

CV, Lars Kjeldahl

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Academic degrees

M.Sc/civ ing, Technical Physics, KTH, 1969

Techn Dr, KTH, 1978, Computer graphics, especially as an aid to present mathematical functions

Senior lecturer, "Docent – associate professor in computer science with a focus on human-computer interaction"

("docent i datalogi med inriktning mot människa-datorinteraktion"), 2004

Brief account of research profile

My main focus of interest for computer graphics and visualization started in 1970 with the use of a vector display (IBM2250) where part of the inspiration was from Ivan Sutherland's work. I designed a software package to make the display easier to use. However price and performance made this display hard to use and get access to.

Diagram drawing using a plotter was instead for many years the main application. Germund Dahlquist suggested to investigate a special kind of diagram drawing called nomograms that was described in many books and almost regarded as an art. I worked mainly on my own and the system that I developed for nomogram drawing showed many early possibilities and problems in visualization. Choice of tickmarks, geometrical transformations of diagrams and combination of diagrams were sub problems that I investigated. This also became my doctoral thesis.

With more powerful equipment being available my interest was focussed on interaction possibilities and especially for architects. During a trip to US in 1982 I (together with Yngve Sundblad and Jan-Olof Eklundh) visited Brown University, Cornell and Xerox Parc, which made me realize the possibilities of graphics interaction. New research groups were formed at KTH when we came home and I cooperated with Jerker Lundequist and some other architects at KTH. Many fundamentals problems with computer supported architectural work were identified, but some problems with architectural sketching using computer interaction appeared hard to solve (and are still partly unsolved). The results from our work and research were presented at conferences, workshops etc. Some of the main ideas were collected in a book by myself and Jerker Lundequist as a results from the Dialog project "Computer Supported Architectural Work" (in Swedish, "Datorstött arkitektarbete", 1986).

During the last few years I also participated in the ViSuCity project (visualization in urban planning), final report november 2010 and presented at a workshop in March 2011. The focus of Computer Supported Architectural Work has changed from interaction to rendering and visualization.

In the beginning of the 90-ties Virtual Reality became a hot area also with relations to our interaction focus. I started to cooperate with Kai-Mikael Jää-Aro and later became his key supervisor for his work.

I have also during the last few years been involved in an international EU Tempus project with KTH/PDC, Cairo and Nottingham concerning the use of VR for mechanical engineering teaching. It turns out that much work in this area is equipment driven.

During the work with Kai-Mikael it turned out that perception is very important for how and what we see in the computer rendered images. We studied depth perception. I also came in contact with other researchers, among them Bo Schenkman, where his expertis in experimental psychology was important. We focussed on colour investigations and has published several papers in that area.

In parallel with other research topics, I have always had an interest in education, especially in graphics and visualization. I have used many ideas, tested and published them in different forums and publications. As a consequence of this I have taken active part in education workshops and programs organised by Eurographics and SIGGRAPH, especially the Eurographics workshops on Graphics and Visualization Education in cooperation with SIGGRAPH (GVE95-GVE05). Also in Sweden I have been active in collecting teachers to workshops discussing education ideas.

Many research questions have been discussed in the interdisciplinary HCI group that I have been part of. My research has been influenced by this although I have my background as a technically oriented person from the master porgram Technical physics and later at the department focussed on numerical analysis.

As a consequence of the work above I participated in standardization work:

- I participated in the Seillac workshop, which was a start for this kind of work within computer graphics (Methodology in Computer Graphics, ed Guedj, Tucker, North-Holland, 1979)
- I participated in the standardization work within ISO
- I have chaired a SIS group for graphics
- I have been a member of a nomenclature group, "Svenska optiktermgruppen", 2007-2009.

My contacts with reserachers in other countries have always been important through the Eurographics annual conferences, workshops and different meetings. In Sweden I have also had many contacts, especially through the Swedish Society for Computer Graphics (SIGRAD, which later became the Swedish Chapter of Eurographics). An initive was taken at SIGRAD97 together with Olof Fahlander to start activities in working groups with graphics and visualization. I have also been invited as a speaker at different universities in Sweden.

