

## Theory of electrical engineering

**Control theory:** Different projects based on “control systems” as a binary control (programmed in C language), programmable logic controller – PLC (with different devices and industrial installations) or a full washer-machine based on PID.

**Theory of electromagnetic fields:** Experimental study of the dependence of the radiation field with the distance to the emitter and the directivity, experimental study of the electromagnetic field produced by conducting spheres, experimental study of the magnetic moment of a circular conductor in the presence of a magnetic field and the dependence of other factors, experimental study of the magnetic field in coils.

**Signal processing:** Different projects based on signaling after being signals modulated AM or FM, study of the effects of the transmission channel, different projects based on transmitting signals after digital modulation (ASK, FSK, BPSK, etc.), different projects of signal processing using Matlab (correlation, analog-to-digital conversion, digital-to-analog conversion, creation of linear systems, spectral Windows, etc.).

## Networks and systems

**Communication networks:** Project based on modeling and design of communication networks using SimEvents, study of the performance of an ADSL network, ICT project in a building.

**Sensors:** Creation of a light intensity and temperature detector through sensors and analog-to-digital conversion to display on a screen.

**Microprocessors:** A lot of microprocessor based projects (clocks, timers, calculator, analog-to-digital converters, CCP modules, memories, etc.), projects based on VHDL.

## Low and high frequency engineering

**Power electronics:** Resolution and simulation of circuits in transient state and three-phase circuits, design of rectifiers, design of converters (Boost, Buck, Buck-Boost), design of a full-wave rectifier with capacitive filter, design of a low-power photovoltaic panel, design of a PWM controller.

**Microwave engineering:** Different projects with simulation tools (filters, adjustments, different transmissions changing parameters such as reflection or isolation).

**Filters:** Band-pass filter using spectrum analyzer with high frequencies.

## Programming:

Designing of Java semaphore server able to interact with clients from different programming languages running on different machines.

Designing of Java 4-in-line game with GUI and AI.

Designing of Java database for a car company.