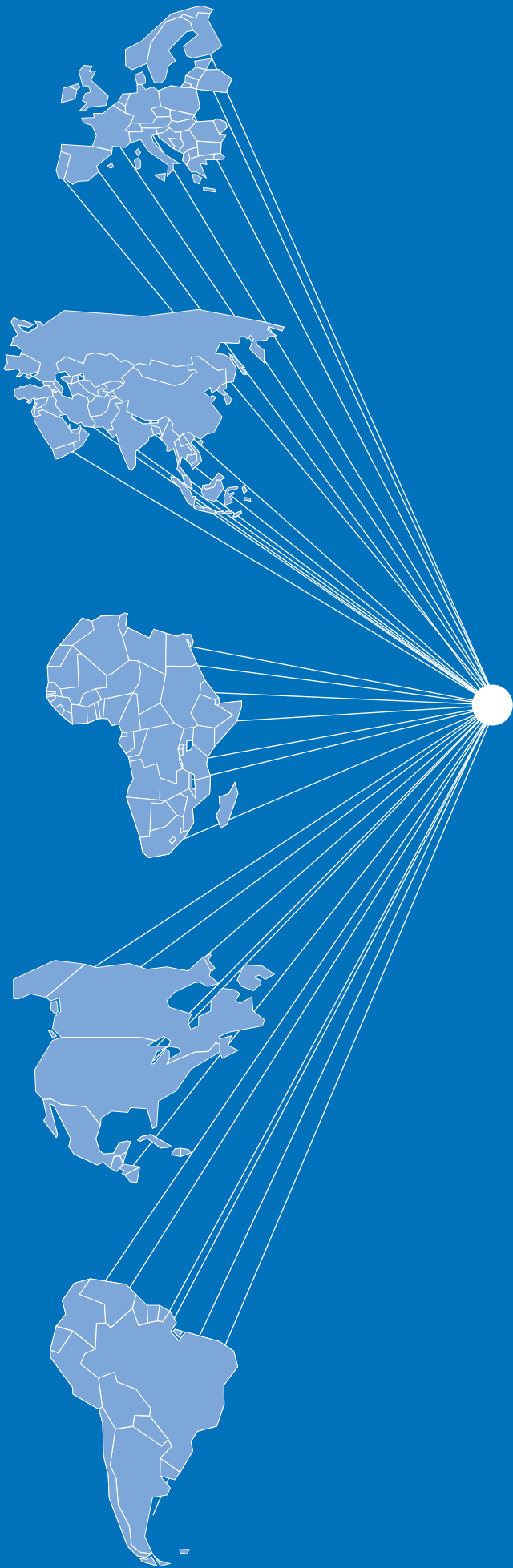


2019

Annual Report

b-it Bonn-Aachen
International Center for
Information Technology



Foreword by the Chair of the b-it Foundation



Annette Storsberg

Last year's success of RWTH Aachen University and especially the University of Bonn in acquiring altogether eight "Clusters of Excellence" within the Excellence Strategy of the German federal and state governments was even topped this year. Thus, the Bonn-Aachen International Center on Information Technology (b-it) became the nationwide first joint central institute of two "Universities of Excellence". Internationalization and fully research-integrated teaching – pioneered by b-it from the start in 2002 – range highly in both university strategies.

In September 2019, the ASIIN accreditation board extended the national and European accreditation of the b-it study programs Life Science Informatics and Media Informatics for the next seven years. Reviewers appreciated the data science-oriented evolution of the initial programs, strong student diversity in terms of gender and nationality, impressive success rates and excellent alumni placement. We are grateful to the prestigious scientific and industrial members of b-it's international advisory board for their strategic contributions to this success.

Like the b-it universities, their Fraunhofer partner institutes at Birlinghoven Castle have further strengthened their leadership in data science and artificial intelligence. We congratulate b-it Director Matthias Jarke for his election as co-speaker of Aachen's interdisciplinary excellence cluster "Internet of Production", which held its annual graduate training event in Birlinghoven Castle. b-it Director Stefan Wrobel, speaker of Fraunhofer's Data Science and AI Alliance, was recognized by the German Informatics society as a "top-10 AI head" in the country. Many new research grants expand further the research opportunities for b-it master and doctoral students, among which b-it's participation in the German National Competence Center on Machine Learning Rhein-Ruhr ML2R is of particular importance. b-it's international visibility was further promoted by co-hosting the first international conference on Process Mining with over 300 participants, remembering Carl-Adam Petri who, as an Institute

Director at Birlinghoven Castle, invented the key mathematical formalism for this industrially very important AI subfield 50 years ago.

On the occasion of his retirement from Bonn-Rhein-Sieg University of Applied Science, we once again cordially thank Professor Kurt Ulrich Witt for 15 years of enthusiastic service in the team of Founding b-it Directors. The strength of the Autonomous Systems Master Program initiated by him, and continued by his successor Paul Plöger, showed once more this year by their b-it-bot student team winning the RoboCup world championship in Sydney/Australia.

I would like to congratulate the b-it leadership – directors, study coordinators, faculty and study advisors – on the progress in the past academic years and look forward to the next steps.

Annette Storsberg
State Secretary at the Ministry of Culture and Science of the German State of North Rhine-Westphalia
Chair of the b-it Foundation Council

b-it Mission Statement

b-it is an international center for information technology. It is jointly carried by the leading universities and research institutes of the information technology region Bonn-Aachen. At b-it, a team of excellent scientific leaders attracts the best students from all over the world. At the same time, b-it is a strategic partner of the regional economy.

At b-it, research and teaching form an integrated unit at the highest level. International orientation and diversity are a particular asset and strength of our institution. In our teaching, we build on the complementary strength of our participating institutions.

Graduates of b-it are sought after as specialists and experts, regionally and internationally. They transport know-how and innovation into science and economy.

We are shaping the digital change in a dialog between economy and society. Our focus is Data Science in the application areas Media, Life Sciences and Autonomous Systems.

