MSc in Embedded Systems
Intro to Programme and Courses

August 23, 10:15, room 2446

Outline for today

- To get started:
  Things to organise over the next days/weeks
- The Swedish/Uppsala/Bologna academic system
- Programme overview

Questions upfront?

Least but not last: BBQ

- **Today from 16:00, Polacksbacken**

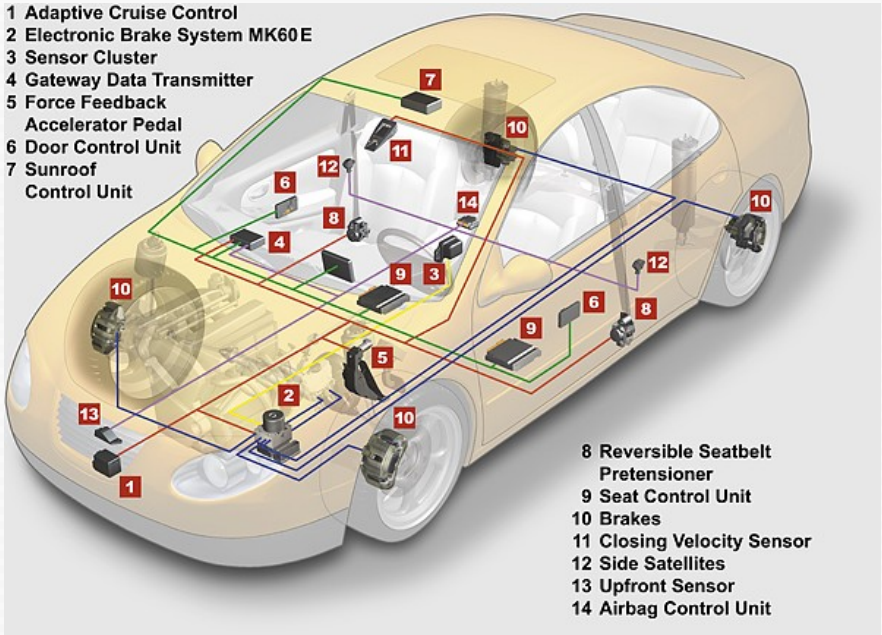
MSc in Embedded Systems at Uppsala University

- Young **Master's Degree** programme
  - Started in 2010
  - Currently approx. 35 students enrolled
  - First students graduated 2012
- Hosted by **IT Dep.** and **Ångström lab.**
- **Goal:** train professionals in Embedded Systems design

What is an Embedded System?

Embedded Systems

- Computer systems **integrated** into a larger device
- **Hardware** + **software** tailored to a particular purpose
- About **99%** of all computers are embedded
- **Applied**, but also leads to **foundational** research questions



Pervasive:
Cell phones, cameras, trains, airplanes, traffic lights, home appliances, robots, industrial machines, etc.

Many Directions ...

- Software design, modelling, implementation
- Real-time aspects
- Electronics/hardware design (VHDL, Verilog, etc)
- Computer architecture
- Control theory
- Signal processing
- Networks, distributedness, wireless communication
- Concurrency, multicore computing
- Compiler design
- *and more*

Embedded Systems ...

- have huge industrial importance
- in Sweden, Europe, and all the rest
- In Sweden: companies like Ericsson, Volvo, Saab, Skanska, ABB, SKF, ENEA, ...

- is a large, well-funded academic area
- spans various fields of basic research
- numerous projects in Sweden, Europe, USA, and ...

→ **Good career opportunities on either side**

Things to organise ...

Student accounts

- Central web page for all course-related activities: www.studentportalen.uu.se
- You have to visit the **IT Division** to get your account details (building 3 ITC) http://uadm.uu.se/it/?languageId=1 (take some id/passport with you)

- **Enrolment/registration is happening as we speak ...**

Unix accounts

- Used for lab rooms
- Account details will be handed out beginning of next week (when courses start)

Access card/Campus card

- New procedure in 2016

- You first need to get a account details/activate the student account ...
- ... then upload a photo of yourself, and set a pin code ...
- ... then pick up the card at the reception (?)

Swedish Personal Numbers

- “Temporary” numbers: 123456-T123
- “Proper” number: 123456-1234
- Administered by the tax authorities http://www.skatteverket.se
- Once you have a “proper” number, tell the student office about it

- (also needed for a bank account)
- **Apply soon!**

Courses in Basic Swedish

- Application form included in your welcome package; deadline Aug 29
- If you do not speak Swedish yet, participation is **highly recommended**

- Other possibilities for learning Swedish:
  - Folkuniversitet
  - SFI, https://www.uppsala.se/sprak/english/

The Academic System ...

