

Proposal of a Climate Change Mitigation tool implemented through an Integrated and Resilient System (IRS) to monitor and measure operation variables for Natural Depuration Systems for livestock farm wastewater effluents in islands and isolated territories.

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Introduction

In Gran Canaria there is a territorial concentration of the livestock census. This means that excess discharge of slurry can have an impact on the environment, altering the balance of soil and water, or improving air quality due to the generation of GHG and undesirable odors, making proper management vital of the manures. Especially, slurry of pig origin are the ones that present the most problems when it comes to correctly managing said waste.

Objective

Design an instrumental system to observe or estimate the operating variables of the NDS, as well as the energy resources available in the area, using Arduino technology.



Figure 1. NDS in a pig farm in Gran Canaria.

Methodology

Has been proposed an Integrated and Resilient System (IRS) to measure the variables through low-cost and open-hardware (sensors, data loggers, control systems, ...) technology, and applying IoT strategies to share, and analysis the information collected using Arduino technology and low-cost sensors, storing the data taken in the cloud.

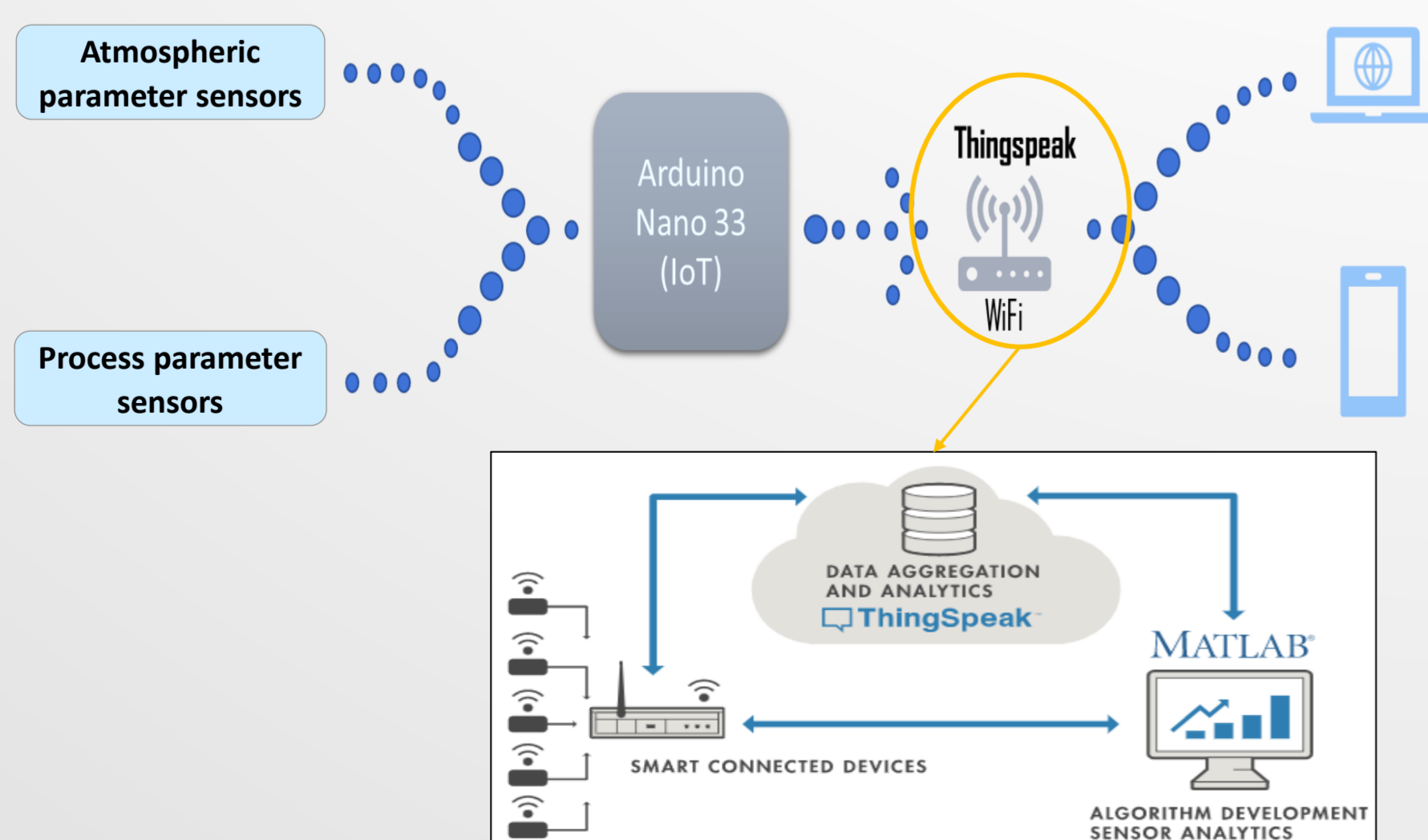


Figure 2. Generic Diagram of System.

Results and Discussion

BME280 Sensor	ML8511 Sensor	TSL2561 Sensor
Temperature, relative humidity, atmospheric pressure and altitude	UV-A, UV-B radiation	Light intensity and VIS-IR spectrum
Digital interface: I2C, I2C	Analog output	Digital interface: I2C

Figure 3. Atmospheric parameter sensors.

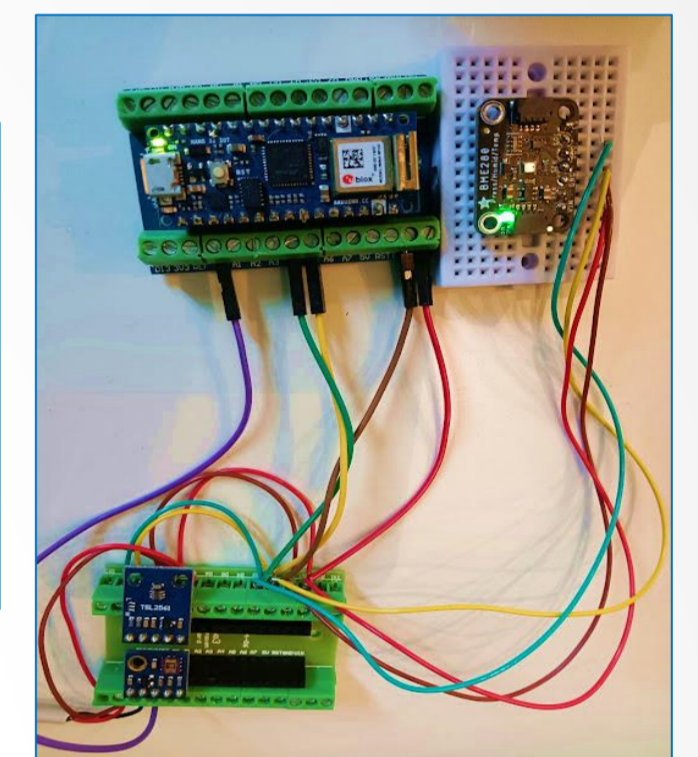


Figure 4. Measurement system assembly.