Projects

I have participated in projects on the following topics:

- Visualization of mathematics using nomogram techniques
- IPLab, Dialog, architectural sketching, I cooperated mainly with prof Jerker Lundequist from Design Methodology, A
- Multi3D, interaction with data glove
- CID, visual quality and use of colour
- VisuCity, visual sustainable city planning
- Tempus, education in engineering using VR, EU project with main focus on VR use in Cairo.
- Cerbof, energy visualization

Publications

Journals, reviewed

Colour induction on computer displays - adjacency and shape effects. 261-272, Behaviour & Information Technology, Volume 26, Number 3, 2007

Authors: L. Kjell Dahl, B. N. Schenkman

Visual perception in computer graphics courses, Computers and Graphics, 2004

Authors: Lars Kjell Dahl, Beatriz Sousa Santos

Preferred color temperature of a color screen, Displays, vol 20, no 2, August 1999, pp 73-81, ISSN 0141-9382

Authors: Bo Schenkman, Lars Kjell Dahl

Experiences from 10 years of student projects oriented towards graphics interaction, Computers and Graphics, vol 20, no 3, 1996

Authors: Lars Kjell Dahl, Yngve Sundblad

A Study on how depth perception is affected by different presentation methods of 3D objects on a 2D display, Computers and Graphics, vol 19, no 2, 1995

Authors: Lars Kjell Dahl, Martin Prime

Computer Vision and Computer Graphics - some Unifying and Discriminating Features, Computers and Graphics, Vol 9, No 4, pp 339-349, 1985

Authors: Jan-Olof Eklundh, Lars Kjell Dahl

A method to choose tickmarks on a nonlinear scale, Computer Graphics Forum, vol 2 No 4, 1983, North-Holland

Author: Lars Kjell Dahl

Conferences, workshops, books; reviewed

Visualization in ViSuCity, a tool for sustainable city planning, SIGRAD2011

Authors: Yifang Ban, Pontus Jakobsson, Lars Kjell Dahl, Ulf Ranhagen

Color Interaction – Theory, Examples and Applications, book chapter, pp 201-225,

in Visual Perception, New Research, ed Isak Nilsson, William Lindberg, Nova, 2008,
also in Encyclopedia of Eye Research, ed James L. McGreeley, Nova 2011
Authors: Lars Kjell Dahl, Bo Schenkman

Fragments from the Swedish history of computer graphics with SIGRAD,
SIGRAD2007
Author: Lars Kjell Dahl

Perceptually Modulated Level of Detail in Real Time Graphics, International
Conference of Virtual Systems and Multi Media (VSMM2005), pp.207-216, Ghent,
Belgium, 2005.10.
Authors: Patrik Johansson, Lars Kjell Dahl, Yoshimitsu Aoki

Deeping assignments in computer graphics courses, SIGGRAPH2005, education
program, 2 pages
Author: Lars Kjell Dahl

Ideas and principles for a project oriented course, CGE04 (Computer Graphics
Education) workshop, 2004, 7 pages
Author: Lars Kjell Dahl

A survey of some perceptual features for computer graphics and visualization,
SIGRAD2003, nov 2003, p5-10
Author: Lars Kjell Dahl

"Computer graphics" and "data visualization" in the Swedish National
Encyclopedia (in Swedish: "datorgrafik" och "datavisualisering" i
Nationalencyklopedin).
Author: Lars Kjell Dahl

Colour interaction on computer screens. Presentation at the 27th International
Congress of Psychology, Stockholm, Sweden, 2000
Authors: Kjell Dahl, L., Schenkman B.N.

Effects of Image Resolution on Distance Perception in Stereo and Nonstereo
Images, EI97, SPIE Proceedings 3012 - Stereoscopic Displays and Virtual Reality
Systems, Feb, 1997
Authors: Kai-Mikael Jää-Aro, Lars Kjell Dahl

Illustrera med datorstöd – tumregler och verktyg, MDA-rapport, 1992
Illustrations with computer support, rules of thumb and tools, 99 pages
Authors: Björn Eiderbäck, Lars Kjell Dahl, Staffan Romberger
This report consists of two parts, rules of thumb, authored by Kjell Dahl and
Romberger and tools, authored by Eiderbäck and Kjell Dahl

Models in computer-aided architectural design work, Knowledge-Based Systems in Architecture, edited by J.S. Gero and T. Oksala, Acta Scandinavica, Helsinki, 1989, pp. 19-25

Authors: Jerker Lundequist, Lars Kjell Dahl

Computer Aided Architectural Design Work, Interact'87, North-Holland, pp 1097-1100, 1987

