

# Master's Programme

in Embedded and Intelligent Systems, 120 credits



HALMSTAD  
UNIVERSITY

[www.hh.se/english/programmes](http://www.hh.se/english/programmes)

# Halmstad Embedded and Intelligent Systems Research Environment (EIS)

The objective of EIS is to provide knowledge (solutions, theories, methods, tools) relevant to the creation of innovative IT products and services, ranging from enabling technologies, via systems solutions and applications, to value-adding IT use. Most of the research is oriented around two main application areas: smart cities and health innovation.

Our competences span from enabling technologies, like low-power technologies and semiconductor sensors, to value-adding IT use, considering user aspects. In between, system and application aspects are treated, e.g. intelligent algorithms, application-specific computer architectures and efficient interconnection technologies. Rather than covering everything, we are focusing on co-operating embedded systems for intelligent applications.

## Centre for Applied Intelligent Systems Research

EIS is the home of CAISR, a long-term research programme on intelligent systems established by Halmstad University. The programme is funded by the University and the Knowledge Foundation with support from Swedish industry.

Several industrial partners are collaborating with researchers from the University in joint projects, and take an active part in the development of CAISR. The key application areas that the centre does research in are

intelligent vehicles and health technology. It is common that students on the master programmes do their master thesis in connection to ongoing research projects.

**BEST IN  
SWEDEN**  
IN COLLABORATION

Halmstad University's courses are among the best in the country when it comes to collaboration with industry and commerce.



# "The University has a profile that makes collaboration easy"

Jörgen Hansson, Services Owner at Uptime and Aftermarket Vehicle Requirements, Volvo Trucks in Gothenburg.



Jörgen Hansson has a Master of Science in Computer System Engineering from the University.

## ***How does Volvo Trucks collaborate with Halmstad University?***

– We are, for example, collaborating in the development of intelligent systems, data analysis and robotics. When I started in the research department at the Volvo Group, we began a close collaboration with the University within these areas to meet our long-term needs. The thoughts and ideas that started on the research side ten years ago are now commercialised, so collaboration means a lot for us.

## ***What more does the collaboration mean to Volvo?***

– It is both a fun and good experience, and I happily work to strengthen this collaboration. Keeping a long-term focus is important for joint success. In addition, for me, it is valuable to give something back to the University and contribute with an understanding of what the industry needs. Because the University has a profile that makes collaboration easy, the drive towards research results can be combined with in-

dustry goals. The collaboration also builds on the fact that the entire organisation sees the value in Volvo being on the cutting edge and the access to good competence.

## ***How does Volvo plan to recruit within Intelligent Embedded Systems and Information Technology?***

– We have very complex products, and coupled with services development where connected systems are increasingly important we need this competence, it is completely right for the future.

## ***What are your experiences of studying at the University?***

– The University has a very good alignment with modern thinking when it comes to image processing, intelligent systems and parallel computer systems, which I studied. The education has always been a very good basis for my professional life and enabled me to develop myself and the areas I work with, as well as to take new steps.

# Master's Programme in Embedded and Intelligent Systems, 120 credits



This is an education for students wanting technical specialist competence, research experience and better career opportunities after their education. The programme requires a previous education in the electrical, computer or mechatronics engineering or information and communication technology fields.

During the studies, you will be in direct connection to the University's research since the teaching is carried out by active researchers. Many of the courses are project based and give the opportunity to study international research. The thesis work is done in the third and fourth semesters. Most students then cooperate with one of our research groups, in many cases with industry connection. As a student on this programme, you choose one of the following specialisations:

**Embedded systems:** Focusing on new methods in computer architecture, particularly co-operating embedded systems and on communication in real-time computer systems.

**Intelligent systems:** Focusing on artificial intelligence and image and data analysis as well as mobile and autonomous systems, dealing with robotics and related issues.

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## The University Campus

A natural meeting point for students in Halmstad is the campus area, where you can find lecture halls and research centres, library, cafés, student organisations, a gym, the library and more. The area is pretty fresh and quite newly built, and it is easy to get in contact with other students, teachers and staff. The town centre is only a few minutes away.





## DEGREES

The degree is 120 credits.  
Upon completion of the degree programme, a degree certificate will be issued bearing the degree programme title: English: Degree of Master of Science (Two Years) with a major in Computer Science and Engineering.

