

## Designing an Embedded Electronic Device for Gas Sensing

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Environmental monitoring, chemical leak detection, pollution monitoring, inspection of landfills, and search and rescue operations are the main applications of gas distribution mapping with autonomous systems. In this project we aim to design and test a small battery-operated electronic board equipped with at least one chemical sensor (e.g., MICS 5521) that is under an active sniffing pump, able to transmit the measurements to a computer server through a wireless WiFi link. Design modularity, interface compatibility with existing sensor network devices at DISAL, and energetic autonomy of the device will have to be carefully investigated and optimized.



In this project we propose to design a digital sensor board, which will consist of one or several sensors and a microcontroller to collect the data and transmit them to the node controller. The node controller is a wireless receiver/transmitter with possibility to connect

several sensor boards together, to take the data and to send them to the host machine (PC, mobile device, etc.). Designing of a user interface for a host machine is also a task of the project.

The sensor board must support one of the most wide-using standard interfaces (such as I2C, SPI, UART), perform simple data processing and provide convenient protocol to control the board. We also have to keep in mind the board's energy consumption making it as lower as possible.

The node controller must be able to link all sensor boards in one local network, to control them (according to demanding requirements), to receive data from all of them without any loss and to transmit to the host device via wireless networking. The module is also required to provide the sensor boards with autonomous power.

Also a user application for a host machine has to be developed in order to visualize the data for all nodes and sensors. Simple console will be developed first and then replaced by a GUI application.

The final prototype will be installed and tested in the DISAL's wind tunnel but an easy upgrade to outdoor operation should be considered from the beginning. The effort and expected outcomes of this work will be adjusted based on the type of project.

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