWS FROM MEDIA INFORMATICS ALUMNI

LUSINE STEPANYAN
Mobile Technology Consultant, SAP, Heidelberg, Germany

My study program in Media Informatics and the projects done during the studies gave me an opportunity to be selected for the master thesis position at SAP, where I had a chance to work on a very innovative project using the latest technologies. My topic was "Mobile shopping experience and purchases on Google Glass" which I did in cooperation with SAP, RWTH Aachen and Fraunhofer FIT. I had an honor to present the project at different forums and workshops. I was awarded to be in top 20% of the best students at SAP. After successfully finishing my master thesis I got an offer to start my career at SAP and currently I am working as a Mobile Technology Consultant. I would like to thank for the invaluable knowledge and experience that I gained during my studies at RWTH Aachen in Media Informatics program.

ANDRII MATVIIENKO
PhD, University of Oldenburg, Germany

After graduating from the National Technical University of Ukraine with a Bachelor's degree in Applied Mathematics, I chose to enroll in the Media Informatics program, given my interests in Human Computer Interaction (HCI) research. The MI program was a great opportunity to realize my ambitions, where I also had the opportunity to spend one year in Bonn and another in Aachen. I gained a solid basis combining both theory and practice in HCI. Currently I am a Research Assistant at the University of Oldenburg (Germany). Without the knowledge and experience I gained during my studies in the Media Informatics program, I would not have been able to continue my research track in HCI. I am extremely grateful for all the support I gained during my years of study.

JIBIN OU
Software Developer, Movilizer GmbH, Mannheim, Germany

I have an interesting piece of experience after finishing all my courses of Media Informatics. After spent 2 years in Bonn and Aachen, I moved to Munich to do my internship in BMW AG. It was a nice opportunity to see how knowledge I have learned can be applied in the industry. After 6 months, I moved to Zürich, and start to do my master thesis in ETH Zürich. It was also interesting as well as high-pressure. At the end everything works out. I have successfully published a paper in a top-tier conference. After that, I am back to Germany as well as back to industry.

KRISHNA PRASAD SOUNDARARAJAN
C++ Search Engine Developer, TravelTainment GmbH, Aachen, Germany

To start about the course, Media Informatics is a flexible course which allowed me to choose my area of interest after getting hands on experience in various fields such as Graphics, Networking, HCI and Machine learning. Also, the course is integrated between RWTH, University of Bonn and Fraunhofer. This allows us with various options to choose the course, do practical labs or to find a thesis topic of our interest in all the three places. With all these practical lessons, I am more confident in my work place. This 2 year masters course helped me to gain expertise in my area of interest and to contribute new ideas to the organization where I work.

Master Program in Life Science Informatics

Prof. Dr. Jürgen Bajorath, Life Science Informatics

Prof. Dr. Martin Hofmann-Apitius, Life Science Informatics

List of employers of LSI Alumni:

4GATC Biotech, Accenture, Asahi Kasei, Astra Seneca, Bayer, Ericsson, carpooling. com GmbH, Galilleo Press, GATC Biotech, Glaxo Smith Kline, Hamilton Medical, Heraeus, Hoffmann-La Roche, Hype Innvation, IBM, IIT Bangalore, Interpretomics, Leaf Bioscience, LHS Telecommunications, MarAnCon, Max Dellbrück Center Berlin, Medtronic, Molecular Connections Private Limited, Merck, Novartis, Pfizer, Postbank, Philips Research North America

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, pharmaceutics 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 2008-2015 have contributed to strengthen ties with scientists of the region. The 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, also on a larger geographical scale.

This year 23 students successfully graduated from the program. Top students received excellent placements again. They were, for example, accepted into PhD Research Schools at ETH Zürich, at Max-Planck Research Schools, German Center for Neurodegenerative Diseases (Bonn), the National Center for Biological Sciences (Bangalore, India) or joined industry (Astra Seneca in Goteborg, Sweden). Twenty four new students from a total of 14 different countries will start their studies in the master program of Life Science Informatics in Winter Semester 2015/2016 selected from about 120 applicants.

