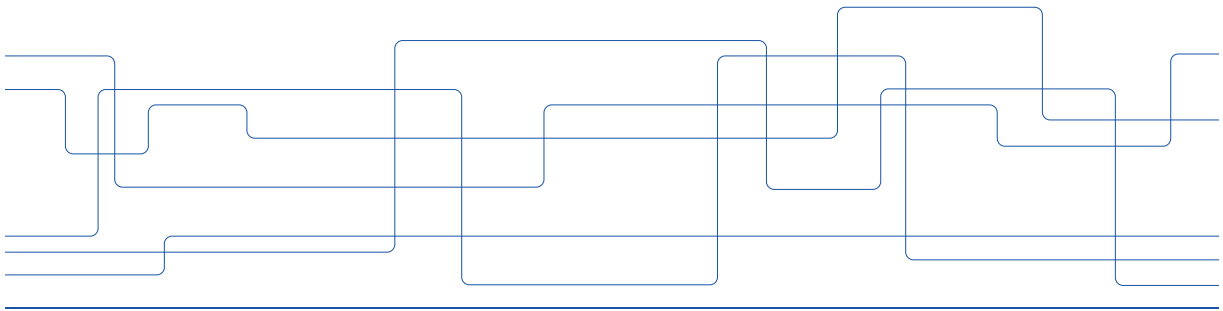# Welcome to KTH, Embedded Systems program

Prof. Zhonghai Lu, School of Electrical Engineering and Computer Science

Program Director, TEBSM

KTH ROYAL INSTITUTE OF TECHNOLOGY

Agenda

- Welcome
- Self introduction/Knowing each other
- Program information
- Message from the Director
- Some practical information
  - Some education-related systems/tools you will experience
  - Student representative
  - Course selection by Nina Werner – Master coordinator
- Question & Answer (Q & A)

Embedded electronic/computer Systems are ubiquitous

- Consumer electronics (home/office appliances)
- Transportation, medical devices, communication etc.
- Industrial domains

- Also called Cyber-Physical Systems
- Internet of Things

Overview

- A two-year program offered in English
  - 120 European Credit Transfer and Accumulation System (ECTS) credits
- The program is managed by the School of Electrical Engineering and Computer Science (EECS)
  - The courses spread over subjects of Electrical Engineering, Computer Science, Information and Communication Technology, Mechatronics and Control Systems.
  - It has the involvement of the ITM school (industriell teknik och management, Industrial Engineering and Management)
  - It has strong connection with Swedish industry through KTH ICES (Innovation Center for Embedded Systems)

Overview: A broad program with Four tracks

- 4 specialization tracks
  - Embedded Electronics
  - Embedded Platform
  - Embedded Software
  - Embedded Control
- The KTH-UESTC (University of Electronic Science and Technology of China) joint program track follows the Embedded Electronics track.
- All tracks start from Day 1

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Program structure

- 2 years, 4 semesters, 8 periods
- Course study is in the first 3 semesters, and the last semester is for master thesis project.

General courses (30 credits)

Specialization courses (~30 credits)

Elective courses (~30 credits)

Master thesis project course (30 credits)

- The mandatory general courses give a good foundation for working in the field of Embedded Systems
- The track courses are directed towards your specialization in the Embedded Systems field.
- The electable courses gives the students the possibility to have their own twist on the education

https://www.kth.se/social/program/tebsm/

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General courses (30 credits)

- Year 1 (7.5 credits)
  - IL2206 Embedded Systems, 7.5 credits – P1
- Year 2 (22.5 credits)
  - Design Project in Embedded Systems, 15 credits, P5-P6
  - II2202 Research methodology and Science Writing, 7.5 credits – P5
  (or AK2036 Theory and Methodology of Science with Applications (Natural and Technological Science, 7.5 credits)

https://www.kth.se/en/studies/master/embedded-systems/description-1.70455

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Other courses (60 credits) + Degree project course (30 credits)

- You study other courses (track-mandatory plus elective courses)
  - for 60 credits in total
  - Different tracks has different track-mandatory courses and elective courses
- Your last semester is dedicated to the master thesis project course (30 credits)
- Please see the complete list at the KTH Embedded Systems program website

  https://www.kth.se/en/studies/master/embedded-systems/description-1.70455

- Course selection
  - All courses listed on a track is also an electable course for the other tracks.
 - If a course is not listed, you have to ask my permission to take it.

