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2018 Annual Report

Department of Computer Science, Aarhus University

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2018 in Short

2018 was a productive year for the department. We have graduated a total of 173 students at Bachelor, Master's, and PhD levels in computer science and IT product development. Our graduates at all levels are in high demand, and they can easily get interesting and challenging jobs in industry and research. Thus, our annual career day (K-dag) in April had attendance from 53 companies with a record number of 225 recruiters to attract our graduates to their companies.

This year we have implemented the GPA of 7 as admission requirement for new undergraduate students, as well as a Quota 2 test and introduction for applicants not fulfilling the admission requirements. We have received 208 applications that fulfill the requirements, although it is early to say, it seems that the new admission requirements lead to a better retention at the first year.

Research-wise 2018 was also an excellent year for the department. We have hosted several international research workshops. Moreover, we have received several large research grants, including the prestigious Villum Kahn Rasmussen Annual Award for Technical and Scientific Research to Professor Ivan Damgård. In average, we receive around 40 M DKK a year in external research funding.

As a new initiative this year we invited our 1800+ alumni to a seminar and social event in April, and more than 225 alumni used the opportunity to attend the event. The event will be repeated in 2019.

STAFF

In 2018, there have been the following changes in our tenured staff:

Jesper Buus Nielsen was appointed as professor in the Cryptography and Security group from April 1.

Kasper Green Larsen was appointed as associate professor in the Algorithms and Data Structures group from May 1.

Hans-Jörg Schulz has been employed as associate professor in Ubiquitous Computing and Interaction group from May 1.

Annemette Hammer resigned from her position as head of secretariat in June.

Ira Assent was appointed as professor in the Data-Intensive Systems group from August 1.

Magnus Madsen has been employed as tenure-track assistant professor in the Programming Languages group from August 1.

Roman Rädle has been employed as tenure-track assistant professor in the Computer Mediated Activity group from August 1.

Kaj Grønbaek was appointed head of department from September 1.

Davide Mottin has been employed as tenure-track assistant professor in the Data-Intensive Systems group from October 1.

Jaco van de Pol has been employed as professor in the Logic and Semantics group from November 1.

Michael Schwartzbach passed away.

AWARDS AND APPOINTMENTS

Professor Ivan Damgård: Villum Kann Rasmussen's Annual Award

PhD student Mark Simkin: Elite research travel grant

Master student Christoffer Hawthorn: Entrepreneurial Award "Guldæg 2018"

PhD student Anders Dalskov: Best Computer Science Master Thesis 2017, Dansk Selskab for Datalogi

Professor Jesper Buus Nielsen and Associate Professor Kasper Green Larsen: Best paper Award, Crypto 2018

Professor Susanne Bødker: Honorary Doctor at KTH Royal Institute of Technology, Stockholm

Master student Karl-Emil Bilstrup: The Queen's travel scholarship

Postdoc Chaya Ganesh: Invited to participate in MIT's EECS Rising Stars workshop

Professor Ira Assent: New member of the Industrial Research Committee at the Innovation Fund Denmark

RESEARCH PROJECTS

The department receives approximately DKK 40 million a year in external research grants. Grants starting in 2018:

Secure, Private, Efficient Multiparty Computation, Claudio Orlandi, ERC Horizon 2020, DKK 11.1 million.

Modern Challenges in Geometric Data Structures, Peyman Afshani, The Danish Council for Independent Research, Natural Sciences, DKK 5.8 million.

Better Theory for Better Practice in MPC, Jesper B. Nielsen, The Danish Council for Independent Research, Natural Sciences, DKK 5.5 million

Annual Award for Technical and Scientific Research, Ivan Damgård, Villum Kann Rasmussen, DKK 4.5 million.

Homotopy Type Theory and Probabilistic, Bastian A.W. Spitters, Air Force Office of Scientific Research, DKK 3.4 million.

360 Degree Health Data Integration and Analysis, Kaj Grønbaek, Innovation Fund Denmark, DKK 3.3 million.

Educational development, Kurt Jensen, It-vest, DKK 1.7 million.

World Robot Olympiad and Girls IT-Camp, Søren Poulsen, Danish Ministry for Children and Education as well as private foundations, DKK 400.000

Travel grants, Mathias V. Petersen, Casper B. Freksen, Manuel Ciosici and Karl-Emil Bilstrup, private foundations, DKK 300.000

Proofs of Replicated Storage without Timing Assumptions, Claudio Orlandi, Protocol Labs, DKK 100.000.

Active Search for the Scientific Enterprise, Panagiotis Karras, The Danish Council for Independent Research, Natural Sciences, DKK 100.000.

CONFERENCES, WORKSHOPS AND SUMMER SCHOOLS

During 2018, the department has hosted the following events:

K-dag career fair, April 6

TPMPC 2018, May 28-30 (Ivan Damgaard)

PhD retreat, June 1

Visit by potential new international students. The visit was organized in collaboration with the industrial network Destination Aarhus, June 6-9

CIO start up seminar, June 19 (Susanne Bødker)

Crypto Summer Workshop, July 6 (Ivan Damgård and Claudio Orlandi)

SummerPIT, August 27-29 (Susanne Bødker)

EU Types workshop, October 8-9 (Bas Spitters)

December PIT: Computational Empowerment, December 20 (Susanne Bødker)

In addition, the department's employees have participated in numerous conferences, workshops, summer schools, and meetings all over the world.

RESEARCH DISSEMINATION

The department has arranged the following CS Colloquiums with both local and external researchers:

A Scaled Conjugate Gradient Algorithm for Fast Supervised Learning (Martin Møller-Nielsen, Alexandra Institute)

Automated Verification: can Brute Force be Smart? (Jaco van de Pol, Aarhus University)

Software-based Microarchitectural Attacks: What do we learn from Meltdown and Spectre? (Daniel Gruss, Graz University of Technology)

Briefly confused? It's not you, it's the context (Ira Assent, Aarhus University)

An Encrypted Glance (Jesper Buus Nielsen, Aarhus University)

Towards the LEGOization of Data Visualization (Hans-Jörg Schulz, Aarhus University)

What would it take to establish an open and malleable Fjæsbog 2.0 (TM), and why don't we? (Susanne Bødker, Aarhus University)

Can Quantum Computers really break any encryption scheme? How worried should we be? (Ivan Damgård, Aarhus University)

Logic and Semantics for Modern Programming Languages: An Introduction to Iris (Lars Birkedal, Aarhus University)

Agent-based Modeling and NetLogo (Arthur Hjorth, Northwestern University)

Additionally, we held our annual Computer Science Day on which the department's research groups presented selected activities.

DISSEMINATION AND RECRUITMENT ACTIVITIES

The department is involved in a wide range of activities for upper secondary, primary and lower secondary schools. The activities are wide-ranging and is organized both locally at CS or in collaboration with ST, AU and/or other external partners. Among other things, we have arranged or been involved in events, such as:

Study-related events:

- U-days.dk
- Student internships for upper secondary school students
- Visits from upper secondary school classes and primary school classes.
- DRU "University on wheels"
- Student for a day

Competitions and camps:

- World Robot Olympiad 2018, www.wrodenmark.dk
- IT-Camp for girls, www.itcamp.dk

Focused talent development programs:

- Student Guidance for upper secondary students in connection with study projects (SRP)
- Cryptology Workshop for Master class in Mathematics High School students
- ATU University days for the Academy for Talented Youth.
- ATU Crypto Summer School

Research dissemination to the general public:

- Workshop and project demonstration at DOKK1, Aarhus Mini maker faire 2018
- Talk about Big Data and effective algorithms

In the course of the year, we have had more than 1000 visitors for events and visits at the department. A great thank to students and employees who contributed to the great work of communicating and sharing information about our study programmes and research.

STUDENT ACTIVITIES

The department's two very well-functioning student associations (DSAU and SOFA) actively contribute to create one of the country's best study environments for our approx. 700 students. Among the many excellent activities are:

Students from the department participated in this year's Danish championship in programming, and subsequently in the North-Western European championship in Bath.

Students organized AUHack - Denmark's largest Major League Hacking event - www.auhack.org.

HatchIT Lab, our student entrepreneurial hub, has moved to a location in the Bush building facing Åbogade. The majority of the companies in HatchIT Lab have external funding and support from Innovation Fund Denmark, EU funds, or other private/public investment companies.

Read more about the companies at their websites:

Protofi: protofi.dk

MONTEM: montem.io

Relion: relion.dk

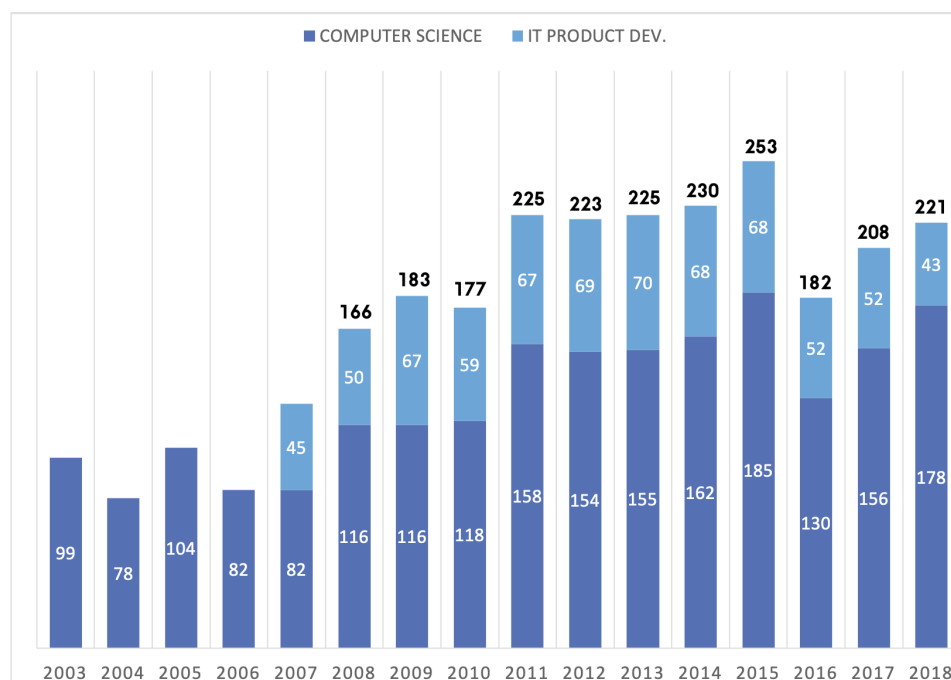
In October the university paid tribute to 17 students who received major entrepreneurial awards in 2018, six of which are students from our HatchIT Lab.

STUDY PROGRAMMES

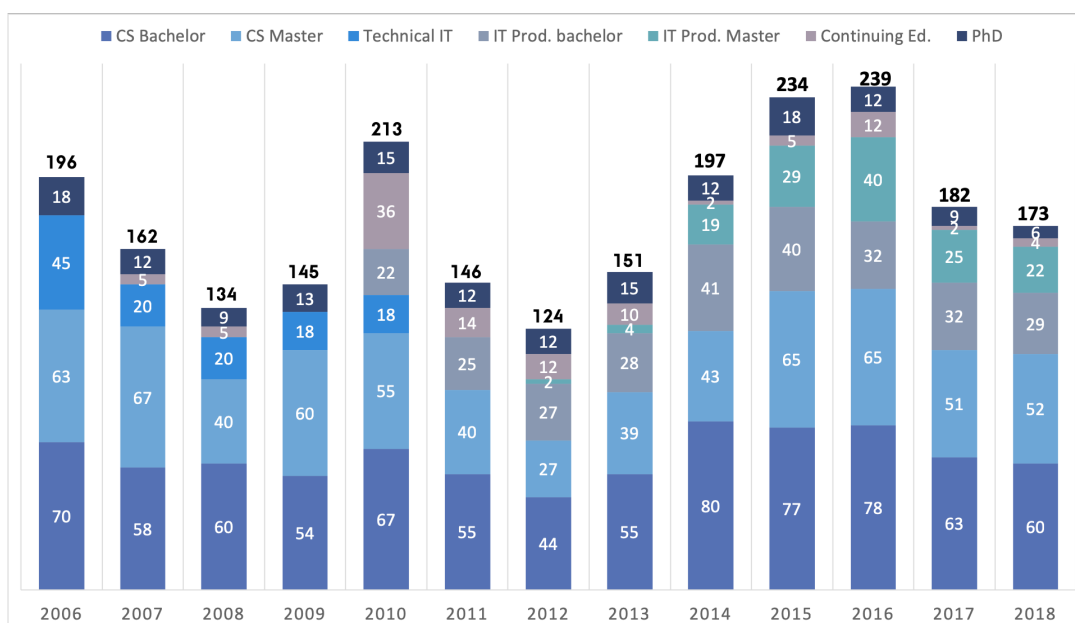
The department has two bachelor programs and two Master's degree programs. In addition, we have a diploma degree programme and an Master's degree programme (continuing education) as well as a PhD degree programme.