Authors: Lars Kjell Dahl, Jerker Lundequist

Computer supported architectural work, the architect's sketching in interactive graphics systems (in Swedish: Datorstött arkitektarbete, arkitektens skissarbete i interaktiva grafiska system), TRITA-NA-E8677, Dialog 29, Royal Institute of Technology, 1986, 104 pages

Authors: Lars Kjell Dahl, Jerker Lundequist

The Architect and the Problem of Interactive Computer Graphics, Swedish-American Seminar II at University of Michigan, Ann Arbor, 1985,

Authors: Lars Kjell Dahl, Jerker Lundequist

Drawing of an unusual kind of diagrams - nomogram drawing, Eurographics'84, ed. Bø, Tucker, North-Holland, 1984

Author: Lars Kjell Dahl

Improving computer graphics tools for architects, Eurographics'84, ed. Bö, Tucker, North-Holland, 1984

Authors: Ekeberg, Engblom, Kjell Dahl, Lundequist och Thörnblom

Interactive computer graphics, a survey (in Swedish: Interaktiv grafisk databehandling, en översikt), 112 pages, 1978, NADA, KTH och ITM
This survey compared different functionality in the software systems available at that time.

Author: Lars Kjell Dahl

Literature survey of computer graphics, TRITA-NA-7804, Royal Institute of Technology, 1978 (part of TechnD thesis)

Author: Lars Kjell Dahl

ADB-teknik i ett tioårsperspektiv, (Computer technology in a perspective of 10 years), Försvarets rationaliseringsinstitut, 1973, 99 pages

Authors: Ingvar Aaro, Leon Fitinghoff, Lars Kjell Dahl

Surveys

Computer Graphics in Scandinavia, SIGGRAPH, Computer Graphics, vol 33, no 3,

1999

Author: Lars Kjelldahl

Scandinavia: Computer Graphics "Roots" with Color Ink Jet Plotters, SIGGRAPH, Computer Graphics, vol 30, no 2, 1996, 4 pages

Authors: Lars Kjelldahl, Mikael Jern

Survey of standardization in computer graphics (in Swedish: Översikt över standardiseringsläget för grafisk databehandling), invited talk at SIGRAD'88, Swedish Society for Computer Graphics, 4 pages

Author: Lars Kjelldahl

Människa-datorinteraktion vid utformning av text, bild och program, forskningsläge och forskningsbehov, MDA-rapport, 1987:15

HCI interaction at design of text, image and program, research status and research needs, 91 pages

Authors: Sundblad, K S Eklundh, Kjelldahl, Marmolin, Romberger

IPLab – Interaktions- och presentationslaboratorium, projektansökan, TRITA-NA-E8659, 1986, IPLab, (Interaction and Presentation Laboratory), 42 pages

Authors: Kjelldahl, Marmolin, Romberger, Severinsson Eklundh, Sundblad

Information sources for computer graphics (in Swedish: Informationskällor för grafisk databehandling), Datorgrafikdagar i Linköping, ed: Attebo, Lenngren, Pettersson, Pääbo, 1983

Author: Lars Kjelldahl

Educational

Sweden: Survey of Computer Graphics and Visualization Education, SIGGRAPH Computer Graphics, vol 30, no 2, 1996

Author: Lars Kjelldahl

Eurographics Models SIGGRAPH Efforts in Education, SIGGRAPH, Computer Graphics, vol 30, no 2, 1996

Authors: Brodlie, Kjelldahl, Teixeira

Some course material that I have written:

- Svar och lösningar till exempelsamling i numerisk analys (answers and solutions to collection of examples in numerical analysis), 1972, appr 100 pages, Authors: Ingvar Aaro, Ilkka Karasalo, Lars Kjelldahl

- Exempelsamling i numerisk analys med lösningar (collection of examples in numerical analysis with solutions), appr 160 pages, 1973, Authors: Ingvar Aaro, Ilkka Karasalo, Lars Kjelldahl

- Grafer och lagringsstrukturer, ”graphs and storage structures”, kompendium, Author: Lars Kjelldahl

