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Welcome to KTH CSC!

"As Dean I am very proud to say that the School of Computer Science and Communication, CSC, is one of Sweden’s most advanced and successful research and education institutions in Information Technology. The success in both education and research is possible thanks to breadth and depth in teaching skills, as well as to prominent research. Being one of eleven Schools at KTH, we are engaged in education and research in Computer Science, Human-Computer Interaction, Media Technology, Music Acoustics and Languages, Numerical Analysis, Speech Technology, at KTH and at Stockholm University (SU).

This biennial report will provide an overview of CSC’s activities and achievements in 2007/08 and 2008/09. I hope you will find it interesting.

During 2008, KTH set itself the challenge of conducting an international review of its entire research base (RAE). The underlying purpose was to ensure that KTH’s research remains competitive internationally and that future research strategies are developed in a global perspective. CSC did very well in the evaluation, with ratings spanning from internationally prominent to world-leading research. The RAE prompted efforts to improve strategy at the School that I am very satisfied with, resulting in thematic platforms for future interdisciplinary collaboration: Security and Safety, Human Communication, Computational and Cognitive Life Sciences and Simulation Interaction and Visualization. All of these are very important areas in making life a little easier for humanity.

I am also proud of the fact that the excellence in our education and research has resulted in several prestigious grants and awards given to our teachers, researchers and students.

Since the mid-1970’s, we have worked methodically and successfully on improving the education. As a result, in the spring of 2009 we applied for the award of Centre of Excellence in Higher Education at the Swedish National Agency for Higher Education.

CSC can present many inspiring examples of research results that have proved to be good business ideas. For example, OculusAI is a company sprung out of cutting edge computer vision research that was founded by PhD students from CSC at the end of 2007. A few months later, the company won the business plan competition, Venture Cup, for their unique technology, which offers services for automatic image recognition on-line. Another example of a recent successful CSC spin-off is Spotify, which provides an on-line music service.

Finally, I want to add a few more CSC activities of which I am proud. In April 2009, the School successfully hosted the World Championship in competitive programming, ACM-ICPC Finals, sponsored by IBM. For the first time, it was broadcasted live, implemented by our Media and Computer Science students. Moreover, as a result of long and persistent work, the meeting place VIC Stockholm (Visualization-Interaction-Collaboration) finally started on May 1st 2009. VIC is coordinated by KTH and CSC, providing an important platform for visualization and bringing together research, education, industry and the public sector in the Stockholm region.”

Ingrid Melinder, Dean
The activities of a university or any of its units can be summarized graphically by a research profile generated by using a number of relevant indicators. The figures provide a summary picture of the two UoA research profiles (Computer Science and Human Communication) within the school in 2007. Six dimensions have been selected.

The first two dimensions are related to the average performance of the UoAs at KTH and depict the resource input profile. The first dimension shows total research funding available per academic staff member and the second dimension shows the competitiveness attracting EU funding in relation to other sources.

The following two dimensions show aspects of research output normalized in relation to the global average of the group, both in terms of field normalized citation scores and journal article productivity. The two remaining dimensions in the graph refer to the education activities addressing the production of PhDs and numbers of student related to the total academic staff input for KTH.
Kickoff for VIC Sthlm’s meeting place on visualization, interaction and collaboration

In June, VIC Sthlm celebrated its grand opening with guests mingling and enjoying light snacks, and with exciting research and new applications. The mission of VIC Sthlm is to coordinate and develop new and existing networks and activities in visualization into a meeting place for the large number of users and visualization developers in the Stockholm region, a meeting place where industry, the public sector, research and education meet to find out about -- and interact with! -- the latest in visualization and visualization technology. VIC Sthlm is funded by and cooperates with the Knowledge Foundation, VINNOVA, the Vårdal Foundation, the Swedish Foundation for Strategic Research, and Invest in Sweden, together with KTH, the Electrum Foundation, the Center for Technology in Medicine and Health, the Research Center for Opera and Technology, and the National Museum of Science and Technology. At present, the industry trade association consists of more than 20 companies, organizations and authorities in the region.

Three world-famous researchers spoke: Steven Feiner, Professor of Computer Science at Columbia University, Kari Pulli, Docent, University of Oulu and Mark Billinghurst, Professor at University of Canterbury, New Zealand.

The Director of VIC Sthlm, Bjorn Thuresson, having coffee with Peter Graham and Dean Ingrid Melinder.

SEK 15 million to visualization

Two research groups at KTH and Linköping University (LiU) have been jointly awarded SEK 15 million (7.5 million each) from the Knut and Alice Wallenberg Foundation to invest in new visualization equipment, Equipment for Visualization Environments (EVE). With EVE, the researchers can interpret data, create pictures and show them on large screens that are possible to interact with. EVE is a joint project between KTH and LiU, and the grant enables the researchers to maintain a high level of technology and a leading position in the international arena, both in terms of basic research and advanced applications. The money will also be used to build up smaller interactive environments. The aim is also to be able to communicate between environments, to “visualize together at a distance”.

The project is led by the professors Yngve Sundblad and Marko Turpeinen at KTH CSC and Anders Ynnerman and Matt Cooper at LiU
KTH was the host when the World Championship in Competitive Programming was held for the first time on a university campus on April 18-22, 2009. A total of 100 teams from all over the world took place in the contest, which was also broadcasted live on TV.

The trials for this year’s world championships have been bigger than ever -- 7,109 teams from 1,838 universities and 88 countries have fought for the 100 team places in the final. Each team consists of three people whose task is to solve 10-12 problems with the help of a computer during the five-hour-long final.

“The competition gives us a chance to show the excellence of KTH internationally. But it also shows our breadth, since we have been competing very successfully with a number of different teams over the years,” says Ingrid Melinder, Dean of CSC.

Student teams from KTH have enjoyed several successes in competitive programming during the 21st century. Every year since 2002, KTH teams have won both the Swedish and the Nordic championships.

This year’s world championships took place in the KTH library. The entire library stacks area was cleared and transformed into a competition area for the 300 programming stars from all over the world. The world programming championships were arranged by ACM ICPC, the trade organization. The computer company, IBM, sponsored the event and also arranged its own activities for participants and visitors.

The competition was broadcasted live over the Internet and also shown on a giant screen in the Students’ Union building. Commentary during the broadcast was given by journalist Nina Hjelmgren and by Fredrik Niemelä, this year’s competition supremo, who is also a doctoral student at KTH and the driving force behind earlier KTH participation in the programming world championships. The TV channel Axess also transmitted live from the competition from 9 a.m. until 3:30 p.m. on the day of the competition, April 21.

This year’s team from KTH was called #define beaver (;;) with the three participants Anders Sjöqvist, Ulf Lundström and Chen Xing, who were coached by Marcus Forsell Stahre.
Major European research grants to KTH researchers

Johan Hästad

Professor Johan Hästad at CSC’s department for Theoretical Computer Science is one of seven Swedish researchers (three of them from KTH) who, in the face of stiff competition, have been awarded major research grants by the newly established European Research Council (ERC). Known as Advanced Grants, the funding is intended to support “excellent and innovative research” conducted or led by established, world-leading research leaders. As “Physical Sciences & Engineering”, a total of 105 European researchers have been chosen from about one thousand applications.

Professor Johan Hästad’s application refers to “Approximation of NP-hard optimization problems”. Also involved in the project is Per Austrin, who obtained his Ph.D. in 2008. The grant is for €2,376,000 over five years.

The NP-hard optimization problems are a large family of computationally difficult optimization problems. The best known of these is the Traveling Salesman problem (TSP), the aim of which is to visit a given number of cities by the shortest possible route. If one accepts a solution that is at most 50% longer than the shortest route, such a solution can efficiently be found for TSP. This does not apply to all problems within the class; instead, different optimization problems have different properties with respect to efficiently finding an approximate solution. The goal of the project is to understand how well different problems can be approximated efficiently, and some of the aspects we will be studying are graph coloring and constraint satisfaction, says Johan.

Highlights
Awards and Grants

Johan Hoffman

Docent Johan Hoffman at the department of Numerical Analysis is one of eleven Swedish researchers (and the only one from KTH) who, in stiff competition with more than 9 000 applicants, have been awarded 2007 ERC Starting Independent Researcher Grants. The aim is to support up-and-coming research leaders who are about to establish or consolidate a proper research team and to start conducting independent research in Europe. The scheme targets promising researchers who have the proven potential of becoming independent research leaders. It will support the creation of excellent new research teams and will strengthen others that have been recently created.
The aim of this project is to improve existing algorithms for automatic recognition of images and to demonstrate their usefulness in a set of new demonstrators based on portable cameras. We will be studying images from regular hand-held cameras, cameras in mobile phones, but mainly cameras that can be carried continuously and take pictures over a whole day. The work is organized in parts that will concentrate on basic functionalities for visual recognition of people, places, objects and events. These will be integrated into systems that will demonstrate applications of potential industrial and commercial interest, says Stefan.

They will also have potential relevance to healthcare as devices to assist memory functions, which is of great interest to a society with a growing ageing population. The project is a joint venture with the group for Mathematical Image Analysis at Lund University.

Danica Kragic Jensfelt and Johan Hoffman

Twenty young researchers selected from 188 with the potential of becoming the research leaders of the future in business and industry or the university world have been awarded large individual grants and participate in a tailor-made program for leadership development. Two of them are Professor Danica Kragic Jensfelt and Docent Johan Hoffman, from CSC.

The twenty researchers receive SEK 8.5 million each for five years’ research, funded by the Swedish Foundation for Strategic Research.

Donica Kragic and Stefan Carlsson at CVAP have been awarded funding from SSF, within Software-intensive Systems 2008

Professor Danica Kragic

Professor Danica Kragic Jensfelt has been granted SEK 25 million for her project RoSy -- Interaction, Learning and Cognition in Robot Systems.

Just as computers and mobile telephones have become a part of our everyday lives, soon we will be seeing systems that provide advanced services with various degrees of autonomy. These systems require a robust and flexible architecture in which both software and hardware can agree and be assembled into an integrated system, explains Danica.

The aim of RoSy is to understand the principles that form the basis on which autonomous systems must be built in order to operate in previously unknown environments characterized by uncertainty and constant change. The most important aspect behind the implementation is the multidisciplinary research. RoSy will create new functionality and new design principles for built-in, network-based and assisting robots. The work will contribute to a systems perspective, intelligent management of unexpected situations and previously unknown environments, and to improved human-machine interaction.

Professor Stefan Carlsson

Professor Stefan Carlsson has been granted SEK 24 million over five years for his project on Portable Vision Systems.

The aim of this project is to improve existing algorithms for automatic recognition of images and to demonstrate their usefulness in a set of new demonstrators based on portable cameras. We will be studying images from regular hand-held cameras, cameras in mobile phones, but mainly cameras that can be carried continuously and take pictures over a whole day. The work is organized in parts that will concentrate on basic functionalities for visual recognition of people, places, objects and events. These will be integrated into systems that will demonstrate applications of potential industrial and commercial interest, says Stefan.

They will also have potential relevance to healthcare as devices to assist memory functions, which is of great interest to a society with a growing ageing population. The project is a joint venture with the group for Mathematical Image Analysis at Lund University.
Now we can all play like Zlatan

Experience the feeling of being Zlatan Ibrahimovic as he flies past his opponents. Or experience the feeling of being the opponent trying to stop him. And all of this while the soccer game is being shown in a live broadcast.

In a few years, this will be reality. At CSC’s department of Computer Vision and Robotics at KTH, a research team is working on turning the traditional two-dimensional TV image of a soccer game into a breathtaking three-dimensional experience. The work is being done in cooperation with the Solna company, Tracab, which has developed a world-leading camera-based system for following players and the ball in real time. The technique has been used at all games in Allsvenskan (Swedish top-division soccer football league), in the Champions League and during the European Championship in 2008.

The game will be almost as realistic for the TV viewer on the couch at home as for the soccer player on the pitch. “This is a whole new way to watch soccer. It should be possible to go in and scrutinize, twist and turn the players and also be able to view and experience the game from completely different angles. A spectator has never seen a soccer game in this way before: everything in real time, while the game is actually in progress” says Professor Stefan Carlsson.

The group receives a grant of SEK 3 million within the program Visualization, which is now supported by the Invest in Sweden Agency, the Knowledge Foundation, the Swedish Foundation for Strategic Research, VINNOVA and the Vårdal Foundation.

“‘A world-leading camera-based system for following players and the ball in real time’

Highlights

Awards and Grants

SEK 100 million to be invested in ground-breaking information and communication technology

In a new VINNOVA venture, ten ground-breaking technical solutions in information and communication technology are being funded with SEK 100 million. The projects include optical communication advanced multimedia technology for healthcare and wireless sensor networks. The four KTH projects include functionality-enhancing technology for built-in systems with applications in advanced medical processes (SEK 8,730,000).

The project focuses on different techniques to enable support systems for advanced medical processes, says Kristina Groth at CSC’s department of Human-Computer Interaction. We will be exploring and developing haptic technology to use in connection with evaluation of digital information, such as magnetic camera images for diagnostics and therapy selection and in simulation environments to transfer tactile information as a complement to sound, image, video and text. We will also explore and develop techniques such as metadata marking, pattern matching, and information handling to allow multimodal information to be stored in an experience database in a way that is efficient and permits flexible utilization, particularly in terms of usability in storage, updating and searching.
Inauguration and Doctoral graduation ceremony 2008

A total of 140 new doctoral degrees were conferred and 21 new professors from KTH were inaugurated at the annual ceremony in Stockholm Town Hall.

Here Danica Kragic is inaugurated as professor of Computer Science specializing in Robot Perception by University President Peter Gudmundsson. Danica was also given the honorary task of giving a much appreciated inauguration speech.

Promotor Professor Stefan Arnborg, from CSC, responsible for conferring the degrees, opens the conferment ceremony.

First came the “jubilee” doctors (awarded their PhDs 50 years earlier), among them Gunnar Fant, who worked over the years both at KTH and MIT. He is also the founder of the department of Speech, Music and Hearing. Among his many scientific honors, Gunnar Fant has been awarded the KTH Grand Prize, the Royal Swedish Academy of Science Great Gold Medal, the ESCA (European Speech Communication Association) Gold Medal in 1989, and several honorary degrees, the latest one from Trinity College, Dublin, in 2006.
Gunnar Fant 1919 - 2009

A pioneering giant in speech research has passed away. Professor Emeritus Gunnar Fant died last spring at the age of 89 after a long and prominent research career. He was active right up to the end.

