

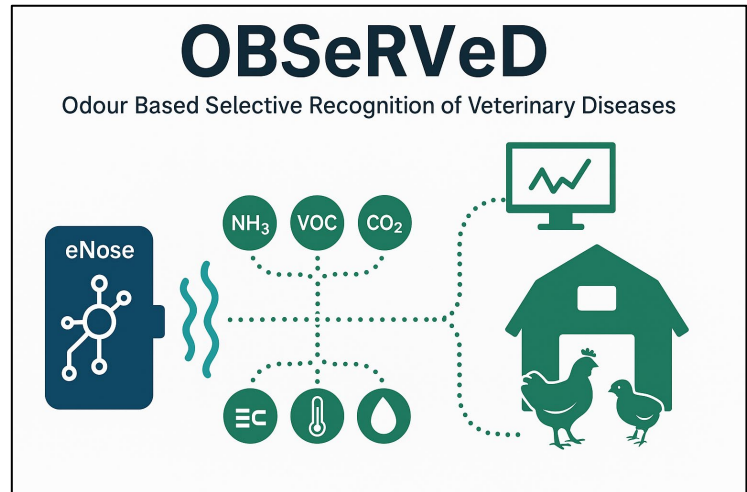
STUDENT ASSIGN - DIGITALTWIN MODELLING OF VOCs FOR SYNTHETIC DATA GENERATION DISEASE

PROJECT INTRODUCTION

This assignment is part of the OBSeRVeD project – Odour Based Selective Recognition of Veterinary Diseases – a national collaboration to develop smart sensor systems for early disease detection in poultry farming.

In modern livestock systems, animals are highly vulnerable to infections due to high-density housing and minimal antibiotic use. The goal of OBSeRVeD is to enable early detection of such infections using “smart nose” technology—sensor arrays that measure air quality (e.g., VOCs, NH₃) and use AI to identify disease indicators.

Within this context, the assignment focuses on creating a **Digital Twin** model that simulates VOC sensor data in both healthy and disease-affected poultry barn conditions. The synthetic data helps pre-train AI models used in detection systems and supports CRISP-DM-based development of digital monitoring platforms.



STUDENT TASKS

- Literature & Tooling Scan
 - Explore existing digital twin models in agri-tech and VOC simulation techniques.
 - Summarize tools used for sensor signal generation and AI model testing.
- Digital Twin Simulation Development
 - Build a Python-based model that generates time-series VOC data (normal vs. disease scenarios).
 - Include key parameters such as animal count, barn type, airflow, and temperature.
- Output Structuring & Integration
 - Export simulated data in standard formats (e.g., CSV) ready for ML pipelines.
 - Ensure alignment with OBSeRVeD farm models and allow future extension or integration.
- Documentation & Reporting
 - Document system design and simulation logic clearly.
 - Describe how the output fits into CRISP-DM and potential usage by researchers.

PRACTICAL INFORMATION

Student profile: For HBO/UTwente students interested in IoT, simulations, Python, and CRISP-DM. A proactive attitude is key. Affinity with agri-tech or poultry health is a plus.

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