- Kompendium i grafisk databehandling, tredje uppl, (Compendium on computer

graphics, third edition), Jan 1984, 80 pages, Author: Lars Kjell Dahl
- Kompendium om grafisk databehandling, kompletteringar till grundläroboken (Compendium on computer graphics, complement to the text book), August 1989, 36 pages, Author: Lars Kjell Dahl
- Exempelsamling i grafisk databehandling (Collection of examples in computer graphics), Jan 1995, 13 pages, Author: Lars Kjell Dahl
- GKS – Graphical Kernel System, 1989, 7 pages
Author: Lars Kjell Dahl
- A small collection question in computer graphics, second course (in Swedish: En liten exempelsamling med småfrågor till OOP med grafik), March 1991, 3 pages
Author: Lars Kjell Dahl
- A small collection for computer graphics and interaction, first course (In Swedish: Liten exempelsamling till kursen Datorgrafik med interaktion), 1998, 16 pages
Author: Lars Kjell Dahl

Manuscripts

Människa-datorinteraktion i grafiska system (Human-Computer Interaction in Graphics Systems), Yngve Sundblad, Kerstin Severinson-Eklundh, Lars Kjell Dahl, Staffan Romberger, TRITA-NA-E8361, INTEGRAL-9, 26 pages

Requirements for interactive editing of diagrams, TRITA-NA-8303 (INTEGRAL-7), Royal Institute of Technology, 1983
Authors: Lars Kjell Dahl, Staffan Romberger

INTEGRAL – A PROPOSAL FOR A RESEARCH LABORATORY AT NADA, Örjan Ekeberg, Jan Olof Eklundh, Kerstin Frenckner, Anders Hillbo, Lars Kjell Dahl, Anders Lansner, Lennart Pettersson, Björn Ringh. Staffan Romberger, Yngve Sundblad, Peter Svanberg, TRITA-NA-8103, 47 pages

Computer graphics, especially as an aid to present mathematical functions, TRITA-NA-7806, Royal Institute of Technology, 1978 (part of TechnD thesis)

The publications above gives an overview of my research topics (visualization, architectural work, virtual reality, education and perception).

Conference activities

I have been co-chair of Eurographics92 and Eurographics94.

I have been co-chair of the Education Program at Eurographics2008 and Eurographics2010.

I was co-chair and organizer of SIGRAD2008 and SIGRAD2011 (Annual Swedish Eurographics Chapter conference).

I have been member of the program committe for SIGRAD2001-2012.

In 2001 I was invited to give a talk in Gävle as part of a seminar day when they prepared the announcement of a professorship at Gävle/Uppsala in computer graphics.

National and international awards

I was elected Eurographics Fellow in 1994 (only person from Scandinavia so far)

Membership of academies and the like.

I am a member of SIGGRAPH and Eurographics and have earlier been a member of IEEE.

Editorial or advisory assignments in international periodicals.

I have been member of the editorial board of Computer Graphics Forum, 1981-1996 and also editor of the Theses section in that journal, 1993-1995. I have been Associate editor of the Journal Computers and Graphics, during 1995-2010. I am in the editorial board of the Springer periodical, LNCS Transactions on Edutainment

Editor of special issues

- Computer Graphics in Scandinavia, ed: Lars Kjelldahl, Computers and Graphics, 19(2), 1995
- Education, ed: Colleen Case, Lars Kjelldahl, Computers and Graphics, 26(4), 2002
- Education, ed: Lars Kjelldahl, John Finnegan, Computers and Graphics, 28(3), 2004
- Education, ed: Lars Kjelldahl, Zhigeng Pan, Computers and Graphics 29 (2), 2005

Review / referee assignments / IPC

Computers and Graphics (5), for 20 years
Edutainment conference (2),
eLBA, e-learning Baltics, IPC, 2008-2012
Computer Graphics Forum (1) , for approx 10 years
Education Program at Eurographics (2), for approx 5 times
WSCG (International Conference on Computer Graphics, Visualization and Computer Vision), IPC and/or reviewer: 1995-1998, 2005, 2007, 2008

Organiser and editor of education workshops, GVE

- Eurographics Workshop on Graphics and Visualization Education (GVE94), in cooperation with SIGGRAPH, september 1994, at Eurographics1994 (ed: Lars Kjelldahl, José Teixeira)
Contribution: Future for Graphics and Visualization Education at GVE94, Lars Kjelldahl

GVE93, GVE96, GVE99: Participant/IPC

GVE95: cochair

Contribution: Lars Kjelldahl and Yngve Sundblad: Experience from ten years of student projects oriented towards graphic interaction
Education workshop at Edutainment'06: An education workshop was held

with myself as invited chair in Hangzhou, April 2006, organised by myself, Steve Cunningham and Zhigeng Pan.