Officers

Scientific Directors

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

Prof. Dr. Paul G. Plöger, Hochschule Bonn-Rhein-Sieg

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

Coordinators b-it Study Programs

Prof. Dr. Ulrike Meyer, RWTH Aachen University, Media Informatics

Prof. Dr. Jürgen Bajorath, University of Bonn

Prof. Dr. Gerhard K. Kraetzschmar, Hochschule Bonn-Rhein-Sieg, Autonomous Systems

Assistant Directors/Study Advisors

Iman Awaad, M.Sc., Hochschule Bonn-Rhein-Sieg

Dr. Thomas Bode, University of Bonn

Arnab Chakrabarti, RWTH Aachen University

René Röpke, RWTH Aachen University

Dr. Alexandra Reitelmann, University of Bonn

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b-it Foundation Council

Annette Storsberg (Chair), State Secretary at the Ministry of Culture and Science NRW

Thomas Trännapp (Secretary), Vice Chancellor, RWTH Aachen University

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Holger Gottschalk, Chancellor, University of Bonn

Prof. Dr. Hartmut Ihne, Rector, Hochschule Bonn-Rhein-Sieg

Stefan Hagen, President, Bonn / Rhine-Sieg Chamber of Commerce

Report by the Scientific Directors

b-it offers highly selective graduate IT education to top international students in a unique cooperation between leading research universities and the Fraunhofer Society. English-language Master Programs address important cross-disciplinary fields linking Computer Science to Robotics, Media and Communications, and the Life Sciences. b-it graduates have consistently enjoyed an excellent placement record in research and industry.

The University of Bonn and RWTH Aachen University are among the only 11 German universities achieving the national "Excellence University" predicate and well over € 100 mio. each, in addition to eight large-scale Research Clusters already awarded in the previous years. This offers many further student research, doctoral training, and postdoc opportunities for b-it students and graduates. This year already saw also successful completions of joint doctorates with Bonn-Rhein-Sieg University of Applied Sciences.

b-it Directors and Faculty mourn the untimely death of our long-term colleague Prof. Gerhard Kraetzschmer, an internationally influential robotic specialist. He would have been proud of his b-it-bots robotic team winning both the national and the world championship in the RoboCup@Work tournaments.

The quality of the Master Programs has been reconfirmed by their recent second re-accreditation. We appreciate the contributions to the intense re-accreditation effort by the study coordinators Prof. Ulrike Meyer (Media Informatics) and Prof. Jürgen Bajorath (Life Science Informatics), the study advisors Dr. Alexandra Reitelmann, Arnab Chakrabarti, and René Röpke, and the continued support by Deans, and Rectorates, and the Ministry of Culture and Science. Thanks are due to Foundation Board Chair State Secretary Annette Storsberg and Manager Thomas Traennapp, for steering the b-it Foundation through challenges of historically low interest rates. The entry of new industrial leaders and internationally renowned researchers into the b-it International Advisory board should further strengthen b-it's industrial linkages and scientific network.

In addition to summarizing the principles and program of b-it, this report highlights some major accomplishments of faculty and students during the last year. Enjoy reading!



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



Prof. Paul G. Plöger
*Bonn-Rhein-Sieg University
of Applied Sciences*



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

Matthias Jarke,
**RWTH Aachen University and
Fraunhofer FIT**
Paul G. Plöger,
**Bonn-Rhein-Sieg University of
Applied Sciences**
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. The b-it Research School offers doctoral training. Since 2018, most courses take place in the newly erected b-it building on the Poppelsdorf Campus for Mathematics and Computer Science of Bonn University. Admission to the b-it Master Programs is linked to, and conditional upon, placement in research lab courses at the participating Fraunhofer institutes. Students

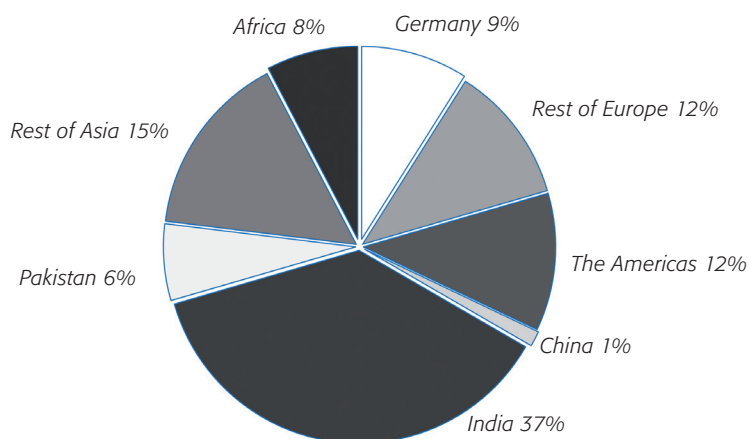


in good standing are offered financial support during these lab courses.

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.

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. A comprehensive external evaluation in 2015 confirmed the very positive developments and stimulated a few new accents. 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

b-it Director Stefan Wrobel selected as one of the 10 most influential computer scientists in the field of AI in Germany

The vote was part of the Science Year 2019 in Germany as well as the 50th anniversary of the Gesellschaft für Informatik (GI). The 2019 edition of Science Year focuses on Artificial Intelligence. The jury consisted of 15 computer scientists from academia and industry from all over Germany.

Prof. Wrobel is Head of the Department of Information Systems and Artificial Intelligence (Institute of Computer Science III) at University of Bonn and Director of Fraunhofer IAIS. Currently, he is also the Spokesman of the Fraunhofer Big Data and Artificial Intelligence Alliance, and Deputy Chair of the Fraunhofer Information and Communication Technology Group.

Media Computing Group turns 15

In November 2018, Prof. Jan Borchers' celebrated his 50th birthday, and his b-it-funded Media Computing Group its 15-year anniversary. Over a hundred alumni and other visitors gathered to look back at the first fifteen years, and to experience current hands-on research demos.



Demos at Media Computing Group 15-year anniversary.

Best Paper Awards

Ahmad Drak, best paper award titled "Towards Finding an Optimal Flight Zone for a Side-by-Side Tracking UAV w.r.t Extraction of Dynamic Vector Fields" presented at the 19th International Arab Conference on Information Technology.

Nur Hamdan, Adrian Wagner, Dr. Simon Völker, and Prof. Jan Borchers of the b-it-funded Media Computing Group at RWTH Aachen University received an Honorable Mention for their paper "Springlets: Expressive, Flexible and Silent On-Skin Tactile Interfaces" presented at the ACM CHI 2019 conference in May 2019. Springlets are the first toolkit of haptic input devices to create a variety of force and stretch sensations on the wearer's skin with a single technology. Each Springlet uses shape-memory alloys, and can be built in under 15 minutes for less than 10 Euros. ACM CHI is the world's most prestigious and impactful conference in Human-Computer Interaction. Only the top 5% of submitted papers receive an Honorable Mention.



