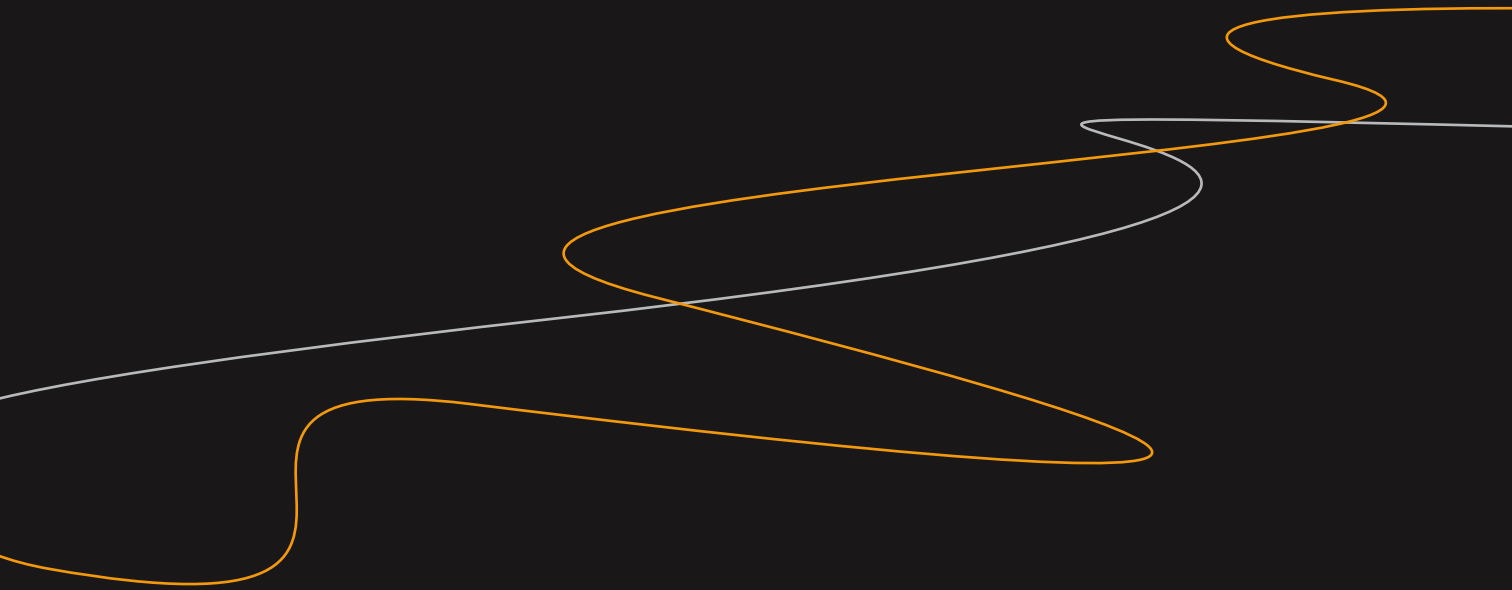





CIVILINGENJÖR
MEDIETEKNIK
LINKÖPINGS TEKNISKA HÖGSKOLA





“Media Technology is the link between ideas and groundbreaking solutions.”



Anders Ynnerman – Professor of Scientific Visualization

What it Means to be a Graduate in Media Technology

“Creative, intelligent and enthusiastic with a high level of communication and social skills”. These are some of the ways our graduates have been described. The Media Technology program at Linköping University has a history of attracting individuals with the unique combination of all these qualities. It then imparts four and a half years worth of advanced scientific and engineering knowledge in the field of media technology to produce extremely talented graduates, ready to set the future for information technology both in Sweden and internationally.