Admissions

The department's admissions to the Bachelor's degree programmes are illustrated below:



During 2018, the department has produced the following number of degrees:



Kaj Grønbaek

Head of Department

02

Research

New Head of the Department at Computer Science

Professor Kaj Grønbæk was appointed new head of department at Department of Computer Science from September 1, 2018.

Photo: AU Photo



It is a familiar face that will be running the Department of Computer Science. Professor Kaj Grønbæk has been at the department for almost 30 years, and has played a big part in developing and strengthening both research and educational activities at the department.

Kaj Grønbæk is an internationally recognised scientist, who has written over 175 scientific articles and is among the most cited computer science researchers in Denmark. He has had great success attracting competitive research funds and during his career, he has been the head of or participated in the management of research grants and project for more than DKK 150 million.

Kaj Grønbæk has many years of experience as a research leader and centre director at the Department of Computer Science, and for a number of years he has handled tasks close to the management, e.g. in the department's research committee and as the chairman of the business committee. Because of this, he already has a thorough insight into the organisational and economic conditions as well as experience in managing activities at the department.

"I am very pleased that the position as head of department at the Department of Computer Science now has been filled. Kaj Grønbæk is a great

resource at the department with a lot of experience, and I look forward to working with him as the head of department", says Dean Niels Chr. Nielsen.

The newly appointed head of department is also looking forward to getting to work.

"The Department of Computer Science is an exciting and dynamic workplace. We have many research groups that are part of the international elite within their area. We have many passionate students that organise hackathons (AU-Hack) and win programming and entrepreneurial competitions. Finally, we have a very service-oriented administration", says Kaj Grønbæk. "I'm looking forward to have all this as a foundation and lead the department through the great expansion that is planned as part of AU's digitalisation initiative. This initiative gives us both the opportunity to consolidate strong areas and to start new initiatives."

Kaj Grønbæk has his degree from the Aarhus University, where he received his master's in computer science in 1988 and his Ph.D. three years later. He began working at the Department of Computer Science in 1990 as an assistant professor and later on as an associate professor. In 1999, he was granted a five-year Danske Bank professorship, and he was tenured as

a professor at the university in 2005. Since 2009, he has also been the head of Interactive Spaces Lab at The Alexandra Institute on a part time basis.

Kaj Grønbæk's overall research area is Human Computer Interaction (HCI) including Ubiquitous Computing – interaction with IT integrated into physical surroundings. This work lead to, in collaboration with the School of Architecture, the establishment of the research centre Interactive Spaces in 2002, which in 2009 became Interactive Spaces Lab under the Alexandra Institute. Today he does research in the field of Internet of Things (IoT), Augmented Reality and Visual Analytics within the MADE (www.made.dk) and DABAI (www.dabai.dk) projects.

Back in the 1990's Kaj Grønbæk was a part of the creation of the interdisciplinary multimedia degrees at Aarhus University and has since then been the main player behind the establishment of the IT Product Development education at the Department of Computer Science.

Kaj Grønbæk was born in 1960. He is married, has two grown sons and lives in Aarhus N.

The employment as department head is a limited tenure until 2024.

Photo: Simon Knudsen

Ivan Bjerre Damgård Receives Villum Kann Rasmussen's Annual Award

Professor Ivan Bjerre Damgård is this year's recipient of the Villum Kann Rasmussen Annual Award in Science and Technology (5 million DKK). He receives the award in recognition of his outstanding research in the field of cryptography and data security.

Professor Damgård, of the Department of Computer Science at Aarhus University, has established himself as one of the world's leading and most influential researchers in his field.

With a clear vision for the future of cryptography, Professor Damgård has also established a highly prominent and successful research group at Aarhus University that is considered to be one of the strongest cryptography groups in Europe.

Among his accomplishments, Professor Damgård broke new ground

by developing the complex theories that serve as the foundation for the processes that allow us to safely and securely process the large amounts of data that our modern digital society is built on.

The seed for his research was planted more than 30 years ago with the successful completion of a research project. While the results of his research were of interest on a theoretical level, at the time they had no applications. The results of his work showed how individual computers could be linked in what is known as a multiparty com-

putation system. Any data transferred to the closed system can be securely stored and processed.

- Multiparty computation makes it possible for a network of computers to work together as a single computer, Professor Damgård says.

- Together, the computers are more secure than each one is on its own. Even if one or more of the computers on the network is hacked, the network will continue to process data properly, and any data you wanted to keep secure will stay that way.

As it turned out, it would take more than 20 years until it became possible to transform theory into practical application.

- We began working out possibilities in the 1980s and by the end of the decade we'd devised this theory for getting a network of separate systems to work together as one. At that time, we agreed that the theory was novel and interesting – and we could easily see the enormous application potential – but the technology back then didn't allow us to put the idea into practice, and we didn't really believe it would ever be more than just theory, Professor Damgård says.

In today's interconnected world, the need for systems of the sort the theory describes – systems that can safely process huge amounts of secure data

– is enormous. Applications range from auctions – where bidders want to keep their identity unknown to other potential buyers – to the electrical grid – where producers want to keep their information secret from their competitors, while at the same time allowing it to be processed with other producers' data in order to be able to come up with accurate industry-wide statistics that can be used for benchmarking purposes.

Cryptography and data protection were two fields that really began to take off while Professor Damgård was doing his PhD. Today it is driven forward by an interest in solving apparently unsolvable problems.

- I was deeply fascinated by the combination of mathematics and the practical

applications it has. But what appealed to me in particular were all those problems that, at first glance, seem unsolvable, but, which, once you look more closely, turn out to have solutions. One of the things we are working on now is how a network that can process data without giving it access to the data is processing. It sounds like a paradox, but it's actually possible, Professor Damgård says.

Photo: AU Photo

Project to Promote Health Using Data From the Patients' Smartphones

A new interdisciplinary research project aims at promoting health by analysing up-to-the-minute data, for example from patients' smartphones, and statistical data from the healthcare system. With DKK 20 mill. from Innovation Fund Denmark, two professors, one in public health and one in computer science, will be joining a number of companies, hospitals, local authorities and citizens to promote more personal treatment pathways.

An increasing number of the elderly and chronically ill, as well as young people with mental problems and ever-rising costs in the healthcare system, mean that there is a need to re-think prevention and treatment.

This is exactly what Professor Carsten Obel from the Department of Public Health and Professor Kaj Grønbaek from the Department of Computer Science will be doing, working with

a large number of private and public players. They will enable the Danish healthcare system, and not least citizens themselves, to benefit from the new types of health data that people generate via mobile devices and new body-worn medical devices. At present, the Danish healthcare system is not geared to exploit the huge potential in this type of patient data.

Data 24 hours a day

Professor Kaj Grønbaek points out that there is a huge potential for many patient groups from gathering data around the clock between consultations, and analysing this data to continuously identify patterns in patients' illnesses.

"For example, epileptic seizures, blood-sugar fluctuations for diabetics and anxiety attacks can be under-

stood and prevented much better if detailed data is collected from sensors on the patients that measure symptoms precisely in the situations where they arise,” says Kaj Grønbaek.

The HealthD360 project will set up pilot examples of healthcare solutions that offer advanced continuous data analyses as well as a modern software and data infrastructure that can collect data from network-linked sensors and devices that patients can carry with them around the clock, at work and at home.

Close collaboration with the public

Such solutions require close collaboration with the public, patients and healthcare professionals within the two selected pilot areas: 1) mental health and obesity in children and young people; 2) wound care and health in the elderly. The aim is to develop new models for effective, personal and cohesive patient care, in which patients' privacy and data security has top priority.

The project is based on a unique collaboration between public and private players to deal with data-security and GDPR challenges. The investment from Innovation Fund Denmark makes it possible for partners to coordinate their efforts in development of solutions for the healthcare sector that ensure that citizens' health data remains community property securely and to benefit all Danes.

Can prevent inequality

“There's a huge potential in health data for innovative approaches to prevention and treatment, if we collaborate with citizens to develop safe and easy-to-use solutions. If we don't reach out in projects like this, technology giants such as Google and Apple will in future develop and offer the best digital healthcare solutions themselves – and that will almost certainly be only for those who can afford to pay. In the long term, this may lead to greater inequality in healthcare,” says Carsten Obel, who is heading the project.

HealthD360 is being conducted as a partnership between Aarhus University (Department of Public Health and Department of Computer Science), the Alexandra Institute, the Danish Technological Institute, Bispebjerg Hospital, Randers Regional Hospital, Cambio, Novax, Opus Consult, Kite Invent, Sundhed.dk, the Danish Regions' clinical quality development programme (RKKP), Danske Patienter (an umbrella organisation for patients and their families) and the municipalities of Aarhus, Favrskov, Odder and Ringkøbing-Skjern.

New Professors



Photo: AU Photo

Jaco van der Pol

On November 1st, Jaco van der Pol, joined the Logic and Semantics group as a professor. He held his inaugural speech on November 16th on automated verification of complex systems, for example railway safety systems or human cell behavior. In particular, he explained smart brute-force algorithms for exhaustive verification. His ambition is to develop parallel algorithms for synthesis problems too, like parameter synthesis for timed systems, or strategy synthesis for games. The ultimate dream would be to synthesize software automatically, just from the user requirements.

Professional Background

Being raised in a strong Dutch school on term rewriting and process algebra, Jaco's research interests are on the border between logic and algorithms. He started his research on termination of rewrite systems using higher-order functionals, as a PhD at the University of Utrecht (1996). During a 9-month visit to the mathematics department at LMU Munich, he applied his method to the normalization of formal mathematical proofs.

After his PhD, van der Pol did a postdoc at Eindhoven University of Technology on formal requirements engineering,

and moved in 1999 to CWI Amsterdam, to become the leader of the research group Specification & Analysis of Embedded Systems. He developed and applied a wide range of formal methods tools to the verification of distributed systems, in particular interactive theorem provers and model checkers based on process algebra.

In 2007, he became full professor at the University of Twente, chairing the group Formal Methods and Tools. With his MSc and PhD students, he developed the high-performance model checker LTSmin, running on parallel hardware. The tool won several prizes in international competitions, like the Model Checking Competition on Petri-nets.

Personal Interests

Moving to Aarhus has changed life quite a bit for Jaco and his wife Corrie. They left their children (20, 22, 24) behind in The Netherlands to continue their studies. Instead of a family house with garden, they now live in an apartment in Højbjerg.

Despite the similarity between Danish and Dutch language and culture, they have to solve many small riddles on a daily basis. Even after 4 weeks of intensive Danish language course, fol-

lowing "DR Nyheder" and "Vores Vej" remains a challenge.

Living on the top of Højbjerg (under the TeraCom TV tower) they are enjoying Aarhus a lot, with direct access to forest and beach. Culture is never far away with Moesgård around the corner, and Aarhus city center at biking distance. The 40-minute commute twice a day (first going down and then up nearly 100m) is not a bad exercise.



Photo: Mette Breth Klausen,
Alexandra Institute

Jesper Buus Nielsen

Jesper Buus Nielsen has been appointed professor in cryptography and security at the Department of Computer Science as of 1 april 2018.

Jesper is one of the top cited and pub-

lishing researchers in secure multiparty computation. His primary research areas are implementing secure multiparty computation in practice, rational cryptography, leakage resilient cryp-

tography, tamper resilient cryptography, and universal composability.