His last book “Speech Acoustics and Phonetics – Selected Writings” was published in 2004, some 40 years after his seminal reference work “Acoustic Theory of Speech Production”. Gunnar was a true KTH man, obtaining a Master’s degree in Electrical Engineering in 1945. He then quickly progressed to the position of docent in Teletransmission Theory at the department of Telegraphy and Telephony.

He spent the years from 1948 to 1950 at MIT and Harvard, where he laid the foundation for his international reputation and created a widely branching network of contacts. One researcher who became interested in Gunnar’s work was the Harvard linguist Roman Jakobson. Their collaboration led to “Preliminaries to speech analysis”, today considered a milestone in the history of linguistics.

Back in Sweden and at KTH, he founded the Speech Transmission Laboratory in 1951, which later became the Department of Speech Transmission and eventually Speech, Music and Hearing (TMH). Gunnar achieved major international successes even in the 1950s, one of which was his attempts to produce synthetic speech that was very similar to human speech.

With Gunnar’s scientific acumen and broad interest in voice, speech and language in all its manifestations, the research was quickly expanded to include linguistics, phonetics, audiology and handicap applications, and, as a result, the department grew into an international center for speech research. The Quarterly Report in English reached a circulation of over 800 printed copies, distributed world-wide.

Gunnar was a soft-spoken person who cared about his colleagues and supported their personal and professional development. He created a unique spirit in his department, which was characterized by kindness, care, respect, scientific openness and cooperation. This feeling of scientific focus and human concern created a unique environment that was appreciated by all the researchers who made the pilgrimage to meet Gunnar.

In Memorial
Ingrid Melinder receives the Equal Opportunity and Diversity Prize 2007

The President’s Equal Opportunity and Diversity Prize for KTH employees 2007 was awarded to Ingrid Melinder, Dean of CSC. President Peter Gudmundson writes in his motivation “Ingrid Melinder strives purposefully to create an equal opportunities workplace and better career paths for women researchers and teachers in a field where male dominance is considerable. Encouraging teachers and researchers to combine family life with acquiring academic qualifications up to the level of professor is one of the many measures towards increased equality at the CSC School.” The prize, a diploma and SEK 10,000, was presented on December 12, 2007 at KTH’s graduation ceremony in Stockholm Town Hall.

The Janne Carlsson Scholarship for Academic Leadership to Ingrid Melinder 2008

The Janne Carlsson Scholarship for Academic Leadership was created in 1998. The purpose of the foundation is to promote the development of leadership skills among university faculty. For 2008, a scholarship of SEK 50,000 was awarded to Dean Ingrid Melinder, School of Computer Science and Communications, KTH.

About the 2008 Scholarship Holder Ingrid Melinder studied mathematics, mathematical statistics and numerical analysis at Stockholm University. She was awarded the Ph. D. degree in 1979 for a dissertation on numerical approximations in interpolation. Ingrid Melinder has worked since 1966 as a teacher in the Department of Numerical Analysis and Computer Science jointly shared by KTH and Stockholm University. She has been the Head of Department for 22 years and the Dean of the School of Computer Science and Communications since the outset.

Ingrid Melinder is the natural node of KTH’s networks in the computer science field. During a very long period she has been an ever-present leader who has positioned her employees in the centre of a process of change and quality assurance which has continued to generate an incessant flow of ideas. She is also constantly engaged in boosting interest in science and technology in Swedish schools.
Linda Kann is Teacher of the Year at KTH 2008

KTH’s Students’ Union (THS) has chosen Linda Kann from CSC as Teacher of the Year at KTH for 2008. In part of their motivation, THS writes “Linda Kann uses well thought-out props such as Russian dolls, colored balls and boxes to illustrate abstract concepts in computer science in a relaxed way. Her laboratory sessions encourage and stimulate students to work independently and provide many opportunities for applying the abstract concepts.

Each of the exercise groups is given a different pace and depth to allow the students to choose the model they find most rewarding. The course homepages are simply designed but full of information, and are used as course material in the courses. What makes Linda a good example to other teachers is perhaps mainly that the courses are improved year after year and that she cooperates with her colleagues, so that together they can give the students as good teaching as possible.”

The Teacher of the Year award consists of a challenge cup in the form of a silver apple, a diploma and a scholarship from Ericsson for SEK 25,000.

Johan Karlander and Björn Hedin have been awarded SEK 20,000 each in travel grants for their outstanding practical teaching achievements in undergraduate education at KTH. The motivation includes these words: “Together, Göran Andersson, ICT, and Johan Karlander, CSC, have developed an exciting new mathematics pedagogy, which focuses on concept formation in mathematics.”

Björn Hedin, CSC, has developed video-based teaching materials and played a central role in the development of the new Bologna-based program in Media Technology. They received their travel grants at KTH’s graduation ceremony in December 2008 in Stockholm Town Hall.

Awards to outstanding teachers at KTH 2008

Johan Karlander, CSC and Göran Andersson, ICT, 2008

Björn Hedin, Media Technology 2008

Linda Kann, teacher of the Year at KTH 2008

Björn Hedin, Media Technology 2008

Johan Karlander, CSC and Göran Anderson, ICT, 2008

Awards and Grants

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School Prizes - The Dragon of Enlightenment, The Creative Tie, The Crystal Bear

To show our particular appreciation of the involvement of teachers and other staff members in teaching and improvement, CSC has established three challenge trophies that are presented annually.

With pomp and circumstance, music, coffee and cake, the School’s three prizes for 2007 were formally presented.

Gerd Eriksson was thanked after a long and successful teaching career, which she planned to continue even after her retirement, but to a somewhat lesser extent. As a token of appreciation, she was given a collage of previous winners of the Dragon of Enlightenment Prize as a small remembrance to hang on the wall.

2007 Anders Lindström

Motivation: “Three years in a row, Anders has been nominated for the Dragon of Enlightenment Prize for first-rate supervision of numerical labs in the basic course and the stage 2 course Tilnum1. To the course leaders, too, he has been a great asset -- reliable, knowledgeable, careful, and always there to help in a good-humored manner.

2008 Leo Giertz

Motivation: “Activating engineering students is sometimes too much even for our best teachers. Leo, however, manages to do it and therefore deserves to have his name carved at the foot of the green dragon.”
The Creative Tie

The prize is awarded to teachers and inspirers connected to CSC for meritorious work during the year.

2007 Svante Granqvist

Motivation: “Svante is regarded as an unusual type of teacher, namely a skilled engineer and a good fellow human being, and not only a regular academic. No one but Svante would come up with the idea of designing a course for constructing a loudspeaker, and many of us would have liked to attend that course with him.”

2008 Yoko Takau-Drobin

Motivation: “We have many excellent teachers, but in the role of inspirer there are few who can match Yoko. This makes her a worthy wearer of the Creative Tie.”

The Crystal Bear

The prize is awarded to a staff member for meritorious achievements in the School. Special consideration is given to continuing work or new initiatives and their implementation, particularly initiatives of change, which make the School an attractive professional and social environment for staff and students.

2007 Sara Hasselgren Johansson

Motivation: “Sara Hasselgren Johansson, administrator in the systems group, takes care of everyday administrative duties and challenges, large and small, with great enthusiasm and a wonderful sense of humor. Sara sees the problems, initiatives change, and gives sound advice on solutions. Her go-ahead spirit, common sense and straightforwardness are appreciated far outside the boundaries of the School, so that Sara’s captivating optimism is now also being spread among the administrators at KTH.”

2008 Maria Malmqvist

Motivation: “Maria Malmqvist has performed a face-lift on the School’s website and weekly newsheet. The new layout has turned reading Numero into one of the joys of the week. By complementing her professionalism with whole-hearted commitment to the School, Maria has succeeded in turning CSC’s place in the cyberworld into an attractive and easily navigated “site”, despite the narrow template.

She Is awarded the Bear for this great contribution and for her --less visible but no less important-- indefatigable coordination and cooperation with KTH’s Information distributors.”

Sara Hasselgren Johansson
FiDiPro is jointly funded by the Academy of Finland and Tekes (the Finnish Funding Agency for Technology and Innovation). The aim of the program is to establish long-term international cooperation to strengthen Finland’s scientific and technological competence. This means that the universities and research institutes selected to participate in FiDiPro are given resources to recruit prominent experts they would not otherwise be able to attract.

New members to the Royal Swedish Academy of Sciences

In 2008, the Royal Swedish Academy of Sciences (IVA) elected 26 new members, among them professor Anders Lansner from SU NADA within KTH CSC. Anders has a Master of Engineering degree in Chemistry and received a Ph.D. in Computer Science at KTH in 1986. His research has been devoted to studies of artificial neural networks and he founded the research group SANS. In 1999, he was appointed Professor in Computer Science at NADA within Stockholm University. Artificial neural networks and computational neuroscience are used for mathematical modeling of biological nervous systems, in particular for brain studies. See the Department of Computational Biology.

CB one of fifteen leading-edge research areas at Stockholm University

The President of Stockholm University has named 15 research areas in natural science after an internal process to identify leading-edge research. Among them we find the research at CB within Quantitative Biomodeling – Molecules to Populations, headed by Professor Anders Lansner. The motivation is: “The research focuses on mathematical, statistical, and computational models for biological systems. It ranges over a broad spectrum of issues, including simulation of quantum-chemical phenomena, modeling of protein structures, population dynamics of both animals and humans, dynamic systems for activity in the human brain, and probability models for mapping of disease genes. The scientific production is of top International standard. They focus on relevant and topical biological problems, and have access to unique experimental and population-based data. Furthermore, the research is leading-edge with respect to developing and utilizing quantitative modeling tools.”

Collaboration with society at large

Erik Aurell become a Finland Distinguished Professor in 2008

Erik Aurell, Professor of Theoretical Biological Physics at KTH CSC, is one of 12 international top researchers who 2008 were invited to the “Finland Distinguished Professor Program” (FiDiPro). The research project that Erik Aurell will be working with is coordinated at Helsinki University of Technology. Erik Aurell, Professor of Theoretical Biological Physics at KTH CSC

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Julia Hirschberg, honorary doctor at KTH, 2007

Julia Hirschberg, professor of Computer Science, works with speech communication at Columbia University, USA. She is a prominent figure in the field of speech communication and has experience of research both in industry and academia. While working at AT&T, she took part in the development of several computer-controlled telephone services. Julia Hirschberg has conducted distinguished research in a number of areas in human-human and human-machine interaction. Particularly in the field of prosody, she has studied how people make use of other signals than language to communicate focus, turn-taking, and emotions in dialog. She has also studied how this knowledge can be utilized in various speech-based services. Julia Hirschberg has also been President of the world-wide International Speech Communication Association (ISCA) since 2005. In this capacity, she is responsible for the annual Interspeech conference, which brings together more than 1,000 participants every year. Professor Hirschberg was also a visiting professor at the Department of Speech, Music and Hearing for the academic year 2008/09.

“Flower bombing” during the Pirate Bay trial – Roger tells us the story

Roger Wallis has been visiting professor at the Department of Media Technology and Graphic Arts since 1999. Among other things, he is a member of the Swedish Government’s IT Advisory Committee and works with the EU project Peer-to-Peer Next, which runs until the end of 2011. The latter is about finding new business models based on file-sharing technology, aimed at distributing audio-visual material via the broadband network in a cheaper and more efficient way than today. Professor Wallis participated as an expert witness in the high-profile Pirate Bay trial in spring 2009. A few months later he talked about that experience and many others in the radio program “Sommar i P1”.

- Yes, to say the least. I want to point out that I was called as an expert witness to talk about the research and effects of file sharing on CD sales and cinema visits, etc., and not to defend the Pirate Bay. The background was that we were about to conclude the EU project MusicLessons, which was studying how digital technology has affected the music industry. It showed that file sharers are hardly a homoge-
neous group, and that those who download music illegally attend live concerts more often than those who do not. Unfortunately, this did not interest the lawyers representing the international film and music industry. Instead, they insulted the whole academic world by dismissing KTH’s research as debate; the reason for this was the fact that I am a visiting professor at KTH “only” half-time. It made me very upset.

What did you learn from this experience?
- The “flower bombing” was what got the most attention in the media. When the judge asked me what I wanted in compensation, I replied “send a flower to my wife”. He did not accept that, but what then happened is a very interesting case study of how e-commerce and technology work together. Within two hours, someone had started a website, found a reliable method of payment, as well as access to an efficient logistic system (Interflora Blommogram). We got 70-80 bouquets the first few days before we managed to get them to stop. One of the international media students at the Department has done a case study of the event, from which we can learn a lot, I think.
- The second thing is an insight as a researcher when I look back on the confusing research results of file sharing effects on the music and film industry which came about 2005-2006. You cannot simply ask


"Are you downloading music?" and "Do you buy fewer CDs?", when most people no longer want to have their music on a round piece of plastic, but on an mp3 player, a hard drive or with someone else storing it for you. If you as a researcher don’t realize that there is a large irreversible change going in society, the answers you get will be quite confusing and inaccurate. The fact is that the questions that lay the foundation for the entire compensation process in the Pirate Bay trial are irrelevant, because they did not realize that we have a technology change. What happens in the industry today is a huge transfer of money, from the production of these plastic pieces to the concert stage.

Bloggers against the FRA “bugging” law awarded honorary prize

Mikael and Anna have been honored for their work against a controversial law. In just one week, their website had 350,000 unique visitors. Now, Mikael Nilsson and Anna Petersson have been given the Swedish newspaper, Aftonbladet’s, Honorary Prize for their efforts to spread information on the FRA (National Defense Radio Establishment) “bugging” law, an issue that has caused heated debate all over Sweden.

“It feels like enormous recognition for what we have done. At the same time, I have to say as an actor in the blogosphere that this is based on a great team effort rather than an individual contribution.

We are small in this context, the tip of an iceberg. But it’s fantastic that our work has attracted so much attention,” says Mikael Nilsson in an interview on www.aftonbladet.se.


Mikael is a doctoral student in computer science, with Ambjörn Naeve KTH CSC as his supervisor and Anna is a doctoral student in mathematics.

Anna Petersson and Mikael Nilsson at the Award Ceremony
serious discussions with a number of potential customers, where our automatic image analysis can increase their revenues substantially” says CEO Omid Ashrafi.

With the help of a unique research-based technology, OculusAI can offer automatic analysis of image and film material on the Web. Using the technology, websites can handle, rapidly and with high precision, the enormous and fast-growing volume of user-generated images uploaded on the Internet every day. OculusAI is to be found in STING’s (Stockholm Innovation & Growth) pre-incubator Business Lab. Like STING’s other incubator companies, OculusAI has been allocated its own experienced business coach, who speeds up and ensures the quality of the commercialization process in a number of areas.

