

## Project Title

AI for Smart Farming: Detecting and Identifying Cattle from Drone Images

## Lead Supervisor

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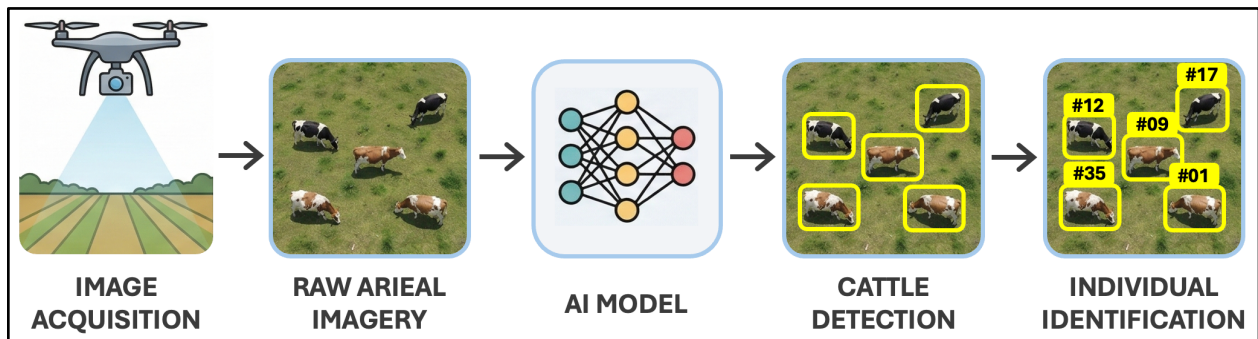


Figure 1: AI pipeline for detecting and identifying cattle from drone imagery.

## Context and Project Goals

Advances in computer vision and machine learning are creating new opportunities for smart farming and livestock management. In particular, drone imagery can provide valuable information for monitoring cattle, supporting applications such as population monitoring, behavioural analysis, and farm management. However, automatically detecting and identifying cattle in aerial images remains challenging due to variations in viewpoint, lighting, occlusion, and visual appearance. As illustrated in **Figure 1**, this project explores how artificial intelligence can be used to analyse drone images and build an automated pipeline for cattle detection and identification using real-world agricultural datasets.

During the internship, the student will gain hands-on experience with core machine learning workflows, including data preparation, model training, and evaluation. The project is scoped around existing datasets and baseline methods, enabling the student to focus on building and testing a prototype pipeline for cattle detection and identification. The work will progress through a clear sequence of stages: familiarisation with the dataset and baseline methods, development of the prototype pipeline, and evaluation on real-world agricultural image data. This structure allows the student to develop and evaluate a working prototype within the eight-week internship period, while gaining practical experience in applying computer vision to a clearly defined smart farming task.

## Computational Aspects and the Role of HPC

The project involves computationally intensive machine learning workflows, including training and evaluating deep neural networks for object detection and visual recognition. These tasks require processing large collections of high-resolution aerial images and performing repeated optimisation of model parameters during training.

High Performance Computing (HPC) resources will therefore play an important role in enabling efficient experimentation. Access to GPU-enabled computing infrastructure will allow the student to train deep learning models on large image datasets, perform model evaluation at scale, and explore different model architectures within the limited time frame of the internship. Using HPC resources will make it possible to run training and evaluation experiments efficiently within the eight-week project period and compare multiple model configurations that would be difficult to explore on standard desktop hardware.