PROG5120 – Programming for Artificial Intelligence
Project Proposal

Students:

Sanjeev Sharma
Benjamin Chafe
Emeka Eruokwu

Project Title
Python Edge-AI Control System for PIR-Triggered Wildlife Warning Sign.

Project Overview
This project focuses on building the Python-based control system for the wildlife warning unit. A PIR sensor detects motion, triggering the camera to capture an image that is fed to the ML model produced in the PROG5155 project. If wildlife is detected, a flashing beacon is activated. The system architecture is designed so that in future versions, detection events may be sent to a central server using MQTT, but MQTT integration is not required for the current project.

Objectives
Integrate a PIR sensor using Python GPIO.

- Capture images only when triggered by PIR motion.
- Run ML inference using the model developed in the PROG5155 project.
- Implement decision logic with debouncing and IR night-mode handling.
- Control a flashing beacon via GPIO relay.
- Record detection events locally for testing.

Python/AI Programming Tasks
- Implement PIR event listener.
- Capture still images using the camera.
- Load ML model and perform inference.
- Implement edge-state machine for alert workflow.
- Add logging and error-handling mechanisms.
- Create demonstration using wildlife video or simulated triggers.

Expected Deliverables
Functional Python edge-AI control application.

- Working PIR ---> Capture --->Inference --->Beacon pipeline.
- Local event logging system.
- Demonstration script and documentation.

Future Enhancements

Future deployments may integrate MQTT to report wildlife detections, such as species, timestamp, and captured images to a central analytics server. This networking feature is not part of the current project scope.