OculusAI AB was founded in the winter of 2007 by six close friends and earlier fellow-students from KTH, and the technology is based on the research of two of the founder members, of whom Babak Rasolzadeh is a doctoral student at CSC CVAP.

**Stockholm Innovation & Growth (STING): OculusAI the overall winner of the VENTURE CUP**

Out of 925 innovative business ideas in the nation-wide business plan contest, VENTURE CUP, only twelve entries remained in the big Swedish final. After earlier triumphs in the big regional final of business plan competition VENTURE CUP Öst, the overall winner was OculusAI from Stockholm, whose unique technology offers services for automatic image analysis online. As well as the honor of winning, they also received SEK 400,000.

“The team is easily the best and has a realistic picture of what it takes as well as a great entrepreneurial spirit. A strong innovation with enormous, enhanced growth potential, coupled with a clever choice of customer segment in a globally growing market” was the jury’s motivation.

“This feels great, fantastic, but still a bit unreal. Good to get such a clear confirmation of our market potential and business strategy. Now it’s all systems go, and we’re having serious discussions with a number of potential customers, where our automatic image analysis can increase their revenues substantially” says CEO Omid Ashrafi.

Stockholm Innovation & Growth (STING): OculusAI the overall winner of the VENTURE CUP

Malin Sandström, the researcher who wants to blog the research world out of the communication shadow.

Malin Sandström was invited to the Swedish Radio program ‘Vetandets värld’ in December 2008 to discuss the impact of the universities on society at large. Malin is a Doctoral student at CSC and is one of very few voices from the research society communicating outside the university walls. She stated her view of the researchers’ responsibility as well as that of the media. She thinks that the blog can be a way out of the information shadow. Malin has had her own scientific blog updated with material every month since 2005.

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**Malin and her science blog**

Malin and her science blog

The gang from OculusAI with doctoral student Babak Rasolzadeh from CSC CVAP.

**The gang from OculusAI with doctoral student Babak Rasolzadeh from CSC CVAP**

**Collaboration with society at large**

The gang from OculusAI with doctoral student Babak Rasolzadeh from CSC CVAP.
He has devoted time particularly to computerized language support and language editing programs and to making major dictionaries available on the Web. He has led the work on the grammar check program Granska, which can be used by everyone who writes in Swedish, but which is also available in a special version for writers whose first language is not Swedish. Viggo Kann has also ensured that the dictionary series Lexin, in which 30,000 Swedish words can be looked up in sixteen languages, can be read in digital form.

Erik Wellander's prize for language preservation goes to Viggo Kann

Erik Wellander's prize of SEK 50,000 for outstanding research in the field of language preservation, 2009, goes to Viggo Kann, Professor of Computer Science at CSC.

Viggo Kann is one of Sweden's leading language technologists, and modern language conservation is inconceivable without language technology. In his research, Viggo Kann has always striven for results that are useful in practice and widely available to the Swedish language community.

Erik Wellander's prize awarded Viggo Kann

Prize worth SEK 500,000 for research on advanced packaging

The 2009 Competence Development Prize from Gunnar Sundblad's Research Trust Fund has been awarded to Marcus Rehberger at the research institute STFI-Packforsk, Stockholm.

Marcus Rehberger is an industrial doctoral student at Media Technology. The aim of his research, which is in the field of fiber-based packaging, is to make these more attractive, informative, and functional by using advanced printing methods. This involves, for instance, combining different printing techniques in what is termed “hybrid print”, which allows quality high-volume print to be combined with specific information to selected consumers and customer groups.

Marcus Rehberger’s supervisor is Professor Nils Enlund and the study is funded by STFI-Packforsk. His secondary supervisor is Dr. Astrid Odeberg Glasenapp at STFI-Packforsk.

Marcus presented his Licenciate thesis “Topographical micro-changes in corrugated board production - Effects on flexographic post-print quality”, in December 2007 and is now working on his doctor's dissertation, which will be presented at CSC Media Technology.

The Prize was presented on April 21 in conjunction with Forestry Industry Week and will be used for a six-month visit to Quebec Institute of Graphic Communication in Canada.

Award – Collaboration with society at large

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Sharewether.com awarded for traffic safety information

At CSC, research is being conducted in the field of media technology into future meteorology services for the general public and business and industry, all of whom are dependent on efficiently functioning road transport. With the help of the latest technology and modern information channels, the aim is to reach traffic users when they most need support in handling different traffic situations in the event of extreme weather conditions. It is also important to raise the quality of weather forecasts to enable warnings to be issued well in advance of approaching bad weather.

Katarina Elevant was presented with the scholarship by the Director General of the Swedish National Road Administration, Ingemar Skogö, at the annual Transport Forum in Linköping in January.

The project group at Best in Heritage 2009 conference in Dubrovnik

“The Nodem Award for best digital design for museum communication”

The project “The Mediated Museum” has been awarded the distinction “The Nodem Award for best digital design for museum communication” at the NODEM08 Conference in Reykjavik. NODEM stands for “Nordic Digital Excellence in Museums” and is a Nordic forum for exchange of expertise, research and renewal concerning communication and the use of digital media in museums and other cultural heritage contexts.

CSC’s part of the project is included in “An accessible research culture environment”, funded by the Swedish National Heritage Board. In the project, a mediated extension of the Museum of National Antiquities was made to an archeological dig on Djurgården.

Included in the project group are Leif Handberg and Charlie Gullström from KTH and Katty Hauptman Wahlgren and Fredrik Svanberg from the Museum of National Antiquities.

KTH meteorologist given award for traffic safety information

Meteorologist Katarina Elevant at CSC is developing a reliable information service for traffic users in the event of extreme weather conditions. For her work, she has been given SEK 100,000 from the Swedish National Road Administration’s Jubilee Trust Fund.

The project group at Best in Heritage 2009 conference in Dubrovnik
Jonas Forsslund won the PIEp Engineering Creativity Challenge 2008.

On 25th November 2008, HCI research assistant Jonas Forsslund was awarded first prize in the Product Innovation Engineering Program (PIEp) Engineering Creativity Challenge Master’s Thesis Competition 2008. He won a round-the-world trip with visits to international partner universities of PIEp. (PIEp is a Swedish national program whose aim is to strengthen innovation capabilities in product and business development.)

In his thesis in the Master of Science in Computer Science and Engineering, Jonas Forsslund developed a virtual simulator that enables dentists to “feel” parts of the mouth, which can improve their surgical skills. His supervisor was assistant university lecturer Eva-Lotta Sallnäs, who specializes in haptic research. The work was performed in close collaboration with the dental education at KI and the simulation system developer HiQ. After finishing his Master’s Thesis, Jonas Forsslund started a spin-off company, Forsslund Systems AB. The business idea is to develop an oral surgery simulator that combines haptic technology, medical visualization and advanced graphics to meet the surgical training needs of dental students. In parallel, Jonas Forsslund continues doing research on other medical applications at HCI within the project Func-Is where the aim is to haptify various internal organs for surgeons.

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Highlights

Students Award

Jonas Forsslund’s thesis: Simulator for Operative Extraction of Wisdom Teeth

Honorary scholarships 2007 and 2008

“Honorary scholarships are awarded to deserving students after they have taken their first degree, within a period of time determined by the Computer Science students’ union.”

Of those that graduated in 2007, Mengmeng Du has been awarded the honorary scholarship in Computer Science and Engineering and Paulina Modlitba has received the honorary scholarship in Media Technology.

Out of the 2008 graduates, Mikael Klamra D03 has received the scholarship in Computer Science and Engineering and Anna Malmlöf, CMETE03, has been given the scholarship in Media Technology.
Gold medal in accessibility
Photo album for disabled people wins prize

A concept for a picture-show program that has been developed by KTH student Frida Löfqvist has won first prize in the AOL/TopCoder Sensations Developer Challenge – an international competition. The program is intended for use by older or disabled people.

Frida Löfqvist’s winning idea – Imagine – is an extremely simple picture-show program that can be controlled via Internet. The idea is to enable photo albums to be shown to individuals who have impaired cognitive abilities or, for some other reason, are not able to use a computer.

After its success in this competition, Imagine may be developed into software. The goal of the AOL/TopCoder Sensations Developer Challenge is to develop software that can increase access to Internet for people with different disabilities. Totally 163 entries took part in the competition, three of which were awarded prizes. The full competition consists of three phases. In the final in June in Las Vegas, up to three finished software programs may be presented.

Frida Löfqvist is studying for a Master of Science in Computer Science and Engineering at KTH and is specializing in human-computer interaction.
The STINT scholarship for "Excellent teaching" to Olof Bälter, Ninni Carlsund and Örjan Ekeberg

Every year, the Swedish Foundation for International Cooperation in Research and Higher Education, STINT, awards the scholarship “Excellence in teaching” to outstanding teachers in Sweden. The scholarship allows them to spend a fall semester at a highly ranked liberal arts college in the USA in order to participate in, and study, the excellent educational environment. Four teachers at CSC have received this scholarship. Professor Viggo Kann visited Amhurst College during 2006, and during 2008 docent Olle Bälter was invited to Williams College, both in Massachusetts. After an inspiring semester, the contacts continue, as does the exchange of good ideas to improve our education. During 2009, the scholarships were awarded to eleven teachers, among them docent Örjan Ekeberg, who will visit Vassar College in New York and associate professor Ninni Carlsund Levin, who will be staying at Amhurst College.

The School’s Family Day and Open House

For two years in a row, students and their families, relatives and friends, alumni, high school teachers and students, and anyone else interested have been welcomed at the School’s Family Day, modeled on the custom at Amherst College in the USA. Visitors were offered an interesting and varied program with a dozen or more popular lectures, as well as a conjuring performance, demonstrations, guided tours, and last but not least, a concert with the School’s own teachers. The doors to our regular classrooms were open, and academic advisers were available to answer any questions. The popular lectures explained why it is so hard to manage e-mail, why the Japanese are so fond of robots, why it is so hard to talk to computers, and what pitfalls there are in the media world.
DigiGirlz 2008

The recruiting campaign, DigiGirlz, a program to interest more girls in technical education, attracted considerable attention from the media. The program is a joint project with Microsoft, its initiator. The 25 places were quickly booked by girls from the top two grades in junior high schools (years 8 and 9 in Sweden, 14-16-year-olds). During the intensive three days of the course, the participants listened to experience from working life, and results from the latest research, interleaved with playful practical exercises with different IT aids. In charge of the program were Kerstin Frenckner, a teacher at CSC, and Eva Pethreus from Microsoft.

Richard M Stallman, prominent figure in free software lectures at KTH.

Honorary doctor at KTH, prominent figure in free software, computer guru and cult figure Richard M Stallman gave a seminar on his life’s work and his favorite topic: “The Free Software Movement and the GNU/Linux Operating System” in February 2008.

At Richard Stallman’s lecture in 1986, NADA donated, on the initiative of professor Yngve Sundblad, USD 5,000 to the Free Software Foundation, by way of thanks for all the GNU and other software that we use.

On the initiative of professor Stefan Arnborg, Richard Stallman was elected honorary doctor at KTH in 1996, an unconventional choice that aroused a great deal of admiration around the world.

At the ceremony at KTH (in his absence), the doctorate was conferred with the following motivation: “Richard M Stallman, 57, was educated at Harvard in the USA and at the same time made a pioneering contribution at the AI (Artificial Intelligence) Laboratory at MIT.

He has devoted his life to realizing his idea about Free Software -- the best software should be free for everyone. Many of the important computer programs used at KTH are written by Stallman or come from his Free Software Foundation. In 1986, Stallman gave a lecture at KTH that is in a small way historic. He is a huge idol and an example to a whole generation of young people interested in computers. Stallman has shown that computer brilliance can be combined with moral commitment and social responsibility.”

Global civil society and digital communication networks

A popular public lecture at KTH was given 2008 by professor Manuel Castells, Wallis Annenberg Chair of Communication Technology and Society, University of Southern California, Los Angeles and Research Professor of Information Society, Open University of Catalonia, Barcelona.

The lecture was followed by a panel discussion with Manuel Castells, Pekka Himanen, Helsinki Institute for Information Technology, Ulf Ranhagen, Åke Walldius and Roger Wallis with closing statements by Nils Enlund, CSC. The event was hosted by: the Departments of Human Computer Interaction and Media technology, CSC, together with UsersAward and VINNOVA.
The Royal Fireworks Music

Traditional fireworks music has been played at KTH every year since 2005. The scene is the KTH main courtyard where about 150 musicians from several wind orchestras play “the Royal Fireworks Music” by Händel while a fireworks display lights up the sky.

The President of the School of Opera is the Master of Ceremonies and the welcome speech is held by the President at KTH. The conductor and the organizer is the KTH Director of Music Gunnar Julin from CSC.
Workshop in honor of Jan-Olof Eklundh’s 70th Birthday

As Visiting Professor, Jan-Olof Eklundh started to build up an academic activity within Computer Vision in the early 1980s. The research group grew rapidly to about 30 members. Initially, most funding came through NUTEK, TFR and many EU Projects within ESPRIT and INSIGHT. The international collaboration has been influential with many visiting researchers and post docs. In 1986, Jan-Olof became a full professor, a position he held until he retired in 2006. He is still very active, running EU projects and advising doctoral students, and up to 2009 thirty of his students have been awarded Ph.D. degrees. In the mid-90s, he was one of the initiators of the Center for Autonomous Systems (CAS), and was the head of the Center for two interim periods. To celebrate Jan-Olof Eklundh’s 70th birthday, his colleagues held a workshop on Trends in Computer Vision in his honor at the Czech Technical University in Prague in July 2009.

Workshop CSC on Close Ties between Mathematical Application and Industry

A session in the HPC course 2008 was given in honor of Professor Jesper Oppelstrup’s 60th birthday and his contributions to Industrial Mathematics. Picture from the Numerical Analysis department’s birthday dinner for Jesper, taken for CSC’s in-house magazine Numero.

Dean of Faculty Folke Snickars has just presented Jesper with a gift from the President. Under the wrapping was a physics-colored Dalecarlian (Dala) horse.

Minisymposium on Scientific Computing

The Scientific Computing Program was among the first Master’s Program to start at KTH in 1997. It was also among the first in this subject to start in Europe and up to now about 200 students from 50 different countries have graduated.

Nowadays, Scientific Computing (or Computational Science) is offered by many universities all over the world. One reason for its popularity is the demand from industry for graduates who are trained to perform efficient and large-scale computer simulations based on mathematical models of processes in science and engineering. Among the areas that have been greatly influenced by this approach to tackling problems are fluid dynamics, electromagnetics and material science.
KTH welcomes students from all over the world and actively encourages our own students to study outside Sweden. This makes language and cultural skills important. The Language Unit within the school (see page 50) therefore offers a wide range of first cycle language courses as well as specialized courses at second cycle levels, as well as for teachers.