A good engineering degree program is guaranteed to educate generalists, able to cope with a rapidly changing technology. Our engineering program does more. It produces specialists with expertise in one or more of the areas of print and electronic publishing technology, computer graphics, scientific and information visualization, video and film production,

and sound technology. The mission of creating a curriculum for the MSc in Media Technology and Engineering program was given to Professor Björn Kruse in 1996. From its inception till its completion, he led a team of industry experts, researchers, teachers and students with the goal to develop the self-contained, unique and professional program it is today. While it may sound a contradiction in terms, Media Technology represents a broad specialization. It embraces both visual and audio aspects relevant to today’s commercial, social and community needs.

In this document you will read in more detail what MT graduates can achieve, what the experts say of the program and of the caliber of the graduates as well as some examples of interactions our graduates have had with a diverse range of industries through their Masters thesis projects.



Björn Kruse – Professor of Digital Image and Media Technology

Print and Electronic Publishing

In the middle of the 15th century, Johannes Gutenberg became famous for his invention of the movable type printing press. Information in the form of written text could now be mass-produced, and the new possibilities for information dissemination changed the world and its future.

The printing industry has always been at the forefront of modern technology. The first non-military use of lasers was in the optical photo setters and today plate setters use laser exposure on plates with photosensitive material for direct-to-plate operation.

A very recent new form of publishing is electronic publishing on the web. It constitutes yet another inventive step in the publishing industry, making the information go live. The glue that keeps all the different channels of information together is the realization of asset management and information

management systems. Electronic publishing would not be possible without standards for electronic documents and images. Daily newspapers have embraced the new technology with their web editions, and new electronic information services are being created all the time.

The MT students are offered many opportunities to carry out projects utilizing not only techniques such as color separation, halftoning and advanced image processing but also graphic design and communication.

Digital Film and Video

Digital technology in film and video spans a wide area of expertise. The specialization can be roughly divided into three sub-areas: narrative techniques, production techniques and distribution.

Narrative techniques include playwriting, theory of communication and all stages up to the script. Cost estimates, production planning and contracting are closely related. Production techniques include the tools of production and their function. The students get insight into the functionality of the video camera and the various parameters that affect the resulting footage and audio, as well as post-production - such as editing, compositing, audio construction and mixing. The distribution part concerns the different conditions that apply in sending the finished product to the receiver. In this part compression technology and signal processing are included.



Frida Österberg

Frida is the technician responsible for a Global Colour Communication (GCC) system at Tetra Pak Packaging Material production. With 40 printing plants around the world, it is one of the largest printing companies. The GCC system enables objective colour assessments and ensures colour repeatability, regardless of where produced. Frida's Masters thesis studied the visual impact of the packaging material's outermost lamination layer on the design. The result is a model of how to visualize the effects in the proofing phase of the production.

Maria Forsman and Emma Stråle

Maria Forsman and Emma Stråle did their Master of Science thesis at IKEA, the goal of which was to examine an alternative product image flow. By using product drawings as the starting point, they were to produce photorealistic images of the products using computer graphics, which would dramatically decrease costs of image production. This also meant that images could be generated before an actual prototype existed. One of the images has already been included in the IKEA catalogue for 2006.

Patrik Littman

Patrik produced a stereoscopic high-resolution video film for the Norrköping Visualization and Interaction Studio (NVIS), viewed using special 3D glasses connected by infrared signals to an advanced computer program. The purpose of this unique project is to gather data that can help others to produce stereo movies. This is accomplished by determining correct placement and direction of cameras in order to achieve the stereoscopic effect, appropriate techniques for playing the movie, optimal resolution, and suitable compression methods.



Roboren



Dag Haugum - Lecturer in Digital Film and Video

Since production work tends to get increasingly integrated it is of great importance that an engineer also has insight into the human factors, not least of which is to be able to conduct a constructive dialogue with different occupational groups. The student has an opportunity to delve deeply into all of these areas, both theoretically and practically through extensive projects. The program utilizes the students' creative side and at the same time gives them good preparation for work as project managers within the movie and TV production industry or any other area where strategic decisions have to be made.

