

Mini-annual report, Computer Science, 2010

It is with great pleasure and pride that I once again can observe, that the past year has been extremely successful with growth and prosperity in many different areas. Our researchers have repeatedly asserted themselves in the top of all the areas that we deal with: research, teaching, dissemination and collaboration with the industry and public organizations. I would therefore like to extend a huge thank to all employees. It is because of you and your efforts that the Department is performing brilliantly.

The physical environment

The expansion of the IT-City of Katrinebjerg continues, and the third phase of the IT-Park will be finished in the summer of 2011. It does not give us significantly more space as we give away other areas to the Engineering College of Aarhus, which moves all its electronic and IT activities to Katrinebjerg. However, the expansion means that the rooms of the Department will be located closer together and therefore be more well-functioning than they are today. Our Master's Thesis students will e.g. have offices together with the research groups they are connected to, and there will be teaching rooms, group rooms and reading rooms in the buildings next to the employees' offices. Furthermore, the new building will accommodate a 250-man's auditorium, which means that it will be possible to place the major courses in the IT- City of Katrinebjerg in the future.

Academic staff

The department has a highly well-functioning VIP staff ranked in the top of all common parameters for the measurement of research, teaching and dissemination of information – both when compared to other Danish departments of computer science and when compared across our faculty.

The department's biggest problem has been that we have too few permanent academic staff members. During 2010 this situation has improved through a series of new appointments, and we hope for continued growth through the next years so that the number of tenured academic staff will increase from the current nearly 20 to approximately 30. We would like to hire more foreigners and also more women.

- Christian S. Jensen has been appointed professor in databases, thus we have succeeded in attracting a world leading researcher in this field. Christian will be a central figure in building up a strong group within the database area at the department.
- During 2010 the department has obtained five new associate professors: Marianne Graves Petersen (human-computer interaction), Jesper Buus Nielsen (cryptographic protocols), Kristoffer Arnsfelt Hansen (complexity theory), Niels Olof Bouvin (software architecture for mobile computing) and Ira Assent (databases).
- Bjarne Stroustrup (object-oriented programming language) and Liam Bannon (Human-computer interaction) have joined the department as Honorary Professors. They are both extremely well-known and highly estimated international researchers.

- Peter Møller-Nielsen has become emeritus. The department would like to send a huge thank to Peter for his excellent and very dedicated work throughout the years. We look forward to seeing Peter several days a week.
- Klaus Marius Hansen has been appointed professor at University of Copenhagen and has therefore resigned his lectureship at the department.

Technical / administrative staff

The department has an extremely efficient TAP staff. After having major administrative reorganizations in late 2009, when the areas of IT, economy and web were grouped under the faculty, the year 2010 has been a year with relatively few changes:

- Aino Vonge Corry has been appointed project manager for the department's new three-year project to improve our teaching (more on this matter in the section about teaching).
- Karina Svanborg is permanently employed as study manger
- Sara Ølholm Eaton is permanently employed as research group coordinator
- Kirsten Boddum Andersen and Fred Mosekjær Madsen have retired after respectively 42 and 40 years of employment at Aarhus University. Also they must have a huge thank for their efforts over the years.