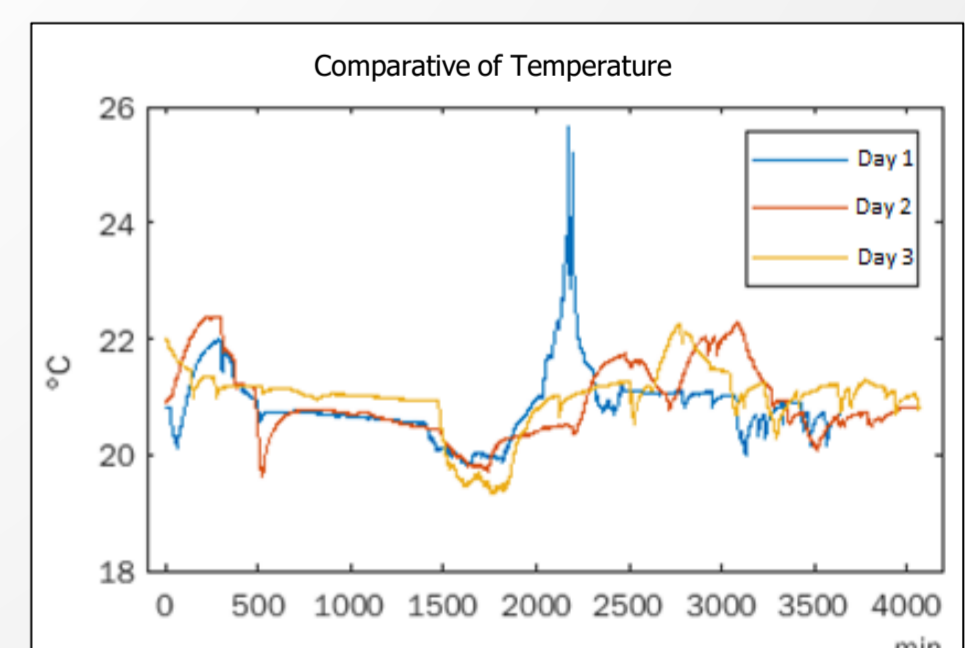
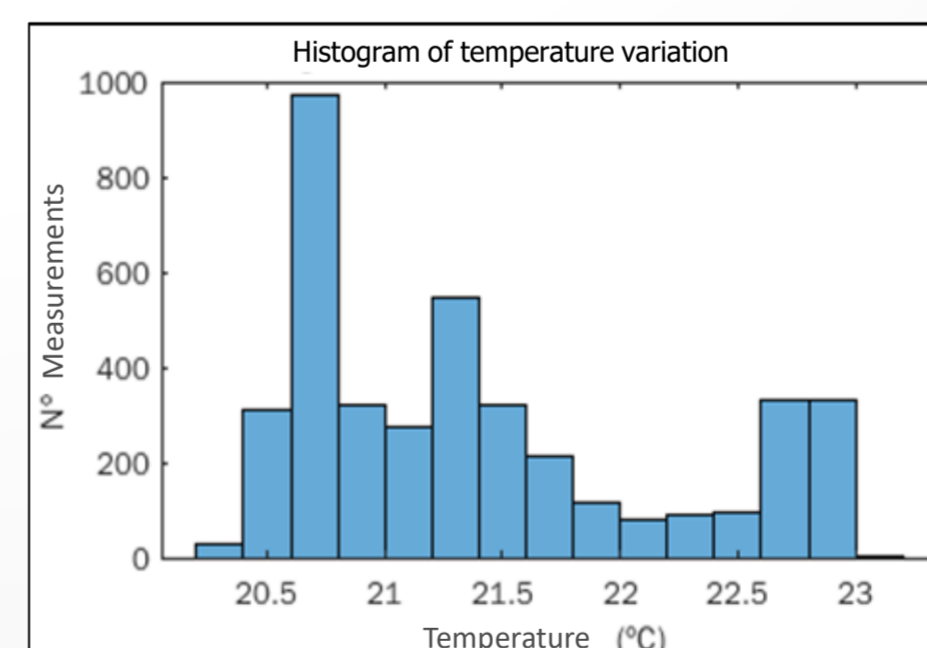
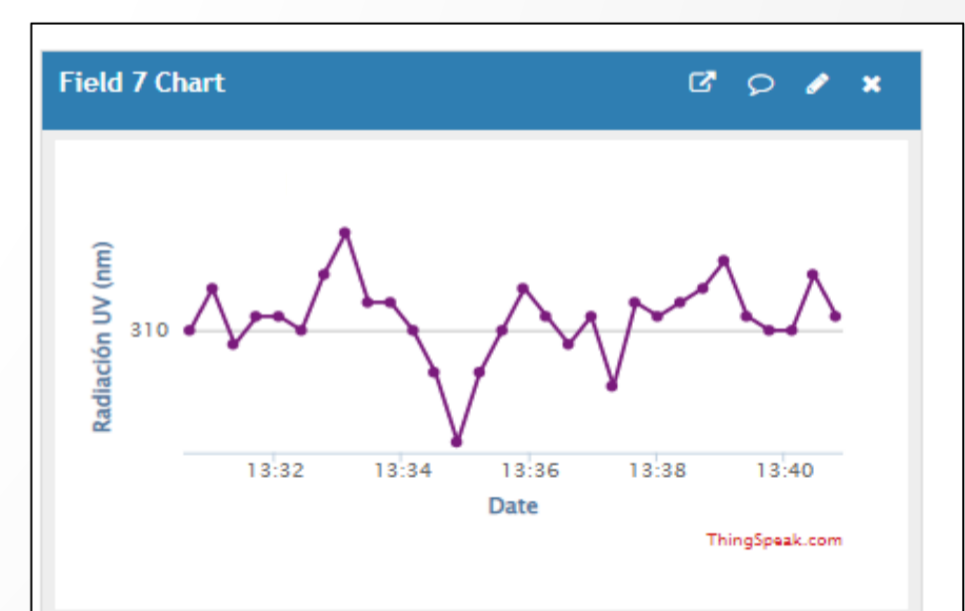
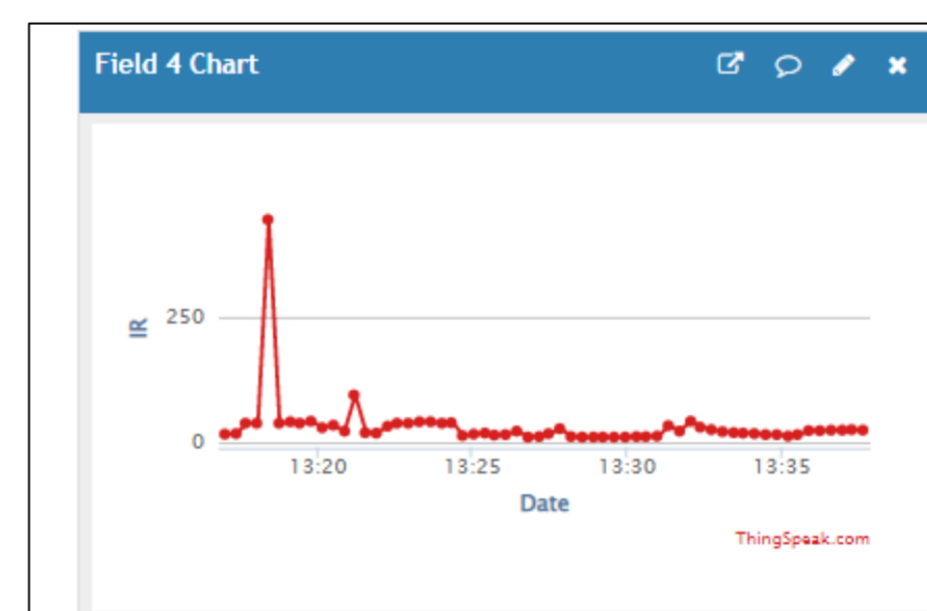
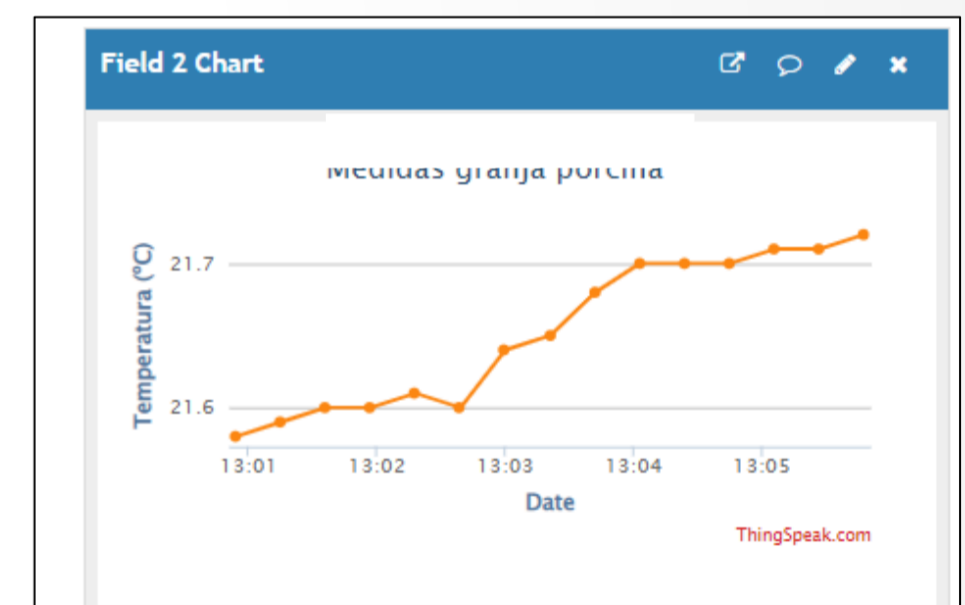
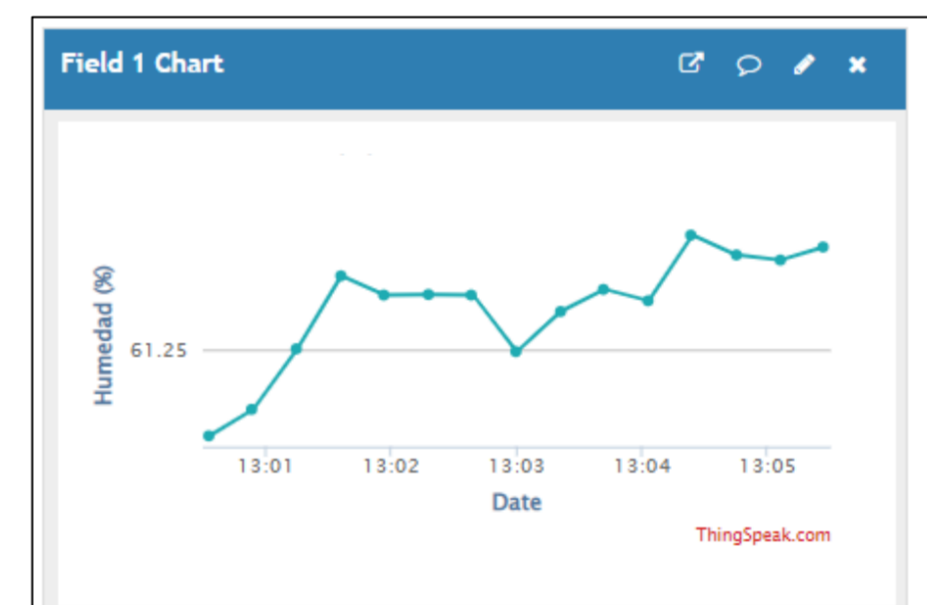


Figure 5. Results.

Conclusions

The study has shown that it is a suitable option to monitor, control or acquire data on natural purification systems with adequate precision at low cost. Being able to view them from anywhere thanks to the connection to the cloud.

In addition, renewable energies are presented as a real option to provide autonomy to these systems and/or improve the operation of the plant. including the possible use of potentially renewable gases (biomethane, H₂, ...) produced by the anaerobic digestion of the NDS.