**First- and Second-Cycle Programs**

The CSC School is responsible for 210 courses with a total of 1375 full-time-equivalent students, including 200 Master’s Theses. The courses cover levels from first and second cycle, including continuing professional development. Our main disciplines are computer science (69), human-computer interaction (29), language (42 courses), media technology (30), scientific computing (25 courses) and speech and music technology (14).

CSC offers two Master of Science in Engineering programs (300 ECTS credits), Master of Science in Computer Science and Engineering (since 1983) and Master of Science in Media Technology (since 1999). Both programs are the most popular of their kind in Sweden, judging by the number of applicants. The Bachelor-level degree program (180 ECTS credits) in Media Technology was canceled in 2008. At Stockholm University the department of Numerical Analysis and Computer Science, Nada at CSC is responsible for one Master of Science and one Bachelor of Science degree program in Computer Science.

At present, we have adapted the curriculum to harmonize with the Bologna model, but we expect our five-year Master of Science in Engineering programs to remain as vocational degrees, as selected combinations of Bachelor and Master programs.

**Education Programs First and Second Cycle Advisory Group 07-08**

- Olle Bälter, Associate Professor, Vice Dean of Education
- Helena Hedman, Program Coordinator
- Professor Stefan Arnborg, Programme Director, Computer Science
- Professor Nils Enlund, Programme Director, Media Technology
- Associate Professor Ninni Carlsund Levin, Numerical Analysis, partly acting Vice Dean of Education
- Professor Danica Kragic, Computer Science
- Associate Professor Mats Boij, SCI
- Associate Professor Thomas Sjöland, ICT
- Per-Anders Legeryd, Student Representative, Computer Science
- Jörgen Björklund/Maryam Ammoun, Student Representative, Media Technology
### Main Programs

**Master of Science in Computer Science and Engineering**
This program aims to train students to leading roles in assessment, development and implementation of new computer and information technology. After a core curriculum in mathematics, computer science and engineering, students specialize in at least one of several areas in computer and information technology and management, and finish with a written thesis. Since 2008 there have also been three international versions of the program whose students study Japanese, Chinese or a major European language as well as culture.

**Master of Science in Media Technology**
This program provides the students with an educational profile that will enable them to work with the development and marketing of new innovative media products both within established companies and as contractors within areas where the development has just started. Engineers graduating from this program will in addition to knowledge of the latest technology also understand the information content and its formation, economy, marketing and media usage.

**Master in Scientific Computing**
The scientific course program gives profound knowledge in Scientific Computing for industrial processes and comprises a number of areas: numerical methods, mathematical modeling, object-oriented program construction, algorithms for parallel programming and applications in fluid dynamics, electro-magnetics, financial mathematics, computational physics and chemistry.

### New Programs

**Master in Computational and Systems Biology**
The program provides knowledge, skills and networks to continue on entrepreneurial, engineering or research tracks to the biotech and pharmaceutical industries and to academia in the post-genome and bio-simulation era. Some of the courses are given by Karolinska Institutet. The first admission was in 2008.

**Master in Media Management**
The program in Media Management provides students with knowledge and understanding of the multidisciplinary field of media management, encompassing media technology and its basic components as well as market studies, business development, organization and economics. The program has been offered in cooperation with the Stockholm School of Economics since 2007.

**Master of Science in Computer Science at Stockholm University**
The program is focused on computer science and offers specializations in computer security, computer vision and robotics, Internet technology, human-computer interaction, program system technology and theoretical computer science.

**Bachelor of Science in Computer Science at Stockholm University**
The program is focused on basic computer science and mathematics with elements of mathematical statistics and scientific computing. The pedagogy includes practical application carried out in teams or individually. Database management, software engineering and user interfaces are also part of the program, which opens up to a number of exciting fields of work.

### Year programs Number of Admissions, Male/Female

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<tr>
<th>Year</th>
<th>programs</th>
<th>Number of Admissions, Male/Female</th>
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<tr>
<td>2007</td>
<td>Master in Computational and Systems Biology</td>
<td>11/2</td>
</tr>
<tr>
<td>2007</td>
<td>(TBSBM)</td>
<td></td>
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<tr>
<td>2007</td>
<td>Master in Media Management (TMEMM)</td>
<td>12/13</td>
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<tr>
<td>2008</td>
<td>(TMEMM)</td>
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<tr>
<td>2007</td>
<td>Master in Scientific Computing (TSCCM)</td>
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<td>2008</td>
<td>(TSCCM)</td>
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<tr>
<td>2007</td>
<td>Master in Human-Computer Interaction (one year)(TMDAM)</td>
<td>6/4</td>
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<tr>
<td>2008</td>
<td>(TMDAM)</td>
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<tr>
<td>2007</td>
<td>Master in Software Engineering (one year)(TPVUM)</td>
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<tr>
<td>2008</td>
<td>(TPVUM)</td>
<td>3/0</td>
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<tr>
<td>2007</td>
<td>Bachelor of Science in Computer Science at SU (NDATK)</td>
<td>11/0</td>
</tr>
<tr>
<td>2008</td>
<td>(NDATK)</td>
<td>7/1</td>
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Education Programs
First and Second Cycle

Closing Programs

Master in Human-Computer Interaction (one year)
The program provides knowledge on how to design and evaluate interactive computer systems for all sections of society. The main focus is to understand each specific situation and all specific groups of users. Last admission was 2008.

Master in Software Engineering (one year)
The program provides opportunities to improve knowledge and competence in several areas central to the development of software systems, such as web-based client-server solutions, databases and project development. Last admission was in 2008.

Bachelor of Science in Engineering program in Media Technology
The program is geared towards the use and distribution of information in different media with the main emphasis on functionality. It provides broad knowledge of media technology, where knowledge of systems and methods takes priority over details of implementation. Last admission was in 2007.

Bachelor of Science in Scientific Computing at Stockholm University
The program focuses on basic mathematics and programming, including elements of modeling from the areas of mechanics and physics. Numerical analysis, algorithms, software, and programming for technical mathematical problems are emphasized. First and last admission was in 2007.

The table shows number of admission to different programs, years 2007 and 2008:

Master of Science in Computer Science and Engineering
2007: Male 166/Female 8
2008: Male 153/Female 12

Master of Science in Media Technology
2007: Male 49/Female 23
2008: Male 52/Female 26

Bachelor of Science in Media Technology
2007: Male 46/Female 10
2008: No admission

Olle Bäåker, Associate Professor, Vice Dean of Education is traditionally "caked".
After three years, the students can choose a specialization among nine in computer science and five in media technology. CSC also offers specializations for other schools at KTH, for example the School of Information and Communication Technology and the School of Engineering Sciences, and other schools offer specializations for our students. In accordance with the Bologna model, these specializations will be replaced by Masters programs starting in 2010. In a development plan, the school has lined up plans for the coming five years.

**Courses offered**

There are 17 Master of Science in Engineering programs (300 ECTS credits) at KTH. The black areas below show the amount of education in the different years for the programs which CSC is responsible.

We offer courses to all Master of Science in Engineering programs at KTH and the Faculty of Science at Stockholm University. This applies both to those who want to specialize in our disciplines and those who have chosen other disciplines but need the computer as a sophisticated tool. Our ambition to change old courses and create new ones is driven by advances in the scientific fields and by improved tools and new applications. We have experience of adapting the curriculum to students who have studied at other universities and we aim to develop new types of education to facilitate these transitions further.

Since 2006 we have offered on-line courses in programming techniques in cooperation with KTH’s Resource Centre for Net-based Education. During this period, we have also offered introductory courses in computer-supported reporting, and paradigms in computer science at Stockholm University.

**Student Exchange**

- Of the CSC exchange students, 71%, visit universities outside Europe (usually in Asia).

- Of the incoming exchange students most come from European universities. In 2007/08 the number was 72% and in 2008/09 no less than 86%!

- Ten of the incoming students during this period are Double Degree students (i.e. the student receives a Master of Science (M.Sc.) diploma from each of two universities, both a home university and a host university).

- Many students study abroad without taking part in the KTH exchange program, and are therefore not counted below.

### CSC Students Travelling to Other Universities

**Academic Year 2007/08**

- Exchange students: 19
- Masters Thesis: 5
- Spring term 2008/09:
  - Exchange students: 31
  - Masters Thesis: 5

**Academic Year 2007/08**

- Spring term 2008/09:
  - Exchange students arriving at CSC: 43
  - Spring term 2008/09: 57
Education Programs
Third Cycle

Third Cycle Programs

The School’s third-cycle programs maintain a high international standard and the doctoral students bring immense value to the research activities. We produce researchers that are sought after and who can look forward to careers as researchers and teachers at universities as well as applied researchers in industry. CSC has about 100 doctoral students and the annual target is 15-20 PhDs. The foundation of good research training is created through a balance between depth and breadth. Both our research and our research training courses maintain high quality internationally, and probe deeply into the specific research areas. In addition, the research training provides broad scientific, social and cultural insights, thereby contributing to education in the wider sense. Some of the students are enrolled in local or national graduate schools but most of them are closely tied to one of the departments.

KTH KCSE

The KTH Computational Science and Engineering Center (KCSE) headed by Associated Professor Olof Runborg at CSC, comprises most scientists at KTH using large scale computer simulations in their research. The center promotes collaboration between disciplines and departments in this area through seminars, workshops and conferences. It also runs a graduate school, financed by the Swedish Research Council, where it offers doctoral students the opportunity to obtain dual expertise in scientific computing and applications. Another goal of the center is to strengthen the computational infrastructure available for KTH researchers in collaboration with PDC. Today, eight departments at KTH with broad interest in computational science and engineering attend the activities within KCSE.

The national Graduate School of Language Technology (GSLT) is hosted by the Faculty of Arts at Göteborg University, and is a collaboration between leading centers in language technology in Sweden. Professor Rolf Carlson from CSC is a member of the academic board. In total, 10 doctoral students from KTH have received financial support from GSLT.
Education Programs Third Cycle

Education Programs Third Cycle Advisory Group

Jens Lagergren, Director of Third-Cycle Programs
David House, Director of Studies: Media Technology and Graphic Arts, Human-Computer Interaction, Speech and Music Communication
Michael Hanke, Director of Studies: Computer Science, Numerical Analysis
Professors, Directors of subject fields:
Stefan Arnborg, Computer Science
Kerstin Severinson-Eklundh, Human-Computer Interaction
Nils Enlund, Media Technology and Graphic Arts, Lennart Edsberg, Numerical Analysis
Rolf Carlson, Speech and Music Communication

Above: Tree of Knowledge fully decked with theses.

To the left: Tug-of-War, Professors vs. PhD students
Photo: Hans Brock
According to Professor Erik Aurell, the department has a mission to be at the forefront of mathematical modeling and analysis of high-throughput biological data, by developing algorithms and software, and by being actively engaged in joint projects with experimental biologists.

"With the new experimental techniques, so-called high-throughput, we can analyze several thousand proteins at once on a single chip. The fundamental applications that CB is working with, together with researchers at Karolinska Institutet, aims ultimately at improved diagnosis and treatment of cancer and Alzheimer’s," he says.

The main research areas of CB are Bioinformatics, Biological Physics, Computational Molecular Biology, Computational Neuroscience and Systems Biology. CB is also involved in research on communication networks.

The department has close collaboration with academic neighbors such as Stockholm University and Karolinska Institutet in different projects. CB shares its premises with Stockholm Bioinformatics Center (SBC), which is run jointly by KTH and Stockholm University. SBC has existed since 2000 and is the largest bioinformatics center in Sweden with approximately 30 affiliated researchers. Situated in close proximity is NORDITA (Nordic Institute for Theoretical Physics), which has a strong group in Computational Neuroscience. CB is also part of the KTH Linnaeus Center, ACCESS, whose aim is to develop fundamental understanding and engineering principles for designing self-managed and scalable communication networks. In the Berzelii center Stockholm Brain Institute (SBI) -- a collaboration among departments at KTH, Karolinska Institutet and Stockholm University --, CB leads the modeling methodology platform and participates in projects investigating brain disorders using a combination of experimental and computational methods.

“This area of research, computational neurophysiology, has been central to the CBN group and will continue to be one of the key areas of research,” says Erik Aurell.
Quick questions for: Associate professor Erik Fransén, Associate professor Erik Fransén, you predict that pharmaceutical companies in the future will use modeling and simulation more?

“Yes, they do it already on a small scale, but it will be one of the fundamentals in their R&D activities, I believe, especially in the first phase of the projects. What they will also do is to set up equations for chemical reaction patterns and do tests of new drugs in the model before and in parallel with doing tests on cell cultures, for example.”

What are the benefits of modeling the chemical reactions instead of doing it the “old” way, by trial and error in the lab?

“I know a company that works with technology to optimize medication against Alzheimer’s and they want to find the optimal mix of new active substances which collectively provide the best effect. Such a project is very expensive and time consuming, since it is about making an incredible number of variations of the same experiment. “With a computer you can save time and money, as well as find good starting points that can then be tested experimentally. One reason why a model is so useful is that it can more easily predict how different materials interact. It may be that the effect of substance A and substance B is much better if they occur together or, say, if one is applied 2.5 hours before the other.”
Service robots that can grasp anything

“In the robotics area, the group has mainly focused on research into service robots. One focus has been on visually guided manipulation of objects in everyday environments. Several principles of active vision have been explored using an articulated robotic head with seven degrees of freedom. One of the objectives is also to enable systems with robotic hands to reason about graspable targets, to explore and investigate their physical properties and thus make robotic hands grasp any object. This is currently accomplished through a combination of observing humans performing similar tasks and robot self-exploration, which continues the previous work on grasp mapping and visual servoing. Secure grasping and manipulation of objects in a domestic setting is a necessary skill for a truly useful service robot. In an uncontrolled environment, such as in a living room, knowledge of the world cannot be expected to be perfect,” states Professor Danica Kragic.

To enable a more intuitive formulation of grasp control – as opposed to decentralized control of reference trajectories and torques - a conceptual framework for control design has been developed and integrated with an experience-based system that learns from human demonstration. Programming robots through demonstration is not like the conventional program development process, since the user does not have to be familiar with the syntax and semantics of the programming language. Most of the state-of-the-art robot programming systems are based on a single demonstration.