LSI SUCCESS STORIES

ADHIDEB GHOSH

holds a bachelor's degree in Biotechnology from West Bengal University. Afterwards he acquired work experience (among others) as a Software Engineer at Infosys Ltd., India. He joined the LSI master program in 2015. In his senior year at B-IT, he joined Dr. Fröhlich's group and tutored juniors in the exercises to Dr. Fröhlich's lecture "Algorithmic Bioinformatics." Mr. Ghosh is currently a member of Professor Bajorath's group where he is working on his master thesis. After completion of his thesis he will join the 'PhD Program Molecular and Translational Biomedicine' at ETH Zürich, Switzerland.

MENGJUN WU

started her studies in the LSI master program in the winter semester 2013/2014. Previously, she obtained a bachelor's degree in Pharmacy from Sichuan University. She continued her education with a master's degree in Toxicology from the University of the Chinese Academy of Science, Institute of Materia Medica, Shanghai, China. Ms. Wu joined the master program in the winter semester 2013/2015 and currently is carrying out her master thesis in Professor Jürgen Bajorath's group.

SHILVA KAYASTHA

from Nepal is currently working on her PhD thesis in Professor Bajorath's group. She joined the LSI master program in the winter semester 2011/2012 with a bachelor's degree in Biotechnology from Koneru College of Engineering (affiliated to Acharya Nagarjuna University, Nagarjuna Nagar, Andhra Pradesh, India). Ms. Kayastha is also a teaching assistant in the Molecular Modelling and Drug Design lab.

BIJUN ZHANG

joined the LSI master program in the winter semester 2010/2011. Prior to this, she obtained a bachelor's degree in pharmacy at the Jiangsu University in Zhenjang, Jiangsu, China. In 2012 she graduated with a master's degree in Life Science Informatics. In 2013 she continued her education as a PhD student in Professor Bajorath's group. Ms. Zhang was awarded a scholarship from the Chinese Scholarship Council in June 2013. This scholarship is awarded for excellent Chinese students studying in leading groups abroad.

ASHUTOSH MALHOTRA

joined the LSI master program in October 2009 with a bachelor's degree in Bioinformatics from Jaypee University of Information Technology, Solan, India. At B-IT he joined Professor Hofmann-Apitius' group and obtained his master's degree in Life Science Informatics in February 2012. Mr. Malhotra continued his education in Professor Hofmann-Apitius' group with a PhD thesis that has been submitted in 2015. Since 1st May 2015 he has joined Heraeus Medical as a management trainee. Heraeus is a family led internationally active group of technology companies, headquartered in Hanau near Frankfurt.

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's program in Autonomous Systems is an international program, taught entirely in English, offering multi-faceted training in the fields of robotics and artificial intelligence. Various robot platforms are used for educational and research purposes, including the Care-O-Bot 3, and the youBot. The focus is on enabling and integrating the necessary intelligence behind the autonomous behavior of artificial agents rather than on the hardware-related aspects of robotics. Students get a solid theoretical background in autonomous mobile robots, advanced control methods, robot manipulation, learning and adaptivity, hardware-software co-design of embedded systems, probabilistic reasoning, and planning and scheduling. The courses are combined with research work conducted at the Fraunhofer Institute for Intelligent Analysis and Information Systems (IAIS) and other partner institutions.

Students take a number of core courses in the first semester as well as compulsory seminars, and practical courses throughout their studies. The Winter Semester 2012 saw the first students study under the new curriculum, which received ASIIN accreditation in April 2012. In addition to the accreditation certificate from the German Accreditation Board, the program got the special ASIIN accreditation label and the Euro Inf Label from the European Quality Assurance Network for Information Education (EQANIE). Students now choose one of two tracks to specialize in at the end of their first semester: the Intelligent Robots track and the Robot Systems Design track.