Photo: AU Photo

Ira Assent

On August 1, Ira Assent was appointed professor at Department of Computer Science at Aarhus University.

Following positions in Germany (RWTH Aachen University) and at Aalborg University, Ira Assent joined Aarhus University in 2010 as associate professor. In 2013, she became research group leader of Data-Intensive Systems, which contributes models and algorithms for large volumes of

data as generated e.g. in social networks, e-commerce, or science.

The group, of eight researchers, works with two strands of research – data management and data mining / machine learning. In data management, focus is on efficiently finding relevant information in a big data set. In data mining / machine learning, the goal is to automatically discovery information in large data volumes, and to

learn from them.

Privately, Ira lives in Tru near Aarhus with her boyfriend and their three small children.

New Associate Professors

Kasper Green Larsen



Photo: Lars Svankjær

On May 1 Kasper Green Larsen started as Associate Professor at Department of Computer Science. Kasper received

his PhD from Aarhus University in 2014. He is a member of the Young Academy under the Royal Danish Academy of Sciences and Letters. Kasper is also a recipient of the Hartmann Foundation's Diploma prize 2017, the Aarhus University PhD prize 2014, the Danish Minister of Science's EliteForsk travel scholarship (2011) and a Google European Doctoral Fellowship in Search and Information Retrieval (2010). His research interests spans many areas

of theoretical computer science, including data structures, lower bounds, range searching, dimensionality reduction, streaming algorithms and fine-grained complexity. His publications have received numerous best paper awards and special issue invitations at top conferences such as CRYPTO, STOC and FOCS.

Bas Spitters



Photo: AU Photo

Bas Spitters has been at the department since 2015, where he has been working with Lars Birkedal in the Logic and Semantics group.

From August 1, Bas was employed as Associate Professor in this group. Recently, Bas received a large grant - DKK 3.4 million - from Air Force Office of Scientific Research. With the grant,

Bas will be working on how to apply homotopy type theory to probabilistic programming and to develop theory and tools for computer aided proofs in security.

New Assistant Professors

Davide Mottin



Photo: Kay Herschelmann

On October 1st, Davide Mottin joined the Department of Computer Science as Assistant Professor in the Data-Intensive Systems research group.

Davide Mottin, PhD from University of Trento, Italy (2015), comes from a postdoctoral researcher position at the Hasso Plattner Institute, Potsdam,

Germany. His research interests include graph mining and exploration, user-centric exploratory systems and exemplar queries.

Magnus Madsen



Photo: Private

On August 1 Magnus Madsen started as Assistant Professor. Magnus Madsen's research interests are in programming languages, specifically in static and dynamic program analysis, language design, compilers, and web programming. He is currently working on a new language called Flix which combines elements of functional programming with logic pro-

gramming. Magnus is originally from Aarhus where he did his PhD. Later, he worked as a research intern at Samsung Research America and Microsoft Research, as a post-doc at the University of Waterloo, and at Aalborg University as an assistant professor, before returning to Aarhus.

Roman Rädle



Photo: Private

On August 1 Roman Rädle started as Assistant Professor. Working across a user's ecosystem of computing devices

often requires mental gymnastics and becomes even more cumbersome in collaborative situations where the number of people and devices may vary over time. Roman Rädle's research focuses on these collaborative multi-device computing challenges. He specifically researches enabling technologies that support cross-device interactions and fluid transitions between individual work and collaborative group work.

Before joining the Department of

Computer Science at Aarhus University, Roman was a Postdoctoral Fellow in the Department of Digital Design and Information Studies at Aarhus University. He holds an M.Sc. and a PhD in Computer Science from the University of Konstanz in Germany.

More information about Roman can be found on his professional website: romanraedle.com

3 New Honorary Professors at Department of Computer Science

It was with great pride and pleasure that the department announced three new honorary professors - Bjarne Stroustrup (extension), Olivier Danvy and Michael E. Caspersen. With the title as honorary professor, the appointee has agreed to promote the department and work closely with the department, i.e. by giving guest lectures.



Bjarne Stroustrup

Bjarne Stroustrup is born in Aarhus, cand. scient. from Aarhus University and is the recipient of the Rigmor and Carl Holst-Knudsen Award for Scientific Research. Stroustrup is Managing Director at Morgan Stanley in New York. Also, he is visiting professor at Columbia University, and affiliated as University Distinguished Professor at Texas A&M University.

Stroustrup is world-famous for developing the C++ programming language, and has received countless awards for his work.



Olivier Danvy

Olivier Danvy is a Knight of the Lambda Calculus since 1988, worked at the department for over 20 years, and defended a DSc at Aarhus University in 2006. Today he is working at Yale-NUS College in Singapore.



Michael E. Caspersen

Michael E. Caspersen is cand.scient. (1987) and PhD (2007) from Aarhus University. He has been director of

It-vest at AU (1999-2008), associate professor at Department of Computer Science, Aarhus University (2008-2016), and director of Center for Science Education (2009-2015).

Michael E. Caspersen is a leading researcher within the areas 'Computing Education' and 'Computational Thinking'. As the only person, he has chaired all leading international conferences within his field. Moreover, Michael E. Caspersen has - as the only non-American ever - chaired 'the Technical Symposium for Computer Science Education', which is the world's largest computing education conference with 1.500 participants and running for 50 years.

In 2013, he was one of only four computer scientists worldwide appointed Distinguished Member (Education) of ACM, which is the world's largest professional association for computer scientists with more than 100.000 members. To achieve this, you must have contributed tremendously to the international 'Computing Education Community'.

Today, Michael E. Caspersen is managing director of It-vest - networking universities.

Meet Our New Data Visualization Expert

On May 1, Hans-Jörg Schulz started as Associate Professor at the Department of Computer Science. He joins the Ubiquitous Computing and Interaction group, but expects to have close co-operation with both Computer Mediated Activity and Data-Intensive Systems. With his expertise, he hopes to contribute to the research activities in these groups.



Photo: Malte Willert, Rostock

At the department, Hans-Jörg will be working on data visualization with the overall aim of creating a better overview of complicated data. Before coming to AU, Hans-Jörg worked as Senior Researcher at the Institute for Computer Science, University of Rostock. His scientific background lies in the fields of information visualization and visual analytics. Particularly, developing novel visualization solutions that facilitate the understanding of structured data with an emphasis on graph and hypergraph structures. In doing so, Hans-Jörg has frequently worked with application partners from the domains of biomedicine, climatology, and manufacturing that have a high demand for visual analytics solutions for structured data.

We should all do what we are best at

- When data is too complex for Excel, that is when I get in, Hans-Jörg explains and further elaborates; In my work I aim at letting humans and computers do what they are best at. The computers can process and crunch numbers much better and

faster than any human, while humans can draw conclusions and run analyses based on common sense and a broader understanding of the data's context. Good visualization facilitates the hand-off between computer and human: Complex data and computational results are made accessible to people who might otherwise not be able to make sense of it. And the people interact with these visualizations, again triggering computations whose results are in turn visualized, and so on. My goal is, to create visualizations that achieve a seamless back and forth between both worlds.

To achieve this goal, Hans-Jörg is working on creating an interactive table that can visualize data, and the effects or results of different uses of the data. Via tangible items, users of the table will be able to explore various analysis scenarios with their data, and get an instant visualization of how different analytical and visual choices affect the result.

My job is my hobby

When not working, Hans-Jörg is still

busy with data visualization. During his time as a PhD student, Hans-Jörg found a great interest in tree-visualization, and is creating a library of different techniques for visualizing hierarchically organized data. Currently, there are 300 different tree-visualization techniques on his website treevis.net.

When not at the computer, Hans-Jörg is an avid hiker and climber who enjoys the great outdoors. With him, Hans-Jörg brings his wife to Aarhus.



Photo: Markus Spiske on Unsplash

ERC Starting Grant for Research in Next Level Cryptographic Protocols

The European Research Council (ERC) has awarded Associate Professor Claudio Orlandi from the Department of Computer Science at Aarhus University a starting grant worth €1.5M for research into private and efficient secure multiparty computation (MPC).



Photo: Peter Gammelby

More and more data is collected and stored every day. This data is an incredible resource: by analyzing the data we can discover new knowledge and advance society. On the other hand, all this data represent a liability, as data can leak and end up in the hands of individuals with bad intentions.

MPC is a cryptographic technology that allows to solve the struggle between utility and privacy by allowing users to compute on “encrypted values”. Thanks to MPC, mutually distrusting parties can compute any joint function of their private inputs in a way that preserves the confidentiality of the inputs and the correctness of the result. For instance, two individuals could learn who is the richest without having to disclose their wealth to each other. Examples of MPC applications include secure auctions, benchmarking, privacy-preserving data mining, etc.

The key word in Claudio Orlandi’s research is efficient.

In the last decade, the efficiency of MPC has improved significantly and these advances have allowed several companies worldwide to begin implementing and including MPC solutions in their products.

MPC has reached the wall

However, the efficiency of MPC is still far from what would be necessary for this promising technology to become used in every day’s computations.

“It now appears, that we have reached a wall with respect to possible optimizations of current building blocks of MPC, which prevents MPC to be used in critical large-scale applications,” Claudio Orlandi explains.

He believes that a radical paradigm shift in MPC research is needed in order to make MPC truly practical.

Thanks to this ERC Starting Grant, Claudio Orlandi intends to take a step back and challenge current assumptions in MPC research and design novel MPC solutions. His hypothesis

is that taking MPC to the next level will require more realistic modelling of the way that security, privacy and efficiency are defined and measured.

“The special thing about an ERC Starting Grant,” continues Claudio, “is that it provides the researcher with a very high degree of freedom, which is necessary to follow potentially risky but promising, research directions. The keyword is high-risk and high-reward.”

Grants

5.5 MILLION FROM DFF TO JESPER BUUS NIELSEN



Photo: Mette Breth Klausen, Alexandra Institute

Congratulations to Professor Jesper Buus Nielsen who has received DKK 5.5 mill. from Independent Research Fund Denmark (DFF – Natur og Univers) to do research in better theory for better practice in MPC. Secure multiparty computation (MPC) is a collection of cryptographic techniques allowing computation on encrypted data without leaking information

to anyone involved in the computation except the intended result. MPC facilitates a large spectrum of applications involving confidential data, for instance collaborative machine learning across data from competing companies.

GRANT TO CHAYA GANESH



Photo: Private Photo

Congratulations to Chaya Ganesh, who, together with Ivan Damgård and Claudio Orlandi, have been awarded a USD 15,000 grant from Protocol Labs, a research, development and deployment

lab for network protocols, in connection with their Request For Proposals (RFP) Program.

The team was awarded the grant for offering a solution to an open problem in the RFP on file storage on multiple servers. When storage is a service, the client pays for storing each copy, and could end up paying malicious servers many times while really storing only one copy. In their paper, the team formalized what it means to store many copies by capturing the requirements in a definition of proof of replicated storage. They pro-

posed a construction, and proved that their solution satisfied the desired security properties.

Chaya Ganesh is a Postdoc in the Cryptography and Security Group. The team is grateful for the grant and will use it for conferences, workshops, and other research related expense.

LARGE GRANT FOR ASS. PROFESSOR BAS SPITTERS



Photo: AU Photo

Associate professor **Bas Spitters** has received a grant of DKK 3.4 million from Air Force Office of Scientific Research. The grant includes funding for a PhD student and a Postdoc to work on how to apply homotopy type theory to probabilistic programming and to develop theory and tools for computer aided proofs in security. Congratulations!

THREE PHD STUDENTS RECEIVE STIBO TRAVEL GRANTS

Congratulations to PhD students **Manuel Ciosici** (Data-Intensive Systems), **Andreas Mathisen** (Ubiquitous Computing and Interaction) and **Casper Freksen** (Algorithms and Data Structures) who all have received travel scholarships from the STIBO Foundation to cover their stay abroad

at University of Southern California's Information Sciences Institute, University of Maryland and Harvard respectively.

The STIBO foundation hands out a number of travel grants every year of up to DKK 100.000. Recipients of the travel

grants are PhD students within computer science and IT.