“One objective of our research has therefore been to study novel methods for learning robot tasks from multiple demonstrations or multiple observations,” says Professor Danica Kragic, who is also Acting Director of the Center for Autonomous Systems, KTH.
A flexible system for fault detection

Another robotic research focus has been on path following, terrain servoing and mapping with mobile robots. Contour reconstruction and formation control based on limited sensor information has been investigated. These and similar applications in service robotics require that the position of the robot be accurately known. The group has also investigated methods for detecting faults affecting the localization system of a mobile robot. Problems of localization and navigation have been extensively studied in the robotics community, and there exist many reliable methods and robust implementations of such systems. Professor Danica Kragic says: “We have developed a low complexity, flexible system for fault detection that does not need direct access to sensor data, or modification of existing localization algorithms.”

One key competence for a fully autonomous mobile robot system is the ability to build a map of the environment from sensor data and use it to localize. Natural landmark detection and incremental building of consistent maps for simultaneous localization and mapping (SLAM) has been one of the main research areas for the past several years. For large scale and complex environments especially regarding full 3D, the problem is still an open research topic. While the previous CVAP research relied on range sensors such as lasers or sonars, more recently the focus has shifted to using vision as the main sensor.

Cogeye, Oculus AI and InMoDo

During the period three companies based on research in CVAP have found their markets:

• InMoDo - the vision and business idea is to add significant value to the usage of mobile phones by offering unique computer-vision-based products and solutions that are innovative, robust and easy to use. The product range comprises mobile tickets and coupons for transportation, retail and events, bar code reading applications and form reading applications. InMoDo supplies its cutting edge technology and robust products to large companies and organizations for use in context with advertising, ticketing, couponing, betting, distance selling, etc.

• CogEye – developing visualization and analysis tools for sports based on advanced computer vision and image analysis techniques. The core of CogEye is a groundbreaking technology for creating a high resolution video feed of the entire pitch in sports events such as football. CogEye has a collaboration agreement with Hego - a leading provider of products and services for real-time 3D graphics, virtual graphics, newsroom automation and sport analysis - for commercializing the technology.

• Oculus AI - develop a technology that allows automatic real-time review of image and film material on the Internet. The technology is based on research in computer vision and artificial intelligence. OculusAI was formed in early 2008 by a few fellow students from the program Electrical Engineering at KTH, one of which, Babak Rasolzadeh, is an excellence doctoral student at CVAP. The company won the business plan competition VENTURE CUP 2009. They were also one of the promising young companies that was selected to participate in the entrepreneurial fair Innovation & Technology 2008 in Kista.

Facts:

Head of CVAP Professor Stefan Carlsson
Professors: Stefan Carlsson
Henrik Christensen (on partial leave from 2007), Jan-Olof Eklundh (to 2006) emeriti,
Danica Kragic Jensfelt
Tony Lindeberg (on leave)
Other research personnel include
2 assistant professors,
5 researchers and about 20 doctoral students
Licentiate Theses: 1
Doctoral Theses: 3
For more highlights, facts, and research and publication lists, please visit: http://www.kth.se/csc
“Software security and reliability is a research area that is becoming more and more important, as the complexity of computer systems increases. The department of Theoretical Computer Science (TCS) presents world leading skills in this important field,” says professor Stefan Arnborg, Head of TCS.

The mission of the Theory department is to carry the culture of theoretical computer science, and to develop and disseminate new, interesting and useful theory in computer science. Among current topics are Computational Complexity, Approximation Algorithms, Cryptography, Logic and Semantics, Autonomous Networks, Decision Support, Human Language Technology, Program Verification, and Software Security. The topics originate in applications of computer technology, but the department studies them foremost from a mathematical and mathematical modeling perspective.

Interfacing with industry - Spotify

An academic group traditionally lives a secluded life where the most significant impact on society is mediated by students bringing new technology into industry when they graduate or while doing Master’s and other projects.

“For the current period, the TCS department has had intense interactions with industry, exemplified by the start-up company Spotify. The company is also populated by several (graduated and non-graduated) students from KTH”, says professor Stefan Arnborg.

Spotify, founded in 2006 by a former CSC student, has gained international publicity by a music service that is available to anyone with an Internet-connected computer. The service allows the user to listen, legally, to most existing music. Many technical problems had been resolved before the release in 2008, like a security protocol implemented by Gunnar Kreitz, doctoral student in the TCS department. The feasibility of broadening the scope of the company’s products has been investigated in projects and Master’s projects performed by KTH students and advised by KTH and Spotify staff. Magnus Giertz and Jesper Särnesjö made a pilot implementation on the Apple iPhone, to see how the Spotify product can be used on completely new mobile platforms. Furthermore, Erik Bernhardsson and Jens Bäckbom studied the adaptation of recommender systems technology in the Spotify context, and Erik Bernhardsson wrote a Master’s thesis on the use and implementation of recommender system technology on Spotify products. This is somewhat different from the well-known book and DVD recommender systems of Amazon and Netflix. In on-line music, it is interesting to generate a stream of music, a ‘radio station’, where not only the listeners’ ranking of particular tracks or artists is interesting, but also concepts such as progression, diversity and control using audio cues. Some of the latter are being investigated in upcoming Master’s projects, at the music perception group of CSC.

TCS doctoral student Fredrik Niemelä has been working full-time at Spotify since late 2006 as Technical Development Director.

“It’s a very exciting work we do at Spotify. We invent smart, cool technical solutions, and the reason we can come up with these unique solutions is that many of us have a background in Theoretical Computer Science at KTH,” he says.

Another Spotify employee connected to TCS is Associate Professor Mikael Goldman, who together with Fredrik Niemelä has also been the driving force behind live broadcasted ACM-ICPC Finals, successfully hosted by KTH in April 2009.
Professor Johan Håstad

Professor Johan Håstad, in 2008 granted 20 Million SEK over 5 years by the European Research Council

The ERC award is called Advanced Grants and aims to support excellent and innovative research in Europe, led by established researchers. The research area is called “Approximation of NP-hard optimization problems”. What will you do with the money?

“Basically, we will try to find more efficient algorithms to solve difficult computational problems. For example, if it were to take a million years to find the optimal solutions to a problem, maybe we could find a reasonably good solution in one day. Thus, the matter is to decide exactly how good ‘reasonably’ can be for each problem,” he says.

“The grant will be used to build a dynamic research group that studies basic research questions in computational theory. I hope we will attract two post docs every year to the group, and three new doctoral students, as well as a visiting professor.”

It is rare to receive such a large grant for theoretical research. Why do you think ERC chose to award you this Advanced Grant?

“Well, one reason is that, along with my former doctoral students Per Austrin and Jacob Nordström, I have been successful in producing well received papers in this research field.”
Department of HCl
Human-Computer Interaction

Human-Computer Interaction, HCI, is a young research area which deals with the interaction between humans and computerized systems. Whereas early HCI was mainly influenced by cognitive psychology and computer science, the influences today are much more differentiated and include ethnology, sociology and design.

The HCI department at CSC is an interdisciplinary research group that has evolved from computer science, psychology, linguistics, anthropology, cinema studies, industrial design and communication.

It has more than 25 years of experience of project collaborations with industry, academia and user organizations, such as Telia, Ericsson, Vattenfall, The Swedish Tax Agency, the Police Authority, museums and schools. The department is responsible for HCI education at KTH and Stockholm University on all levels. The field is strongly related to information technology and its applications, but also more generally deals with the usability and usefulness of technology. NADA was one of the first departments in Sweden with research and education in HCI. The research group started in 1985, and has its roots in the Scandinavian tradition which has strongly influenced the research to focus on co-operative design and activities within different work domains. Work environment is in focus in most of the research projects, where especially the area of medical applications and haptic research has grown stronger in the last decade.

The department is active within five main research areas: computer-supported collaborative work, computer support for writing and reading processes, human-robot interaction, perceptual user interfaces, and user-oriented design and development.

Kerstin Severinson Eklundh - first KTH professor in Human-Computer Interaction

Kerstin Severinson Eklundh was appointed professor in Human-Computer Interaction in 1997. One year later the area was established as a separate academic subject separated from Computer Science. The research in human-computer interaction at KTH started within the department of Numerical Analysis and Computer Science where a research group, Interaction and Presentation Laboratory, IPLAB was founded 1985. The two initiators were Kerstin Severinson-Eklundh and Yngve Sundblad and the activities grow both in research and education. The research focus has been in areas such as computer support for writing and reading processes, computer-supported collaborative work, user oriented design and development, and human-robotic interaction. The education has grown and the department gives around 30 courses within first and second cycle and a new master of science program in Human-Computer Interaction will start 2010. Kerstin Severinson-Eklundh retired from the chair in March 2009 but is still an active professor advising doctoral students and running the European research project Advanced Robot behaviour and high-level multimodal communication.

Jan Gulliksen new head of the department

When professor Kerstin Severinson Eklundh retired in March 2009, Jan Gulliksen took up the chair of HCI at KTH as head of the department. He was previously at Uppsala University for 25 years, and has been a visiting researcher at KTH and HCI from 1997 to 2002.
“It’s exciting to be here at HCI. I am animated by the idea that research should be useful from a work environment perspective. HCI is facing major changes in the activity—I see before me a new master’s program in human-computer interaction in the future and more research focus on developing solutions and applications in close interaction with the user.”

You mention two key words - collaboration and sustainability?

“There is a trend towards increased collaboration with others, in academia, industry and the public sector. I want to build on earlier collaboration between KTH and Uppsala University within HCI. And yes, sustainability is the heart of our business. We are working with social sustainability, creating meaningful user environments. One way is to work with sustainable and useful design processes in close collaboration with the Center for Sustainable Communication at CSC.”

**Ongoing research**

- **CSCW: Computer-supported collaborative work**
  This research concerns aspects of the design and use of groupware applications and computer-mediated communication systems. An example of a project within this area is Funk-IS; Functionality enhancing technologies for built-in systems with application within advanced medical processes. The purpose is to combine and develop advanced techniques for perceptualization and decision making, to be used in decision situations focusing on diagnostic and therapeutic guidance and in simulation environments with an educational purpose. The research in Funk-IS is performed in collaboration with medical researchers at Karolinska Institutet (KI) in Huddinge and Gastro Center Surgery at the Karolinska University Hospital. The project led by the researcher Kicki Groth, started in September 2008 and is funded for three years by Vinnova. “It is about video-mediated communication and different types of visualization information concerning both lab data and x-rays. In advanced video-mediated decision conferences, surgeons can discuss, for example, pancreas patients’ history, treatment and follow up,” says Assoc. professor Ann Lantz. The research also connects to haptic interfaces, offering the surgeons possibilities to feel organs etc. (In a haptic user interface it is possible to feel the shape, weight, texture, friction and stiffness of an object as well as, for example, collisions between objects)

- **Perceptual user interfaces**
  In this field, the HCI department conducts work on not only interaction with text and graphics and pointing devices but also on sound, gestures, sensors and/or haptics. By seeing people in their social and cultural context, an attempt is made to adapt such technology to open the possibility of supporting human needs in different situations, e.g. in the communication between visually impaired and seeing people. Examples of projects within this area are Multimodal Collaborative Environments (MCE) and Visualization, Interaction and Collaboration Center (VIC).

**Robot-evaluation in the EU project CommRob**

**Briefly about other ongoing research areas**

- **Computer support for writing and reading processes**
  The Human Language Technology group are developing efficient and resource-lean NLP methods, especially for Swedish, but also for English and other languages.

- **Human-robot interaction**
  This area deals with the interaction between humans and autonomous service robots on a fundamental level.

- **User oriented design and development**
  This research area is about developing methods for user-centered design within research projects like MAVB (enabling technology via user centeredness and organizational development of the procuring organizations demands with focus on procurers’ terms and goals), Users Award, and Usability and Acquisition Capability.
The department of Media Technology and Graphic Arts forms a multidisciplinary research group focused on applied technology and methods within “new media” for supporting human communication through various media over distances in time and space. The work also includes the conditions for and effects of the use of media technology.

Within this broad field, “new media”, the department has chosen to focus on three specific areas and their intersection: graphic arts production, digital interactive media, and business development in media. These areas are highly interdisciplinary, and are areas where much of the development of today occurs.

The majority of the research projects at the department are, in cooperation with the KTH ABE Department of Environmental Strategy Research and the CSC Department Human-Computer Interaction, performed within the Vinnova Center of Excellence for Sustainable Communications. The center investigates how the use of media technology can help create and maintain an environmentally, economically, and socially sustainable society.

The department is involved in, for example, the Center project Mediated Meetings, studying how improved design of technology, environment and usage procedures can increase quality, acceptance and use of mediated meetings between individuals and/or groups of individuals. Persuasive services is another project, which studies how mobile services can support and persuade people towards more sustainable behavior.

In June 2009, KTH CSC and the University College of Opera in Stockholm successfully performed two mediated master classes in collaboration with the Sibelius Academy in Helsinki, Finland.

“We believe that mediated master-class teaching can be a useful complement to live instruction, that the technical quality of the audio and video affects the quality of teaching, and that eye-to-eye contact is important in the creation of emotional contact between teacher and student,” says professor Nils Enlund.

In the education of singers of opera and other classical music, an advanced and effective form of instruction is the so called master class. This is a teaching method where an experienced singer observes, instructs, and coaches one single pupil at a time, usually with other pupils as an audience. In master-class teaching, the interaction between teacher and student is extremely close and intensive. The teacher observes and addresses body stance, tone formation, sound projection, phrasing, breathing, etc. and the interaction is both verbal and physical.

Master-class teaching is an expensive form of training. In addition, experienced, highly qualified teachers are scarce and students often have to travel extensively in order to attend master classes. In the experiments, the practicality and viability of master-class teaching at a distance was tested. The teacher was connected to his students using a high capacity video and audio connection. The video equipment used was designed to allow eye-to-eye contact between teacher and student. In addition, the teacher had a secondary screen showing the posture of the student.

Highlights in brief:

- Peking University. Since 2005, the department has had regular teacher exchange with Peking University, Beijing, China. The collaboration had been financed by the Linnaeus-Palme program and is currently being expanded to include also student exchange.
During the period 2007-09, Leif Dahlberg, Christer Lie and Jenny Sundén have been teaching at Peking University whereas KTH has been visited by professors Jincan Xu, Zengzhi Shi, Wenxiang Gong and Guan Shijie.

- Moscow State University Higher School of Economics, HSE. In a three year project financed by the Swedish Institute, KTH and HSE collaborate in the field of media management. Nils Enlund and Christer Lie have visited and lectured in Moscow and Professor Ilya Kiriya at KTH.