Prof. Dr. Stefan Wrobel.



The Passing of Prof. Dr.-Ing. Gerhard Kraetzschmar

It was with a very heavy heart that we mourn the passing of MAS Prof. Dr.-Ing. Gerhard K. Kraetzschmar. Professor Kraetzschmar had been teaching and conducting research at the Hochschule Bonn-Rhein-Sieg since 2005. He deserves a great deal of thanks and recognition for his work in teaching and research as well as for his extraordinary commitment at the university. In sadness and gratitude we bid farewell to a deserved and popular colleague. Our thoughts and prayers are with his family.

Events and Visits

b-it Lecture Series:



Prof. Dagmar Waltemath from the University of Greifswald presented a talk about "Model reuse with joy: From paper-based model description to interactive disease simulation".



Dr. Michael Platzer of the AI company "mostly AI" from Vienna delivered a talk about generating virtual patient data modelled after real patient data by preserving privacy as much as possible.



b-it Study Programs Successfully Re-Accredited

In 2005, the b-it Master Programs in Life Science Informatics and Media Informatics were the first ones in RWTH Aachen University and the University of Bonn to undertake the then novel accreditation procedures installed by the so-called European Bologna process. After a first reaccreditation in 2011, a second reaccreditation by the ASIIN accreditation was conducted in the spring and summer 2019. In detailed re-accreditation reports, the successes and challenges were discussed and the evolution strategy for the programs presented. Highlights included the strengthening of a shared Data Science and AI aspects for both programs, experiences with new teaching concepts such as flipped-classes and digitalization methods, and the recent actualizations of admission and study regulations, addressing changes in the state laws. In mid-July, an expert committee visited b-it to discuss with students, faculty, directorate and university rectorates with quite positive feedback. In September, the ASIIN Accreditation Board approved the national and European re-accreditation for the next seven years.

3. Workshop on Computational Chemogenomics and Chemical Biology

This hands-on workshop was delivered by Prof. JB Brown, Kyoto University, invited by Prof. Jürgen Bajorath on September 23-24, 2019. Students were able to explore realtime data retrieval and data analysis using ChEMBL, a curated database of bioactive molecules with drug-like properties.

TABULA Roadshow Event with Ranga Yogeshwar for BMBF

The TABULA project at Prof. Borchers' Media Computing Group is one of the four flagship projects in the Tangible Learning Initiative of the BMBF. The BMBF organized a roadshow that involved four German universities and three core research demonstrators across Germany. The event hosted in Aachen attracted over 100 guests including RWTH's new rectorate Prof. Dr. Ulrich Rüdiger and science journalist Ranga Yogeshwar, who gave an invited keynote. Guests tried out 15 hands-on demonstrators developed in the BMBF's Tangible Learning Initiative.





b-it-bots are RoboCup German & World Champions 2019

The b-it-bots team won the World Championship title at the RoboCup competition which took place in Sydney in July 2019. The team, which is made up of students of the Autonomous Systems program as well as from various programs at H-BRS, placed first.

As in other sports, the successful participation in the World Championship required a long and intensive preparation. The six students and their team captain Deebul Sivarajan Nair invested a lot of free time in the past months to make the robots fit for the big tournament. An important step was winning the @Work league title in the German Open in May 2019. The b-it-bots are supervised by the computer science professors Paul Plöger and Gerhard Kraetzschmar.

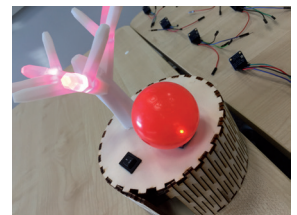
AC² Digital Fabrication Workshops

In 2019, Prof. Borchers' Media Computing Group launched a new event format: Digital Fabrication workshops for members of the annual local AC² startup competition. Attendees learned how to quickly fabricate affordable prototypes for their business ideas with the latest open-source digital tools for laser cutting, 3D design, 3D scanning, 3D printing, and Arduino microcontroller development.

The events are funded by the German Ministry of Science and Education (BMBF).

Talk by Prof. Rose on the Celebration for the 125 Anniversaries of the Institute of Preventive Animal Welfare (ITW)

PigConomy is about the statistical analysis of animal welfare and the impact assessment of housing conditions in farm environments. We have developed a quantitative model to predict the impact of certain housing decisions for the breed of pigs. Once causal relationships between housing conditions and animal welfare have been identified, economic applications are at the bring. Blockchain-enabled clearing house services allow one to monitor the use of such know-how in an immutable fashion. Prof. Thomas Rose presented the idea of PigConomy on the celebration for the 125 anniversaries of the Institute of Preventive Animal Welfare (ITW) of the University of Bonn. This renown institute has been the first agricultural institute for animal welfare in the State of North Rhine Westphalia and is located in the direct vicinity of b-it.



Example photonic tree, AC² Digital Fabrication Workshop.

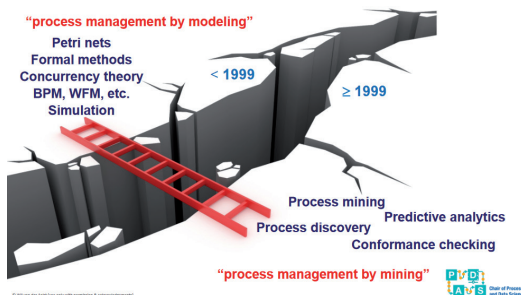
Young Researcher Summit "Internet of Production"

The b-it Research School cooperates with the Research Training group of the DFG-funded national Excellence Cluster "Internet of Production" (IoP), an interdisciplinary undertaking among mechanical engineering, computer science, business, and social sciences at RWTH Aachen University and its associated Fraunhofer Institutes. Associated with b-it's IPEC program, the annual IoP Young Researcher Summit was held May 23-24, 2019, at Birlinghoven Castle. Tutorials and student presentations were combined with Fraunhofer institute visits and social meetings in the attractive historical setting of the Castle; wonderful weather added to a memorable experience for all participants.



© Anja Wassong / Exzellenzcluster Internet of Production (IoP).