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Embedded Electronics

- Track for building analog/digital electronics, circuits and systems for Internet of Things (IoT), Cyber-Physical Systems (CPS)
  - **Analog circuits**, amplifier, Radio circuits (transmitter, receiver), AD/DA-converters
    Sensors, Printed-Circuit Board (**PCB**)
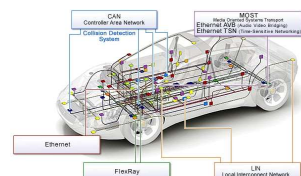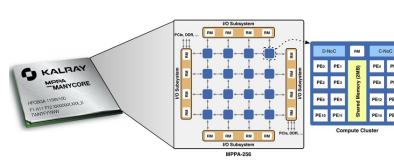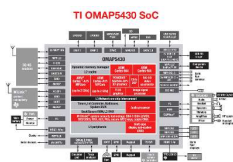 - ASIC/FPGA, System-on-Chip (SoC)
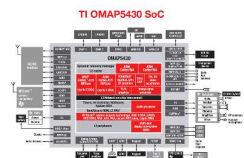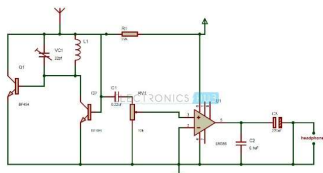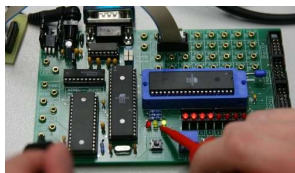
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Embedded Platforms

- Track for building different forms of (digital) VLSI designs and computer based architectures for Embedded Systems
  - ASIC/FPGA, SoC
  - Single core (CPU), Multi-core processors
 - Distributed many-core systems (e.g. in-vehicle networked computer system)

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Embedded Software

- Track for programming all types of platforms for Embedded Systems
  - Single-core, multi-core systems (centralized or distributed) in resource-constrained embedded computer domains
  - Real-time computing systems (in contrast to general-purpose computing systems)
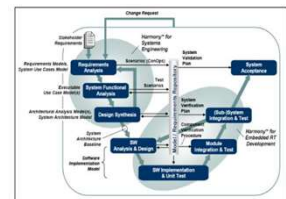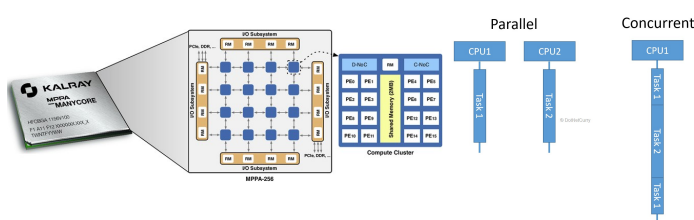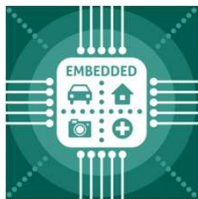
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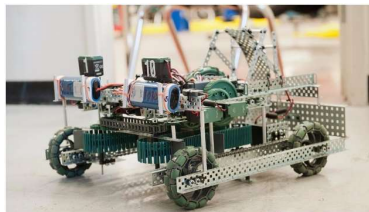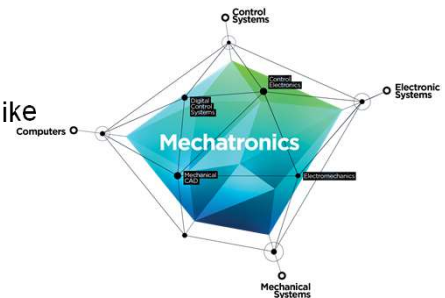
Embedded Control