Acknowledgments

SUSANNE BØDKER APPOINTED HONORARY DOCTOR AT KTH



Photo: AU Photo

To honor Susanne Bødker being one of the key figures behind the Participatory Design movement, she has been appointed Honorary Doctor at KTH Royal Institute of Technology, Stockholm. Susanne received her honorary doctor title on November 16, where she gave a seminar on her work.

PROFESSOR IRA ASSENT NEW MEMBER OF THE INDUSTRIAL RESEARCH COMMITTEE AT THE INNOVATION FUND



Photo: AU Photo

Professor Ira Assent has been appointed new member of the Industrial Research Committee at Innovation Fund Denmark within the field of information and data processing.

The task of the Industrial Research Committee is to decide on applications for industrial PhD and Postdoc schemes and assist Innovation Fund

Denmark in research issues related to these two schemes.

CHAYA GANESH IS A RISING STAR



Photo: Private Photo

Chaya Ganesh was invited to participate in MIT's EECS Rising Stars workshop 2018.

Every year, 60-80 junior researchers within computer science and electrical engineering are invited to participate in the Rising Stars Workshop, which is an academic career workshop for women.

This year, postdoc Chaya Ganesh from the Cryptography and Security group was the only person representing a Danish university.

Rising Stars is an intensive workshop for women - graduate students and

postdocs, who are interested in pursuing academic careers in computer science and electrical engineering.

PhD 2018

HALL OF FAME

The department has a long tradition for educating excellent PhDs. Since 1975, 288 have completed a PhD degree in computer science from Aarhus University. In 2018, 6 new PhDs completed their studies. Meet each of them on the following pages.



Matúš Tomlein

Ubiquitous Computing and Interaction

Supervisor: Kaj Grønbaek

Date: April 3, 2018

Context-Aware Integrability and Maintainability of Cyber-Physical Ecosystems: Tactics and Tools

During his studies, Matúš Tomlein researched tools and tactics that enable integration of industrial products into the Internet of Things (IoT). Such smart industrial products can be then adapted by an ecosystem of organizations to support different use cases and goals through software.

Matúš collaborated with industrial partners to develop and evaluate tools that support integration and maintenance of IoT-enabled industrial systems. The tools build on Augmented Reality, Visual Programming and Machine Learning and support tasks performed by system installers, system builders and end-users. The developed tools and tactics support future industrial IoT ecosystems and reduce required effort and time for common integration and maintenance tasks in industrial systems.



Christoffer Quist Adamsen

Programming Languages

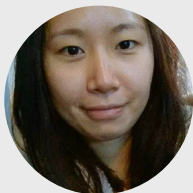
Supervisor: Anders Møller

Date: May 23, 2018

Automated Testing Techniques for Event-Driven and Dynamically Typed Software Applications

During his studies, Christoffer Quist Adamsen studied techniques for automated testing of event-driven and dynamically typed software applications, such as mobile and web applications. Due to the nature of these applications, it is challenging for developers to ensure that their application correctly handles erroneous inputs, unexpected use cases and events, as well as environment failures and non-determinism. As a result, it is not unusual for end-users to experience that applications sometimes fail to work as they should.

Christoffer Quist Adamsen worked on designing new automated testing techniques that are better suited for being adopted in practice. In his research, he developed a methodology that extends the error detection capabilities of manually written Android test suites, and practical techniques for detecting and preventing event race errors in web applications. He also developed a hybrid static/dynamic program analysis that approximates a new notion of test completeness for dynamic languages. The results may inspire future research in the area, and can hopefully lead to the development of automated testing techniques that will be adopted in practice.



Yujin Shin

Algorithms and Data Structures

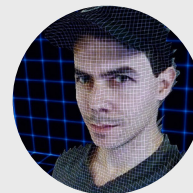
Supervisor: Lars Arge

Date: September 28, 2018

External Memory Algorithms for Massive Terrains and Polygons

Predicting Flood risk is a critical task, as the prediction can be used to minimize the flood damage. Nowadays, very detailed terrain models and highly accurate sea-level forecasts are available, and these datasets can be used for designing a computer program to predict the flood risk caused by the rise of sea level. Since the size of detailed terrain models easily exceeds a terabyte, such a program needs to be designed to handle massive data efficiently.

During her studies, Yujin has researched algorithms and data structures for computing flood risk that can handle massive terrain data efficiently.



Andreas Fender

Ubiquitous Computing and Interaction

Supervisor: Kaj Grønbaek

Date: October 23, 2018

Optimal Placement of Digital Content in Physical Space

During his studies, Andreas Fender investigated methods for optimizing digital content placement in room-scale user interfaces. Such interfaces include projection-based augmented reality systems that involve projecting digital content directly onto physical surfaces in environments like offices or industrial facilities. Andreas' systems measure the geometry of the physical space and user-viewing behavior to optimally place projected content like situated notifications or assembly instructions in physical space. These measurements are unobtrusive, i.e., neither the users nor the surfaces of the environment are equipped with any input devices or markers.

Andreas' contributions include several algorithms and system prototypes, including an extensible multi camera software framework for continued research. The core and novel idea of his methods are to align digital content not only to the physical geometry and surfaces of a room, but also to include the usage of the room and activities over time as part of the analysis and calibration processes – without interfering with everyday interactions in the environment.



Tiare Feuchtner

Ubiquitous Computing and Interaction

Supervisor: Kaj Grønbaek

Date: October 24, 2018

Designing for Hand Ownership in Interaction with Virtual and Augmented Reality

Virtually extending the body in augmented reality. Wearing a head mounted display the user (right) can see a virtual arm in place of his own (left). This virtual arm can be extended to supernatural length to manipulate distant objects in the environment.

During her PhD studies, Tiare Feuchtner researched the body ownership illusion in Virtual and Augmented Reality. She has conducted experiments showing that the body ownership illusion can be leveraged to overcome the limitations of our physical bodies and to create more efficient and engaging interactions. The conviction that your physical hand is, in fact, your own hand is an example of body ownership. When this feeling is achieved for an artificial body part (e.g., a virtual hand) we speak of the illusion of body ownership.

The results of this research indicate that our mental body representation may be more malleable than was previously believed. For instance, humans can feel body ownership of an unnaturally long virtual arm or a virtual hand that appears in a different position and orientation relative to the body. While most approaches to VR and AR interaction design attempt to modify the virtual world with which we interact, Tiare proposes to instead augment the body we interact through - or at least our mental image thereof.



Morten Krogh-Jespersen

Logic and Semantics

Supervisor: Lars Birkedal

Date: December 12, 2018

Towards Modular Reasoning for Stateful and Concurrent Programs

Throughout his PhD studies, Morten Krogh-Jespersen has done research on how to ensure that multi-threaded and distributed systems behave as intended. Certain IT-systems are so essential to our everyday lives that such a guarantee is almost a necessity, no matter if the system is a mail-service, software for healthcare, software in cars or software that facilitates the transfer of funds. Proofs of such systems being devoid of errors can only be obtained by formal verification efforts grounded in mathematical models.

As a result of his research, Morten Krogh-Jespersen has developed models with the potential to aid the verification of real-world programs used by thousands of people every day.



03

Education

Students Help DR With Ultra:bit

IT Product Development Students Ninna Hoffmann and Marie-Louise Stisen Sørensen worked with Danmarks Radio (DR) on the new project ultra:bit which hope to spark an interest for IT and coding in Danish kids.

From lighting stars in the ceiling to a microcomputer that can light up your room - these are some of the things Ninna Hoffmann and Marie-Louise Stisen Sørensen work with at DR.

"It's been so fun to be a part of ultra:bit. They are really happy when we can make something happen with just a little bit of code," says Marie-Louise. "Also, it is nice that we have an influence on the project with our work, and that they listen to us when we bring up ideas," Ninna adds.

Ninna and Marie-Louise study IT Product Development at Aarhus University and are about to finish their studies. "It's really nice that we can use our skills and knowledge from our degree in IT Product Development in real-life projects that affects so many", says

Marie-Louise.

Ultra:bit is the Danish version of BBC's micro:bit. The goal of the ultra:bit project is that kids should be inspired to write their own code and program the minicomputer into for instance a game or an alarm clock. Schools from all over Denmark are taking part in the ultra:bit project, and 10.000 4th graders have received a microcomputer to use their own code on. The schools and teachers have received materials with inspiration on how ultra:bit can be used as part of e.g. Danish or maths classes.

Inspiring the young

Ninna and Marie-Louise are happy with that they get to inspire kids with their work. "I really hope that the kids will be inspired by this project, and

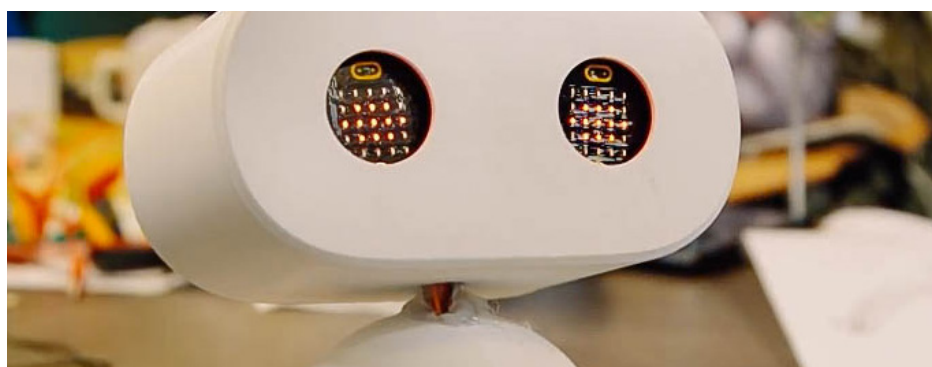
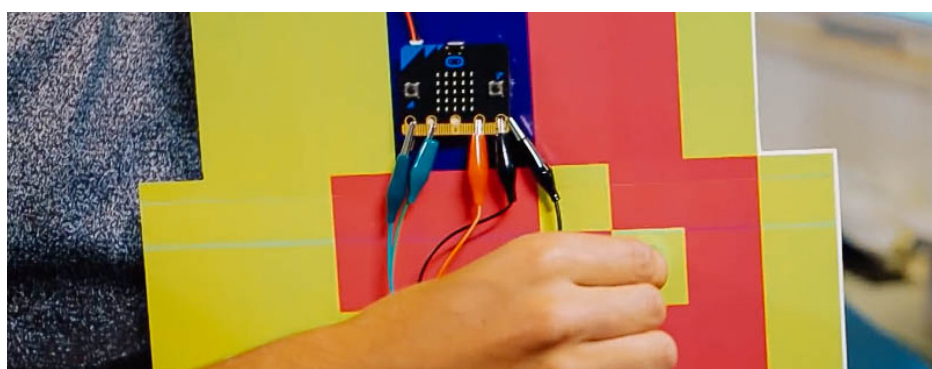
that they can use it in school or in their spare time," says Ninna.

However, the most important thing for them is to give the kids sense of coding both what is it and what they can do with it. They compare the new ultra:bit microcomputer with the little chemist playset, which many children have tried and been inspired by. In a world that becomes increasingly digital, it seems more important than ever to give children a strong digital foundation for when they grow up, and possibly inspire them to a future in IT at the same time. "If we introduce kids to coding when they are young and they like it, that might make them consider studying IT when they grow up," says Marie Louise Stisen.

The ultra:bit

Ultra:bit originates from BBC in United Kingdom where it's known as micro:bit. Micro:bit is a handheld, programmable micro-computer that can be used for all sorts of creations, from robots to musical instruments. It can be coded from any web browser in blocks, Javascript, Python and more. Micro:bit is used in schools from Denmark and Iceland to Singapore and Sri Lanka.

Education .03



CS JOB WALL

Official job bank for students
and graduates from
Dept. of Computer Science

cs.au.dk/jobwall



AARHUS UNIVERSITY

Students Celebrated for Their Dual Careers

On October 25, Aarhus University celebrated their most talented dual-career students. We are very proud to announce that all the entrepreneurial students honored from Science and Technology came from Department of Computer Science. Congratulations to all.

More than 500 passionate AU students are affiliated with the university's Dual Career programme, which helps students handle two parallel career paths: an academic career alongside a career as either an elite athlete or an entrepreneur. AU's

Dual Career programme, has been promoting the possibility of university education in parallel with a career in elite sport since 2011 – as well as with entrepreneurship, since 2016.