Computer Graphics and Visualization

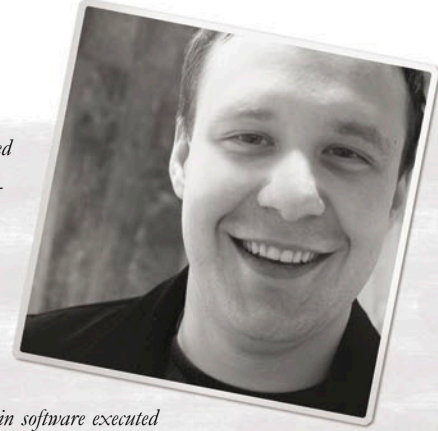
The use of computer graphics to visualize information has become a vital industrial technology and has found uses everywhere. The most obvious areas are in films and games, where computer graphics is used to generate visual scenarios

indistinguishable from the real world, but these technologies are also used in all kinds of information handling tools. Interactive graphical representations can provide great assistance in understanding the enormous and complex information flows required by modern business and industry.

The Media Technology program at Linköping University meets this need by introducing 2D and 3D Computer Graphics from a fundamental level and following that up with a course program in advanced visualization. Thus our students have the chance to explore the use of scientific and information visualization techniques, photorealistic rendering and lighting,

and the intricacies of human-computer interaction through both desktop and virtual reality systems. The program's practical focus is carried through to these courses, which include extensive laboratory work and project development. Many students undertake Masters thesis projects in these areas each year, tackling real problems from industry and research, developing both hardware and software solutions.

The graduates of this program are well versed in both computer graphics programming and in techniques and methods to make creative and effective use of computer graphics and visualization in industrial applications. Many of our industrial collaborators turn the Masters thesis projects that they host into products, and we use them as a springboard into new research areas.



Joel Rohlin

*Joel's Masters thesis was conducted at and commissioned by the development department of the Swedish public service broadcaster - **Sveriges Television (SVT)**. His work was to evaluate whether the internal communication system at SVT could be implemented in software executed over an IP-network while cooperating with existing solutions. The given tool was an intranet, based on a general IP-network with access only to unicast, implemented with the transport protocol TCP. Joel now works as Technical Manager at SVT News and Current Affairs*

Daniel Sundberg and Thomas Rydell

*Media Fusion is a concept, created by **Silicon Graphics Inc. (SGI)**, enabling the possibility to combine different data and pixel sources to one stream which can be shown, saved or streamed over a network. Daniel and Thomas worked with SGI to create a window manager with an intuitive 3D graphical user interface, incorporating a physical engine for smoother window handling, and a framework for 2D and 3D streams. The project was carried out using OpenGL Performer, the C programming language, developed on a Onyx4, now ported to the SGI Prism system.*

Fredrik Limsäter

*Fredrik is the Senior Technical Director of **Sony Pictures Imageworks** in Los Angeles. He did his Master of Science thesis at Cinesite in London, one of the world's largest and most diverse visual imaging facilities. The result was the crowd simulator, React, which relies heavily on artificial intelligence. It was used in the feature films "King Arthur" and "Charlie and the Chocolate Factory", among others. Fredrik also developed a feather generator for photorealistic owls and ravens for the fourth Harry Potter movie.*





Gianpaolo Evangelista – Professor of Sound Technology

Sound Technology

Perception of sound is among the most intriguing aspects of the human sensory system. While most visual stimuli are strongly coupled to our immediate response, no immersive experience can be generated disregarding the auditory component. Humans are able to detect small phase differences of sounds arriving at the two ears in order to extract directional information and localize sources, very important to our orientation and detection of danger capabilities. Moreover, while humans can make sense out of highly distorted images, a low-quality projection of audio can result in a very disturbing experience.

Sound Technology has prehistoric origins as cavemen built their first instruments to fulfill their needs to communicate at a distance and, probably, even to entertain themselves. Ever since, humans have deployed their best technology, from mechanics through electro-mechanics, to analog and

digital electronics, in order to devise musical instruments, musical machinery or sound recording, communication and reproduction systems.