Appointments and awards

- Lars Arge has received the major EliteForsk (Elite Research) prize, which is awarded to outstanding young researchers (under 45 years of age) who are in the top class internationally. The award amounts to DKK 1.2 million of which DKK 200.000 is considered a personal prize of honor, but the remaining must be used for research activities.
- Susanne Bødker has become member of the CHI Academy and thus recognized as one of the world leading researchers in the field of human-computer interaction.
- Ivan Damgård has been selected Fellow of the IACR (the International Association for Cryptologic Research). The appointment is due to his fundamental contributions to cryptography, for sustained educational leadership in cryptography and for his service to the IACR.
- Erik Ernst is assigned the Dahl-Nygaard Junior prize 2010 for his research within object-oriented programming. The prize is given to a young researcher who has great potential to follow in the footsteps of the two pioneers.
- Bjarne Stroustrup has received the Rigmor and Carl Holst-Knudsen research award. The award is one of the oldest and most prestigious science awards.
- Anders Møller has received a Google Research Award, which according to the company is given to world-class research within the research areas that has the company's interest. Anders has also (for the second time) received an IBM Faculty Award.
- Kasper Dalgaard Larsen is the first Danish student who has received a Google European Doctoral Fellowship for a PhD scholarship and conference participation for the next three years.
- Martin Simonsen has been awarded the NRW Young Scientist Award 2009. Martin received the prize based on an article he wrote and published during his Master's degree programme.

- Elias Tsigaridas won the distinguished paper award at the 35th ACM International Symposium on Symbolic and Algebraic computation with the article “The DMM bound: multivariate aggregate separation bounds.”
- Ian Zerny won the award for best student paper at the 10th Symposium on Trends in Functional Programming with the article “On Graph Rewriting, Reduction and Evaluation”.
- Jakob Aarøe Dam won the award for best computer science Master’s thesis in Denmark for the development of a web service that allows surfers to see where the weather is perfect for a trip on the water.
- Nis Bjørn Jensen and Isak Glundal Nuur have won the Welfare Challenge 2010 with the contribution “from social worker to investor”. They are both IT bachelor students.

Research projects

During 2010 the department has started up a large DSF center funded by the Danish Council for Strategic Research: “Center for research in the Foundations of Electronic Markets”. The center is headed by Ivan Damgård and has participants from Aarhus University, CBS, KU Life and a number of companies. Furthermore, the department has been granted a new research center: “Center for Theory of Interactive Computation”. The center is a cooperation with the highly prestigious Tsinghua University in Beijing. The Danish part of the center is directed by Peter Bro Miltersen, while the Chinese part is directed by Andy Yao (the received of the Turing Award; the Nobel Prize of computing).

Through Jesper Buus Nielsen and Anders Møller, the department has received two of the 31 Sapere Aude grants from the Danish Council for Independent Research. The grants are given the Assistant Professor researchers who have done research in the top of their field. The aim is to provide best possible framework for the most talented researchers who are prepared to become research leaders.

The department has received external funding for DKK 40-50 million per year, which means that more than 50 per cent of the funds to the department come from external grants.

Major research projects undertaken in 2010:

- Center for research in the Foundations of Electronic Markets. Ivan B. Damgård, DSF, 13.5 million DKK
- IKT-based Health innovation, Morten Kyng, Caretech Innovation, The European Regional Fund 6.0 million DKK
- Confidential Benchmarking, Ivan B. Damgård, FTP, 4.8 million DKK
- Center for Interdisciplinary Geospatial Informatics Research, Lars Argen and Jens-Christian Svenning, Biology, AUFF, 2.5 million DKK
- Real Algebraic Geometry and Applications, Elias Tsigaridas, FNU, 1.7 million DKK
- Galileo Platform extra grant, Kaj Grønbaek, HTF, 1.5 million DKK
- Use of New technologies in Innovative solutions for Chronic patients, Morten Kyng, FNU, 1.2 million DKK
- Google European Doctoral Fellowship, Kasper Green Larsen, Google, 1.1 million DKK

- Eliteforsk award, Lars Arge, FNU, 1.0 million DKK
- Skanderborg, Denmark's Most Beautiful Festival system, Preben Holst Mogensen, Central Denmark Region, 1.0 million DKK
- Next Generation Disease Mapping, Thomas Mailund and Mikkel Heide Schierup, EU, 1.0 million DKK (BiRC)
- Infrastructure for Health Service, Henrik Bærbak Christensen, The European Regional Foundation, 0.8 million DKK
- Research on Program Analysis for JavaScript, Ander Møller, Google, 0.5 million DKK
- Sportcasting 2.0 – Social in 3D, Preben Holst Mogensen, Central Denmark Region, 0.4 million DKK