FACTS ABOUT

AU'S DUAL CAREER PROGRAMME

12 AU students have won 17 European and World Championship medals in 2018.

17 students from 6 different companies have been presented with seven major entrepreneurial awards since 2016.

With 55 elite athletes, Aarhus University has the highest number of Team Danmark-funded students in Denmark.



Join us at

AUHack

2019

MORE THAN 200 STUDENTS, FROM ALL OVER
THE WORLD, ARE EXPECTED TO VISIT IT CITY
KATRINEBJERG FOR THE THIRD EDITION OF
“AUHACK” FROM APRIL 5 TO APRIL 7, 2019.

AUHack is part of “Major League Hacking”, and Aarhus University’s largest hackathon. Over a 36-hour period, students interested in IT development and IT design will meet and collaborate intensively to create prototypes and concepts.

The goal is to bring students from different fields of study and universities together, and to set a framework where they can carry out projects and ideas. Students from all study programs are welcome, and everybody is there to help each other and to have fun.

Read more and apply at auhack.org!



Award:

Teacher of the Year 2018

Five teachers were nominated for the Teacher of the Year award. The winner is selected via a vote among all the departments' students in both computer science and IT Product Development. The winner was announced on Computer Science day. Turn to page 41 to find out who the winner is.



Kasper Green Larsen
Foundations of Algorithms
and Data Structures

Kasper Green Larsen is nominated for the course Foundations of Algorithms and Data Structures. Kasper's way of teaching is characterized by great involvement in student learning and enthusiasm for the overall subject – and also for the attention the important details in the specific subjects of the course. The FADS course had some initial design issues regarding student prerequisites, but Kasper managed to handle this very agile and elegantly to ensure that students came back on track with the learning goals. Kasper's enthusiasm and active teaching style really reflects positively on the students, and this is reflected in the course exercises through the TA's.



Henrik Bærbak Christensen
Software Engineering and
Architecture

Henrik Bærbak Christensen is nominated for the Software Development and Software Architecture course. During the course Henrik managed to exemplify core parts of the curriculum through small stories from the industry - always in a very committed and enthusiastic way. Henrik is very committed to maintaining the students' attention throughout the lectures and manages to balance the weight of theory and practical aspects in an elegant manner. The course is perfectly complemented by a large project where all students had many opportunities to apply and implement the theory. That way everyone was able to feel the joy of good code - as well as the frustrations of bad.



Eve Hoggan
Physical Computing

Eve Hoggan is nominated for the Physical Computing course. Being an entirely new course, the design of the Physical Computing course seems very well planned and structured regarding the learning goals for the students. The individual lectures are very well aligned to practical assignments that allows the students to get relevant and interesting hands-on experience. The Physical Computing course is clearly an important core subject for IT Product Development students, and Eve is very attentive in conveying this perspective to the course participants.



Kurt Jensen
Introduction to
Programming

Kurt Jensen is nominated for the Introduction to Programming course. The programming course is characterized by being a very thoroughly thought out and well organized. The alignment between the content of lectures and the hands-on programming assignments during the course is very clear, and it also shows that Kurt has put a lot of attention to securing that teaching assistants were prepared and accessible to students whenever needed. The video recorded lectures is a great way to catch up with subjects that requires more attention and also great for exam preparation.



Anders Møller
Regularity and Automata

Anders Møller is nominated for the Regularity and Automata course. Anders achieves to convey complex subjects in a very simple and understandable manner. His lectures were comprehensive, and the assignments corresponded extremely well to the curriculum. Anders gave the impression that he genuinely wanted his students to understand. This was clearly evident whenever someone asked a question, to which he would take time to ensure that not only did they understand the correct answer, but also why the answer is correct.

PREVIOUS WINNERS

2017: Gerth Stølting Brodal

2016: Henrik Bærbak Christensen

2015: Niels Olof Bouvin

2014: Olivier Danvy

2013: Henrik Bærbak Christensen

2012: Gerth Stølting Brodal



Aarhus Attracts International IT Talents

In June, the department invited 13 European top-students from countries such as Czech Republic, Portugal, Romania and Germany. All were interested in doing their Master's degree in Computer Science abroad, and Aarhus is one of their top choices. The visit was sponsored by the department and Destination AARhus – a network of 13 large companies in Greater Aarhus that all recognize and experience a great lack of IT specialists.

The department has a special interest in attracting international students to get the student population to match the international diversity of the research staff. However, the department realizes that they compete with many other universities about these top-students. Thus, for the second time the department arranged a visit for potential international students. During the visit, the students get a thorough introduction to the department, the curriculum and Aarhus University, they get to experience the city, and to meet with the starving local IT industry.

"When we saw the impact the visit made on our visitors last year, we had no doubts that we would like to repeat this in order to show these promising young people that Aarhus is a vibrant city and on the forefront of research within computer science. We are very

happy that the local IT industry again supported this initiative", says one of the organizers Søren Poulsen.

Why Aarhus?

There are two main reasons why the international students has chosen to apply at Aarhus University. First is recommendations from friends and supervisors who praises Aarhus as a city but also the department as a top-location for studying computer science. Ilona Benko from Croatia explains; "I am very interested in studying cryptography, and my mentor recommend me to apply at Aarhus University as some of the best researchers within this field works here". Second, many of the students checked university rankings and found Aarhus University that way.

"I really like the educational system in Denmark – especially the flat hierarchy, and that professors are accessible for students. In addition, I am very surprised that the local IT companies want to spend time meeting us. It really seems there are great opportunities for getting an interesting IT career in Aarhus."

- MAX SCHEID
MASTER STUDENT, GERMANY



IT Camp for Girls Was a Big Success

For the 13th time, IT camp for girls was organized during the autumn holidays. 42 girls, from all over Denmark, participated in the three-day event that focused on business visits, lectures, and assignments. The camp is organized by volunteer students from Department of Computer Science, and is aimed at girls who are in their final year of high school or on sabbatical.

The autumn holiday was slightly different from 42 girls than it used to be. Warm socks and slippers were replaced with design, IT and company visits. The girls were all part of IT Camp for Girls at Department of Computer Science. "It has been really fun. I think it has been a big advantage that we could explain the difference between our two programs Computer Science and IT Product Development," said Alberte Herold, organizer and Computer Science student at fourth year.

Even though there are not many women in IT, it is not something that frightens Emilie Bjerg. "I've never been frightened of choosing an education

in IT. It is also a big part of my life in High School, where it's a part of my classes."

During the week, the girls tried life as a university student, which included anything from lectures in cryptology to building and programming LEGO Mindstorms. "I have learned a lot. Especially from the lectures, we had, but everything has been fun. In particular, working with Lego Mindstorm was funny", says Maja Biel. Emilie Bjerg was also excited about the IT camp; "I think the lectures in cryptology were really exciting, and LEGO Mindstorms was just really fun".

The industry needs more IT specialists

IT companies in Aarhus are having trouble filling all their open positions. One of the event sponsors, Bankdata, is very positive towards the organization of events such as IT Camp for girls in order to attract more people to a career in IT. "The effort by Aarhus University and the volunteers is really important, so young women can have a glimpse of the everyday as a student of either Computer Science or IT Product Development. I would have jumped at the opportunity before I began to study," says Anja Larsen, Software Developer at Bankdata.

Before the camp, did you think an education in IT was interesting?

Definitely	13%
Mainly Positive	16%
Maybe	24%
Mainly Negative	32%
Not at all	15%

After the camp, did you think an education in IT was interesting?

Definitely	26%
Mainly Positive	40%
Maybe	24%
Mainly Negative	8%
Not at all	2%

EMILIE BJERG

AARHUS

Why did you sign up?

I would like to have an insight into the programs as I consider studying something with IT. I already have IT at Aarhus Tech.

What take home from the event?

It has been nice to get an insight into the programs. There are many different things that have been fun and educational. Among other things, Lego Mindstorms and the lecture in cryptology were really exciting.

KIRSTINE STEENSIG

IKAST

Why did you sign up?

I would like the experience, and I expected it to be fun and exciting.

What take home from the event?

The organizers have been really good at making everything exciting. We have experienced a lot of business visits and lectures, so I have definitely become wiser. I not scared by an education in IT.

DAGMAR THORBEK

NORTH ZEALAND

What have you learned?

I have learned many different things. I especially think the lectures were fun. I think that I learned a lot there. In my field of study, we have programming, and I think that much of what we have learned can be used.

Why did you sign up?

I found it exciting and I would like to challenge my view of an IT education. This was a way to get informed. I do not know if I end up studying IT in the future, but at least it has been fun.

What take home from the event?

I take much of the programming we have learned further. I really think that's something I can use in the future.

ELISABETH BØRRESEN

HADSTEN

What have you learned?

I learned a lot from the lectures we have had. I think I will be able to use some of it in the future. It has been exciting, and I am not been scared away at all.

Why did you sign up?

I found it exciting, and I have been considering studying IT in the future. That is why I thought it might be something for me.

What take home from the event?

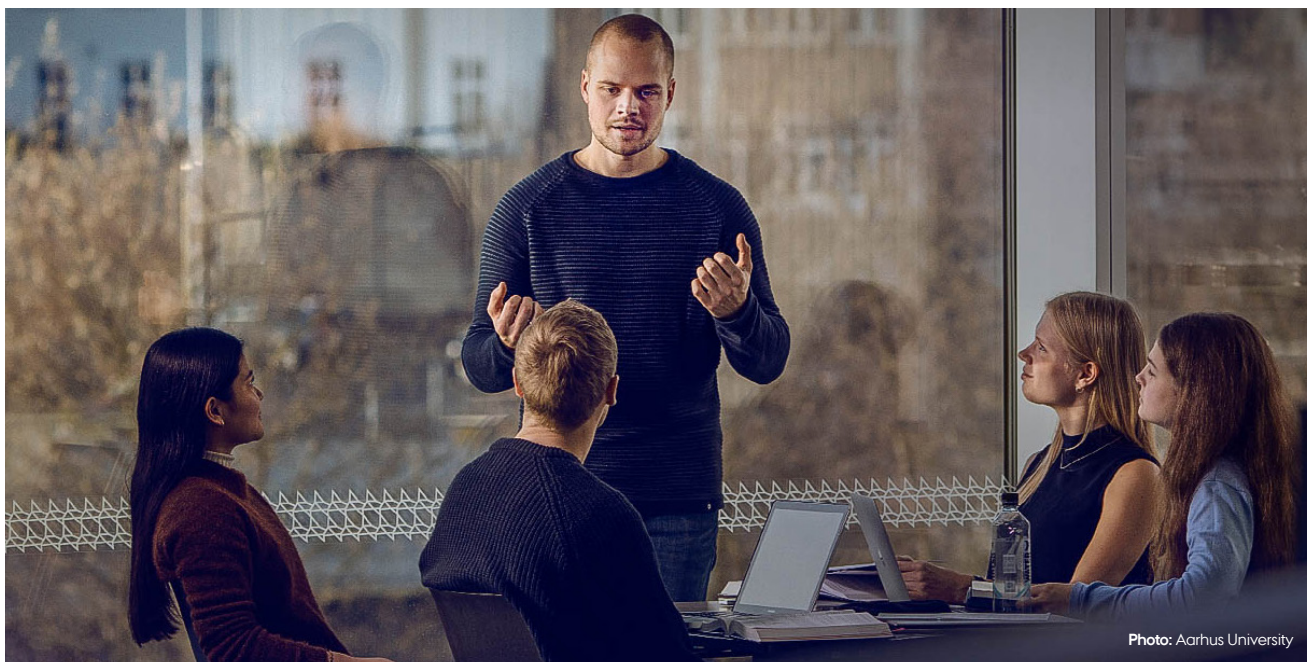
It has been really fun to participate, and I am not scared by the idea of studying IT.

And the CS Award Goes To ...

Teacher of the Year

KASPER GREEN LARSEN

Foundations of Algorithms and Data Structures



Teaching assistant(s) of the year

The award for teaching assistant of the year is given to one or two TAs who consistently get good reviews for their work. Both Frederik Hvilshøj and Konstantinos Mampentzidis have received extraordinary good reviews from their students.

