From the sensor to the test bench in open source hardware

ECTS
3 crédits

Hourly volume
92h

Introducing

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

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

Practical info

Location(s)

Toulouse