Today, research in audio technology comprises areas as diverse as aids for the visually impaired, auditory displays and model based sound synthesis able to reproduce acoustic sources in a virtual environment, useful both in the computer game industry and in the monitoring of industrial processes.

The Media Technology students enjoy a strong curriculum in Sound Technology with courses and Masters thesis projects in audio offered by an increased number of experts in the field. Among other things, students learn concepts behind compression, sound processing and 3D audio technology for virtual environments.

Said About the MT Program and its Graduates

“I am very impressed with what has been accomplished here in Norrköping over the past 10 years. It’s been a privilege to be a part of this exciting development and to work with so many talented people. Starting from scratch, several strong research environments with international impact have been established and a world class educational program in Media Technology has been created. The MT-program has attracted some of the most talented students I have ever come across, who combine deep specialist knowledge with a broad understanding of media technology. Combining this with their excellent social skills, makes them fit for a wide range of career paths in industry. I have seen our students end up in the SFX industry in Hollywood and in other specialized computer graphics companies, but also in general engineering industries creating added value by providing expert knowledge in visualization. Working with these smart and socially skilled students has been the most rewarding job I have ever had. Hiring an MT-graduate from Norrköping is a great investment in the future. Trust me; my own labs are filled with graduates from our program!”

Anders Ynnerman, Professor of Scientific Visualization



David Kästel

David is a Media Technology graduate well aware of the ever-increasing demands the gaming and VR-industry is placing on sound technology. Advanced computer graphics and impressive visual effects are often let down in VR-applications by poor 3D sound effects. SAAB Training Systems (STS) let David look into how they could improve GIZMO3D, their own 3D-graphics engine, in this aspect. David shed light on key ideas, methods and existing technologies, after which he presented his own solutions on how to implement 3D sound in VR-applications.

Christoffer Eggeborn

The replacement of analog devices with digital in sound technology has led to a different class of sounds being produced. Professionals are now more and more looking for ways of reproducing the effects of vintage equipment. Christoffer's Masters thesis work, conducted together with researchers at British sound software development company Sonalksis, involved just this type of innovation. Using the example of an electric guitar, his aim was to implement a mathematical approach to simulating how audio is altered when passed through an old-style, analog amplifier.





Ken Museth – Professor of Computer Graphics

“I’m often asked why I chose to pull up my roots in California and move to Sweden. While the full story is obviously long and complex the short version is that I came because of the Media Technology students! While working as a consultant for a Hollywood movie house I collaborated with two students from the Media Technology program and was very impressed with their abilities. After arriving in Sweden my expectations that their qualities were shared by most MT students were confirmed. The students have a rare combination of technical engineering skills and creativity, which allows them to tackle problems in a very unique way. While a solid technical background is obviously the basis for any good engineering degree, it is the creative element that truly sets these students apart from other engineering students. Add a good MT student to your project and you’ll see magic start to happen - that’s what happened to me and several of my industrial colleagues!”

Ken Museth, Professor of Computer Graphics



Special Thanks to:
Senior Lecturer Matthew Cooper PhD, Senior Lecturer Stefan Gustavson, Professor Stan Miklavcic,
Shelley Torgnyson and Michael Wass

www.medieteknik.nu



Linköpings universitet

Editor in Chief: Joanna Beltowska

Produced by: Peter Asplund, Joanna Beltowska and Damir Filipovic

Texts Written by: Peter Asplund, Joanna Beltowska, Senior Lecturer Matthew Cooper PhD, Professor Gianpaolo Evangelista, Damir Filipovic, Maria Forsman, Lecturer Dag Haugum, Professor Mikael Jern, Professor Björn Kruse, Professor Stan Miklavcic, Professor Ken Museth, Joel Rohlin, Emma Stråle and Professor Anders Ynnerman

Graphic Design and Retouching: Petter Lorentzon

Photo: Petter Lorentzon and Rickard Söderberg

Print: AB Danagårds Grafiska, Ödeshög