Research @ b-it



1st International Conference on Process Mining: A Reverence to Carl Adam Petri

50 years ago, Carl Adam Petri, an early institute director at what is now b-it partner Fraunhofer Institute Center Birlinghoven Castle, proposed one of the best-known formalism for modeling parallel processes. Over the last 20 years, automatic process mining of such “Petri nets” from captured event histories, has emerged as one of the fastest growing data science and AI applications. To celebrate this European success story, Prof. Wil van der Aalst, Process Mining pioneer and Humboldt Professor at RWTH Aachen University and Fraunhofer FIT, organized the 1st International Conference on Process Mining (ICPM) in June 24-26, 2019. Over 500 participants from all over the world met in Aachen’s Tivoli soccer stadium to debate new research results and business opportunities.

by the public. ARPen enables in-situ 3D modeling of objects directly through makers’ smartphones to enhance the process of modeling custom-build objects. ARPen was presented at ACM CHI ’19, the world’s premier conference on Human-Computer Interaction.

Prof. Witt Has Retired

In January 2019, former b-it Applied Science Director Prof. Dr. Kurt-Ulrich Witt retired from his position in the Department of Computer Science at the Hochschule Bonn-Rhein-Sieg. He was one of the first professors on the campus and, therefore, significantly involved in the establishment of the university and in particular of the Department of Computer Science. He was elected founding dean in 1999 and was re-elected numerous times to that office.

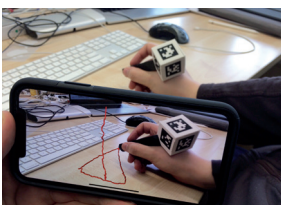
Witt was a man of many hats: In addition to serving for 14 years as director of b-it-AS, he taught as a professor of mathematical and theoretical foundations of computer science, and published ten textbooks with a total of 17 editions. In addition to his membership in the Department of Computer Science, he was also a member of the senate for several terms and in 2016 became a member of the Institute Council of the Graduate Institute.

Competence Center Machine Learning Rhine-Ruhr (ML2R)

On January 23, 2019, the Competence Center for Machine Learning Rhine-Ruhr (ML2R) celebrated its opening in Dortmund. ML2R is one of Germany’s four Machine Learning Centers funded by the German Ministry of Education and Research (BMBF). b-it and the University of Bonn are integral partners of ML2R and our activities are coordinated by professors Stefan Wrobel and Christian Bauckhage.

Personal Photonics: Haptic Vests and AR Sketching

In the ongoing BMBF project “Personal Photonics”, Prof. Borchers’ Media Computing Group explores new interaction techniques and user interfaces for photonics components and tools. After the Haptic Vest, which enables vision-impaired users to experience their surroundings by vibratory actuations on their belly, the project continued to develop projects over the last year. With the release of the ARPen app in the iOS App Store, the first results of the project can now be experienced



ARPen: 3D Sketching with your Smartphone in Augmented Reality.

Blockchain Project SINLOG

Clearing house services certainly constitute an attractive application perspective for blockchain technology, because stakeholders from different businesses with perhaps different goals have to agree on a common and mutually agreed basis, i.e. transactions cooperatively conducted. Yet, proper execution of processes as in logistics with complex rules for process compliance is of equal importance. Project SINLOG (Prof. Thomas Rose) supports the development of a clearing house for document synchronization according to physical transfers under the umbrella of the mFund Initiative of the German Ministry BMVI (Transport and Digital Infrastructure) in order to foster digitalization for transport infrastructures and the integration of inland waterway transport in tri-modal shipment processes.

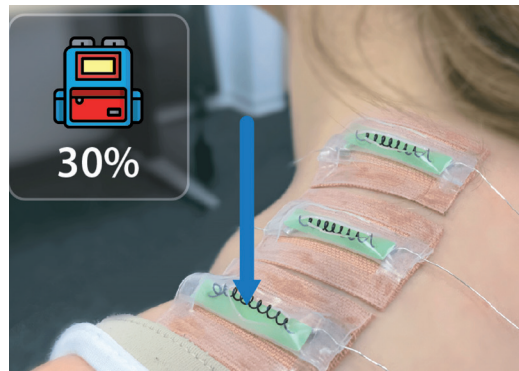
3D Competence Center: New User Interfaces for Personal Fabrication

In June 2019, Prof. Borchers' Media Computing Group successfully completed the EFRE project "3D Competence Center (3DCC)" on the future of user interfaces for personal design and fabrication. The project brought to life a wide range of successful prototypes. Sketch & Stitch is an end-to-end fabrication system that can transform a hand-drawn sketch on fabric into an interactive circuit using conductive embroidery. Flowboard brings flow-based programming to embedded coding for Arduino microcontroller boards through an innovative hardware and software design. Springlets allow for expressive, flexible, and silent on-skin tactile experiences. The 3DCC project also funded the Fab Academy initiative organized in collaboration with MIT's Prof. Dr. Neil Gershenfeld.

StatPlayground: New Tools to Learn Statistics

To help students learn statistical concepts better, researchers at Prof. Borchers' Media

Computing Group developed StatPlayground, a web application based on exploratory learning. The application allows students to form their own understanding of statistical concepts through direct manipulation of visualizations. StatPlayground was presented at the INTERACT '19 conference.



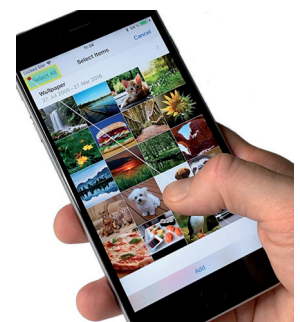
Springlets.

Terra Mosana: Digital Cultural Heritage Across Borders

Prof. Borchers' Media Computing Group continues to acquire new funded projects, with "Terra Mosana" being the latest addition. This Interreg project is a collaboration between municipalities, heritage sites, museums, universities and citizens to reinforce the attractiveness of tourism and shared identity in the Euregio Meuse-Rhine through digital exploration of cultural heritage. Together with Prof. Kobbelt's Visual Computing Institute at RWTH, the Media Computing Group is creating a mobile tourist app that allows visitors to experience the famous Aachen cathedral digitally. See hci.ac/terramosana.

ForceRay: Touch Input Without Dropping Your Smartphone

In the current day and age of ever-growing smartphones, it is difficult for users to tap on regions of the screen that are far away from the user's thumb. Researchers at Prof. Borchers' Media Computing Group developed ForceRay, an interaction technique that utilizes the "force touch" feature to improve interaction with smartphones. ForceRay was presented at the ACM CHI '19 conference.



