



Test and capture rig for Telraam

Internship proposal

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Situation

For Telraam, we built an AI based traffic counting sensor. The sensor works based on a deep-learning object detection algorithm. We want to improve the accuracy of this algorithm in various circumstances, including circumstances with less-than-ideal lighting.

This is especially challenging because, as the Telraam devices need to be affordable, we cannot use an expensive camera that performs well in poor lighting conditions.

To support our work, we want to build an automated test rig that collects data and tests our algorithm in various lighting conditions, using the exact same camera we will use on the final device.

The selected camera is intended for microcontroller applications and can not be driven by USB or a common interface.

The project

PRIMARY GOAL: AUTOMATED TEST RIG

As an intern, you will be responsible for building the full test rig, which will be a battery powered device that can be mounted on a (4m high) tripod. The project will include:

- A raspberry pi or similar computer that will drive the data collection and upload results to the cloud.
- A microcontroller that drives the camera and communicates with the raspberry pi.
- A (3D printed) plastic enclosure mounted on a tripod (using iso thread) keeping everything stable and offering some protection from weather

SECONDARY GOAL: AN ITERATION ON THE MODEL

We will collect a dataset with the test devices and use them to do an iteration on the ML model, and try to come up with an improved version.

For this, we will:

- Test the existing model on the newly captured data to find areas where improvement can be made.
- Select footage and create a dataset for training / improving on the model. For data annotation, we will likely rely on a specialized firm.
- Train a new version of the model and evaluate its performance.

What you will learn

- Working with a raspberry pi and writing (python) software to automate tasks such as initializing a microcontroller, capturing data and upload to the cloud.
- Working with embedded systems (embedded linux on the raspberry pi, and microcontroller firmware for the camera)
- Designing and 3D-printing a basic enclosure for the test rig.
- Data selection, annotation and model training for a computer-vision deep learning model.

What we expect

- Proficiency in Python.
- Experience working in a Linux environment.
- Knowledge of the theory behind, and experience in applying the concepts of Machine Learning.
- Eager to learn and can easily pick up new skills.