Swedish education workshops that I have been organised:

- December 1990, KTH, local co-organiser
- April 2005, KTH, local organiser

In addition to this, I have participated in a number of Swedish workshop on computer graphics and visualization education.

Doctoral courses in computer graphics and visualization, KTH that I have given

- Seminar course, 15 sessions, course number 2D5328, 1987
- Computer Graphics and visualization, 1993
- VR and computer graphics
- 2D5328 Current problems in Computer Graphics, VR and Visualization, doctoral seminar course, 2000-2001, in cooperation with Norrköping and Gävle, mainly at KTH (<http://www.nada.kth.se/kurser/kth/2D5328>)

Public examiner/opponent/supervisor.

I have served as opponent for doctoral theses at five disputations

Ketil Bø, NTH, Norway, 1983

Morten Zachrisen, NTH, Norway, 1989

One in Darmstadt, Germany

Jan Brown, Copenhagen, Denmark, 1994

One in Göteborg, Sweden

I have been a member of about 10 examination committees for doctoral theses (betygsnämnder)

1998: Tomas Akenine-Möller, Göteborg

2005: Rebecca Hinks, Stockholm

2007: Anders Henrysson, Norrköping

2008: Lars Winkler Pettersson, Uppsala

2009: Stephen Peterson, Norrköping

2011: Jakob Munkberg, Lund

2011: Magnus Axholt, Norrköping

2012: Babak Rasolzadeh, KTH (substitute)

Assignments as outside expert.

I have been external expert ("sakkunnig") for

- Senior lecturer (lektorat):
 - Modelling and animation, 1 applicant, Linköping, 2000
 - Computer Graphics and visualization, 4 applicants, Norrköping, 2007
 - Computer Graphics, 1 applicant, Lund, 2010
 - Computer Graphics, 1 applicant, Gävle, 2010
- Adjunct professor: Mikael Jern, Norrköping, 1999
- Associate professor (docent): Michael Doggett, in Lund, 2011

International networks activities.

- I have been a member of the Executive committee of Eurographics, 1981-1993, and also vice chair and member of the Executive Board for two years.
 - The Swedish Computer Graphics Society, SIGRAD, was established after a call by myself, in 1976, and I was elected its first chair person and I have been active since then in different positions, currently as secretary. During the first years I invited several international speakers for our conferences and workshops, among them José Encarnação, Judy Brown, Dave Duce and Andy van Dam.
- A few years ago SIGRAD was transformed into a Chapter of Eurographics. I have written a paper on the development of SIGRAD.
- I have organised several SIGRAD events, the most recent being the SIGRAD2008 and SIGRAD2011 conferences, held at KTH.
- I organised the first Eurographics Multimedia workshop with financial support from STU and held at KTH in 1991. The result was the book: Multimedia, Systems, Interaction and Applications, L. Kjelldahl (ed), 353 pages, Springer.
 - I organised a CID workshop on visualization, May 1998
 - I supported the KTH Game Awards (later Swedish Game Awards), 2001-2003, by participating in the evaluation committee as KTH representant (in addition to the company representants). I also at that time arranged a seminar and workshop day on computer games with financial support from Teknikbrostiftelsen.
 - I was a member of the EPOCH network (for cultural heritage)

PEDAGOGICAL ACHIEVEMENTS

Pedagogical experience

I have been teaching many different courses during 40 years. The courses I have given include

- numerical analysis
- automata theory
- introductory computer graphics
- computer aided project work for architects
- programming project
- second computer graphics
- visualization
- information visualization
- selected problems in computer graphics (doctoral course)

I have supervised more than 100 master theses

I have also lead study groups on cooperative (tenant-owners') building society (not at KTH)

Early courses in computer graphics that I have given include:

1971: Seminar course on computer graphics (together with Leon Fitinghoff and Lars-Erik Thorelli): 10 lectures, also with guest lecturers, written exam

1976: Course using my survey report on computer graphics, 15h of lectures

1977: Two-day course on computer graphics at Lund, together with Mikael Jern and Gunnar Pettersson

1977: Computer graphics course at Saab-Scania, Linköping, 15h

1981: First regular computer graphics course at KTH given annually, 20h of lectures and lab sessions.