- Track for Control of Embedded Systems in areas like
  - Automation, control systems
  - Mechatronics and robotics

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Track selection in one sentence

- Interest/background in both **Analog** and Digital IC Designs, go to **Embedded Electronics**
  - Examples of analog ICs (power/operational amplifier, A/D-D/A converter, RF circuits etc.) and PCBs
- Interest/background in Digital IC designs, VLSI, many-core chips, go to **Embedded Platforms**
  - Examples of VLSI (System-on-Chip, many-core processors), FPGA, ASIC design & synthesis
- Interest/background in programming embedded software (C/C++, realtime constraints), go to **Embedded Software**
  - Software for embedded computer systems, Safety-critical and realtime systems
- Interest/background in computer control systems, go to **Embedded Control**
  - Example systems with control-intensive tasks like robotics, drones …
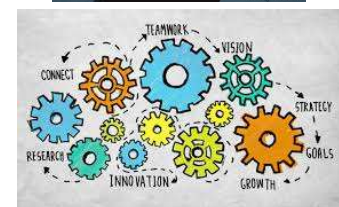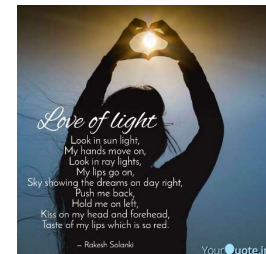
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Words to share with you

- Stay healthy and be positive (look at light !)
- Contribute to and benefit from the learning environment
  - Learn from & Help each other
  - Respect each other
- Pursue excellence for your brighter future
  - Work hard
  - Be ambitious

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Student representative

- You will represent all students in the program
  - Get opinions/feedback from students
  - Communicate student opinions, issues with the program director and coordinator
  - You will be invited to attend relevant meetings, e.g., the program council meeting, if any
- If you are interested, please send me an email with a short motivation by Monday August 31, 2020 .
  - May have two representatives for gender balance: one male student and one female student.
  - A good combination is one student who knows about KTH and the other new to KTH

zhonghai@kth.se

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Some digital platforms/tools you may experience

- **KTH Schedule** (called timeedit)
  - Very important for planning your activities.
  - You find all your course schedules there, and you can make a personalized daily schedule for all courses your are registered.
  - Open access (Google search: KTH Schema, Sök schema) room: Ka-208 Ka: Kista, Digital

    https://cloud.timeedit.net/kth/web/public01/

- **Canvas**
  - KTH learning management system
  - All courses usually have their course websites in Canvas, where you find lecture slides, assignments, video recordings etc.
  - You get access after registering a particular course.
  - If you are registered to a course but can't access the Canvas course page, you need to contact the KTH IT support, it-support@kth.se
  - Remember: You course examination may have a separate Canvas page different from the course Canvas page.

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Some digital platforms/tools you may experience

- **Ladok** (limited access by students, you may hear about it often)
    - A student-registry system used by teachers/administrators for study results registration
    - It is the database for your transcripts.
    - You can access **Ladok for Students**. Q & A for Ladok can be found here: https://www.kth.se/en/student/studok/fragor-och-svar-ladok-faq-1.833292

- **KTH social** (maybe invisible to you)
    - It was used to host course websites, but not now any more.
    - Still it is often used for **Course Evaluation survey** by teachers.
    - You will receive a Course Evaluation survey to answer after each course is finished.

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My pages | På svenska | Log out

Current education | Completed education | Certificates | Apply for ▼ | Cases

Current education

CURRENT	UPCOMING	UNCOMPLETED
There are no current courses	There are no upcoming courses	There are no uncompleted courses
	PLANNED STUDIES	
	There are no study selections to do	

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Thank you!

Acknowledgements: All pictures in the slides are from Google images.