In addition the department received a number of new grant commitments during the last months:

- Center for the Theory of Interactive Computation, Peter Bro Miltersen, The Danish National Research Foundation, 15.0 million DKK
- Static Analysis for Dynamic Languages, Anders Møller, DFF Sapere Aude, 7.9 million DKK
- Basic Research in Cryptologic Protocol Theory, Jesper Buus Nielsen, DFF Sapere Aude, 5.7 million DKK
- Tools for Rich Internet Actions, Anders Møller, FTP, 4.8 million DKK
- Scalable and effective anomaly detection and correction of automatically collected data in e-Science, Ira Assent, FTP, 4.0 million DKK
- Postdoc grant, Joshua Brody, associated with CTIC, FNU, 1.7 million DKK

Conferences, workshops and summer schools

The department has over the year hosted the following events:

- Designing Interactive System 2010 (Olav Bertelsen, Peter Krogh & Kim Halskov Madsen)
- Madalgo Summer School on Geometric Data Structures (Lars Arge and Gerth S. Brodal)
- Workshop on Solution Concepts for Extensive Games (Peter Bro Miltersen and Jesper Buus Nielsen)
- Aarhus-Chennai Computational Complexity Workshop (Kristoffer Arnsfelt Hansen and Peter Bro Miltersen)

In addition the employees of the department have as usual attended lots of conferences, workshops, summer schools and meetings all over the world.

Seminars

During 2010 the department has arranged the following "Friday lectures":

- Dealing with Massive Graphs: Algorithms, Techniques and Challenges (Norberth Zeh, Dalhousie University, Halifax, Canada)
- Inaugural lecture for four new associate professors (Jesper Buus Nielsen, Kristoffer Arnsfelt Hansen, Marianne Graves Petersen and Niels Olof Bouvin)
- Augmented Reality – integrating digital information in the physical world (Kaj Grønbaek)

- Peer-reviewed Scientific Journals (Olivier Danvy)
- Inaugural lecture for new professor within databases (Christian S. Jensen)
- Evolving a Language in and for the Real World (Distinguished Lecture by Bjarne Stroustrup, Texas A&M University, USA)
- Computational Nature of Processes Based on Biochemical Reactions (Distinguished Lecture by Grzegorz Rozenberg, Leiden University, Holland)
- Towards 2020 Parallel Programming (Jens Palsberg, UCLA, Los Angeles, USA)
- Another Go at Language Design (Rob Pike, Google, USA)
- Density-based Subspace Clustering (Ira Assent)

Research Dissemination

Each year the department hosts the Computer Science Day event, where our research groups in 15 minutes present themselves and their present research activities. The event provides a compact overview of the research of the department and addresses employees at Katrinebjerg as well as outsiders with an interest in computer science research. In addition we participated in 2010 in e.g.:

- The Danish TV show “Danskernes Akademi” where Preben Holst Mogensen and Ivan Damgård lectured about different perspectives on surveillance.
- “Forskningens Døgn” with two features by IT bachelor students: “Dirigentdragten James” & Jesper Lysgaard Rasmussen, Jonas Degn Grann and Tobias Fjeldsted Alrøe) and “Social Shadows” (Jacob Marcussen, Tobias Sonne, Morten Mortensen and Matthias Nielsen).
- Production of a number of videos “Ud af Boksen”, where some of our researchers give a peek into the computer science world. (www.cs.au.dk/udafboksen).