In the academic year 2014-2015, 8 Autonomous Systems students completed their studies. 23 students joined the MAS program from an applicant pool of 488 candidates.

The MAS program has always attracted the interest of students all over the globe. The 13 different nationalities of the 23 students who joined the program in the 2014-2015 academic year is proof of this fact.

The program is offered by the B-IT Applied Science Institute (b-itAS) in the Department of Computer Science at the Bonn-Rhein-Sieg University of Applied Sciences (BRSU). b-itAS cooperates closely with the Fraunhofer IAIS in implementing the program, which started in the winter of 2002. Two dual degree programs exist with both the University of New Brunswick in Canada and the German-Jordanian University in Amman, Jordan.

The program is managed by three professors (Gerhard Kraetzschmar, Paul G. Plöger and Erwin Prassler), four teaching and research associates (Iman Awaad, Frederik Hegger, Nico Hochgeschwender, and Anastassia Küstenmacher) and researchers, who have been recruited through the XPERO, BRICS, RoCKIn, EmoRobot and Echord Edufill projects, namely Björn Kahl, Rhama Dwiputra, Matthias Füller, Jan Paulus, and Azamat Shakhimardanov.

The faculty and staff are actively involved in many scientific activities, including memberships in technical committees of IEEE or in the RoboCup Federation trustee board, the euRobotics aisbl board, numerous program committees of workshops and scientific conferences such as IROS, ICRA, ICAR, ICMA, and AAMAS.

RONNY HARTANTO APPOINTED PROFESSOR OF COMPUTER ENGINEERING

Ronny Hartanto was one of the first students in the Master's Course in Autonomous Systems. Originally from Indonesia, he soon felt at home and became an active member of the University's Robocup team b-it bots, which succeeded in national and international competition, as they still do. Additionally, he coached international students and helped them settle in.

However, his academic achievements did not suffer from his extracurricular activities: Following his graduation, Ronny worked as a research associate at the b-it Applied Science Institute for several years and wrote his PhD thesis "Fusing DL Reasoning with HTN Planning as a Deliberative Layer in Mobile Robotics" which was awarded the FBTI prize 2012.

Since 2010, Ronny Hartanto had been working at the German Research Center for Artificial Intelligence (DFKI) in Bremen. In January, he was appointed professor of Computer Engineering at the faculty of Technology and Bionics at Rhein-Waal University in Kleve!

AWARDS FOR SERGEY ALEXANDROV

For his master thesis, Sergey was awarded both the Förderpreis of the Hochschule Bonn-Rhein-Sieg 2014 and the 2nd place prize by the AFCEA Bonn e.V. Studienpreis 2015. His master's thesis is titled "Geometric segmentation of point cloud data by spectral analysis". In addition to his academic efforts, Sergey has been actively involved in extracurricular activities such as being a member of the b-it-bots RoboCup team and contributing to the development of the Point Cloud Library (PCL).

ADAM GAIER WINS E-DRIVE ACADEMY AWARD

This prize is awarded to the two most promising projects from over 50 contributions on energy efficient driving and batteries in electric mobility.

Adam Gaier received the second prize for his master's project "Energy Efficient Control Policies using Evolutionary Strategies". Adam explains his project as follows: "A vehicle controller was designed which, when given a map of the elevation of the road you plan on traveling and the time you want to be there, controls the motor in such a way as to use a minimal amount of energy to get you to your destination on time. This was done through a naturally-inspired algorithm which mimics biological evolution to produce an artificial neural network that reacts to its environment. By taking this alternative approach the controller was able to perform just as well as traditional planning techniques, but instantaneously and thousands of times more efficiently, allowing us to use it on our own experimental vehicle with only the need for very simple and cheap electronics."

Adam Gaier (left) with E-Drive Academy award.

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.