WINNERS

Konstantinos Mampentzidis
Foundations of Algorithms and Data Structures

Frederik Hvilshøj
Introduction to Databases

Student Award 2018

The award is given to one or more students, who during the year has contributed positively to the study environment, initiated extraordinary activities or in other ways have been an excellent representative for the department.

WINNER

Rasmus Lunding Henriksen
Member of the educational board and study board

KDAG 2019

KATRINEBJERG CAREER FAIR

12. APRIL 2019
11:15 - 15:00

NYGAARD BUILDING (5335), FINLANDSGADE 21, 8200 AARHUS N
KDAG.AU.DK

KDAG 2019 PRESENT A GREAT
POSSIBILITY FOR OUR STUDENTS TO ENGAGE
FACE TO FACE WITH IT COMPANIES LOOKING
FOR TALENTED GRADUATES AND STUDENTS
FROM OUR DEGREE PROGRAMMES.

More than 50 companies and +600 students will be waiting in line to present themselves at the intense One-minute-madness session, followed by conversation with students and visitors at the company stands in the Nygaard building.



Photo: Chen Hu on Unsplash

CS Student Honored with the Queen's Travel Scholarship

Karl-Emil Bilstrup, who studies IT Product Development, is one of four AU students, who was honored with Her Majesty the Queen's travel scholarship in 2018.

When Karl-Emil Bilstrup was given the scholarship, emphasis was placed on the fact that Karl-Emil has been very socially active at the department, while also working as teaching assistant for several bachelor courses – always with excellent evaluations. “I'm very honored to get the scholarship. It makes me very proud,” he says.

Swapping Aarhus with Singapore

The scholarship will fund part of Karl-Emil's stay abroad in Singapore. Karl-Emil explains that he has chosen to study in Singapore to get closer to that part of the world, where a great deal of the technological development takes place.

“There is a great difference in how

we teach in Denmark and in Asia. They seem to only have their eye on the exam, and they are fully aware of what you need know when we get to the exam. In Denmark, I think we are a bit more calm and focus on learning to get smarter rather than only having the exam as an end-goal.”, says Karl-Emil.

Karl-Emil explains that one of the greatest difference he has experienced between studying in Denmark and Singapore is the number of students who sit in the study hall late in the night. “Many of my classes are in the evening, and when I go home, I still see people reading in the study hall, and they can make it far into the night. That is very different than in Denmark,” he says.



Photo: Lars Kruse, AU Photo

Other differences are the campus size and the heat. “The campus at Nanyang Technological University is big enough for busses to drive around, but it is also small enough that it may take only 20 minutes to cross. But remember it is 30 degrees, so when walking you will be soaked when reaching the lecture”, Karl-Emil Bilstrup concludes.

Entrepreneurial Award to Master Student

Christoffer Hawthorn

Congratulations to computer science student Christoffer Hawthorn and his business partners in Emplate ApS who won the entrepreneurial competition Guldæg 2018. As part of the dual-career

programme offered at AU, Christoffer is both student and business owner.



AU Hack Was a Big Success

More than 200 participants from all over the world came to Aarhus from April 13-15 to attend AU Hack. AU Hack is the largest hackathon in Denmark, and is organized by volunteers from the department's student organizations. The participants were kept busy over the entire weekend

with 36 hours of prototyping, networking, and fun. Mark your calendars for April 5-7 when AU Hack will return in 2019.

Find more information at auhack.org



IT Product Development Students Show Off Their Project Work

PIMP MY BIKE

As a part of the course Foundations for IT-Product Design, 43 IT Product Development students were challenged to pimp their bikes with electronics and digital features. With the attached electronics, the bikes could do everything from send information to

the driver about speed, traffic and weather to transmit information to others in traffic. The students said this project was a great way to combine electronics, design and everyday life.



Photo: AU Datalogi

FESTIVAL OF LIGHT

In December, first semester students from IT-Product Development exhibited their first-year project for teachers, friends and families. Their assignment was to design, program and built an interactive lamp for the Department's study café using Phillips Hue light bulbs. At the exhibition, the students showed off many different sizes and shapes of lamps.

Seven weeks up to the exhibitions, the students have been working with their prototypes. During the process, the groups have worked with research, design, programming and construction of the lamp itself.

One of the groups designed a lamp that should initiate more contact between the people using the study café. "Our research showed that people do not want to sit at a table, where other people already are sitting. We have tried to solve this "problem" by designing a lamp where you can have a discussion about adjusting the light, and thus make it easier to talk to strangers", says Frederik.

Another group used the Aros art museum as inspiration for their lamp. "It has been really fun to work with this project. I did not think that we would be able to do all this so early in our education", says Keyan.

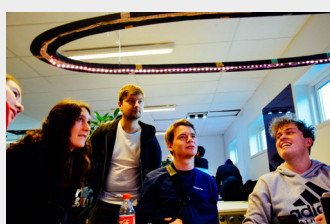


Photo: Kaspar Hvid

Photo: Daniel Chen on Unsplash

Let Us Introduce You to Fuzzlyn

This year in the Language-Based Security course, the students worked on a number of individual projects. One of these projects is Fuzzlyn – a tool for detecting bugs in the .NET platform.

Fuzzlyn - developed by computer science students Jakob Botsch Nielsen, Christoffer Schmidt, and Jonas Larsen - is a fuzzer that utilizes the Roslyn compiler framework to generate random C# programs. It runs these programs on .NET core and ensures that

they give the same results when compiled in debug and release mode. Using Fuzzlyn, several bugs have been found and reported in RyuJIT used both by .NET Core and the full .NET framework. A (harmless) bug was also found and reported in Roslyn. Asso-

ciate professor Aslan Askarov, who teaches the Language-Based Security course, is excited about the project, and believes it will have a significant practical impact.

Find more information about how to use Fuzzlyn for finding bugs and reducing programs at github.com/jakobbotsch/Fuzzlyn



We Have Denmark's Best Programmers

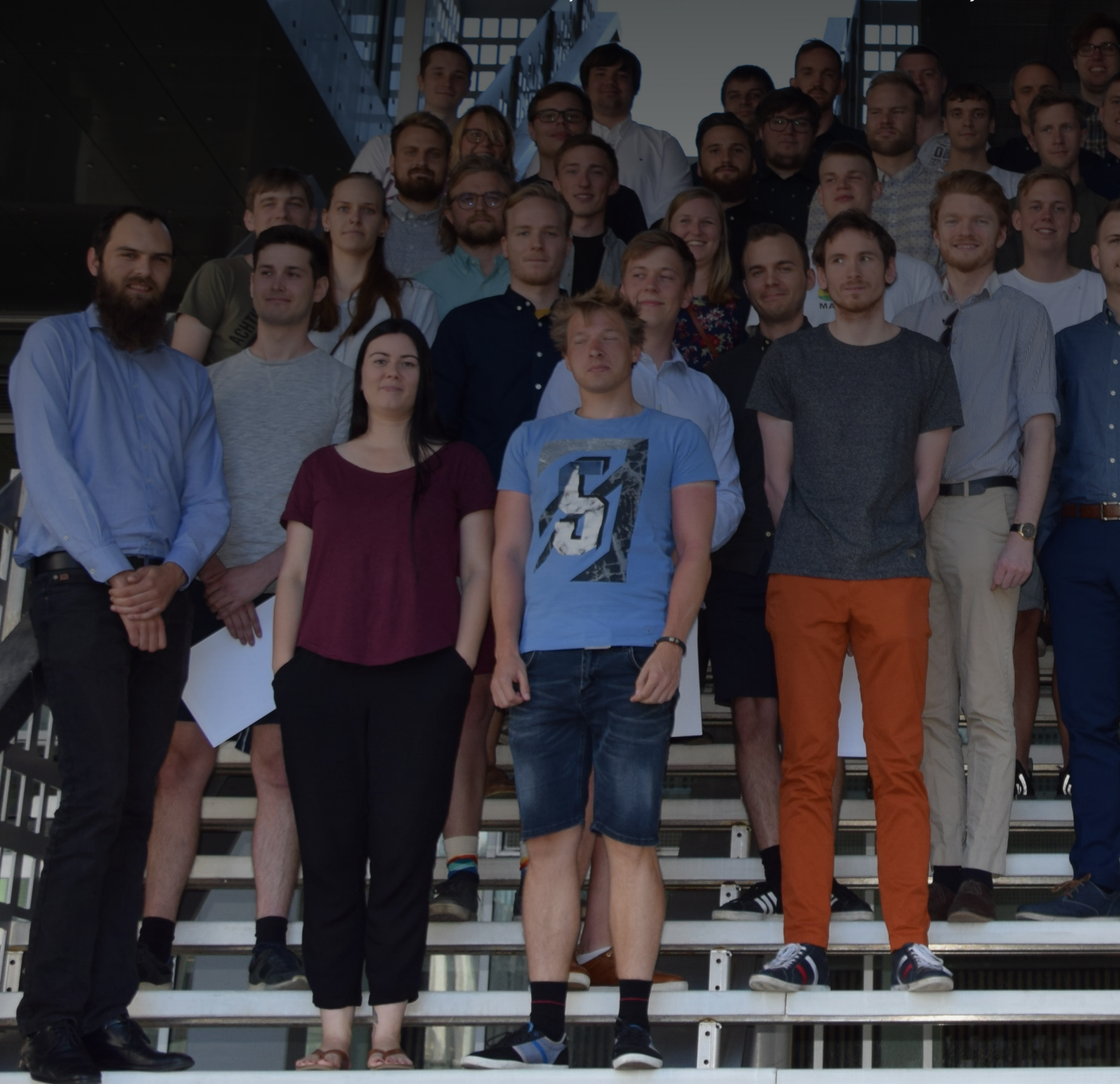
Congratulations to computer science students Oskar Haarklou Veileborg, Matias Frank Jensen and Asger Hautop Drewsen for winning the Danish National championship in programming 2018. After the many challenging assignments, their team “Beyond Ballmer’s Peak Frank” came out on top beating the reigning champions Lambdabamserne from University of Copenhagen, who has held the title from 2013-2017.

CONGRATULATIONS CLASS OF 2019

Friday June 29, family, friends and teachers gathered at Department of Computer Science to celebrate the graduation of 76 new masters in Computer Science and IT product development.

Associate Dean of Education Finn Borchsenius congratulated and handed the Master's diploma to each of the 56 graduates who attended the graduation ceremony in a packed Peter Bøgh Andersen auditorium.

Security Lead Architect at KMD Ebbe Skak Larsen, who gradu-



RELATIONS TO OF 2018

ated from the department in 1993, gave this year's graduation speech: Now it is time to go and use your super powers in the world. The industry is waiting for you, and we feel extremely lucky every time we succeed in recruiting one of you.

In 2018, 76 students have completed a master's degree in either computer science (52) or IT product development (24) at Aarhus University. The department wishes the best of luck to all of them, and hope you will stay in touch!

WELCOME TO 234 NEW BACHELOR STUDENTS

In August, the Department of Computer Science welcomed 234 new bachelor students. Out of the 234 students, 182 are enrolled in Computer Science, while 52 have been accepted into the IT Product Development program.

For the next three years, they will be studying either IT Product development or Computer Science. Two degrees that are in high demand on a job market that welcomes them with open arms; "I am delighted, that so many students have chosen an it-education. It taps into a much needed workforce in the future. IT plays a key-role in Bankdata and in the digitalization of our society as a whole. At Bankdata we have employees from both computer science and IT product develop-

ment, and we have a strong tradition of meeting and following the it-students through events and sponsorships. We look forward to following your progress during the next three years," says HR director Mette Marie Buhl from Bankdata, which supplies 10 Danish banks with it-solutions.