Dissemination for future students

Besides the ordinary visitor activities of the faculty, “Det Rullende Universitet”, study placements and U-days, the department participates in a variety of activities which address young future students:

- The department has participated in the education of upper secondary school teachers (in algorithmics) at the “Nationale talentcenter for naturvidenskab” in Sorø and has contributed to the teaching at one of the center’s TalentCamps (in cryptology).
- The department has held workshops in artificial intelligence for students affiliated to “Akademiet for talentfulde unge”.
- Together with ITEK the department arranged the Danish qualification tournament in WorldRobot Olympiad, which took place in the Lakeside Lecture Theatres. More than 100 secondary school students competed for representing Denmark at the finals in Manila.
- We work closely with selected upper secondary schools, where we have offered courses with a technical overlap with various upper secondary /HTX subjects (technology, mathematics, economics and english)

- During the autumn holiday the department hosted for the fifth time an IT Camp for girls between the age of 15 and 19. On the camp the girls experienced some of the many opportunities the IT area has to offer, through presentations and exercises in programming, cryptography and audio design together with company visit at Systematic.

Student activities and events

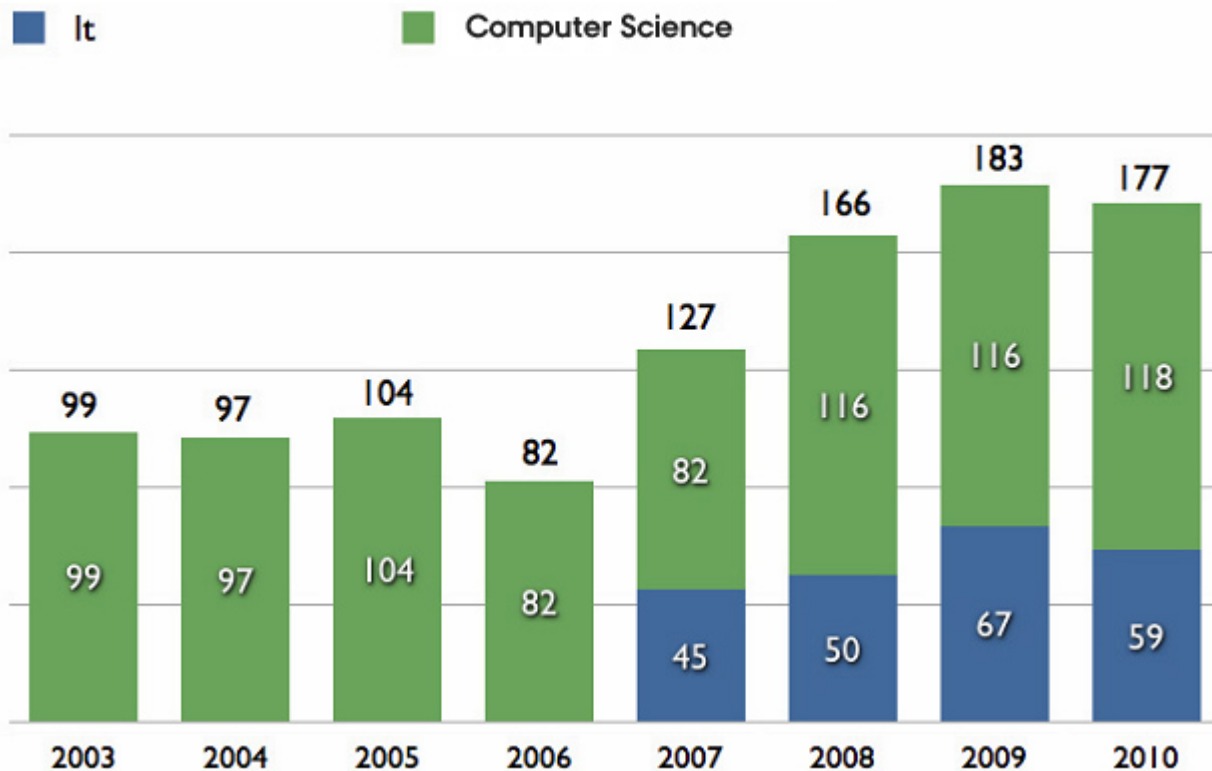
The department has more than 1000 students. As seen below, there are also among those great initiative and energy:

