Graduate school on Embedded Control systems, May 26-30 at KTH, Stockholm

The Control for Embedded systems cluster, within the ARTIST2 network of excellence, announces a Graduate Course on Embedded Control Systems. The course will take place 26-30 May, 2008, at KTH in Stockholm.

The course during 2008 will be the 4th in a successful series of course instances, providing an overview and account of state of the art theory and techniques that address the connection and integration of the areas of Control systems and Embedded systems.

A large variety of automated control applications are today implemented as embedded systems. Increasingly, also, control systems theory is used to guide the design of embedded systems resource management, with example applications in load balancing and scheduling of computer systems. This strong interaction between Control and Embedded systems forces the need of a new generation of researchers and engineers that can combine both fields. One of the goals of ARTIST2 is the dissemination of this theory and methodology by developing and giving courses.

The main goals of the course are to provide the basic understanding of
- Basic concepts on embedded control systems from the control point of view
- Real-Time concepts
- Interaction between the control design and control implementation
- Real-Time implementation of control algorithms in a multitasking environment
- Analysis of the effects of the execution platform on control performance
- Control-based approaches for modeling, analysis, and design of embedded control and communications systems
- Co-design tools for analysis and simulation of embedded control systems
- Overview of different off-line scheduling problems found in embedded systems
- Embedded systems development

The course consists of lectures and laboratory exercises. Through the laboratory exercises the participants get hands-on experience of embedded control developed both using micro-controllers and using multi-thread approaches. The course ends by several industrial presentations including representatives from the telecom, automotive, automation, modeling and simulation fields.

The course is free of charge. For PhD students substantially discounted accommodation will be provided at Youth hostels located centrally in Stockholm.

The course is intended for PhD students and engineers with background in control engineering and/or real-time systems.

No specific knowledge is required to understand the course, since all new concepts are explained and illustrated with concrete examples. In order to cater for the diversity in student background, part of the first day is split in two parallel preparatory tracks.

The number of participants is limited to 35. Register early! Registration deadline: April 21

For registration and for more information, see page 3 and http://www.artist-embedded.org/artist/Registration,1341.html

Program

Monday, May 26

09.00 – 09:15	Welcome	Martin Törngren
09:15 – 10.15	Embedded Control Systems: Introduction	Martin Törngren
10:15 – 10.30	Coffee	
10:30 – 12.30	Parallel tracks	
	Introduction to Control	Jan Wikander/Bengt Eriksson
	Introduction to Real-time computing	Alfons Crespo
12:30- 13.30	Lunch	
13:30 – 14.30	Parallel tracks continued including Coffee	Bengt Eriksson/Alfons Crespo
14.30 – 15.30	Example flow from PID control to implementation	Martin Törngren
15:50 – 18.00	Introductory labs (Matlab/Simulink and 32 bit microcontroller development environment)	KTH Mechatronics
19.00 -	JOINT DINNER AT KTH!	

Tuesday, May 27

09.00 – 11:00	Control and Real-time issues	Pedro Albertos, Alfons Crespo
11:00 – 11.15	Coffee	
11:15 – 12:30	Integrated control and scheduling	Karl-Erik Årzen, Anton Cervin
12:30 - 13.30	Lunch	
13:30 – 14:15	Integrated control and scheduling cont.	Karl-Erik Årzen, Anton Cervin
14:15 – 17:15	Lab1: PID control of DC servo and RTOS implementation	KTH Mechatronics

Wednesday, May 28

8.30 – 10.30	Control of computer systems	Karl-Erik Årzen, Anton Cervin
10:45 - 11.45	Fixed point arithmetics	Anton Cervin
11:45 – 12:30	Lunch	
13:00 - 17.00	Parallel tracks	
	Network control: Brief intro and lab Control over the CAN network	KTH mechatronics
	FPGAs: Brief intro and lab	KTH ICT

Thursday, May 29

09:00 – 10.00	Networked control systems	Karl Henrik Johansson
10:00 – 11:00	Integrating multiple models and tools in embedded control systems development.	Martin Törngren
11:00 – 11.15	Coffee	
11:15 – 12:30	Offline scheduling for FPGAs	Premysl Sucha
12:30 - 13:30	Lunch	
13:30 – 17:00	Lab3: Truetime and TORSCHE	KTH and Premysl Sucha

Friday, May 30 - Industrial guest lectures

09:00 – 09:55	Model based development of automotive comfort and safety functions	Scania
9:55 – 10:50	Embedded control systems in Industrial robotics	Peter Ericsson, ABB
10:50 – 11:10	Coffee	
11:10 – 12:05	Design for redundancy and high reliability, with examples from spacecraft development	Gunnar Andersson, Swedish Space Corporation
12:05 – 13:00	Control problems in wireless networks	Fredrik Gunnarsson, Ericsson

Registration and more information

The number of participants is limited to 35. Register early!

Registration deadline: April 21

For registration, send an email to Karin Blombergsson (karin@md.kth.se) including the following information:

- **Name:**
- **Affiliation:**
  - **If relevant: I am a PhD student.**
- **Address:**
- **Email:**
- **A short motivation why you would like to take the course**

For more information about the Technical program, contact Martin Törngren (martin@md.kth.se)