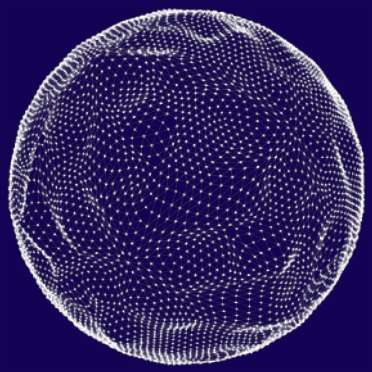


SNIFFIRDRONE

Drone-based air pollution mapping for environmental monitoring and improvement of quality of life

PUBLIC SUMMARY

Air pollution is a raising global concern due to its long-term environmental and health impacts. The main sources for environmental pollution are related to a range of human activities, such as waste treatments, agriculture, traffic and industrial processing. In particular, the gas emissions of waste water treatment plants (WWTP) occasionally generates episodes of unpleasant odours that are often related to toxic gases (e.g. H2S) that may affect the health of plan operators.

Furthermore, these occasional emissions have a negative impact in the welfare of neighbouring populations. The mitigation of these episodes is very limited due to the difficulty and cost of monitoring these odours as well as the complexity of predicting when they will occur. In this project, we propose to build and demonstrate a drone-based system to monitor the air pollution emitted by WWTP to the environment.

The project builds upon the results and expertise obtained in three phase 1 ATTRACT projects: SNIFFDRONE, IRPHOTONANOSILI, and 3DMETA. The main objectives of this project are the following.

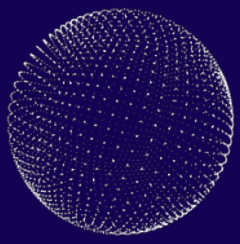
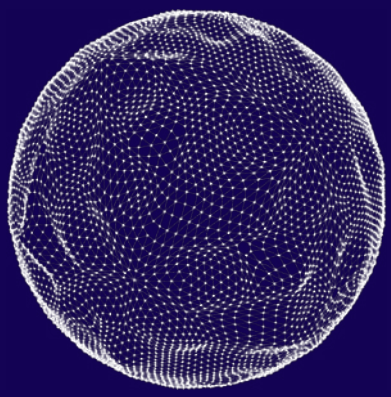
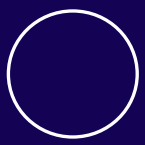
First, to develop and build a new generation multi-gas sensing system with advanced sensing capabilities for the measurement of H2S, CH4, CO2, SO2. To build this sensor, we will exploit the latest advances in infrared optoelectronics and nanotechnology.

Second, to generate real-time highly dense 3D pollution maps of WWTP emissions. The high-speed measurements of the NDIR sensor (response time < 5ms) will allow the drone-base system, flying at a relative fast speed of 5m/s, to generate an unprecedented dense 3D grid with 0,25m distance between measurements.

Third, to generate real time 3D odour maps of WWTP emissions that, to the best of our knowledge, has been never done before in industrial plants. The subjective perception of the odour is what represents a nuisance for the population and this has no easy correlation with the use only of highly specific gas detectors as the NDIR unit. For this reason, we will complement the NDIR unit readings with those of a custom e-nose integrated also into the drone. We will train a machine learning algorithm to predict the hedonic tone and/or the odour intensity from the e-nose and the NDIR unit readings.

Fourth, it is a strong commitment of this project to bring the developed technologies to TRL 7. With this objective in mind, we will demonstrate the advanced pollution and odour monitoring capabilities of the drone-based system in a number of measurement campaigns in a WWTP. The flexibility of the system will be validated also measuring the emissions of a composting plant. The NDIR-based sensing unit will be demonstrated as well with the pollution emissions of a WWTP.

As a final note, highlight that the route to the market of the instruments developed in this project (dronebased system and NDIR sensing unit) will be highly facilitated by the industrial partners of our consortium DAM and GSS.

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