In the degree certificate is also stated the specialisation of the education: Embedded and Intelligent Systems. More information on [hh.se](http://hh.se)

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### **Compulsory courses:**

Engineering Mathematics, 7.5 credits  
Artificial Intelligence, 7.5 credits  
Cyber-Physical Systems, 7.5 credits  
Real-time embedded systems, 7.5 credits  
Design of Embedded and Intelligent Systems, 15 credits  
Thesis, 30 credits

### **Eligible specialization packages:**

#### **EMBEDDED SYSTEM**

Networks for Embedded Systems, 7.5 credits  
Embedded Parallel Computing, 7.5 credits  
Distributed Algorithms, 7.5 credits  
System-on-chip Design, 7.5 credits

#### **INTELLIGENT SYSTEM**

Learning Systems, 7.5 credits  
Intelligent Vehicles, 7.5 credits  
Robotics, 7.5 credits  
Image Analysis, 7.5 credits

### **Remaining eligible courses**

Algorithms, data structures and problem solving, 7.5 credits  
Computer Vision in 3D, 7.5 credits  
Optical Communication, 7.5 credits  
Stochastic Processes, 7.5 credits  
Data mining, 7.5 credits  
Testing and verification in embedded systems, 7.5 credits  
Dependable and realtime networking, 7.5 credits

Each student chooses one of the specialisation packages above. This choice is made after the start of the programme. A thesis project of 30 credits is to be performed within the same area.

# “We look forward to meeting the students from Halmstad University in the future”

**Lisa Svalmark, CEO and partner at the startup company Beam AB.**

## *What are your experiences of studying at the University?*

– I had a great time at Halmstad University, from an academic point of view, but I also had a lot of fun. During that time, I climbed, skied and went cross-country cycling.

## *How have you collaborated with the University in your roles in your career roles?*

–We started a collaboration with the University within intelligent systems during my previous work at Cybercom Group. I contacted my thesis supervisor and he put me in contact with the right people.

## *Are you in contact with the University today?*

– The automotive industry is going through its most disruptive time since horse and carriage. The key here is knowledge and flexibility and this often comes from researchers and students. We have created something we call BEAM Academy to keep our employees up to date with new knowledge, but also the need-to-know stuff. To blend this together we collaborate with universities and students to take care of knowledge and new ideas. We want to share industry knowledge with students and create Master thesis positions together with

experienced engineers. We will collaborate with several universities, among them Halmstad.

## *How does BEAM plan to recruit within Intelligent Embedded Systems and Information Technology?*

–The car will in the future be a platform for functions in the same way the IT industry looks at its applications on its devices. It will be more important to think in terms of functions rather than systems. The need for software knowledge and skilled developers will be huge, so we look forward to meeting the students from Halmstad University in the future.



Lisa Svalmark has a Master of Science in Computer Systems Engineering from Halmstad University



## Gold for the University student team in international competition with self-driving cars

Despite tough competition, Team Halmstad won the prestigious GCDC (Grand Cooperative Driving Challenge) 2016 in the Netherlands. In the competition, an ordinary car was turned into one which is self-driving and can cooperate and communicate with other vehicles.

Six master students participated. Team work and social interaction turned out to be important aspects of their success – apart from technical skills, hard work and constant testing.

Tony Larsson, Professor and team supervisor, said that the win is also a real joy considering that the University also did well last time the competition took place.

– We came second in GCDC 2011, with a slim margin for the winners. The teams worked fantastically well, said Tony Larsson:

– Halmstad University has done research in this field since 2006, and therefore the students have a strong research and reality connection.



## Halmstad University Embedded and Intelligent Systems Industrial Graduate School (EISIGS)

– The time at Volvo is used for the same thing that we do at University, but I get the chance to meet people, find out what they are working on and initiate new collaborations. I also have a company mentor, and present my work to larger groups within the company.

Julian Carpatorea. PhD student with Volvo. Previously Master student at the University

# Discover Halmstad, Sweden

We are located in one of Sweden's greenest, most liveable and most innovative cities, situated on the beautiful southwest Swedish coast. Halmstad offers you a peaceful study environment and an inspiring seaside and riverside setting. Sweden's most famous beach, Tylösand, is very popular, and so is the forested area Galgberget. Both offer lovely days in both summer and winter.

Being a small city, Halmstad enables close relationships between students and between the University and businesses in our community. Halmstad's ideal size also makes it convenient to get around. Just a few minutes by bicycle or bus takes you from the campus to the city centre, sandy beaches or Galgberget. Additional-

ly, Halmstad is close to big city life when you need a change of scenery. Trains take you directly to Gothenburg in an hour and a bit, to the Malmö-Copenhagen area in less than two hours and to Stockholm in 4.5 hours.

-Halland is ranked number 1 in a survey of the most innovative provinces in Sweden in 2012, by the Confederation of Swedish Enterprise.

-Halmstad is ranked number 2 in a survey of the best places to live in Sweden by the Media Academy at Gothenburg University.



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