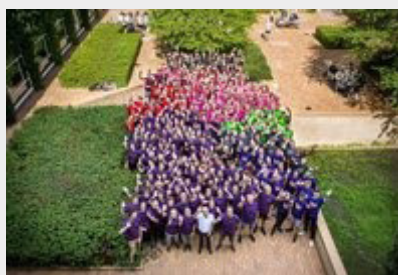


Photo: Science & Technology, AU

04

Outreach

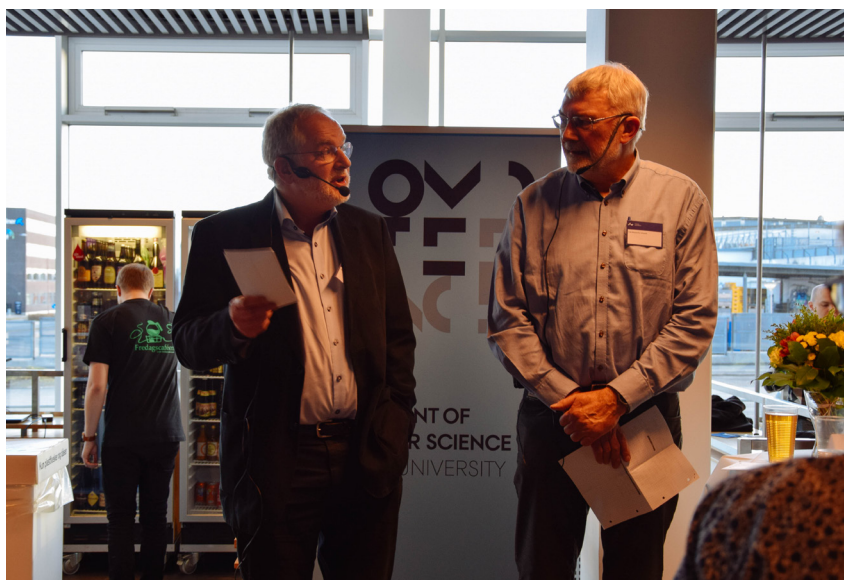


Well-attended Alumni Day

In 2018, Science and Technology decided to re-launch activities for all alumnus across the faculty. On April 5, more than 1,300 former students and employees visited their previous academic environment on to meet fellow alumnus and teachers, to attend presentations of the latest research, and to tour the new facilities.

At the Department of Computer Science, we welcomed 235 alumnus who attended three exciting presentations about Crypto currency 3.0, machine learning and big data. Following the presentations, was a tour of the department's facilities including presentations from students and recent graduates in HatchIt lab. The alumni day ended with a dinner where Professor Emeritus Mogens Nielsen and Associate Professor Emeritus Erik Meiniche Schmidt gave a festive speech.

In 2019, the Alumni day will be on April 25. Find more information here: cs.au.dk/alumni



Meet Our Alumnis



ANGELO FROM DANSKE BANK

NAME: ANGELO AGATINO NICOLOSI

AGE: 29

ORIGIN: ITALY

POSITION: CHIEF SOFTWARE ARCHITECT AT DANSKE BANK GROUP IT, AARHUS

EDUCATION: MASTER IN COMPUTER SCIENCE FROM AARHUS UNIVERSITY IN 2012

I have never really had a structured career path. Instead, I chose to follow what interested me: Computer science, new technology, and software development. I started working in Danske Bank as a graduate, while writing my master thesis at the Department of Computer Science, Aarhus University. A graduate program is a great way to start your career. You get introduced to a world of enterprise and business, and you learn to transform theory into practice in a steady learning curve. Gradually, your tasks and assignments gets more complex and intriguing. Now I have worked at Danske Bank for 7 years, and I would not change it for anything.

Computer science is pure creation

As a Chief Software Architect at Danske Bank, I am responsible for the development of the company's web and mobile bank solutions. It is an exciting field of work, because we are migrating a centralized software architecture model towards a model based on distributed systems. This will greatly enhance the customer experience. Working with distributed systems gives me the opportunity

to develop solutions that ensure we are available for the customers, whenever they need us. Another exiting task that have I have been working on is the development of an internal cloud infrastructure for the 3 million private customers and 19.000 employees at Danske Bank. It is very intriguing to be working with cutting-edge technology, which has an impact for so many people.

Computer Science is a field of pure creation: You can build a complete universe with your own hands. There are so many opportunities, and you work with many different kinds of technologies and research areas. At Danske Bank, I started working with infrastructure and server technology. My favorite field of work is cryptography and computer security – how do you secure and hide information while still making it accessible under the right circumstances? My master thesis was related to Secure Multiparty Computation, a subfield of cryptography. These crypto systems can for instance allow companies, who are competing on the same kind of market, to share information without revealing their busi-

ness plans and without involving any external third party. Although they do not trust each other, it can still be an advantage for both of them to share certain information in order to develop new products and technology.

Open and helpful atmosphere in Aarhus

I arrived in Aarhus in 2008 as an exchange student in the Erasmus program. I already had a bachelor degree in computer science from Pisa University in Italy. It was not until I arrived in Denmark that I found out how great academic life at a university can be. I felt like a fish in water. In Denmark, there is a great willingness to teach, and you can feel that the lecturers really love the subjects they are researching. Teachers are very open and willing to develop and adopt new learning methods. In addition, the atmosphere and communication between teachers and students is informal and down to earth.

See more about Angelo at cs.au.dk/career



FIE FROM SYSTEMATIC

NAME: FIE HEBSGAARD MORELL

AGE: 27

ORIGIN: DENMARK

POSITION: SYSTEMS ENGINEER AT SYSTEMATIC

EDUCATION: MSc IN COMPUTER SCIENCE FROM AARHUS UNIVERSITY IN 2015

The best thing about computer science is that it is so application-oriented. You can translate what you learn directly into your working life, and you can use what you learn to create meaning in your work. Actually computer science is a very practical subject. And that I can use what I've learnt during my studies in reality means a lot to me. My interest in computer science actually comes from my favourite subject, maths, which is closely related to computer science. I had maths at A level, and I love it: algebra, algorithms and mathematical analysis. Proving things and coming up with a correct answer with two nice lines underneath really appeals to me. So I decided to study for a Bachelor degree in mathematics.

IT security and cryptology

During my Bachelor, I became very interested in algorithms and data structures, as well as cryptology and security, both of which featured prominently in the computer science programme. So for me, it was an obvious choice to take a Master's degree in computer science after my Bachelor in mathematics. Especially because the computer science programme is very flexible, and you can put together your own subjects based on your interests. I specialised in cryptology and IT security. This area of computer science is currently very visible in the public debate, with themes such as cybercrime and privacy.

From student to systems engineer

I attended several career fairs such as K-day during the computer science programme. While I was at the fairs it dawned on me that there is great demand for the computer scientists and IT expertise. Companies are queuing up to recruit us.

As a new graduate, there's a lot you don't know. But because you've learned the methods on the computer science programme, you quickly get into the routines and tasks. As a systems engineer at Systematic, I have many different tasks. Right now, I'm working in a large team on developing the new Danish library system. You probably wouldn't think about it, but there are actually a lot of restrictions, for example in relation to privacy, when you borrow a book from the library. It's a huge development task, and it's been great to be involved in starting up the project, and finding the best possible solutions for the system. It's also a job where you have to work with software architects, project managers, and designers.

I love working in a major international company, because I can work with IT security in many different sectors, for example defence or health. It also means that I can steer my career in a different direction if I feel like it. I can keep a lot of doors open.

The IT industry is good at giving you a clear message about how you can improve within a specific area or task. That means I can develop both professionally and personally. And that's just brilliant!

"I attended several career fairs during the computer science programme. While I was at the fairs, it dawned on me that there is great demand for the computer scientists and IT expertise. Companies are queueing up to recruit us."

- FIE HEBSGAARD MORELL

Different genders give good dynamics

Even though there's nowhere near as many women as men studying computer science, you shouldn't let this deter you. It's really good that more women are deciding to study computer science. Because even though men and women have the same level of professionalism, there's different dynamics on the programme and at the workplace, because we women approach and perform assignments in very different ways.



SØREN FROM STIBO

NAME: SØREN LUNDTTOFT

AGE: 27

ORIGIN: DENMARK

POSITION: TECHNICAL PRODUCT MANAGER AT STIBO SYSTEMS

EDUCATION: MSc IN IT PRODUCT DEVELOPMENT FROM AARHUS UNIVERSITY IN 2016

"I love watching ideas and concepts go all the way from the drawing board to realisation. That's the driving force and motivation for everything I do, and the reason I'm so happy about my choice of education. What appealed to me from the start of the IT Product Development programme was that it is a broad, interdisciplinary IT programme and you learn about working at the intersection between design, software development and business understanding. Together, these three areas cover the entire development process, taking an IT solution from conception to reality. It was especially exciting for me to learn about how to develop prototypes in a business context, because you're forced to think strategically in relation to business understanding and market needs. The IT world is full of examples of good ideas where they forgot to take into account the specific needs of end-users and customers. Students on the IT Product Development programme learn from the start to focus on users, because there's constant focus on the fact that your projects have to be used in real life.

Entrepreneurial spirit on the programme

There's a strong entrepreneurial spirit on the programme, because you constantly have to think creatively and in many different subject areas. This was one of the main reasons why I chose to write my Master's thesis project in Stibo Accelerator, which is a hub to the business community for university students at Stibo Systems, where I work today. The Accelerator gives you a unique opportunity to work

on your study project in a business context, and to build bridges to the business community with your project. Mixing this "anything-is-possible approach" with methods from entrepreneurship and the broad synergies and resources from an established company gives you some unique working conditions to forge innovative product development.

My Master's thesis project focused on using new digital technologies to improve the shopping experience in a supermarket. We worked with the REMA 1000 supermarket chain and developed new shopping concepts focusing on the digital, social and physical shopping experience. Developing a business case was both fun and exciting, and it could disrupt the whole retail sector.

Contact with many different disciplines

After my Master's thesis, I got a job at Stibo Systems, and I'm currently responsible for a project called Tagglo. With Tagglo, we're helping producers of tools or groceries, for example, to manage and transform product data for their dealers. The Home Depot or Walmart need product data in a very specific format in their role as an intermediary between the producer and the customer. You could say that we're making it easy for producers to get their products over the ramp to the customer at the other end. And therefore, you could say that Tagglo is a good example of how quickly things are going in the IT industry. With Tagglo, Stibo Systems can support other industries with solutions we had no idea there was

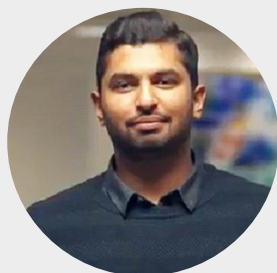
a market for just 10-15 years ago.

In my job I come into contact with many different disciplines. You could say that the interdisciplinary aspect that is such a large part of the IT Product Development programme has given me a "language" I can use to communicate with business people, designers, developers, sales people and end users.

"You should study IT Product Development because the whole IT field is undergoing such huge development and there's always something new happening."

- SØREN LUNDTTOFT

The programme is the "glue" that means that I can form an overview of all the components in our business and development process and make sure everything works together. For example, I can organise the development tasks with our developers in Poland, but at the same time work with our team in Boston in the US on future milestones, customer cases and business aspects. One of the best experiences I've had at work, was to demonstrate our application and business concept for some of our US customers. It was fantastic to see how they worked and interacted with a solution which I had worked on so hard. When you see how your own efforts can help make other people's work so much easier, it all just makes sense.



GANESH FROM RETINALYZE

NAME: GANESH RAM

AGE: 26

ORIGIN: DENMARK

POSITION: COMMERCIAL DIRECTOR AND CO-FOUNDER OF THE START-UP RETINALYZE

EDUCATION: MSc IN IT PRODUCT DEVELOPMENT FROM AARHUS UNIVERSITY IN 2015

I've always been interested in technology and I've been messing around with computers since I was very young.

I liked physics and maths and actually I thought that I was going to study nano-physics. At upper secondary school I had several student jobs in sales, support and customer contact, and it dawned on me that I wanted to work with something practical and with a human dimension. IT Product Development had everything I was looking for in a higher education programme, because it embraced the interplay between IT, technology and people. IT Product Development is a broad and interdisciplinary programme, and that's also its greatest strength. You don't only learn about programming, design and software, you also learn about the link between sales people, designers, developers and programmers, who all think, prioritise and make decisions in their own unique way.

Student and entrepreneur

Retinalyze is built-up around a software algorithm and artificial intelligence that makes it possible to screen patients' eyes and retinas and calculate the risk and indications that a person will develop an eye disease. The tool can be used by people who are not specialists in eye diseases such as clinic assistants, nurses and, not least, opticians, with whom we have broad cooperation. By lowering the cost and barriers to performing eye

screenings, we can make them widely available and help save people's sight.