The Year in Uppsala

- 1 year = 2 terms = 4 periods
- Autumn term: periods 1 + 2
- Spring term: periods 3 + 4
- Courses cover 1 or 2 successive periods
- Summer: vacation, summer courses, time for individual studies or projects
- 1 period = 10 weeks = 8 weeks courses + 2 weeks exams

Credits (högskolepoäng, hp)

- Master degree = 120hp
  (90hp courses, 30hp thesis)
- 1.5hp = 1 week full-time studies
- 1 term = 30hp
- 1 period = 15hp

Courses

- Most courses:
  5hp, or
  10hp
- Various formats:
  Lectures
  Assignments, labs
  Projects
  Flipped classrooms
  Seminars

Choosing Master's Courses

- **Talk to Liselott or Philipp!**
- Courses have to complement your Bachelor; no courses that overlap too much with your Bachelor courses
- For your degree, you need:
    - 120hp of courses altogether
    - including 30hp thesis (also possible: 45hp)
    - including at least 60hp ES courses
    - including at most 30hp basic courses

Student counsellor

Liselott Dominicus
studievagledare@it.uu.se
https://www.timecenter.com/uthenheten/

Thursday, 10:30 – 12:00, room 4213
(other times by appointment, use webpage)

Course registration (“regular”)

- Step 1: Attend **course fair/course information meeting**
  (normally: end of March, end of Sept.)
- Step 2: **Apply** for courses
  (deadlines: April 15, October 15)
  antagning.se, universityadmissions.se
- Step 3: At beginning of period, **register** for courses that you were admitted to; on studentportalen.uu.se

Course registration (“regular”)

- Important:
  If you do not apply in time, you might not get a place in your favourite courses!

Dropping courses

Can be done
within 3 weeks of course start
(then course credits will not be counted)

After 3 weeks, in general it is not possible to remove courses

Contact the student office, or talk to Liselott or Philipp if you want to drop a course (as early as possible)

Tuition fees

- Fee-paying students can always apply for courses, but **registration** is only possible once tuition fees for a term have been received by the university
- For all questions about fees, contact: feemaster@uu.se

Exams

- Many courses end with a written exam
- Registration deadline is always 2 weeks before the exam (link on student portal) → Important to register in time!
- At least two re-examination options per year

Grades

- U, 3, 4, 5
- Sometimes: U, G

Course registration
Autumn 2016

- Courses are discussed at individual meetings later this week
- Outcome: “individual study plan” for the first term
- We then directly register the courses

Changing courses
Autumn 2016

- There will be a drop-in day next week for changing the study plan (probably: September 2)
- More information via mail!

Information and Offices ...

Student office (IT Kansliet)

Building 4, floor 2

Monday – Thursday, 10:00 – 12:30

Dealing with: course registrations,
exams, study results

Admissions Office

Important webpages

- Main page of the programme,
  http://www.it.uu.se/student/programmes_and_courses/master_programmes/embedded_systems/
- Detailed programme syllabus,
  http://www.uu.se/en/admissions/master/selma/studieplan/?planId=968&pKod=TIS2M
- Education pages of the IT department (including list of all courses offered),
  http://www.it.uu.se/education
- TimeEdit, https://se.timeedit.net/web/uu/db1/
- Studentportalen, https://studentportalen.uu.se/portal/portal/uusp
- Admissions, https://www.antagning.se/se/start
  (English, https://www.universityadmissions.se/intl/start)