ForceRay.



Prof. Dr. Jan Borchers,
Media Computing



Prof. Dr. Thomas Rose,
Media Processes

List of employers of MI Alumni

(Universities & Research):
Airport Research Center GmbH,
b-it, b-it Research School, Centro
Nacional de Investigaciones
Cardiovasculares, CErTH, Cha-
rité 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, Microsoft Re-
search (Cairo), National University
of Computer & Emerging Sciences,
National University of Ireland
Maynooth, National University of
Sciences and Technology, Research
Center Jülich, Robert Bosch Foun-
dation, RWTH Aachen, Suez Canal
University, Swiss Federal Institute
of Technology, Uniklinik Aachen,
Uniklinikum Bonn, Universidad
Tecnologica de Panama, Univer-
sitätsspital Basel, University Clinic
Carl Gustav Carus; Universities
of Agder, Arab American Jenin,
Asia and the Pacific, Atma Jaya
Yogyakarta, Augsburg, Bahria,
Bonn, Cambridge, Düsseldorf-
Essen, Dresden, Duisburg-Essen,
Edinburgh, Engineering & Techno-
logy Peshawar Pakistan, Ghent,
Göttingen, Hamburg, Hasselt,
Heidelberg, Houston, Oldenburg,
Ireland, Maynooth, Ienes Kepler,
Kiel, Leipzig, Mainz, Münster, Paris,
Rotterdam, Sud, Stuttgart, Tilburg,
Tirana, Toronto, Trento, Tübingen,
Washington, Waterloo, Western
Australia, West Indies, Zurich; TU
Darmstadt, TU Dresden, TU Eind-
hoven, TU Munich

b-it Programs

Master Program in Media Informatics

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 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, 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.

Twenty seven Media Informatics students have completed their degree in the academic year 2018-2019. The graduates quickly found interesting positions either as doctoral students in Germany and abroad, or in attractive companies. The incoming class of 2019 comprises 22 students, selected from 447 applications. The new students come from 11 countries, and include 54 % females and 46 % males.

Prof. Dr. Emmanuel Müller



Prof. Dr. Emmanuel Müller joined the team of b-it Endowed Chairholders in 2018 to strengthen the Data Science and Engineering core of the b-it Master Programs. In his INTEGER teaching concept, he aims to bring

students and data scientists together, to work through a series of lab courses and small research projects towards publications at international conferences. The emphasis is on formal methods and scalable algorithms for Data Science and Engineering.

News from Media Informatics Alumni

MARIUS SHEKOW



His interest in the conception and development of cooperation-supporting applications was kindled by his participation in the CSCW and groupware lecture at b-it. After receiving the award for

the best Master thesis of 2013 while working as student at Fraunhofer FIT, he immediately became a member of the research staff. After working in several projects, including the combination of augmented reality technology with cooperation-supporting solutions, he finished his PhD in 2019. In his thesis he developed a novel solution for file synchronization between local devices and cloud-based team rooms, with the technical implementation providing the basis for a startup.

Lab Course “Data Visualization and Analytics”

In winter term 2018, b-it Professor Rose and his Microsimulation Models team held the lab course “Data Visualization and Analytics” as a practical teaching and training measure to familiarize students with statistical data analytics on a system level. Rather than teaching concepts and analysis methods in theoretical settings, it focused on finding answers to challenging societal questions, building upon the SOEP (socio-economic panel) dataset, a large time series of data about typical parameters of German households. Hence, it provides a solid basis to answer questions addressing German society, such as “Gender X Gaps” where X could mean payment, pension or education, to name a few. Such questions furnished an exciting discussion platform within our international teams. The lab – tutors as well as students – witnessed vivid discussions on how to combine analytic tools such as the R tool for statistical analysis, to find answers and perhaps also some kind of rationale for certain phenomena. The final presentation attracted an impressive audience because of the societal questions addressed.



List of employers of MI Alumni

(Business): 4tree GmbH, Ableton, Adecco Engineering & IT, Adecco Phaholyothin Recruitment Ltd., Adidas, Agfa Healthcare, Airbus, Alcatel-Lucent, Ancud IT Beratung, Ansaldo STS, ANSR Source, AOL, ARC International, ArcSoft, Avedas, Avid Technology, awato Software GmbH, Bank of Mexico, Bayer Technology Services, BCA Auctions, BCA Europe, Bertelsmann, Bertrand Ingenieurbüro GmbH, BESA GmbH, Blimp.Mx, Bombardier Inc., Brainloop, BTC Business Technology Consulting, Capgemini, Capitaworld Platform Pvt. Ltd., CAS, CBC Cologne Broadcasting Center, Cellent AG, CGI, CIGNA, Cloudberrytec, CMLabs Simulations, Cognizant Technology Solutions, COMNEON, Contentteam, Crytek, CSC India, Daedalic Entertainment, Daimler, Deloitte AG, Delta Engine, Demax, Deutsche Bank AG, Deutsche Telekom, devolo AG, Dolby Laboratories, DP ITServices GmbH, Dynevo (Bayer), Ericsson, Euromoney Institutional Investors, European Computer Telecoms, Evimed Online, Exact Software, Facebook, Famous Group, Finantix Srl, Forth corporation, Fox Chase, Game Analytics ApS, GIVE.sg, Global Crop Diversity Trust, Goodyear, Google, Grandcentrix, GTT Technologies, Hewlett Packard Enterprise, HITS, Huawei, Humance, i22 internetagentur, IBM, IdeaObject Softwares, Ilypsys, IMC BV, IMC Financial Markets, Infineon, Inforcept Networks, Internet Company, IP Labs, iPharro Media, ISRA Surface Vision GmbH, ITBrainiacs, IVU Traffic Technologies, IW-One, Johnson Controls, Keynote SIGOS, Kisters, Kuveyt Turk Participation Bank, Lakshmi Technology and Engineering Industries, LHS Telekommunikation, Ligatus GmbH, Lufthansa Systems, Lycos, MarAnCon, Merck, Mastercard, MeVis Medical Solutions AG, Microsoft, Mobilab Solutions, moneymeets GmbH, Monsanto, Movilizer, NAVTEQ, Nato Communications and Information Agency, Nemetschek AG, NeuroSky, Inc., Nexcom IT Services, Next Level Integration, Novartis, NTT Data, NVIDIA, Oando Plc, Oracle, Pater-sons, PCI Geomatics, Pepsi, Philips, Plinga, PricewaterhouseCoopers, Qiagen, Qosmotec Software Solutions, QSC, ReadSoft, Recognizer Group, Recommind, Roamworks Research & Development GmbH, Robert Bosch GmbH, Roche, S&P Capital IQ, Samsung Electronics, SAP, SD Inspiring Travel, sd&m, SE Consulting, Secat, Shell, SHS VIVEON, siCAT, Siemens, Siemens Healthcare, SIGOS, Simfy, Sogou Inc., Solnista, Solutions 4 Media, Sony, Steinberg Media Technologies, Sytel Reply, T-Systems, TeamViewer, Teleca, Telemotive, Tessella, Texas State - Health and Human Services (HHSC) Agency, Thomson Reuters, TravelTainment, Turk Telekom, Twitter, Vantage Labs, Viacom, vmware, Vodafone, Wacom Europe, Werum Software & Systems, Westwing Home and Living GmbH, Whowish, Widespace AB, Wieden+Kennedy, Workplace Systems, World Bank, Xerox Research Centre Europe, Yahoo!, Yieldlab AG, Zalando



