

Adaptive LED frequency control for optimal plant growth

The aim of this project is to create an environment for plant growth where photosynthesis is monitored and helped by correctly adjusting the light frequencies of LED. To accomplish this goal, it's important that the environment is isolated and conducive to growth.

In general, I'd like this project to focus on the practical work with experiments and construction. I'm very interested in the implications of a system like this working on a small scale, and I think the practical process here could be as important as the theory behind it.

Methods:

A neural network searches for the optimal LED frequency by considering different factors in the environment, such as

- carbon dioxide
- humidity
- outside light
- soil

Arduino will be used to implement the search and control the mechanical components of the environment. The electronics portion of the project is where I have the least experience, but it's also something that I'm very interested in learning how to utilize.

Implementing the search algorithm itself will mean modelling photosynthesis, and possibly acquiring some intuition about the domain of biology. The machine learning part of the project is something I'm currently taking courses to become more proficient with, so I imagine it's a good idea to focus on that during the fall semester of 2017.

Tentative progress plan:

Spring 2017 (10 ECTS):

I'd like to focus on the construction of the environment during the first semester. This entails design and implementation of the environment; getting the mechanical components to work (automatic air dampers), understanding sensor data, and considering what goes into the input vector for the search algorithm. Also decide on what type of plant to use and why.

Fall 2017 (20 ECTS):

Hopefully already have a working environment and be proficient in with its facets. If not, I'd like to finish that, and tweak it as needed. Mainly, I'd want to conduct an actual experiment (or more, if possible) over the semester, record results and tweak the search algorithm. Possibly I'll have some result, and write about them.

Spring 2018 (30 ECTS):

What I do this semester will depend heavily on how the previous semesters went, but I hope to have enough material at this point to write something worthwhile.