Open Thesis / Project

Embedded Control for Improved Pollen Detection and Classification

Motivation

Automatic pollen sensing is important to understand the local distribution of pollen in urban environments and to give personalized advice to the citizens suffering from seasonal pollen allergies to help milder the symptoms. We built an automated pollen measurement system based on low-cost transmitted light microscope technology (see pictures below and read the publication cited at the bottom of the page). We now wish to optimize the system operation while minimizing computational resources necessary to run pollen detection and classification models locally. You will control the focal plane of the camera module in real time to improve the outcome of the pollen identification models and minimize the amount of data to be processed. **Interested? Contact us for more details!**

Target Group

Students in ICE and Computer Science.

Thesis Type

Master Project / Master Thesis.
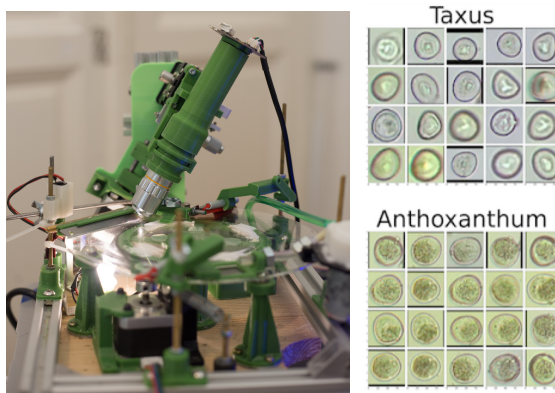
Pollen sensing system (left) and sample microscopic images of pollen (right). See: N. Cao et. al, Automated Pollen Detection with an Affordable Technology, EWSN'20.

Goals and Tasks

In this project, you will optimize an automated pollen sensing system by adjusting the position of the microscope in real time. The microscope records videos of pollen grains which are processed on an AI-accelerator. We wish to duty-cycle the latter to minimize the system's energy consumption while optimizing system's performance. The project includes the following tasks:

- Literature review on control of the focus plane to improve the outcome of object detection and classification tasks.

- Given pollen identification models trained on library data, design an algorithm to predict and choose the focal plane setting to optimize system performance.

- Test your embedded control algorithm on a live system (remote access will be provided).

- Summarize the results in a written report.

Requirements / Skills:

- Experience with embedded systems and basic knowledge of deep learning models, creative thinking.

- Joy working with real systems and real data.

- Programming skills in Python.

Contact Person

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