Prof. Dr. Jürgen Bajorath,
Life Science Informatics



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

List of employers of LSI Alumni

(Business): 4GATC Biotech, Accenture, Alcedo, Arbern GmbH, Asahi Kasei, ASI Data Science, Astra Seneca, BASF SE, Bayer, Bayer Monsanto, BenevolentAI, Clariant, Ericsson, carpooling.com GmbH, Clue Points, Comma Soft AG, Coty Germany, Curetis, Deutsche Post, DFind Science and Engineering, DHL, ecSeq Bioinformatics, Freeletic, Galileo Press, Gamomat GmbH, GAMOMAT Development GmbH, GATC Biotech, Generali Deutschland AG, Genestack, Glaxo Smith Kline, Hamilton Medical, HealthCare Global, Heraeus, Hoffmann-La Roche, Hype Innovation, IBM, IIT Bangalore, ITTM S.A., Interpretomics, KWP Inside HR, LabVantage Solutions Inc., Land of Lakes Inc., Leaf Bioscience, LHS Telecommunications, LinkTechnica, L'Oréal, MacKinsey, MarAnCon, Mastercard AG, Max Dellbrück Center Berlin, McKinsey, Medtronic, Miltenyi Biotec, Molecular Devices, Molecular Health GmbH, Molecular Connections Private Limited, Merck, Monsanto, msg systems ag, Nestlé Institute of Health Science, Novartis, Omnicom Media Group, Pfizer, parlamind GmbH, Postbank, Philips Research North America, ProfileXpert, Protagen AG, quintly Inc., real.digital, Recognizer, Sciex, Seasoon Information Technology, StepStone, Synechron Ltd., Syngene Ltd., United Brands Marketing, Tubs System LLP

b-it Programs

Master Program in Life Science Informatics

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 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 last years have contributed to strengthen ties with scientists of the region. Several interesting Master thesis have been carried out in collaboration with them. 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 18 students successfully graduated from the program. Top students received excellent placements again. They started positions for example at at Recognizer or Generali, as well as Postbank or McKinsey.

Twenty five new students from 15 countries ranging from Belarus to the USA will take up their studies in Winter Semester 2019/2020 carefully selected from more than 150 applications.

LSI Success Stories

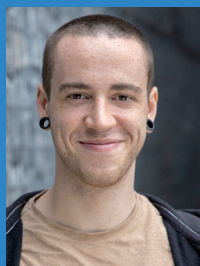
MEEMANSA SOOD



joined the LSI program with a Bachelor's Degree in Bioinformatics from Jaypee University of Information Technology, India. During her studies she joined the group of Prof. Hofmann-Apitius as a work study student.

This brought her in close contact with real research conducted in the Department of Bioinformatics at Fraunhofer SCAI. She decided to stay with this group for her Master thesis under the supervision of Prof. Hofmann-Apitius and Dr. Marc Jacobs. Her Master thesis paved the way for an entire, EU-wide initiative on disease-progression modeling. After graduation, she continues her training as a PhD student in Prof. Hofmann-Apitius' group. At present, she is leading all SCAI research activities in the context of the RADAR-AD project. RADAR-AD stands for "Remote assessment of disease and relapse – Alzheimer's disease", the project is funded by the European Commission within its Innovative Medicine Initiative [IMI]. It is noteworthy that Meemansa has led all activities for the "full proposal writing" of the RADAR-AD project proposal.

COLIN JAN BIRKENBIHL



joined the LSI program with a Bachelor's Degree in Biology from the University of Cologne in Winter Semester 2016/2017. During his studies at b-it Colin joined the group of Prof. Hofmann-Apitius

as a student in b-it work study program, a program where students join b-it groups in parallel to their studies as research student assistants. Colin got rapidly involved in large EU projects (RADAR-AD, AETIONOMY, VirtualBrainCloud) and decided to stay in the department after carrying out

his Master thesis. Colin now continues his PhD studies in the team at Fraunhofer SCAI. In RADAR-AD Colin teams up with Meemansa Sood. Together, they generated one of the most comprehensive collections of Alzheimer study data. Also, Colin represented Prof. Hofmann-Apitius group on the world's largest Alzheimer conference, the AAIC, in San Diego this year. On behalf of Prof. Hofmann-Apitius, he was talking about strategic partnerships in science with our partners from the UK, The Netherlands and the US.

MARIANA GONZÁLEZ MEDINA



joined the LSI program with a Conacyt grant (from the Mexican Government) in Winter Semester 2017/2018 with a Bachelor's Degree in Biology and Chemistry from the Universidad Nacional Autónoma de

México (UNAM). During her undergraduate studies she has already won several grants. She joined the LSI program with five publications in international journals. For her Master thesis she entered the group of Prof. Bajorath where she collaborated closely with the Pharmaceutical Department of the University of Tübingen (Department of Pharmaceutical and Medicinal Chemistry, Prof. Laufer). In her Master thesis she digitized and curated the Tübingen lab's extensive results of kinase inhibitors and could even carry out a study on this digitized and curated data that is submitted now for publication. Mariana completed her studies in LSI in four semesters, and will now continue her PhD studies at the Institut Pasteur in Paris, France, on basis of a scholarship awarded by this institute.