- In January 3rd year students at the IT programme presented their bachelor projects within the subject "Tangible User Interface" on a mini-conference in INCUBA Science Park.
- In March, students at the department founded the first (legitimate) Aarhus attacker association Hack-Aarhus. The association soon developed into the independently-run Open Space Aarhus, where students from many different directions build, hack and construct new and exciting digital projects. (www.osaa.dk)
- In April the student network UNITY:Katrinebjerg arranged "Coding for Charity" which is an interdisciplinary project for charity. The event gathered 40 students from computer science, IT, technical IT, information studies and digital design to solve different IT challenges for voluntary organizations in Aarhus in the good cause. Among the happy customers customers for the free code sere: Cyberhus, IndvanderRådgivningen, colunteer Aid and Mødrehjælpen. (www.codingforcharity.dk).
- In May our students created the association DSAU (Computer science student association, Aarhus University). The association stands behind a series of social and professional activities for computer science students, including study trips, "Crash Course in C" and training activities for the yearly Danish Championship in programming.
- In June the results from the final first year projects on the IT programme were presented. Here you could see the students' view on future digital solutions in semi-public buildings. The solutions spaned interactive washbasins for energy saving hotel rooms and digital learning environments in zoos.
- In October the department hosted the Danish Championship in programming, where 24 teams competed against each other. Subsequently, we participated with two of our best teams at the Northwest European Championships in Bremen.
- In December, "Random Hacks of Kindness" (RHoK) was held in Europe for the first time and with Aarhus University and Unity: Katrinebjerg as organizers. RHoK is a charity event where IT professionals and IT students from around the world are working free in a weekend for humanitarian purposes. (www.rhok.dk).

Teaching

As shown in the graph below, the intake of bachelor students has stabilized at the high level from 2008 and 2009. This means, that we admit approx. 20 per cent of all new students who start on a bachelor of science at Aarhus University.

Student enrolment, Dept. of Computer Science Bachelors 2003-2010



In August 2010 we admitted 22 students to the new master degree program in IT product development. The program is designed in cooperation with Aarhus School of Architecture and follows up on the IT bachelor program. It includes three courses within the following areas:

- Pervasive computing
- Interaction design
- Advanced web services
- Location-based services
- Physical and spatial interaction design

Thus the department has now two bachelor degrees (computer science and IT) and three graduate degrees (computer science, IT and technical IT). In addition the department offers diploma and master courses within continuing education together with a number of individual courses/additional qualification packages.

The department has over the year produced the following number of degrees (the brackets indicate the production in 2009 and 2008):

- PhDs
15 (13, 9)
- Graduates
Master Sc.: 55 (60, 40)
Technical IT: 18 (18, 20)
- Bachelors
Computer science: 67 (54, 60)
IT: 22 (0, 0)
- Continuing education
Master: 10 (0, 3)
Diploma: 26 (0, 2)

The large number of master and diploma degrees is due to the fact that the department offers the students on the continuing education area a more streamlined process around their master theses with fixed schedules and systematic follow-up.

Supported by IT West, the department has initiated an ambitious 3-year project with Aino Vonge Corry as project leader to improve the teaching. The work of the ESTEEM project (Excellence and Scholarship in Teaching by Effective and Efficient Means) is concentrated in interest groups around the topics:

- How to you become a better teacher (through collegial supervision)
- Active learning (with clickers with which the students can answer questions during the lectures)
- Teaching Portfolios (where the participants are helped to demonstrate the quality of their own teaching)
- E-learning (where the work pt is concentrated on further developing the department's course management system CourseAdmin)

It is intended that other interest groups are created later on, including the guidance of Ph.D. - and graduate students. In addition, workshops on selected topics, eg. "Constructive alignment "and" alternative use of instructors" are organized .

Kurt Jensen
Head of Department