From the sensor to the test bench in open source hardware

ECTS
3 crédits

Hourly volume
92h

Introducing

Description

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

THE MANUFACTURING OF ¿low tech¿ SENSORS based on graphite: with elements of physics (electronic transport) allowing the understanding of the electrical characteristics of a sensor based on a granular system (graphite nanoparticles).

SENSORS AND ACQUISITION CHAIN:
- The criteria for the design and use of this sensor and an adapted acquisition chain
It will be capable of handling:
- The physical principles of sensors operation
- The concepts used in metrology
- Procedures implemented,
- electrical "conditioners"
- The design of an acquisition chain.

DESIGN OF A CIRCUIT IN ANALOG ELECTRONICS:
It will be able to design and simulate an amplification stage dedicated to the measurement of the sensor realized

MICROCONTROLERS AND OPEN SOURCE HARDWARE:
Elements to master the microcontrollers allowing the design and implementation of concrete applications in Open Source Hardware,
- The architecture and operation of ATMEL AVR microcontrollers,
- Programming in the C and C++ language of the Arduino and IDE development environment,
- Creating his own libraries and programs,
- Creating its own human/machine interfaces: in Arduino / Processing, Android and python,
- The achievement of its own circuit boards (PCB + Eagle...)
- Board interfacing with various devices (displays, motors, sensors, Nunchuk, touch screens, I2C bus, wifi, Bluetooth LE ...)
- Intellectual property in open source hardware

REALIZATION OF AN ANDROID APPLICATION:
He will be able to create an ANDROID application to retrieve data from the graphite sensor.

REALIZATION OF A TEST BENCH ADAPTED TO THE SENSOR
He will be able to build a bench allowing characterizing in a optimal and reproducible way the electrical characteristics of the sensor.

REALIZATION OF THE SENSOR DATASHEET
Finally, he will realize the data sheet of the sensor realized.

Necessary prerequisites

Non-contractual information

Knowledge of Fortran, C and even C++
Knowledge of algorithmic

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

Toulouse