List of employers of LSI Alumni (Universities & Research):

Berlin Institute of Health, Biotech Research & Innovation Centre (BRIC), b-it Research School, Boston Children's Hospital, Centro Nacional de Investigaciones Cardiovasculares, Charité Berlin, Christian-Albrechts-Universität Kiel, Czech National Centre for Biomolecular Research, ELI Beamlines, European Molecular Biology Laboratory, ETH-Domain, ETH Zürich, European Bioinformatics Institute, European Bioinformatics Institute, Fraunhofer FIT, Fraunhofer IAIS, Fraunhofer SCAI, Fundación Centro Nacional de Investigaciones Cardiovasculares, German Center for Cancer Research (DKFZ), German Center for Neurodegenerative Diseases, German Institute of Human Nutrition, Hasso Plattner Institute, Heidelberg Institute of Theoretical Studies (HITS), Helmholtz Centre for Infection Research, Helmholtz Zentrum München, Hertie Institute for Clinical Brain Research, Hospital of the University of Bale, Hotkiss Brain Institute, IFOM, Imperial College London, King Abdul City for Science and Technology, Leibniz Institut für Ostseeforschung, Max Planck Institute for Biophysical Chemistry, Max Planck Institute for Molecular Biomedicine, Max-Planck-Institute for Molecular Genetics, Max Planck Institute for Neurological Research, Max Planck Institute for Plant Breeding Research, Max Planck Institute for the Biology of Ageing, Max Planck Institute Tübingen, Microsoft Research-University of Trento Centre for Computational and Systems Biology (COSBI), National Centre for Biological Sciences, National Centre for Biomolecular Research, National University of Ireland, National Technical University of Singapore, Philipps University of Marburg, Princess Nora Bint Abdulrahman University, Radboudumc – University Clinic Centre of the University of Nijmegen, Research Center Jülich, RWTH Aachen, South University of Science and Technology of China, Swiss Federal Institute of Aquatic Science and Technology, TU München, Twincore – Centre for Experimental and Clinical Research, University Clinic Gustav Carus Dresden, University College London (UCL), Western University, ZBMed, and the universities of Alberta, Amsterdam, Bonn, Bern, Cambridge, Cologne, Copenhagen, Dresden, Düsseldorf, Ghent, Kiel, Leipzig, Leon, Luxemburg, Macquarie, Mainz, Münster, Oxford, Sheffield, Tübingen, Utrecht, Western Australia, Vienna, Wageningen, Western Ontario, Würzburg, Zürich.



b-it Programs

Master Program in Autonomous Systems



*Prof. Dr. Gerhard Kraetzschmar,
Autonomous Systems*



*Prof. Dr. Paul 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 2019, 33 students joined the MAS program from an applicant pool of 605 candidates. The MAS program has always attracted the interest of students all over the globe. The 12 different nationalities of the 33 students who joined the program in the 2019 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 Hochschule Bonn-Rhein-Sieg (H-BRS). 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. Ploeger and Erwin Prassler), three research associates (Iman Awaad, Anastassia Küstenmacher and Sven Schneider) as well as researchers who have been recruited through the Sci-Roc, ROPOD, RoboLand and E-Assessment projects (Alex Mitrevski, Tim Metzler, Patrick Nagel, Lakshadeep Naik, Deebul Nair, Argentina Ortega, Maximilian Schoebel, Santosh Thoduka, and Djordje Vukcevic).

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.

MAS Success Stories

PADMAJA KULKARNI



*PhD candidate
TU Delft, The Netherlands*

Currently, I am doing my PhD in TU Delft. My PhD topic aims to use reinforcement learning (learning from experience)

to facilitate manipulation of deformable objects with a dual-arm robot. I completed my M.Sc. in MAS from H-BRS. The study-buddy program and the sense of a family at H-BRS made my transition to a foreign country virtually effortless. I was an active member of the b-it-bots team and traveled around the globe for the competitions. This participation prepared me to deal with real-world challenges and developed my team-building skills along with the technical competency. Being motivated to expand the state-of-the-art in robotics in my capacity, I decided to pursue my PhD after my masters.

ARGENTINA ORTEGA SAINZ



*Research associate
and PhD candidate
Hochschule
Bonn-Rhein-Sieg*

I joined MAS 2013 because I wanted to advance my career in state of the art robotics technology, and by the time I started my thesis, I realized I wanted to do research as a career. During my time as a MAS student, the multi-agent systems class and the EU project I worked for sparked my interest in multi-robot systems. I chose my thesis topic in this area, and after graduation, I joined H-BRS as a research associate for the EU-funded project ROPOD, which aims to deploy a multi-robot system to automate logistics transportation tasks. Late last year, I started as a PhD student in the Photogrammetry and Robotics Lab at the University of Bonn, where I'm researching

experience-based planning for long-term deployments in multi-robot systems. At H-BRS, I have co-lead the b-it-bots @Home team since 2017.

DR. ANASTASSIA KÜSTENMACHER



*Post-Doc.
Hochschule Bonn-Rhein-Sieg / measX, Mönchengladbach, Germany*

After graduating from the MAS, I joined the program as a research associate. I started my PhD

in cooperation with RWTH Aachen under the supervision of Prof. Lakemeyer and Prof. Plöger (H-BRS). The main objective was to investigate how a robot can learn from its faults. I successfully defended my doctorate on November 19, 2018. Since the defense, I was accepted to the program "Karrierewege FH-Professur". This gives me the opportunity to stay at H-BRS for another three years and gain industrial practice at a company (measX GmbH). At measX, I apply my knowledge of AI to real-world applications.

PRIYANKA VOKUDA



*Software Developer
BitTwister Informationstechnik GmbH, Ulm, Germany*

I graduated with an M.Sc. in MAS from H-BRS in 2018. Of the two specialization tracks, I chose

Machine Learning which provided an immersive environment for both state-of-the-art theory and practical applications. The faculty, dynamic student environment and well-equipped labs helped me gain a wholesome perspective of the field. This helped me secure an industrial Master thesis on the topic "Interactive Object Detection" for which I received a Studienpreis at the AFCEA Bonn e.V. in 2019. I now work as a software developer on driver assistance systems in Ulm.

