1. Embedded Multi-processor Systems-on-Chip

Offered laboratory training:
"Edge Detection Algorithm Using The Sobel Operators".

The equipment and the related course are co-founded with Leiden University, the Netherlands. The area of studies includes high-level system synthesis and automatic C-code parallelization with the help of the DAEDALUS tool flow (http://daedalus.liacs.nl). The example presents a raw image Sobel filter that sketches the contours of objects. This process is shown below.

The lab is equipped with Xilinx Virtex-5 XUPV5-LX110T development boards. The students will be able to use them to test their synthesized designs on the FPGA. The number of the processors is user-selectable and interesting experiments could be conducted. At the end of the exercise students will have the opportunity to come up with new ideas about MPSoC and try them out on the development boards.

Below a picture of an example 4-processor SoC is shown.

Expected skills (but not required):
- Good knowledge of C programming
- Good knowledge of digital circuits
- Experience in microcontroller programming
2. Embedded Systems Design with ARMs

Students successfully finished this practical course will:

1) know:
new generation hardware platforms as part of embedded systems
to become familiar with ARM7
to become familiar with Cortex-M
Haw to design such systems.

2) be able to:
Design new systems with hardware platforms with different CPU such a ARM 7 or Cortex-M.
design sequential logic circuits
Specify basic building blocks via a hardware description language.

Main Topics:

1. The objective is to educate the students about hardware platforms and the programming of embedded systems. Help them to develop a systematic approach when designing embedded systems based on the best practices for design, organization and usage of microprocessors and microcontrollers.

2. Presented will be methods for hardware design, development environments, description and programming languages, specifics for the microcontroller’s architectures and their consequences over the programming languages.
3. Special attention will be brought to the design of such systems and the interaction between their hardware and software portions.

4. Presentation of Hardware platforms with ARM7 architecture - MCB2140 Evaluation board from Keil with LPC2148 from NXP: block diagrams, schematics and lab. exercises.

5. Presentation of Hardware platforms with Cortex-M3 architecture MCB1700 Evaluation board from Keil with LPC1769 of NXP: block diagrams, schematics and lab. exercises.

6. The laboratory is equipped with various evaluation boards such as EKI-LM3S9B92, DK-LM3S9B96, EK-LM4F232, MCB1700, MCB2140, MSP-EXP430FR5739, MSP-EXP430G2.

3. Recommended textbooks

2. The Insider’s Guide To The Philips ARM7-Based Microcontrollers, Hitec, Trevor Martin.

Internet sources
1. www.arm.co
2. www.nxp.com
3. www.keil.com

Expected skills (but not required):

- Good knowledge of C programming
- Good knowledge of digital circuits
- Experience in microcontroller programming

Both of the offered courses correspond to the ETIT 408 Embedded System course in GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY.