ELECTRICAL AND ELECTRONIC ENGINEERING
Our society is facing important challenges, including the energy transition and the big data wave. This master’s program prepares future engineers to address those challenges by covering the whole spectrum of Electrical Engineering Sciences and Technologies. The broad and flexible array of courses, labs and projects rank amongst the highest internationally. In addition to its three renowned domains (Micro/Nanoelectronics, Information Technologies and Energy/Smart Grids), the section of Electrical and Electronic Engineering offers two new high-level specializations in Data Science and Systems and in Internet of Things (IoT).

Come and join us in one of these inspiring programs.
Human Brain Imaging

Diffusion MRI is a special magnetic resonance imaging technique that allows to reconstruct the axonal tracts that connect the different regions of the brain. This is very useful in order to understand topics like fundamental human brain anatomy, neurodegenerative diseases or psychiatric disorders. Diffusion MRI image processing is an emerging field with much to explore and great potential for the further evolution of medical imaging. It offers a wide range of signal and image processing problems such as improving the modeling of diffusion at the local level, reducing the needed scan time to acquire an image, developing global optimization algorithms to derive the axonal tracts from the raw data, graph analysis on one of the most complex networks known to man, or transferring those developments to clinical practice by studying the connectivity of real pathological brains as compared to normal controls.

EE student projects in this field of research consist for instance in developing a global optimization algorithm to infer the most probable set of neuronal bundles from diffusion MR images of a brain. This kind of project involves image processing, mathematics, statistics, and computer science - it allows EE students and graduates to contribute to the understanding of the fascinating human brain.

The Real-Time and High Performance System-on-Chip Development for High Resolution Stereo Camera Depth Map Estimation

Depth estimation is an algorithmic step in a variety of image processing applications such as autonomous navigation, robot and driving systems, 3D geographic information systems, object detection and tracking, medical imaging, computer games and advanced graphic applications, 3D television, multiview coding for stereoscopic video compression, and disparity-based rendering.

The target of this project is to develop real-time and high resolution depth map estimation system using Virtex-7 FPGA. While FPGA computes the depth map in real-time, the depth map results and the original images will be displayed in PC using QT based Graphical User Interface (GUI). Moreover, some depth map estimation based simple applications, such as measuring the exact distance of the objects (with meters and centimeters) and computing the speed of the object, will be developed in PC.

The engineer working on the project will improve his knowledge about embedded systems, Xilinx tools, Modelsim, OT, Ethernet Protocol, using high-end Xilinx Virtex 7 FPGA, hardware implementation using Verilog, image processing, and MATLAB.
Master of Science in

ELECTRICAL AND ELECTRONIC ENGINEERING

2-year program - 120 ECTS

Master’s thesis

30 ECTS

Project in social and human sciences

6 ECTS

Lab, 4 ECTS

Semester project

10 ECTS

Core courses and options

70 ECTS

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Students may choose a 30 ECTS specialization in:
A Microelectronic circuits and systems
B Electronic technologies and device-circuit interactions
C Bioelectronics
D Internet of Things (IoT)
E Data science and systems
F Signal, image, video and communication
G Wireless and photonic circuits and systems

Or / and a 30 ECTS minor included in the 120 ECTS.

Recommended minors with this Master:
- Biomedical technologies
- Computational science and engineering
- Energy
- Management, technology and entrepreneurship
- Space technologies

Or / and a 30 ECTS internship (4-6 months)

Industrial internship

The program includes a compulsory industrial internship with a minimal duration of 8 weeks.

School of Engineering
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