

Section Sciences et Ingénierie de l'environnement Design Project 2024 (semestre de printemps)

Proposition n°51

Development for Environmentally-Relevant Educational Scenarios with Arduino Kits

Partenaire externe ou laboratoire IIE

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Descriptif du projet

Embedded systems are important for environmental monitoring due to their efficiency, autonomy, cost-effectiveness, and adaptability. They enable accurate and continuous data collection in challenging climate conditions while supporting remote access and scalability. At DISAL, we have developed an Arduino kit for educational purposes, offering SIE students hands-on experience with embedded systems and sensing instrument programming; this educational Arduino kit currently includes an Arduino Mega board, a Zigbee-compliant Xbee module, light and humidity sensors, and an accelerometer. More recently, the Arduino kit has been extended with a Time-of-Flight distance sensor and a thermal anemometer. We strongly believe that the integration of Arduino kits, endowed with the rich set of sensing modalities above, into environmentally-focused applications is pivotal in stimulating the comprehension and development of embedded system approaches among SIE students. In order to evaluate and stimulate such educational potential, this proposal offers students the opportunity to develop pertinent environmentally-oriented scenarios using the Arduino kit, possibly resulting in valuable classroom-friendly exercises and course projects.

Objectif et buts

The general objective of this project is to develop educational applications for Arduino kits by leveraging existing hardware prototypes.

The students will:

- Propose relevant environmental use cases for Arduino kits.
- Develop the corresponding code for concretely demonstrate the use cases.

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Create classroom-friendly variants of the use cases in order to showcase the developed solutions and related scenarios in the context of a course.

Descriptif taches

The following tasks are part of this project:

- Students will familiarize themselves with the Arduino platform, gain proficiency in using available sensors and Arduino programming.

- Students will draw from the expertise acquired during their studies so far and propose practical applications of Arduino kits endowed with available sensors for educational purpose, focusing on environmental sensing.

- Students will program the Arduino kits to process the sensing data streams, and use the data for explore various use cases.

- Students will test the programmable sensing system within a scenario that can be conducted in a classroom-like environment (no field test) and showcase their work.

Divers

Students applying for these projects should be motivated to work with embedded system, sensing data processing, and Arduino programming.