

## HEALTHCARE SURVEILLANCE FOR POULTRY FARMING USING A SMART NOSE

### PROJECT INTRODUCTION

In livestock farming, especially poultry, the large-scale production and high efficiency requirements make animals very vulnerable to infections. Society demands better care of animals, for example, poultry should get more space with access to an outdoor range. Antimicrobials in animal feed must be reduced, because it can harm the health of humans. Biological poultry farming offers this kind of animal welfare, but the high risk of infections prevents biological farming to become truly successful. Biological poultry farming requires the detection of infections and diseases in an early stage at low cost. The farmer and veterinarian can be notified immediately to intervene and to stop the spreading of the infection. Such surveillance system does not exist yet. A Dutch national research project has been initiated to develop a *smart nose* that can smell infections in an early stage that would make biological poultry farming successful.



This assignment is part of a large-scale project, *OBSeRVeD – Odour Based Selective Recognition of Veterinary Diseases*, in which Dutch research institutes participate and contribute to developing a *smart nose* for poultry farming. Special air sniffing sensors are being developed by Saxion research groups and other universities. The air is analysed to detect infections and other anomalies using intelligent algorithms. Within Saxion, the research group of Ambient Intelligence (AMI) contributes in developing an ICT platform that measures the air in the field, provides participants the sensor data via the cloud and researches Artificial Intelligence to detect infections. This ICT platform involves sensor technology, embedded systems, Artificial Intelligence, Machine Learning, Internet of Things and the cloud.

### ASSIGNMENT OBJECTIVES

The aim of this assignment is to develop an IoT platform that connects sensors to cloud services. The sensor data will be stored in the cloud and therefore the data will be available to the participants in the OBSeRVeD project. The participants will analyse the data and design intelligent data processing algorithms. This platform contributes to ongoing research and experiments.

The assignment task will include, but are not limited to:

- Investigate the state of art of IoT technologies, e.g. edge computing, cybersecurity, RESTfull api and a cloud-based infrastructure which connects all participants to the sensor-unit(s).
- Design and implement a prototype of a wireless sensor-unit (mobile IoT device).
- Design and implement a dashboard application that displays the data (monitoring) and enables configuration of the sensor-unit(s). This requires a reliable and robust protocol between the dashboard and the sensor-unit(s). Multiple dashboard applications can run at the same time.

Some of these tasks are carried out in association with departments of other institutes.

The emphasis is to develop a real-time, secure, reliable, robust and scalable IoT platform that is flexible in many ways, such as:

- Low-power, low-cost, small-size and mobile sensor-unit.
- Connecting multiple sensors per sensor-unit.
- Up to high data rate and real-time (edge) processing.
- Remotely configurable and adaptable.
- Scalable to a grid of multiple sensor-units.

The student can define his/her own assignment according to the project requirements, personal preferences and interest, and internship requirements. Aml and the education coordinator must approve the assignment. The team of students will be working on different and perhaps overlapping subjects using an Agile development methodology and an applied research method.

The assignment will be carried out at the Ambient Intelligence research group, under the regular supervision of a researcher. The research will be carried out at the Ambient Intelligence lab in Enschede.

### **PRACTICAL INFORMATION**

**Student profile:** from HBO-ICT, ACS or EE with knowledge in embedded software C/C++, IoT solutions, wireless technologies and passion to developed embedded systems for real applications.

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