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 NRW public-private scholarship programs the Ministry of Innovation has initiated for this group of students. Another important aspect is support for structured doctoral training programs in applied ICT. From 2008-2013, NRW and the b-it partner universities co-funded the b-it research school from which by now over 30 scholarship holders completed their doctorate. A few last theses are defended in 2015, mostly by candidates who interrupted their doctoral studies by parental leave – over ten new children demonstrating success of the family-oriented measures taken by the b-it Research School. Complementary scholarship funding was acquired from industry and from other sources such as the Marie Curie-Sklodovska program of the EU, and several applications for a follow-up structured b-it doctoral program are under preparation.

SCHÜLER-KRYPTO 2014

On two days in February 2015, 185 high school students, as well as 9 teachers met for the fourteenth Schüler-Krypto to learn @ bit on secret messages, encryption and decryption. They came from Bedburg, Bonn, Bornheim, Duisburg, Hennef, Cologne, Königswinter, Niederzier, and Sankt Augustin.

After an 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 Sage on it, a free open-source computer algebra system which among many other things is capable of calculating with arbitrarily large numbers. The students sent emails to Moneypenny and decrypted answers from her, 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, thanks to the assistance of the teachers, everybody could take home her personal visual cryptogram.

VisKy for free.

Research @ B-IT

RESEARCH CAREER OF B-IT STUDENT ERFAN YOUNESI

Erfan Younesi joined the master program of Life Science Informatics in October 2006, after obtaining his first MSc degree in Biotechnology from the International Center for Advanced Mediterranean Agronomic Studies in Paris, France. During his studies in the LSI program, he was elected as student representative. In May 2007, Mr. Younesi joined Professor Hofmann-Apitius' group at Fraunhofer Institute SCAI, where he carried out his Master thesis. He obtained his Master's degree in Life Science Informatics in December 2008, and immediately was offered a PhD position in the same group. He earned his PhD degree in May 2014 after publishing 17 peer-reviewed journal papers with 31 citations, 6 poster presentations. In January 2014, Mr. Younesi was directly working with Boehringer Ingelheim Pharma to lead the knowledge engineering and curation activities in the Innovative Medicine Initiative of the European Commission (IMI)-funded project, AETIONOMY. After completing his Post-doctoral research, he will join Bayer Healthcare as senior scientist in November 2015. Besides, his scientific endeavors led to winning Fraunhofer's incentives for 2 Fraunhofer – internal invention reports.

NATURE SCIENTIFIC REPORTS PAPER BY B-IT ALUMNI

B-IT Life Science Informatics alumni Ashutosh Malhotra, Dr. Erfan Younesi and Dr. Sudeep Sahadavan are first authors of a Nature Scientific Reports paper entitled: "Exploring novel mechanistic insights in Alzheimer's disease by assessing reliability of protein interactions." The work of this article has been mainly carried out in the group of B-IT Professor Martin Hofmann-Apitius. Dr. Younesi will join Bayer Leverkusen in November 2015 whereas Ashutosh Malhotra has already joint Heraeus Medical in Wehrheim. Dr. Suheep Sahadavan is now with the Molecular Biology Laboratory (EMBL) in Heidelberg.

Erfan Younesi

PROF. DR. GERHARD KRAETZSCHMAR LEADS A SUCCESSFUL BID TO HOST THE ROBOCUP 2016 WORLD CHAMPIONSHIPS IN GERMANY

Prof. Dr.-Ing. Gerhard Kraetzschmar, will also serve as the General Chair of the event, which will be held in Leipzig in 2016.

Prof. Dr. Gerhard Kraetzschmar took over as Chair of the Georges Giralt Ph.D. Award Committee in October 2014. The award was initiated by the Education and Training Interest Group of the former EURON network of excellence in robotics and is now continued by the Topic Group on Education and Training (TGET) of euRobotics aisbl. euRobotics aisbl is a network of industrial and academic stakeholders in robotics research and development, which serves as the private partner in SPARC, the public-private partnership between the European Commission and European robotics industry and research. Prof. Kraetzschmar is also co-chair of TGET.