Course levels

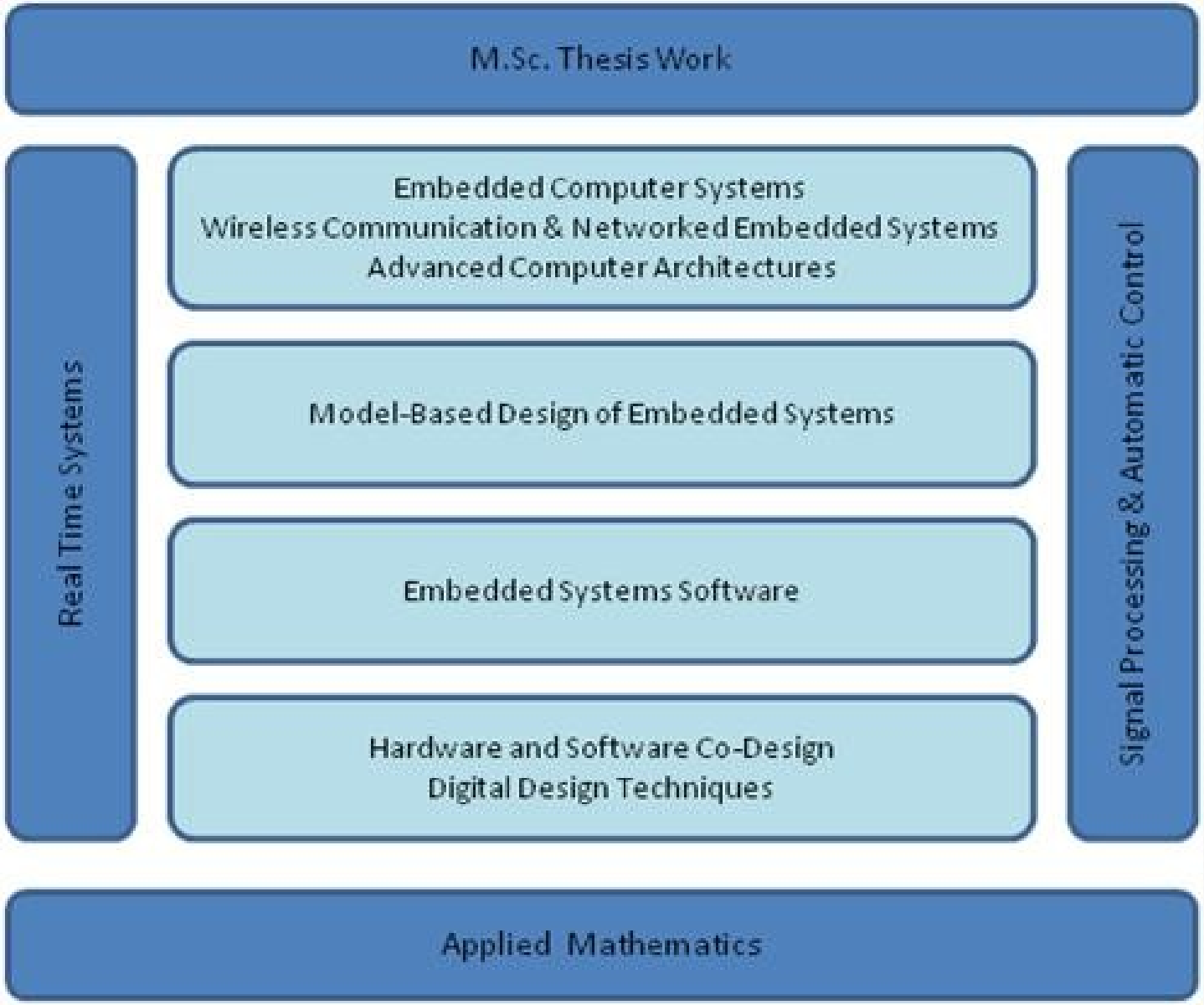
- G1N
- G1F
- G2N
- G2F

- A1N
- A1F

Dependencies, entry requirements

Courses and Topics ...

Programme outline



The introductory course

- Recap in C programming, parallelism/concurrency
- Technical/scientific writing and presentation
- Professional competency
- Working in teams and on projects
- Inter-cultural communication
- *and some more*

The introductory course (2)

- 5hp, period 1
- *After today, most of you will be registered for this course!*

Area: programming/software

- Real-time systems
- Micro-controller programming
- Programming Embedded Systems
- Model-based design of ES

Area: programming/software *optional*

- Software engineering
- Functional programming I
- Software testing and maintenance

Area: hardware

- Accelerating Systems with Programmable Logic Components
- *Previously, now optional:* Digital electronics design with VHDL
- Project in Digital Electronic Constructions

Area: parallelism/concurrency *optional*

- Language Abstractions for Concurrent and Parallel Programming
- Low-level parallel programming
- Parallel and Distributed Programming

Area: control

- Introduction to computer control systems
- Automatic control II
- Embedded Control Systems, Project

Area: signal processing *optional*

- Spectral Processing of Signals (quite advanced)

- *Further courses available in Swedish*

Area: networking

- Wireless Communication and Networked embedded systems (requires “Computer networks”, or equivalent!)
- Computer networks (optional, basic)
- Computer networks II (optional)
- Computer networks III (optional)
- Parallel and Distributed Programming (optional)

Area: language design *optional*

- Compiler design I

Area: AI, HCI
optional

- Human Computer Interaction (many instances)

- Artificial Intelligence
- Machine Learning
- Intelligent Interactive Systems

Foundational courses *optional*

- Applied mathematics

Area: architecture *optional*

- You should already have:
  basic Computer Architecture
  As possible complement:
  Computer architecture I
- Advanced computer architecture

Individual projects *optional*

- “Advanced Course on Topics in Embedded Systems”

- Interesting for later terms, and next summer
- 5hp or 10hp
- Topic chosen individually
- Similar to a small Master's thesis

Master thesis

- Usually done in the last term (i.e., in spring 2018)
- Detailed information on http://www.it.uu.se/student/thesis_project/master

- Mandatory start-up meeting!

Remark

- Already now, think about courses that you find most interesting, and check their prerequisites!
- You might have to choose specific courses early on, to have prerequisites for later courses

Main courses this autumn

- Introduction to studies in ES
- Real-time systems

- Microcontroller programming
- Programming Embedded Systems
- Wireless communication and Networked embedded systems

Enjoy your studies in Uppsala!

Questions?