**Facts:**

Head of Media, professor Nils Enlund

Professors

Nils Enlund

Marcu Turpeinen

Other research personnel include

6 associate professors, 1 visiting professor
4 assistant professors, 2 researchers
and about 10 doctoral students

Licentiate Theses: –

Doctoral Theses: 3

For more highlights, facts, and research and publication lists, please visit: http://www.kth.se/csc

One central case study within the Mediated Meetings project is iCoaching, a project investigating the viability of master-class coaching of opera singers using eye-to-eye distance communication technology. iCoaching is a cooperation project also involving the KTH Research Center for Opera and Technology, the Stockholm University College of Opera, and the Sibelius Academy in Finland. On June 2, during the Nordic Biennial for Opera Education, a large scale experiment was carried out with singers, teachers, evaluators, and audiences both in Stockholm and in Helsinki.
Attracting high school students to study at CSC is a prioritized issue; the department will invest in a new Bachelor’s program in simulation and visualization techniques in the near future.

“It will provide knowledge that can be used in game or medical applications, for instance. In our department, we have methods to solve mathematical problems to make realistic simulations on the screen, whereas other departments are good at designing the programs. This is a good example of an interdisciplinary area where you can easily pair activities from different departments at CSC,” says Lennart Edsberg.

Yana Di the second recipient of the award.

Dahlquist Research Fellowship

The first recipient of the Dahlquist Research Fellowship was Assistant Professor Raul Tempone. He held the position during 2007 and 2008. Yana Di is the second recipient of the award. She was appointed by the board with the following motivation: “Yana Di has been awarded the Dahlquist Research Fellowship for her important contributions to the field of numerical approximations of partial differential equations, with applications to fluid mechanics. In particular she has developed and analyzed new and highly accurate moving mesh algorithms for the Navier-Stokes equations. She has also developed innovative techniques for the contact line problem of wetting dynamics for immiscible two-phase flows.” The main sponsor of the award is Comsol.
Inventing a virtual model of a human heart

In 2008, Johan Hoffman, Associate Professor at the department received the 2008 SSF Advancement of Research Leaders (SEK 8.5 million) and the 2008 European Research Council (ERC) Starting Grant (EUR 0.5 million).

The ERC is designed to support the best researchers in Europe. The Starting Independent Researcher Grants are addressed to young scientists, one of whom is Johan Hoffman. He was awarded the grant for the project “New Adaptive Computational Methods for Fluid-Structure Interaction using a Unified Continuum Formulation with Applications in Biology, Medicine and Industry”.

“It’s quite a lot of money, and for my part it has meant that I am able to expand the team from 4 to 10 people. The grant from the ERC will be used to develop the methods for calculating turbulent flow to also involve the fluid/structure interaction, which has many biological applications,” he says.

One of the projects that his group is engaged in, in collaboration with Umeå University and Linköping University, is modeling of a human heart.

“Using ultrasound images, we will create a model of the heart and simulate the blood flow in it. There are endless possibilities with a virtual heart model. You can have it as a training tool for the surgeon when linked to haptic and visualization, or as a planning model for an operation to test various strategies,” says Johan Hoffman.

They also simulate models of cars and airplanes; for instance, the problem of turbulent flow is that there are so many scales in space and time that must be resolved. But the research group has developed a methodology which selectively only resolves some of the scales based on what information you actually want out of your calculation. Another problem is how to simulate the flow close to a surface; the team has developed a new technology that makes it possible to simulate new types of problems with higher realism.

Johan Hoffman’s team is building a simulation and visualization platform together with VIC (Center for Visualization, Interaction and Collaboration). Firstly, they aim at visualizing different parts of a human being, as well as a full body to study the motion from different angles. Together with TMH, they also aim at modeling the human voice from the air pressure in the lungs, through the vocal cords and vocal tract into speech.

“ It is all about going from a simple mechanical model to actually modeling the true physics of a body with these simulation and visualization methods. We have also had projects in computer games and entertainment, where the computer graphics are based on real physics and physiology: it can be from a man - or a cow,” says Johan Hoffman.

Facts:
Head of NA, Associate Professor Lennart Edsberg.
Professors:
Björn Engquist,
Lennart Johnsson,
Claes Johnson (from 2007),
Gunilla Kreiss (to 2006),
Jesper Oppelstrup,
Axel Ruhe, (emeritus 2008)
Anders Szepessy

Other research personnel include
8 associate professors, 1 assistant professor,
2 researchers and about 20 doctoral students
Licentiate Theses: 4
Doctoral Theses: 7

For more highlights, facts, and research and publication lists, please visit: http://www.kth.se/csc
In a spoken dialogue system, the computer uses speech to communicate. An interesting application where we use this is in a project called Ville, which is about language learning using a virtual teacher. In cooperation with the language unit in the lab, we are now letting students try the application. We had our first trial at the end of 2007 and another in spring 2009.”

The goal of Ville is to develop and test a new type of application for computer-assisted language learning and computer-assisted pronunciation training. The virtual language tutor is an embodied conversational agent that the learner can talk to, and that replies--a person that guides, encourages and gives feedback to anyone who wishes to develop or improve their language skills.

Ville is being put to use as a resource for foreign students at KTH taking a web-based language course for elementary Swedish. It is both a research project and a resource for language learners at the same time. In 2008, Ville was presented on CNN in a show about virtual learning.

“There is also another exciting application of multimodal spoken dialogue systems,” says Professor Björn Granström. “The department is running a large integrated project together with SIAT, the Swedish Institute of Assistive Technology, called MonAMI, where we are responsible for “innovative interfaces” for the handicapped or elderly.”

Work on multimodal dialogue systems combines research in speech technology with linguistics, phonetics, cognitive science, psychology, and computer science. The Speech and Hearing group is engaged in numerous EU projects, and represents KTH on the boards of the International Speech Communication Association (ISCA) and the European Language and Speech Network (ELSNET).

Recording of the Spontal database

Measuring human communication

Face-to-face conversation must be the original form of human linguistic communication. In addition to the spoken word, we use various other ways of expression such as intonation and vocal expressions (for example, hum, aha, mm) and different visual gestures. But much of the detailed knowledge of what the non-linguistic communication looks like is not known, especially regarding spontaneous speech in dialogue situations.

“To get a better understanding of these processes, we are recording over a hundred dialogues in our new lab, dialogues where two people are talking to each other for half an hour. These form a large database of spontaneous dialogues in which we have high quality audio, video and motion capture,” says Professor David House.
The project, named Spontal, is funded by the Swedish Research Council. The database will be available to the entire research community. It can help answer a lot of questions, for example, how turn-taking in a dialogue takes place.

Also the group’s old databases are widely used nationally and internationally. “The goal is to build an infrastructure in Sweden, which includes such combined audio and video recordings. A preparatory BLARK project (Basic language Resource Kit) together with the Universities in Gothenburg, Uppsala and Linköping has been completed during the period. The next step is the large EU project called Clarin which includes most EU countries”, says Professor Rolf Carlson.

The Center for Speech Technology (CTT) at the department is a platform for cooperation between industry and academia within the strategic area of speech technology. Generously supported by VINNOVA and participating companies and organizations for ten years, CTT now continues with project funding in cooperation with its partners.

Research on musical performance

The Music Acoustics group has three main research streams: the science of music performance, instrument acoustics, and technical vocology with musical and medical applications. According to Professor Sten Ternström a deeply rooted experimental approach generally prevails over simulations, often using the paradigm of analysis-by-synthesis, as applied to instrumental performance and the human voice.

“Our research on musical performance by computer modeling is a long term project. Its focus is presently on characterizing expressions of emotion and gestural activities in music performance. The overall aim is to refine our understanding of the voice and the musical instruments and how they are used in communication, and to take an active part in the development of improved methods for analysis and synthesis, “

Together with other parties in the Center for Opera and Technology, the group conducts iCoaching experiments in mediated master classes and individual singing instruction across great distances. This ties in with reducing travel for sought-after teachers and their students. The high requirements for quality are a particular challenge.

Sound And Music Everywhere is the theme for the new EU project SAME, for which the group studies mobile music applications and uses of sonification. The proposal was given the maximum score, which is very unusual in the EU grant approval process. In the summer of 2007, the Group hosted the third Sound and Music Computing European summer school at KTH. This series of summer schools has since continued annually throughout Europe. The consortium is now operating autonomously beyond its initial EU project (S2S)² and is very actively seeking to establish a pan-European graduate school in Sound and Music Computing, with three proposals so far.

Emerging new research interests include the use of sonic interaction as a stimulus to children with cochlear implants, the modification of musical performances through audio morphing, and topics in sonification such as biofeedback auralization of the motions of athletes. The KTH Voice Research Center, formed in 1998, creates a formal link with the Logopedics & Phoniatrics division at Karolinska Institute and the Linguistics department at Stockholm University.

The near future includes an increasing involvement in issues of mobile music and sonic design and the establishment of a Master’s program in Man-machine Interaction, jointly with other departments at CSC.
Language and Communication is responsible for language education at KTH.

The international staff offers instruction in nine foreign languages and in Swedish as both a second and first language. The unit also runs courses in written and spoken English for doctoral students. During the academic years 07/08 and 08/09, approximately 3,000 students per year attended language courses at KTH, of which more than 50 percent were courses in Swedish as a foreign language.

The research focus is the use of English as a lingua franca in the university environment.

“The current internationalization of undergraduate education has led to interesting opportunities for pedagogically-oriented research on language learning and second-language use at KTH. In particular we have co-operated with other universities in Sweden and Denmark in a project on exchange students’ language acquisition,” says Margaretha Andolf, head of Language and Communication.

A doctoral project is investigating the communicative and pedagogical effectiveness of English as the medium of instruction in engineering education, specifically in lectures and interactive student speech. The project addresses the need for knowledge on the usage of English in academic settings. A study has also been carried out to examine the effects on speaking rate and information content of using English or Swedish to give an oral presentation.

From a research point of view, the link between the Unit for Language and Communication and TMH is at present the work on computer-based pronunciation training in the project VILLE. The interactive and virtual teacher is used in the on-line basic course in Swedish as a foreign language, and further development of this function is planned.

**Highlights**

**Language and Communication:**

- A Guest Professor, a specialist in languages for special purposes at Stockholm University, was attached to the unit over the period 2006-2008, intensifying the efforts to introduce Languages for Specific Purposes (LSP) as a research area at KTH and to develop co-operation in LSP with language departments at other Swedish and overseas universities.

- A three-year project on English vocabulary acquisition involving KTH, Stockholm University, Mälardalen University and the University of Edinburgh was funded by the Swedish Research Council.

- A research project on automatic feedback on oral presentations has been carried out with encouraging results, and more work will be done in this area.

- A course in rhetoric for Swedish students was introduced in 2007.

- In 2007, a group of teachers from the ABE School attended a course which focuses on the teacher in the classroom and addresses the questions of how a foreign language affects interaction with the students, particularly with a linguistically mixed group.

- A commissioned course in Technical Swedish was part of the Tägia trainee program in spring 2008.

**Facts:**

- **Head of Department, Anders Askenfelt**
- **Professors**
  - Björn Granström, Speech Communication
  - Rolf Carlson, Speech Technology
  - David House, Acoustic Phonetics
  - Sten Ternström, Music Acoustics
  - Gunnar Fant, emeritus
  - Johan Sundberg, emeritus
- **Other research personnel include:**
  - 4 associate professors, 2 assistant professors,
  - 9 researchers and about 15 doctoral students

**Doctoral Theses:**

- The Music Acoustics group, headed by Professor Sten Ternström
- The Speech and Hearing group, headed by Professor Björn Granström and Rolf Carlson
- Language and Communication Unit, headed by Margaretha Andolf

For more highlights, facts and publication lists, please visit:

- [http://www.speech.kth.se/](http://www.speech.kth.se/)
- [http://www.language.lib.kth.se/](http://www.language.lib.kth.se/)
Centre for Sustainable Communications

Head: Associated Professor Mattias Höijer
http://www.sustainablecommunications.org/

E-paper study gained media attention

The Center for Sustainable Communications published in 2007 a report that attracted much attention in the international media, including an article in The Herald Tribune. The report - a collaboration with Innventia (former STFI-Packforsk) - was designed to explore the environmental impact of various publishing technologies: traditional "ink-on-paper" publishing, web-based publishing and e-paper publishing. The conclusion was that the e-paper based publishing and distribution was far more environmentally friendly than ink on paper, and also much better than web-based reading.

“We are very proud of the e-paper report which has been much spoken about. It was the first time anyone had done a study like this. As a result, project leader Åsa Moberg has been invited to dozens of international conferences to talk about the results,” says Mattias Höjer, Director of the Center for Sustainable Communications since March 2009.

The vision of the Center is to develop innovative applications of information and communications technologies that can contribute to sustainable development by enabling collaboration, interaction and communication exchange between people in different locations. The Center provides a multidisciplinary research platform for research and development in audio and image which contributes to greater accessibility between people regardless of place of residence. Furthermore, the Center aims at developing innovative user-oriented services, products, environments, business models, methods and tools. The Center, hosted by CSC, was established during 2007. It is a joint collaboration with the School of Architecture and the Built Environment (ABE) at KTH.

During the first year the Center was headed by Charlie Gullström, and the second year by Helen Wintzell. Being a Vinnova Center of Excellence, it has joint long-term financing by industry, society, academia and Vinnova. The multidisciplinary research is related to media technology, telecommunications, information technology, transport systems, sustainability assessment, social and cultural sciences, architecture, design and planning. The work is performed in close partnership with industry, society and academia in the pursuit of innovative solutions.

Seven projects have started during the period, including Mediated Meetings, Mediated Spaces, and Persuasive Services. After two years, a first international assessment of the research was performed by Vinnova on March 2, 2009. The Center received good reviews from the evaluation committee, which secured continued financing.

“The Center for Sustainable Communications aims to produce good things, of use to society. This is an incredibly exciting field. The development within ICT is very fast, at the same time as we are facing major environmental problems in the world. I see a major change potential here, and my driving force as a Center Director is to see how these two areas can meet,” says Mattias Höjer.

Center Partners during 2007-09 include Bonnier AB, Boverket (The National Board of Housing, Building and Planning), Ericsson, Joluid AB, TeliaSonera, Tidningsutgivarna (Swedish Newspapers Publishers’ Association), Stiftelsen Folkelts Hubb (Community Hub Foundation), Sting (Stockholm Innovation and Growth), VTI (Swedish National Road and Transport Research Institute).
CAS – Center for Autonomous Systems

Head: Professor Danica Kragic – www.nada.kth.se/cas

The Center for Autonomous Systems is an interdisciplinary research center that performs research in robotics and autonomous systems. Autonomous systems are systems that can perform certain tasks for a user in situations and environments that cannot be fully controlled. These systems therefore need to act autonomously for shorter or longer periods of time. For example, a key aim in industry today is to achieve high-quality, cost-effective safe and flexible manufacturing. This calls for going beyond the classical, highly automated industrial settings where robots are used for precise and high volume production, and developing new manufacturing concepts such as assistive robot co-workers and networks of robots with coordinated actions. The introduction of autonomy into technical systems has a great potential in terms of providing added robustness, simplified usage and flexibility of systems in general. At CAS, autonomy is considered in the context of complex technical systems, service robots and intelligent environments. Examples include mobile robots for domestic and field applications, multi-agent systems, active vision systems for environment modeling and recognition, object manipulation, grasping systems based on multiple sensors and different types of learning systems.