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 percent 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 about 34,000 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 42,000 students. RWTH offers 144 courses of study (undergraduate and postgraduate). 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.

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.
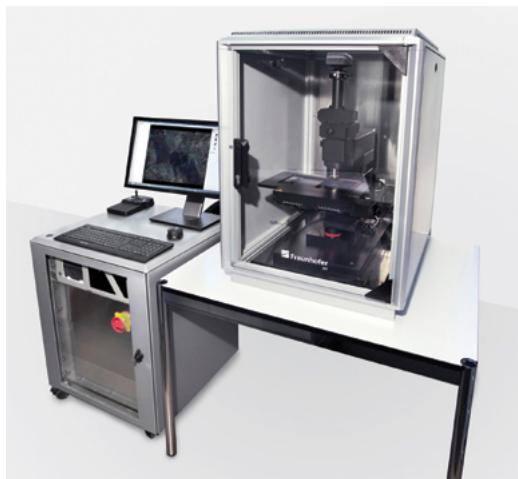

TopoScan microscope of Fraunhofer FIT: TopoScan is a modular hardware-software platform for the automated high content analysis of biological samples. Its unique software-driven architecture combines two properties within one system: Streamlined workflows with minimal intervention for the reproducible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

FRAUNHOFER SCAI

The Fraunhofer Institute for Algorithms and Scientific Computing SCAI conducts research in the area of computational science and is a valued corporate partner for industry and academia. SCAI designs and optimizes industrial applications, implements custom solutions for production and logistics, and employs high-performance computers. The Department of Bioinformatics at Fraunhofer SCAI carries out applied research and development in three areas:

1. Techniques for information extraction in the life sciences, including recognition of named entities and relationships in text as well as large-scale, automated information extraction.
2. Integrative biology, with a particular focus on modeling neurodegenerative diseases.
3. eScience, Grid and Cloud Computing as well as technologies for the operation of HPC (Clusters) with a focus on SLA, security, and license management.

The Department of Bioinformatics is partner in major funded projects at national and EU level. Software tools for information extraction developed at SCAI BIO are used in the vast majority of pharmaceutical companies worldwide.
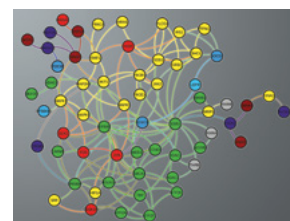
Fraunhofer SCAI: A hormonal network underlying dementia and Alzheimer's disease.

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 2015, the different departments accommodate more than 7,500 students.

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

The Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS develops tailor-made IT solutions to support companies and organizations optimize products, services and processes, as well as to implement intelligent information management. There is a particular focus on the analysis, access and targeted use of Big Data, new media technologies and solutions for innovative business and security processes.

In order to support customers in their information management and decision-making processes, the scientists use innovative technologies such as knowledge extraction, visual analytics and data mining to provide them with holistic analyses of large amounts of data. Semantic and adaptive media applications open up new possibilities for linking data and knowledge and for making them accessible via the Internet. By utilizing business intelligence solutions the Fraunhofer IAIS team is able to optimize its customers' business, IT and security processes and so improve their business success. The institute's research and development activities are defined by the business areas Big Data Analytics, Business Modeling & Analytics, Content Technologies & Services, Enterprise Information Integration, Image Processing, Intelligent Media & Learning, Marketing, Market Research & Media Analysis and Preventive Security. Fraunhofer IAIS and its 230 strong team combine in-depth industry knowledge with expertise in a full range of technical disciplines, most notably computer science but also mathematics, natural sciences, business management, 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 in 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 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 for current admission details.

FEES AND FINANCES

A student union fee of ca. 260 € 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 800 €. 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.

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.