I was still a student on the IT Product Development programme when we started Retinalyze in December 2013. The parallel processes of studying and starting up the company meant that the way we developed, marketed and sold Retinalyze was constantly developing. It was fun, because the knowledge I gained on the programme had to be implemented in a real company with its own business model. Retinalyze was not just a student project. It was a real company that had to stand on its own after graduation, because it was going to be my livelihood. It was also exciting to apply what we learned about programming, physical design and business understanding when we started the company.

140,000 eye screenings

You have to wear a lot of different hats when you're an entrepreneur, and you have to learn about a lot of different things all at the same time. You get right down into the engine room. You don't only have to develop, produce and sell; you also have to take care of practical and administrative aspects such as tax, VAT registration, law, etc. All that has to be in place too if the company's going to work. And it's much more fun and motivating for me to work with all these things at once. I'm getting to know about all the different corners in Retinalyze

and that means I can move things forward immediately. That's probably the biggest difference between being an entrepreneur and being employed in a large company, where in many cases, you'll have some very close-knit and well-defined tasks.

"IT Product Development is a broad interdisciplinary programme, because it embraces the interplay between IT, technology and people."

- GANESH RAM

What drives me as an entrepreneur is the freedom to plan and prioritise my tasks as I want. I'm developing personally all the time, and I have an outlet for my creative desire to develop something that makes sense for others. I find it hard to motivate myself if I don't see the point of something. Therefore, it's pretty amazing to go to work every day with the knowledge that, with Retinalyze, we've created a product that makes a real difference for a lot of people. So far, in Denmark alone, we've performed eye screenings of more than 140,000 clients, and we've save sight or prevented blindness for over 6,200 people. This means I feel that I'm really making a difference. And that makes me happy to go to work!

2 years + 9.1 million: HatchIT Lab is a Success

Since the beginning of 2016, the seven different companies in HatchIT Lab have received more than DKK 9.1 million in support from various funds and programs. HatchIT Lab is an experimental innovation lab and incubator environment, which is anchored at the Department of Computer Science at Aarhus University.

Innovation Fund, Market Demand Fund, Environmental Technology Development, and Demonstration Program. The list of funds and programs, from which the start-ups at HatchIT Lab have received funding to the development of their ideas and companies, is long.

One of the companies that has been very successful in getting funding is the technology company Ceptu. The company has grown from three to 12 employees in just two years. Ceptu has developed FieldSense; an app that provides farmers health updates on their crops through high-resolution satellites photos.

"For us, it's a big advantage to be part of the HatchIT Lab because we are close to other entrepreneurs who, like us, base our business on knowledge and technology. We're different companies, but no more than we have a

lot to gain by helping each other with applications, funds, frameworks, and rules for fundraising, says John Smedegaard, CEO of Ceptu.

Close to professional environments

Another advantage is HatchIT Lab's close relationship with the professional environments in the IT City Katrinebjerg, where the Department of Computer Science is located, says John Smedegaard: "What makes HatchIT Lab unique compared to other entrepreneurship environments in Aarhus is that we have the opportunity to seek sparring and counseling in the University's existing network of researchers, teachers, and students who sit just across the hall from us."

Another HatchIT Lab company that has received large grants is MONTEM, which specializes in intelligent infrastructure and internet-connect-

ed, high-tech products. Founder and co-owner Christian Østergaard Laursen experiences great branding value and legitimacy by having an address in HatchIT Lab:

"The fact that we have a base at Aarhus University has given us a lot of credit and good-will when we have presented our business for funds, companies and collaborators. "Being part of HatchIT Lab means that we have been able to launch MONTEM in a safe space where there has been room for developing our company from scratch. We have had access to networks, competencies, knowledge, and equipment, which has provided us with a very solid foundation to continue MONTEM on when we, one day, have to leave HatchIT Lab," Christian Østergaard Laursen continues.

The university also see it as an advantage that the young entrepreneurs

Photo: Anders Høedholt

work with their ideas and start-ups close to the research and education environments. "By strengthening the opportunities for students to test their entrepreneurial ambitions, we as a university can contribute to the development and testing of innovative ideas, products and services while the students can still follow their current education. At the same time, an entrepreneurial environment like HatchIT Lab gives a whole lot of back to the

university by creating relevant study jobs, partnerships with research and industry and a generally positive impression on the study and learning environment at the department", says Søren Poulsen, Special Consultant at the Department of Computer Science.

hatchit lab is a locally based IT-entrepreneurial environment that is closely linked to IT research and education activities at the Department of Computer Science, Aarhus University. Students wishing to start their own business in IT, electronics, software and product development can in Hatchit lab explore, mature and develop their ideas in a research-oriented incubation and innovation environment. The aspiring entrepreneurs can apply for admission to Hatchit lab during the last half of their master program.

More information at projects.au.dk/hatchitlab

profofi.

profofi.

The creative startup profofi, founded by four IT product development students from the department of Computer Science, aides design companies in exploring how electronics can be embedded into their concepts in a meaningful way. Working with companies in industrial areas such as product and interaction design, profofi facilitates workshops to demonstrate different technologies, exploring possible interactions through sketching, mockups and rapid prototyping, and manifesting these explorations in physical prototypes with embedded electronics. These prototypes can then be used by the clients in their ongoing work, both for ideation and demonstration purposes.

Learn more at profofi.dk

Relion



Relion is a software house who contributes with proprietary computer software without burdening our environment. All products are developed in cooperation with end users. The principle stems from the scandinavian design philosophy known as participatory design. The ambition is to make difficult tasks manageable through the use of the latest technologies, with particular focus on machine learning, blockchain and the possibilities that follow. These technologies will not only optimize the way we work, but revolutionize the way we learn from - and communicate with each other in the internet-based world. In general, we strive to optimize companies through easy-to-use SaaS technologies. Their first product, Relion Business is about to go live.

Learn more at relion.dk

MONTEM



MONTEM develop intelligent infrastructure for different sectors on municipality and national levels. They are specialized in developing research-based, high resolution and low-power sensor networks for digitalizing infrastructure. One of MONTEMs products, CityProbe, is currently installed in 24 lampposts around Aarhus. They continuously measure various factors, such as air quality, rain, noise levels etc. and provide live access to the data. The vision is to create "the fabric of the intelligent city".

Learn more at montem.io

USA (L.A.)

PhD student Manuel Rafael Ciosici shared his experiences in L.A. where he did his stay abroad, which according to Instagram was characterized by crazy traffic, long days and secret movie clubs. We know he also did a lot of work and did some amazing hikes.



Denmark

IT product development student Keyan Javanshir and his study group showed us their creative process leading up to the Festival of Light – first year project for IT product development. We think their ufo inspired by Aros art museum looked very good in the study café.



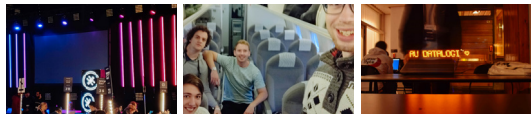
On Instagram you can follow the everyday life at the department. Our students and staff also contribute by doing take-overs and thereby bringing our followers around the world or deeper into their work and research. Have a look at some of the highlights from 2018, and go follow @AUDatologi for future stories.

atalogi

the world

Finland

Tobias Lund Petersen and his team participated in Europe's biggest hackathon – Junction 2018, which took place in Finland. Sadly, they did not win, but they did give us a glimpse into what a hackathon is.



Thailand

Denmark was represented by two team in the World Robot Olympiad 2018, which took place in Thailand. Ole Caprani and Søren Poulsen participated to support the Danish teams, which ended up as number 42 of 96.



Africa (Nairobi, Kenya)

IT product development student Daniel Graungaard took us all the way to Nairobi, Kenya where he did field work for his master thesis about smart home technologies in relation to water. He also got stuck in traffic as Melania Trump visited at the same time.



Photo: Thora Knudsen

Four CS Graduates Get Funding to Help the Blind and Deaf

Four IT Product Development graduates from Department of Computer Science were selected for Innovation Fund Denmark's program – InnoFounder. They were selected based on a device created for their Master's thesis - a sensor that can help deaf and blind people in their every-day-lives.

645.000 kroner. That much has four graduates in IT Product Development from Department of Computer Science at Aarhus University received in funding from Innovation Fund Denmark to support the development of their idea. They have developed a sensor that will make every-day-life easier for deaf and blind people, by making inaccessible information from their home available.

"Our every-day-life is becoming more and more digital, meaning that a blind cannot see the display on the microwave, and a deaf cannot hear the doorbell, and when we started the thesis at the end of 2017, we decided we would try to solve it", says Rasmus Korsgaard Kjeldgaard.

The four describe the sensor as a device that can make your home into a "smart home" as it can track if the

doorbell is ringing, whether the light turns on or off, or if the dishwasher stops spinning, after which you can be notified about it on i.e. a phone. The sensor is not just good on paper, but received great feedback when tested.

"We got a really nice feedback when we tested the sensor. One of the two who tested it on would not give it back because it made her every day so much easier," says Christian Holding Sørensen.

From students to business owners

When they started their thesis, they did not expect that they today would be business owners. The funding from Innovation Fund Denmark enables them to work full time on developing their sensor and business Protofi.

- Being part of InnoFounder really

means a lot to us. In concrete terms, it means that we have time to work full time on our product. Also, we get a mentor who can help us with developing the business side of our company, which probably is a good idea as we otherwise would spend all our time on development, says Rasmus Korsgaard Kjeldgaard, and adds that they now will apply for more funding.

Help from HatchIT-Lab

It was especially in HatchIT-Lab that the four found support and guidance for their application when they decided to apply for the InnoFounder program.

"The Department of computer Science and other companies in HatchIT-Lab were really good at pushing us in that direction and making us realize that our project can be more than just a thesis. At the same time, there is an in-

credible hub of knowledge next door from all the researchers available for us", says Mark Flarup-Jensen

HatchIT-Lab, which is centrally located within the Department of Computer Science, is one of the entrepreneurial environments at Aarhus University, where start-ups can explore, mature, and develop their ideas.

"Since the beginning in 2016, HatchIT-Lab has been an experiment to investigate how student affiliation can create synergy when it's anchored close to research and an educational environment. It has proven to be of great value for our start-ups to be

close to both researchers and fellow students who have provided support and sparring both on technical aspects and business ideas. In particular, I believe that the informal contact with researchers and experts has been very valuable, as our startup companies have a high level of innovation", says Søren Poulsen from Department of Computer Science and continues:

"The goal of HatchIT-Lab is that our students can test the dream of starting their own business in an environment that still allows them to be full-time students. We do not measure the success in the number of sustainable companies. Rather, we believe it to be

of high value for the students to have the opportunity of testing entrepreneurship before one making decided on a career path".

Just do it

The four students say if they should give one advice to any students considering applying InnoFounder it is simple: "Do it. That's the short answer," says Tobias Emil Harbo.

After the defense of their thesis on 28 June, the four will take a short summer break, but they are looking forward to continue working on and developing their sensor in HatchIT-Lab.

CS BUSINESS CLUB

GET CLOSER TO OUR STUDENTS AND RESEARCHERS

CS Business Club serves as the entry point for cooperation between your business and Department of Computer Science in areas such as recruitment, research and knowledge sharing. Visit cs.au.dk/businessclub to investigate your opportunities to collaborate with our researchers and students

BENEFITS OF MEMBERSHIP

Investigate your opportunities to develop your business with project and thesis collaboration with students, recruiting, potential research and innovation collaboration with CS researchers, industrial PhDs, strategic partnerships and professional networks.

Participation in the annual career fair Katrinebjerg Karrieredag (Kdag) with a large stand (value: DKK 8000). The stand is included in the CS PARTNER membership

Firsthand knowledge on news and events at Department of Computer Science

Invitations to special talks and events





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ACTIVITIES AT THE DEPARTMENT.

*Alumnus, current students and staff
members are welcome to join the group.*

"Alumni Network - Department of Computer Science"

[linkedin.com/groups/8559045](https://www.linkedin.com/groups/8559045)



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