List of employers of MAS

Alumni (Business):
Ableton, ASIMOV Robot-ics, Banksoft, BitTwister Informationstechnik GmbH, BMW, Bosch, CHRONEXT, cyber:con GmbH, Delphi, Exciera Technologies, Faro GmbH, Fetch Robotics, Gade Autonomous Systems Private Limited, Google/Alpha-bet, GPS, IBM, Ingen Robotics, Kuka Robotics, M2P Consulting, Magazino, MesaX, Rapyuta Robotics, RBOT, Recognizer, Robots Alive Consulting, Shadow Robot Company, Siemens, Systemantics, TBA Group, The MathWorks, Trivago, VMware

List of employers of MAS

Alumni (Universities & Research):
DFKI, DLR, Fraunhofer FGAN, Fraunhofer IAIS, Freie Universität Berlin, Heriot-Watt University, Hochschule Bonn-Rhein-Sieg, Hochschule Bonn-Rhein-Sieg (Graduate Institute), Hochschule Bonn-Rhein-Sieg (Institut für Sicherheitsforschung), Instituto Superior Técnico (IST) - Universidade de Lisboa, Jacobs University LAAS-CNRS, Norwegian University of Life Sciences, Örebro University, Osnabrück University, Rhine-Waal University of Applied Sciences, RWTH Aachen, TU Delft, TU Wien, TUBITAK-UZAY Space Technologies Research Institute, Universidad Anáhuac Mayab in Mérida, University Jaume I, University of Bielefeld, University of Bonn, University of Erlangen, University of Hertfordshire, University of Louvain, University of Western Australia

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 38,000 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 200 different subjects and degrees. In 2019, the University of Bonn was elected as one of the 11 “elite universities” within the German excellence program, after having already received the record number of six “Excellence Cluster” grants in 2018.

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 45,400 students. RWTH offers 157 courses of study (undergraduate and postgraduate). The RWTH master programs educate engineers who are keen to engage in R & D, innovation, and entrepreneurship. Since 2007, RWTH Aachen was elected and re-elected three times as one of the “elite universities” within the German excellence program. In the current Times Higher Education Ranking, RWTH Aachen University is placed 87th among the several thousand evaluated universities.



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 600 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

For over 35 years, the Fraunhofer Institute of Applied Information Technology Fraunhofer FIT has been conducting R&D on user-friendly smart solutions that blend seamlessly in business processes. Fraunhofer FIT is your partner of choice for digitization, Industry 4.0 projects and IoT solutions. In Life Science Informatics the institute focuses on image-based navigation systems, information-intensive optical instruments, visual information analysis, multi-parametric molecular sensor technology and diagnostics as well as bio-analogue analysis of changing images. 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.

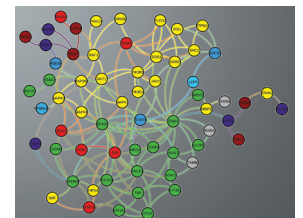


At Hannover Messe 2019, Fraunhofer FIT presented a system that uses AI-based image processing to monitor and evaluate, in real time, the situation and behavior of people, e.g. in a production setting. The system may be used, for instance, to automatically raise the alarm if a person is sitting or lying on the floor, indicating a dangerous situation.

Fraunhofer SCAI

The Fraunhofer Institute for Algorithms and Scientific Computing SCAI combines know-how in mathematical and computational methods, with a focus on the development of innovative algorithms and their take-up in industrial practice – bringing benefits for customers and partners.

SCAI's research fields in Computational Science include machine learning and data analysis, optimization, multiphysics, energy network evaluation, virtual material design, multiscale methods, high performance computing, and computational finance.



Fraunhofer SCAI: A hormonal network underlying dementia and Alzheimer's disease.

SCAI's department of Bioinformatics offers its customers comprehensive services in information extraction (text mining) from the scientific literature and real world data sources such as electronic patient records (EHRs). The major application focus of the team is modeling and mining in the context of neurodegenerative diseases such as Alzheimer's or Parkinson's disease. Collaborative research and development projects deliver solutions to the pharmaceutical industry, the biotech industry and to the life science software industry. The department of Bioinformatics also takes part in the education of students of the Life Science Informatics curriculum of the b-it.

b-it Applied Science Institute

Hochschule Bonn-Rhein-Sieg

Founded in 1995, the Hochschule Bonn-Rhein-Sieg 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 2019, the different departments accommodate more than 9,000 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.

Fraunhofer IAIS

As part of the largest organization for application-oriented research in Europe, the Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS is one of the leading scientific institutes in the fields of Artificial Intelligence, Machine Learning and Big Data in Germany and Europe. With its approximately 300 employees, the institute supports companies in the optimization of products, services, processes and structures as well as in the development of new digital business models. Fraunhofer IAIS thus shapes the digital transformation of our working and living environment.



Hochschule Bonn-Rhein-Sieg.

Fraunhofer IAIS is at the center of a strong research network. Since 2014, the Fraunhofer IAIS has been coordinating the Fraunhofer Big Data and Artificial Intelligence Alliance, which bundles the cross-sector expertise of more than 30 Fraunhofer Institutes in the fields of Big Data and Artificial Intelligence. It is also an important driver of the International Data Space initiative with more than 100 participating companies and organizations, which aims to create a secure data space that enables companies of all sizes and from different industries to manage their data assets confidentially. In addition, there are long-standing close cooperations in research and teaching with the Excellence University of Bonn.

In 2018, Fraunhofer IAIS further expanded its strategic network and plays a leading role in important initiatives at state, federal and EU level. Fraunhofer IAIS is heading the Competence Platform for Artificial Intelligence in North Rhine-Westphalia KI.NRW. Together with the University of Bonn, TU Dortmund, and Fraunhofer IML, Fraunhofer IAIS is a leading partner of the Competence Center Machine Learning Rhine-Ruhr (ML2R) – one of four nationwide nodes for cutting-edge research and transfer in machine learning. At European level, Fraunhofer IAIS plays a leading role within the initiative “A European AI On-Demand Platform and Ecosystem” (AI4EU).

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 for current admission details.

Fees and Finances

As of 2019, a student union fee of ca. 300 € 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.





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Prof. Dr. Paul G. Plöger, Bonn-Rhein-Sieg
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Imprint

Editors

b-it Scientific Directors

Design

Luzia Sassen

Printing

ditges print+more

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Bonn-Aachen International Center for
Information Technology