1982-2012: I have given several courses annually

Personal pedagogical ideas

I have during many years been thinking and working with ideas about undergraduate and postgraduate teaching on how to improve the quality of the education and getting the students more interested and by that learning more.

Below are a few of the ideas that I have used:

- Project course with external project proposals: I think that students want to work with real problems and therefore I collected project proposals from companies that could then be chosen by the students in a programming project course. Around 150 projects have been done during 10 years and companies take the opportunity to create interesting ideas and appreciate the creativity of young students. I have also set up rules for the cooperation and work with the companies in order to take care of unclear situations. The students showed enthusiasm and made impressive work. Evaluation comments have often been such as "the best course during the education". The ideas around the course have been presented in the SIGGRAPH newsletter.

- Deeping assignments: Many courses could include much more material than is available in the schedule. Computer graphics is an area that has developed substantially during the last decades. Students participating in such a course often have chosen the course due to a special interest they have. By giving them the opportunity of doing a deeping assignment in such an area (discussed and approved through a specification by myself), they are allowed to learn more about this special part of the course and also to learn about writing a report and make an oral presentation for their fellow students.

The ideas of deeping assignments was presented at the SIGGRAPH conference (education program).

- Home assignments: As a follow-up from the lectures, home assignments have been used to give support for continuous work with the course material. In that way the students will learn also the theory and background material during the whole time period of the course and not just one week before the exam. This means that they will remember more of what they have learnt.

- Sketching as part of modelling: The students are requested to make some sketches before starting modelling of a 3D object. An external designer has been asked to talk about sketching and then the students are asked to sketch themselves and post them on a board. All contributions are discussed together in a positive way. The students learn that modelling is more than technique.

- Home exam + oral exam: The character of the exam will influence how the students study. A home exam where the students are asked to write overviews on given topics (questions) make them study in a good way. They are afterwards requested to come on an oral exam on what they have sent in. I have asked selected questions on what they wrote, which prevents them from sending in text that they don't understand. I will also get a very good possibility of getting to know the students. The system is appreciated by the students (with a few exceptions). It

seems as though the system is appropriate for a course with not more than 30-40 students. A second teacher may be good, but it needs much resources.

- For computer graphics and visualization, perception is an important topic. I have included examples and knowledge on this in my courses. I have also written survey papers on perception.

- Projects to create useful educational and research tools, such as

a. master thesis of Martin Fitger making a tool for visual programming of shaders

b. project work for visualization of graphics algorithms (7 students)

c. ColorVerus: A Tool to set up experiments regarding color and color perception, 6 students supervised by myself and Bo Schenkman

d. Short overviews and prototype implementations of graphics concepts (in the course advanced graphics and interaction), such as modelling of hair, morphing, fractal landscapes and compression, Mandelbrot sets, games, colour use, textures, medical visualization, polygon filling algorithms, VR, shadowing, radiosity, ray tracing, LOD, inbetweening, file formats, particle systems, blurring, clothes, impossible rooms, computer games (for instance Xazzon, that won KTH Game Awards)

- Master theses supervision: especially important is to control what is happening in the beginning of the thesis by specification and planning of the work and also the study of literature and background. This is also what I talk about in the methodology course that all computer science master thesis student attend. It is also important to take care of the final part of the thesis work, when the students think they are almost done except the report writing. I suggest that students write continuously during the thesis work, e.g. that they write the background when they have studied the literature and make notes on ideas and observations they do.

I have during many years supervised in total more than 100 master theses (computer science, HCI, media), and have also been examiner for computer science and HCI.

- Supervision of doctoral students: Supervision of doctoral students is much more complicated than supervision of master students although there are similarities. You have to guide the student in one way in the beginning and then in a different way in the end. They are expected to become researchers during the years of studies. It is also a personal investment by the student and you have to encourage and support them when they have problems.

The doctoral student has to learn the procedure of publication, i.e. to understand reviewing and revising papers.

- Education workshops: I have been active in participating and arranging workshops on graphics education arranged by SIGGRAPH, Eurographics and SIGRAD. The focus of these workshops have varied during the years.