Since 2008, CAS has been coordinated by Professor Danica Kragic and it includes junior and senior researchers from the Schools of Computer Science and Communication (CSC), Electrical Engineering (EES) and Engineering Sciences (SCI). Thus, CAS integrates methods from mechanical engineering, control and estimation, mathematical modeling, computer perception and computer science in a holistic approach to systems engineering. Current themes for the research are cognitive systems, systems integration and the development of fully operational systems for realistic applications. In addition to basic research and systems integration, the effort also involves close collaboration with industrial partners. The Center was inaugurated in August 1996 and since then more than 30 doctoral students have completed their doctoral degrees.

CAS has also been highly active in research community efforts. The principal involvement is through the founding and coordination of the European Robotics Network - EURON, which is sponsored by the CEC Future and Emerging Technologies Unit. The network involves 145 universities across most EU countries. Among other achievements, EURON has provided road-mapping of research and technology development, definition of standards for benchmarking, organization of several summer schools, and curricula coordination in robotics.

For several years, CAS was involved in a project with FMV (Swedish Defense Material Administration) looking at the use of robotics technology in defense and rescue operations. The implementation and evaluation of the technology was carried out in very close cooperation with active units over several years. One doctoral student, who holds the rank of Major in the Swedish Army, has successfully graduated from CAS in the area of computer science. CAS has an active collaboration with FOI (Swedish Defense Research Agency), which over the years has financed several of the doctoral students. Currently, CAS is involved in a research project managed by FOI and funded by FMV (TAIS). The fact that CAS is able to deliver the physical demonstrators is also evidenced by two successful projects with Stockholm Fairs and ABB. In the first case, CAS has developed an autonomous floor marking robot that has been in use since August 2003. The work at CAS has also resulted in a spin-off company, Intelligent Machines Stockholm AB, together with the former president of E2Home (a joint venture between Electrolux and Ericsson) and the “father” of the Trilobite, Electrolux’s autonomous vacuum cleaner.
VIC Sthlm

Head: Björn Thuresson – http://vic-sthlm.se/
VIC Sthlm, a meeting place for visualization, interaction and collaboration coordinated by CSC, was launched on June 4, 2009.

It is the third meeting place for visualization in Sweden; the others are the Center of Visualization Göteborg and C-site in Norrköping /Linköping.

The purpose of the VIC Sthlm is to coordinate and develop new and existing networks and activities in the visualization field into a meeting point for the Stockholm region’s many users and developers, including industry, the public sector, research and education.

“VIC Sthlm is a place for contact and interaction with the latest in visualization and visualization techniques. Demonstration of the usefulness and value of visualization can be seen as a strategic tool”, says Björn Thuresson, the project manager for VIC Sthlm.

He sees VIC Sthlm’s office, which is centrally located at KTH Campus Valhallavägen, as a live forum where stakeholders can present and demonstrate their projects, tools, and solutions. It creates unique conditions for exchange of knowledge and enhanced visibility. All demonstrations are interactive, which allows visitors to “try them out”.

The new Visualisation Studio that will be realised during 2010 in close proximity to VIC Sthlm, with a grant from the Knut and Alice Wallenberg Foundation.

VIC Sthlm is funded during 2009-2012 by the collaborations partners KK Foundation, VINNOVA-SSF, Vårdal, Invest in Sweden and KTH. Coordinated by KTH, VIC Sthlm also works closely with Electrum Foundation, the Center for Technology Medicine and Health, the Center for Opera and Technology, and the Technology Museum. The latter two also offer excellent places to meet visitors and users. Together with stakeholders, Konsthögskolan and Mejan represent the artistic dimension of the meeting site’s purpose.

Initially, the stakeholder association consisted of more than 20 companies, organizations and authorities in the region. VIC Sthlm, together with partners and stakeholders, will organize seminars, workshops, theme days, lunch meetings, training courses - all to develop the visualization field in the region, spread knowledge, share experiences, find new solutions, alliances and develop new business areas.

VIC KTH

Head: Professor Yngve Sundblad
http://www.csc.kth.se/vic/
Professor Yngve Sundblad at CSC heads the consortium Visualization, Interaction and Collaboration at KTH, and was the initiator of VIC Sthlm. He notes that there has long been major interest in visualization techniques at KTH. Accordingly, all schools at KTH are working with visualization in various forms, often in quite advanced projects,” says Yngve Sundblad.

Visualization is about managing the huge amounts of information produced in our computer society. In a single year, we produce as much information as was produced throughout the rest of the time humans have existed on earth. By processing the information in visual, spoken audio and tactile forms, we gain a better overview - and thus see new relations.

Our ability to increasingly manage very large amounts of data and then combine it with real-time data creates many interesting areas of visualization applications. Five areas were identified before the start by VIC Sthlm’s stakeholders: Calculation and Simulation, Energy and Environment, Medicine with emphasis on Simulation, Architecture and Urban Planning, and Computer Games.

During the year 2009, KTH also received funds from the Wallenberg Foundation to obtain visualization equipment together with Linköping University in Norrköping and collaborate in visualization development.
KTHNOC – KTH Network Operation Center

KTHNoc was responsible for network operation, education, and research related to Internet Technologies for many years. On July 1, 2008, the Center was closed. Network operation includes running the central nodes for the Swedish University Network, SUNET, and the Nordic University Network, NORDUET since 1988 without any running stop. In spite of this astonishing fact, the board of SUNET decided to hand over the network operation to the commercial company NORDUNET/AS in January 2007.

Education activities include development and running Internet routing courses. Research activities focus on routing protocols, techniques for blocking child pornography sites, end-to-end quality measurements and open source routers. These activities continue within the Computer Science departments and the System group.

Spin Off

KTHNOC also operated a Local Internet Registry for RIPE. This activity was handed over to a spin-off company Resilans AB, started by four of the system engineering specialists at KTHNOC. (http://www.resilans.se/).

For many years, KTHNOC also collected Swedish Web Sites and built a Web Catalog. KTH HOLDING AB was offering the responsibility of selling this Web Catalog. Now a spin-off company, Infoo, “Den officiella svenska webbkatalogen” (The Official Swedish Web Catalog), is running and developing the catalog. (http://infoo.se/)

COT – Research Center for Opera and Technology

Head: Associated Professor Anders Askenfelt.
The Research Center for Opera and Technology is a platform for cooperation between the University College of Opera and KTH CSC, both located on the same campus. The Center conducts research related to use of technology for extending and augmenting the communicative power of opera performances. A current project in cooperation with the Sibelius Academy in Helsinki deals with masterclass teaching of opera singers over the Internet. Using state-of-the-art technology to enable eye-to-eye contact and the sensation that the teacher and student are present in the same room, the concept has demonstrated an unexpectedly high potential for efficient interactive singing tuition. Integrated in conservatory education programs, the developed technology will make masterclass teaching more affordable and available to many more students.

Symposia for professional singers and voice pedagogues are organized regularly, featuring international keynote speakers. A successful event in 2009 with the theme Breathing and Support attracted more than 400 participants.

The Center is a node in the World Opera Foundation, a worldwide platform for exploring tradition and innovation in opera. A visionary running project is a worldwide collaborative opera performance in 2011 with artists performing simultaneously on different stages and communicating over the Internet.
PDC
Head: Professor Lennart Johnsson

PDC – HPC Center for High Performance Computing

Head: Erwin Laure – www.pdc.kth.se/

PDC and PDC-HPC, the Center for High Performance Computing, operate leading-edge high-performance computational and storage resources for Swedish and international scientific research. PDC also carries out leading-edge research and development in software for computing, storage, and collaboration in integrated distributed environments. PDC is involved in several national and international projects, most importantly the Partnership for Advanced Computing in Europe (PRACE) project exploring the future directions for high-performance computing in Europe for which PDC procured and operates a prototype system; the Distributed European Infrastructure for Supercomputing Applications (DEISA) project, which will make PDC’s resources accessible on the European scale; and the Enabling Grids for e-Science (EGEE) project for which PDC coordinates the Nordic and Baltic Operation Center. PDC is also a major component of the Swedish e-Science Research Center (SERC) being established between KTH, Stockholm University, Karolinska Institute, and Linköping University.

PDC serves as the Swedish National Infrastructure for Computing’s (SNIC’s) main resource center for the Swedish academic community and additionally operates systems dedicated to specific research groups. Examples of groups serviced by PDC are the Linné Flow Center, the Center for Biomembrane Research (CRB), the Allan Brain Institute, Stockholm Bioinformatics Center (SBC), the Stockholm Brain Institute (SBI), the theoretical chemistry groups of Hans Ågren and Per Siegbahn, the International Neuroinformatics Coordination Facility (INCF), and the Human Proteome Project (HPR). PDC is also active in education and training, most notably by running a yearly summer school on high performance computing. PDC operates some 20,000 cores with a theoretical peak capacity of about 170 TeraFlop/s. Among these resources is the currently largest academic supercomputer in Sweden, Ekman, with 10,1444 cores and 90 TeraFlop/s theoretical peak performance, financed by the Knut and Alice Wallenberg Foundation through SNIC for climate and turbulence research. PDC also operates a mass storage system with a capacity of about 2.3 Petabytes and some additional 400-Terabyte disk storage.

In April 09, there was a PDC-KCSE pub night with the latest info on PDC and new machines.
SBI – Stockholm Brain Institute
Head: Hans Forssberg – www.stockholmbrain.se

Stockholm Brain Institute is a consortium for Cognitive and Computational Neuroscience, joining three leading Swedish Universities; Karolinska Institutet (host), Royal Institute of Technology and Stockholm University, in the endeavour to enhance the understanding of higher brain functions. It is a Strategic Research Center of SSF and a Berzelius Center of Swedish Science Council and Vinnova.

The objective for SBI is to apply a systems neurobiology approach to higher brain functions as well as brain diseases and disorders; from genes, cells and neural networks to cognitive functions and behaviour. This comprehensive approach requires a broad set of skills extending from neurobiology and neuroimaging to psychology and clinical epidemiology.

To achieve a coherent understanding, in which numerous factors vary independently, mathematical modelling and computer simulation provides a necessary tool. The CB department at CSC hosts the computational and modeling platform of SBI. An IBM Blue Gene/L cluster computer with 1K nodes-maintained by PDC is a main computational resource of SBI.

The gathering of 10 high-level research groups from three universities, representing key scientific areas from life and medical sciences, behavioural sciences and technical sciences, has been tailored to meet the important challenge to study higher brain functions. SBI collaborates with industrial partners from the biomedical and biotechnology industry, for instance IBM and AstraZeneca. During the past year collaboration between SBI partners including industry has developed very favourably. The number of collaborative projects, including those involving computational modeling, delivering important research results and methodological advances has increased significantly.

CIAM – The Center for Industrial Applied Mathematics
Head: Professor Anders Lindquist – www.ciam.kth.se

The Center for Industrial and Applied Mathematics (CIAM) is a strategic center at KTH, hosted by the School of Engineering Science in collaboration with the departments of NA and TCS within CSC, and funded by the Swedish Foundation of Strategic Research. CIAM, inaugurated in 2007 and extended in 2009, is operated by a consortium of experts dedicated to bringing to the fore the applied and applicable aspects of modern mathematics. The mission of CIAM is to create a bridge between a broad area of mathematics and industrial applications, by
• developing new mathematics relevant for applications and to disseminate these results to industry
• training a new generation of mathematicians with a profound understanding and experience of applications of mathematics.

Now 17 doctoral student projects are supported related to industrial mathematics including radio communication, cancer therapy, robotics, tomography, genomics and mathematical finance.

Novel data-driven methods allows for the exploration of the connectivity of the brain purely from the brain activity retrieved from an fMRI scanner. Here the so-called fronto-parietal attention network is seen with its statistically determined sub-networks.
Marie Persson Björkman took up a place on the CSC board in early 2009. She sees it as an honorable mission and wants to contribute her experience in business development and managerial positions within IT and telecom.

Vodafone, VM-Data, board work at the Interactive Institute and the online poker company Ongame, as well as a period as a technical attaché in Silicon Valley in the U.S., these are some examples of what Marie Persson Björkman has been working with since she took her MSc in Computer Science and Engineering at KTH in the late 1980s. Since 2007, she has been working chairman and founder of Movinto Fun, a spin-off company from CSC through the commercialization of CEO Jin Moen’s dissertation. "CSC is a school in a state of change”, says Marie Persson Björkman.

“There’s plenty of good innovative power and knowledge at the school and they’re hungry to do new things. But we need girls to be able to reach even further”

Her hope is to be a role model and contribute to raising awareness among girls that technology is used to create fun things and thus inspire them to study at KTH. Generally, Marie Persson Björkman believes it is important that the education and research at KTH is not a world for their own benefit, but are a means of growth for Sweden and the rest of the world.

“Interaction between different worlds, all the way from basic training and up, is extremely important. I hope to bring to the board a few raisins in the cake from what I learned of the U.S. system while in California and in close collaboration with Stanford University. At Stanford they are incredibly good at combining innovation, marketing and society in different ways.”

She confesses to not having done much programming since the time at KTH, but Marie Persson Björkman believes that the education has been of great use, especially in terms of abstract thinking, but also detailed technical knowledge.

"I can hold discussions on a technical level. This skill comes in very handy now that we are developing a product at Movinto Fun, but was also useful when I was at Vodafone and we launched the 3G network.”

Entrepreneurship is an important part of education, and should permeate all activities at CSC, says Marie Persson Björkman. There is a need for more courses and projects that are linked to what happens in industry, she thinks. And these activities should be to an even greater extent implemented together with those who are studying marketing and sales, for example at Handelshögskolan, the School of Economics in Stockholm. "As part of the board, I can be a link from the business community to the exciting knowledge in the CSC school, and help to find new structures of cooperation with the outside world”, says Marie Persson Björkman.
CSC Organization

As part of KTH’s organization, the school should have a clear organization and decision-making structure based on trusting coworkers and characterized by decentralization and delegation of decision-making. The organization is designed to contribute to the creation of conditions for meeting future demands for rapid changes, for example new programs and attractive educational environments.

