

Introducing the Magnitude.io Open Source ExoLab

A Networked and Instrumented Growth Chamber



The Magnitude.io ExoLab is a STEM education program that provides a hands-on, project-based learning experience where students can conduct plant biology experiments in a specialized growth chamber, the ExoLab, and compare their results with similar experiments conducted concurrently by students all over the world.

The 3D printed ExoLab growth chamber contains a programmable 64 element LED array for lighting, sensors for measuring temperature, humidity, carbon dioxide, and light intensity, as well as a camera that periodically takes pictures of the seedlings growth over the course of the experiment.

While the software implementation enables interfacing to the Magnitude.io network which requires a license, it can also be used standalone or with Adafruit.io, a web-based platform for storing and visualizing data. Configuration parameters for lighting and timings are stored on the SD card in an editable JSON file, data measurements in a CSV file, and JPG images in a folder. In this implementation, images can also be stored on Amazon Web Services (S3) using a free account. Software is coded in Python with the appropriate Adafruit and Raspberry libraries.

The project files (software, hardware and enclosure STL) can be found on Github at:
<https://github.com/FredricRaab/ExoLab>

Information regarding Magnitude.io can be found on their website: <https://magnitude.io/>

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