- Individual courses: There are several opportunities to take "individual courses" at CSC with 6, 9 or 15hp. I encourage students to use these courses to learn about some new topic they are especially interested in. It may also be a good opportunity when the student are close to finishing the exam but have a few points left.

- I have been involved in a project "Utspark" where the idea is to take contact with old students close to finish their degree, but have not done anything for some years. It is a challenge to discuss with them how the last part of their education can be

finished and in a dialogue with them try to find solutions that is practical to fulfill the requirements that exist.

Own teaching effort at undergraduate and postgraduate level.

During the last few years I have been teaching the following courses:

- Computer graphics and interaction, (DH2323, 6hp), introductory course in computer graphics, including graphics concepts, fundamental math for graphics, hardware and algorithms, modelling with Maya, graphics library OpenGL, Shader programming concepts using a graphics programming system (made as a master thesis two years ago with myself as supervisor) course analysis.

<http://www.csc.kth.se/utbildning/kth/kurser/DH2323/dgi09/kursanalys/index.html>

- Advanced computer graphics and interaction (DH2413, 9hp), continuation of previous course with more details on algorithms and methods and also assignments on modelling with Maya, graphics library OpenGL, Shader programming. In addition to this they do a deeping assignment presented to the other participants.

- Visualization (DD2257, 7.5hp), content including perception, fundamental elements of visualization, techniques and algorithms for volume visualization, new forms of data presentation, animation, software tools, applications, e.g. fluid visualization. Assignments are included and they have varied during the last few years using vtk, OpenDX, Paraview etc.

- Information visualization (DH2321), together with Anders Lundström, course book was Spence: Information visualization, the core of the course was a set of key lectures and projects that the students had to do in three steps with oral and written presentations (project plan, intermediate presentation and final presentation). The final reports were published on the course web page for most of the projects.

- Software engineering, with a software project, I m not course leader here, but have assisted with the collection and allocation of external project from companies.

- Master theses supervision and examination, both individually and in group.

Own pedagogical education (teacher's courses and/or other pertinent education), -

Education courses: I have during the years participated in many seminars and small courses on pedagogy. The most important one is the course Teaching and learning, LU1 (7 credits), given by Learning lab at KTH.

I have also participated in Doctor study supervision course (kurs i forskarhandledning), three days, May 2005.

I have given three courses at the university of Montevideo at three visits there (courses at levels: beginners, advanced, seminars/supervision)

I have also in Swedish popular technical magazines written about the use of the Data glove (datahandsken), about computer graphics and computer supported architectural work.

Academic supervising experience

I have supervised approximately 100 master theses in computer science, human-

computer interaction, media and numerical analysis. A list of most of these theses is given in a separate appendix.

In addition to this I have been examiner of approximately 100 master theses in computer science and human-computer interaction.

Doctoral students

Kai-Mikael Jää-Aro, key supervisor, dissertation, March 2004

Alexander Baltzatis, in progress. He has done a plan of research and a substantial part of the courses.

Pedagogical merits gained from outside the academic sphere

I have given courses in industry, for example at Saab (computer graphics), Vägverket (computer graphics) and Ericsson (programming)

- I have been responsible for the courses in computer graphics and visualization using evaluation meetings with the teachers involved.

Miscellaneous, external contacts

I have been a member of the board of the institution (Numerical analysis and computer science)

I have had *external contacts* during many years, such as

- SIGRAD (Swedish computer graphics society, later Swedish Chapter of Eurographics): in the first years of SIGRAD many contacts with companies were established

- Master thesis done at companies (around 100)

- Software engineering projects: I have collected more than 50 projects from companies

- Network contacts built and used for the VIC-KTH seminars arranged by me before VIC became VIC-Sthlm (meeting place), Oct 2007-March 2009. This was an important period to build confidence and knowledge for the future. Seminars and courses were given with people like Bob Spence, Helwig Hauser, Ingrid Carlbom and Yifang Ban.

I have made an investigation of external contacts at our school at CSC (KTH) presented in a written report and with an oral presentation for the board of the school, 2010.

I have participated in three trips to Germany, Austria and UK to get an overview of visualization, september 2010.

Involvement in other external associations

- cooperative (tenant-owners') building society, Metern, in executive committee 1976-present, chair: 1980-2002, 2009-present

- parent school association, Eriksdalsskolan, 1999-2009, member of executive committee, chair during three years

- balalajka association, three years, treasurer