Board of Directors, Management, Dean, Pro-Dean, and Committees

The school operates at all levels of education, research and development, and is led by a Dean who reports directly to the President of KTH. The Dean is responsible for all activities at the school. As deputy for the Dean there is a Pro-Dean.

Management group

The school has a management group. Before each important decision the Dean is given the management’s opinion in meetings. The management consists of the Dean, the Pro-Dean, those in charge of education at all levels, department heads, and representatives from technical and administrative (finance and personnel) staff as well as students appointed by the student union.

Departments and Centers

The activities are run within departments or centers. These are led by appointed heads according to decisions made by the Dean, where tasks and delegation are specified through specific decisions. Establishment of centers, consortia and similar bodies connected to KTH are up to the school’s board to set up after consultations with the president. For each established center there is to be a board with responsibility for activities, budget and accounts according to general administrative guidelines for centers at KTH.
Administration and service is shared by the school. The Dean is responsible for the school’s administrative resources and its development as well as ensuring quality and efficiency in administrative work. The board of the school has appointed four reference groups to support the Board and the Dean with proposals for development and improvement. It includes representatives of students, doctoral students, faculty and administrative staff.

Office of Education

At the school there is an office of education to handle general questions associated with the school’s educational programs, from the recruitment of students to graduation, via student advising and following up of study results as well as the school’s internationalization. The Dean has appointed a head of office to lead and be responsible for the office of education.

The office includes a student office to support students and teachers in general questions concerning the school’s course offerings, from sales of course material and matters concerning examination to reporting of study results.
**JML- Equal opportunity, diversity and equal treatment**

In order to strengthen the work on equality issues, the board has appointed a reference group whose task is to produce a proposal for a policy regarding equal opportunity, diversity and equal treatment (JML). The JML group works continuously with these questions, proposes activities and monitors reports.

**Working environment**

In order to improve the working environment, the board has appointed a reference group whose task is to propose measures to improve the students’ and staff’s working environment in a policy document.

**AHA- Administration, processing and assistance**

The AHA group identifies rules and routines that can be made more efficient to reduce frustration with unnecessary bureaucracy and to achieve a more effective and streamlined administration.

**Pagod- Planning group for computer matters**

Pagod’s task is to plan for CSC’s computers, systems, networks and study environments. This includes questions such as long-term development, requirements for functions within computer operations, service and user support, and prioritization of investments.

**The system group and Delfi**

The school has a system group with responsibility for computer investments, computer support to students and staff, computer systems, software and computer rooms. There is a reception, Delfi, where students and staff can obtain daily help in computer-related questions and apply for access to the system. The Dean appoints a head for the system group to lead and be responsible for activities.

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**Organization Reference Groups and Computing Facilities**

**Computing Facilities**

**System Group**

Head: Johan Berglund

The mission of the systems staff, System Group, is to provide students, faculty, and administrative staff with a work environment that is well matched to their computing requirements, tastes and habits. We are firmly convinced that a choice of computer platforms, rigorous and transparent security measures, and freedom from routine maintenance, best supports user creativity and productivity. It follows that the long-standing mission motto continues to be diversity and integration.

Leveraging the AFS distributed file system and Kerberos based authentication, we provide an integrated computing environment featuring Solaris 10, Windows XP, Mac OS X 10.4 and Red Hat Enterprise Linux 4.

The system hosts about 900 computers, 100 network devices and 8000 user accounts, with services available in offices and computer labs, as well as remotely over the Internet. Numerous services are delivered by high performance LAN with gigabit ethernet to offices and computer rooms.

KTH strives to provide better integration, shorter time-to-market for new IT solutions, and stronger support for users that roam between different roles and workplaces. Together with colleagues at other schools we are opening the computer labs all over campus to students from all educational programs and courses. A continuous process of evaluating goals and means for the IT environment is the key to meet the present and future needs of CSC faculty and students.
New professors

We welcome…

Jan Gulliksen who took up the chair in Computer Science, in particular Human-Computer Interaction, after Kerstin Severinsson Ekhlund in February 2009.

Jeanette Hellgren Koterslky who was appointed professor in Computer Science – Neuroinformatics, Fall 2007, and

Danica Kragic who was inaugurated as professor in Computer Science – Robotics and Computer Vision in 2008, and

Claes-Göran Johnsson who moved from Chalmers University of Technology 2007

Honorary Doctor 2007 and Visiting professor 2008/09

As Visiting Professor we welcomed Julia Hirschberg, Columbia University, US, at TMH for a year.

Affiliated Professor 2007

Anders Ynnerman, Visualisation

Affiliated Senior Faculty 2009

Anders Rockström

New Associate Professors

Joakim Gustavsson, Speech Technology 2007

Douglas Wikström, Computer Science 2007

Partic Jensfelt, Computer Science – Robotics 2007

Josephine Sullivan, Computer science – Computer Vision 2007


New Assistant Professors

Joakim Gustavsson, Speech Technology 2007

Douglas Wikström, Computer Science 2007

Partic Jensfelt, Computer Science – Robotics 2007

Josephine Sullivan, Computer science – Computer Vision 2007

Faculty and Staff 2008

Numbers of Professors and Lecturers by Year of Birth

- Female
- Male

Numbers of Graduate Students by Year of Birth

- Female
- Male
## Sources of Income

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<th>Source</th>
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<tbody>
<tr>
<td>Government grants for undergraduate education</td>
<td>86890</td>
<td>33.1%</td>
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<td>Government grants for research and postgraduate studies</td>
<td>73689</td>
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<tr>
<td>External financing</td>
<td>91415</td>
<td>34.9%</td>
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<tr>
<td>Other</td>
<td>10184</td>
<td>3.9%</td>
</tr>
<tr>
<td><strong>Tot:</strong></td>
<td>262178</td>
<td>100.0%</td>
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## External Financing

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<th>Source</th>
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<td>Swedish Research Councils</td>
<td>31045</td>
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<td>EU</td>
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<tr>
<td>Other Swedish Universities</td>
<td>5208</td>
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<td>Strategic Foundations</td>
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<td>Other Government Agencies</td>
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<td>Other</td>
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<td><strong>Tot:</strong></td>
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## External Research Financing by Department

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<td>CVAP</td>
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<tr>
<td>CB</td>
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<td>PDC</td>
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<tr>
<td>Media</td>
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<tr>
<td>TMH</td>
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<tr>
<td>HCI</td>
<td>9710</td>
<td>13.3%</td>
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<td><strong>Tot:</strong></td>
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## Costs

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<td>158470</td>
<td>59.0%</td>
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<tr>
<td>Premises</td>
<td>41184</td>
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<tr>
<td>KTH overhead</td>
<td>34926</td>
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<tr>
<td>Other operating costs</td>
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<td>Depreciation Equipment</td>
<td>9468</td>
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<tr>
<td><strong>Tot:</strong></td>
<td>268451</td>
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The total income amounts to 262 MSEK where one third relates to undergraduate education. The main sources are government grants, totaling 161 MSEK (61.2%) and external financing 91 MSEK (34.9%). The major external funding bodies are the Swedish research councils (34%) and the EU (34.9%). External research financing amounts to 73 MSEK in seven departments and PDC. In addition to this, CSC has received external funds for operating costs for PDC: 10 MSEK. During 2008 operations at KTHNoc were shut down. CSC has also received 6 MSEK from Stockholm University for undergraduate and postgraduate education.

Staff is the major cost, 59.7% of total costs of 265 MSEK, followed by KTH overhead 14.7% and costs for premises 12.3%.
<table>
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<th>Project Name</th>
<th>Start</th>
<th>End</th>
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<th>Program</th>
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<td>EduJudge</td>
<td>08-01-01</td>
<td>09-12-31</td>
<td>Olle Bälter</td>
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<td>Anders Lansner</td>
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<td>FACETS</td>
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<td>Select-and-act</td>
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<td>11-06-30</td>
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<tr>
<td><strong>Computational vision and Active Perception Laboratory,</strong></td>
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<td><strong>Centre for Autonomous Systems</strong></td>
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<td>Åke Edlund</td>
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</table>
Historical highlights

The School of Computer Science and Communication

2005

• The School of Computer Science and Communication, CSC, one of nine Schools at KTH, starts after a reorganization. NADA, TMH and the Unit for Language and Communication join the School.
• 4.5-year Master of Engineering programs in Computer Science and in Media Technology
• 1.5 year Master’s program in Scientific Computing
• Personnel: around 340 staff members. CSC doctoral students: 100.
• CID and PSCI close down.

2006

• One-year Master Program in Computer Science, Human Computer Interaction starts.
• Professor Jan-Olof Eklundh retires. New Professor in Computer Science - Computer Vision: Stefan Carlsson.
• New professor in Media Technology and Graphic Arts: Marko Turpeinen.
• CTT closes down.
• The Center for Sustainable Communications is established.

2007

• The Master of Science in Computer Science and Engineering, is extended to five years.
• The Master of Science in Media Technology is extended to five years.
• Master’s Programs in Scientific Computing and Media Management are extended to two years.
• Three research groups merge into the Department of Computational Biology (CB)
• Jeanette Hellgren Kotaleski is appointed Professor in Computer Science – Neuroinformatics
• The educational programs are adapted to the Bologna Model

2008

• KTH NOC closes down.
• PDC is reorganized and PDC HPC hosted by CSC is opened.
• David House is appointed Professor in Speech Communication and Technology
• Danica Kragic is appointed Professor in Computer Science – Robotperception
• KCSE become a National Graduate School
• New Master’s Programs: Computational and System Biology, Media Management in collaboration with HHS.

2009

• Professor Kerstin Severinson Eklundh retires.
• New professor in Human Computer Interaction: Jan Gulliksen
• Bachelor of Engineering program in Media technology is discontinued.
• VIC Sthlm is opened
• The Center for Opera and Techniques is placed at CSC.
## Doctoral Theses 2008

<table>
<thead>
<tr>
<th>Author</th>
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<tbody>
<tr>
<td>Austrin, Per</td>
<td>Conditional Inapproximability and Limited Independence</td>
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<td>Demoucron, Matthias</td>
<td>On the control of virtual violins Physical modelling and control of bowed string instruments</td>
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<td>Mejtoft, Thomas</td>
<td>Institutional Arrangements and Competitive Posture: Effects of Company Structures in the Commercial Printing Industry</td>
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<td>Carlsson, Jesper</td>
<td>Optimal Control of Partial Differential Equations in Optimal Design</td>
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<td>The good person in information systems development: A reflexive investigation of HCI in the acquisition process</td>
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<td>Algorithmic Verification Techniques for Mobile Code</td>
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<td>Motamed, Mohammad</td>
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<td>Modularization of the Learning Architecture: Supporting Learning Theories by Learning Technologies</td>
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## Doctoral Theses 2009, spring

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<td>Tofigh, Ali</td>
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<td>Computational Modelling of Neuronal Interactions in the Striatum</td>
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<td>Djurfeldt, Mikael</td>
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<td>Unobtrusive Augmentation of Physical Environments: Interaction Techniques, Spatial Displays and Ubiquitous Sensing</td>
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<td>Compressible Turbulent Flows: LES and Embedded Boundary Methods</td>
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<td>Managing Work at Several Places: Understanding Nomadic Practices in Student Groups</td>
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Short Proofs May Be Spacious: Understanding Space in Resolution

Edin, Fredrik
Neural Mechanisms Determining the Performance on Visuospatial Working Memory Tasks Biophysical Modeling, Functional MR Imaging and EEG

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Harischandra, Nalin
Computer Simulation of the Neural Control of Locomotion in the Cat

Persson, Hans
Persons with functional difficulties as resources in ICT design processes

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Sandström, Malin
Early Information Processing in the Vertebrate Olfactory System

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Aarno, Daniel
Intention Recognition in Human Machine Collaborative Systems

Carlzon, Malin
Improving BGP Convergence Properties and Web Content Blocking Using BGP
List of abbreviations

ABE – School of Architecture and the Built Environment
ACM – Association for Computing Machinery
AHA – Administration, Processing and Assistance group
CAS – Centre for Autonomous Systems
CB – Computational Biology
CBN – The Computational Biology and Neurocomputing
CIAM – Strategic Research Center for Industrial and Applied Mathematics
CID – Centre for User Oriented IT Design
CSC – School of Computer Science and Communication
CTT – Center for Speech Technology
CVAP – Computational Vision and Active Perception Laboratory
ECTS – European Credit Transfer and Accumulation System
EES – School of Electrical Engineering
ERC – European Research Council
EU – European Union
EURON – European Robotics Research Network
FMV – Technology for Sweden’s Security
GSLT – The National Graduate School of Language Technology
HCI – Human-Computer Interaction
HMI – Human-Machine Interaction
HPR – Human Proteome Project
ICT – Information and Communication Technology
INCF – Swedish Neuroinformatics Node of the International Neuroinformatics Coordinating Facilities
IPLAB – Interaction and Presentation Laboratory
ISCA – International Speech Communication Association
JML – Equal Opportunity, Diversity and Equal Treatment group
KCSE – KTH Computational Science and Engineering Centre
KI – Karolinska Institutet
KK – Swedish Knowledge Foundation
KTH – Royal Institute of Technology
KTHNOC – KTH Network Operations Center
KVA – Royal Swedish Academy of Sciences
LiU – Linköping University
MDI – Human-Computer Interaction
MEDIA – Media Technology and Graphic Arts
MIT – Massachusetts Institute of Technology
NA – Numerical Analysis
NADA – Department of Numerical Analysis and Computer Science
NBI – Niels Bohr Institute (Copenhagen)
NORDITA – Nordic Institute for Theoretical Physics
NORDUnet – the Nordic University Network
NUTEK – The Swedish Agency for Economic and Regional Growth
PAGOD – CSC Planning Group for Computer Matters
PDC HPC – Center for High Performance Computing
PSCI – Parallel and Scientific Computing Institute
RAE – Research Assessment Exercise
RIPE – European IP Networks
SANS – Studies of Artificial Neural Systems
SBC – Stockholm Bioinformatics Centre
SBI – Stockholm Brain Institute
SCI – School of Engineering Sciences
SNIC – Swedish National Infrastructure for Computing
SSF – Swedish Foundation for Strategic Research
STING – Stockholm Innovation and Growth
STINT – Swedish Foundation for International Cooperation in Research and Higher Education
SU – Stockholm University
SUNET – Swedish University Network
TCS – Theoretical Computer Science
TMH – Speech, Music and Hearing
UU – Uppsala University
VIC – Centre for Visualization, Interaction and Collaboration
VINNOVA – The Swedish Governmental Agency for Innovation Systems
VR – The Swedish Research Council
WWF – World Wildlife Foundation