Automated Plant Nursery and Greenhouse

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Abstract

This capstone project sought to automate a self enclosed plant nursery in an unheated greenhouse. This poster discusses the process and methods used to accomplish this task, the design of the user interface, and the logic behind the control parameters.

Introduction

Seeds require certain environmental conditions in order to germinate. While they are seedling they are very susceptible to stressors and are very vulnerable. In order to create the proper conditions for seedlings in an unheated greenhouse this project included the construction of an enclosed structure to allow for climate control. In order to operate the pumps, valves, heaters, fans, and vents, this project also included wiring of relays. A Raspberry Pi was chosen to facilitate the physical inputs and outputs and also act as a web server. A web based user interface was developed to allow a registered user to track environmental variables and also adjust desired setpoints. Technologies used include:
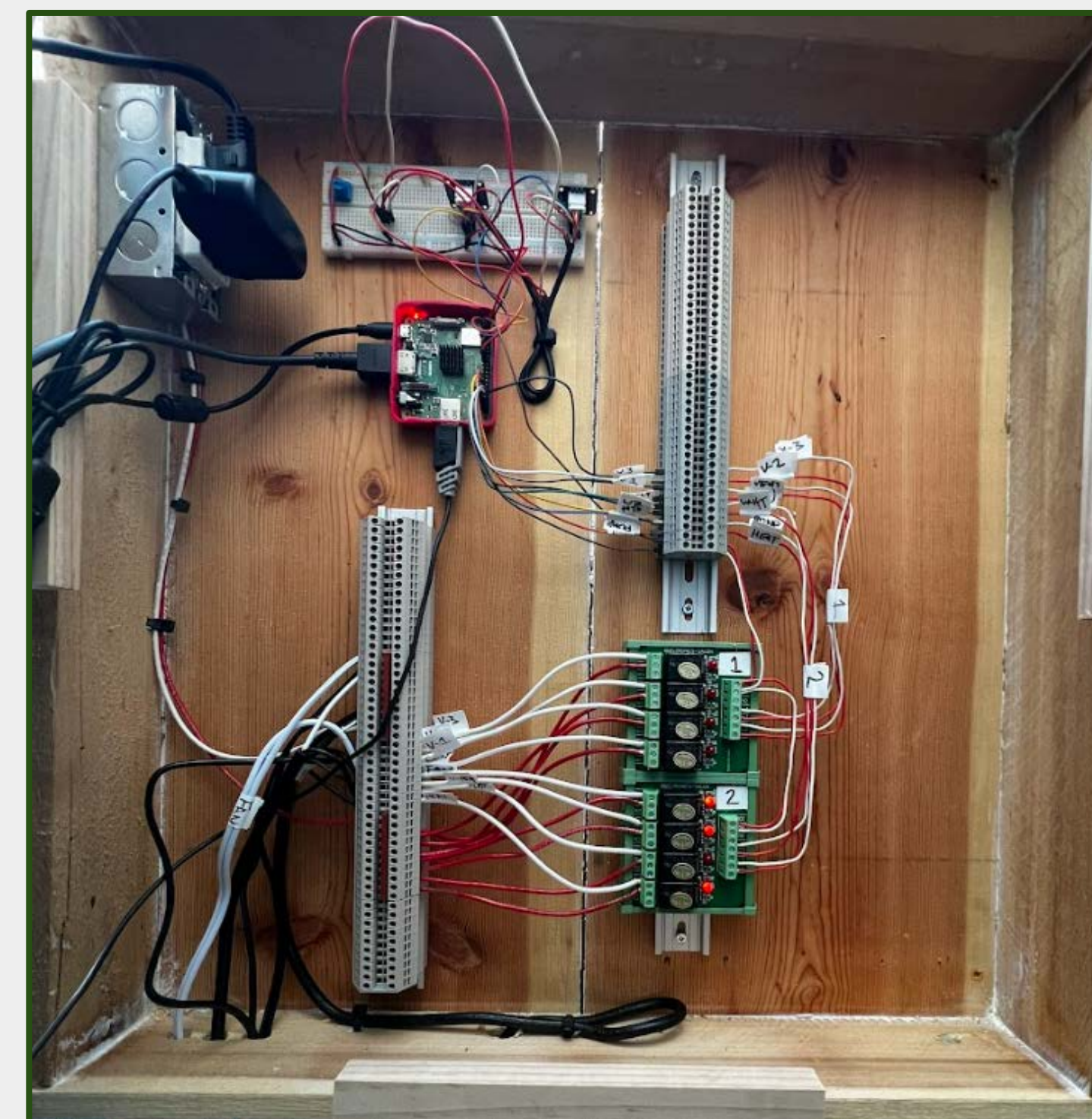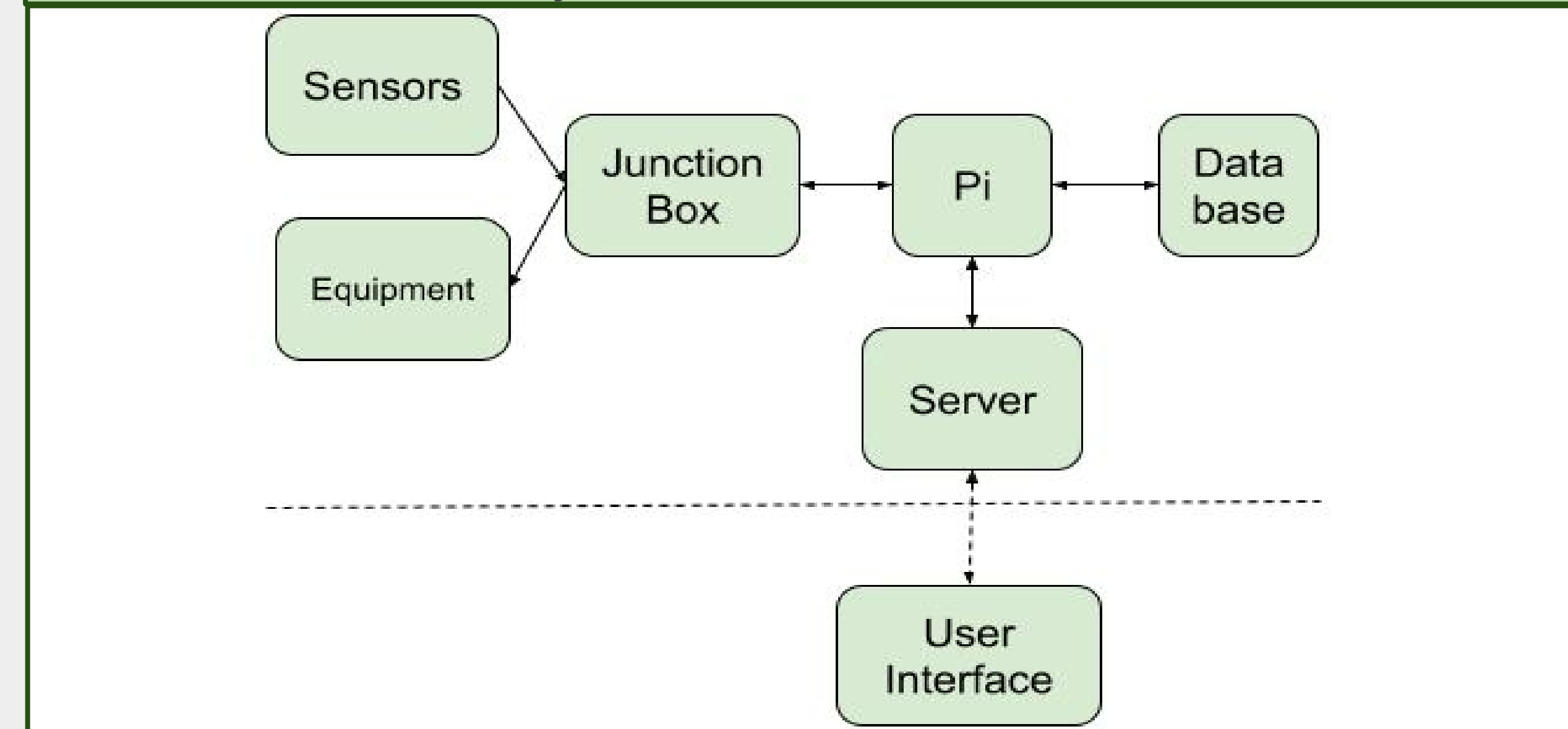
django
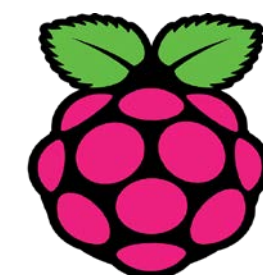
Information

Repository: https://github.com/marshallpratt1/midnightsprouts
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System Architecture

Results

The automated nursery has a single web page that offers all user interface. It accesses the database to populate charts for quick visualization of environmental variables, allowing a user to easily see if any control parameters are not being upheld.
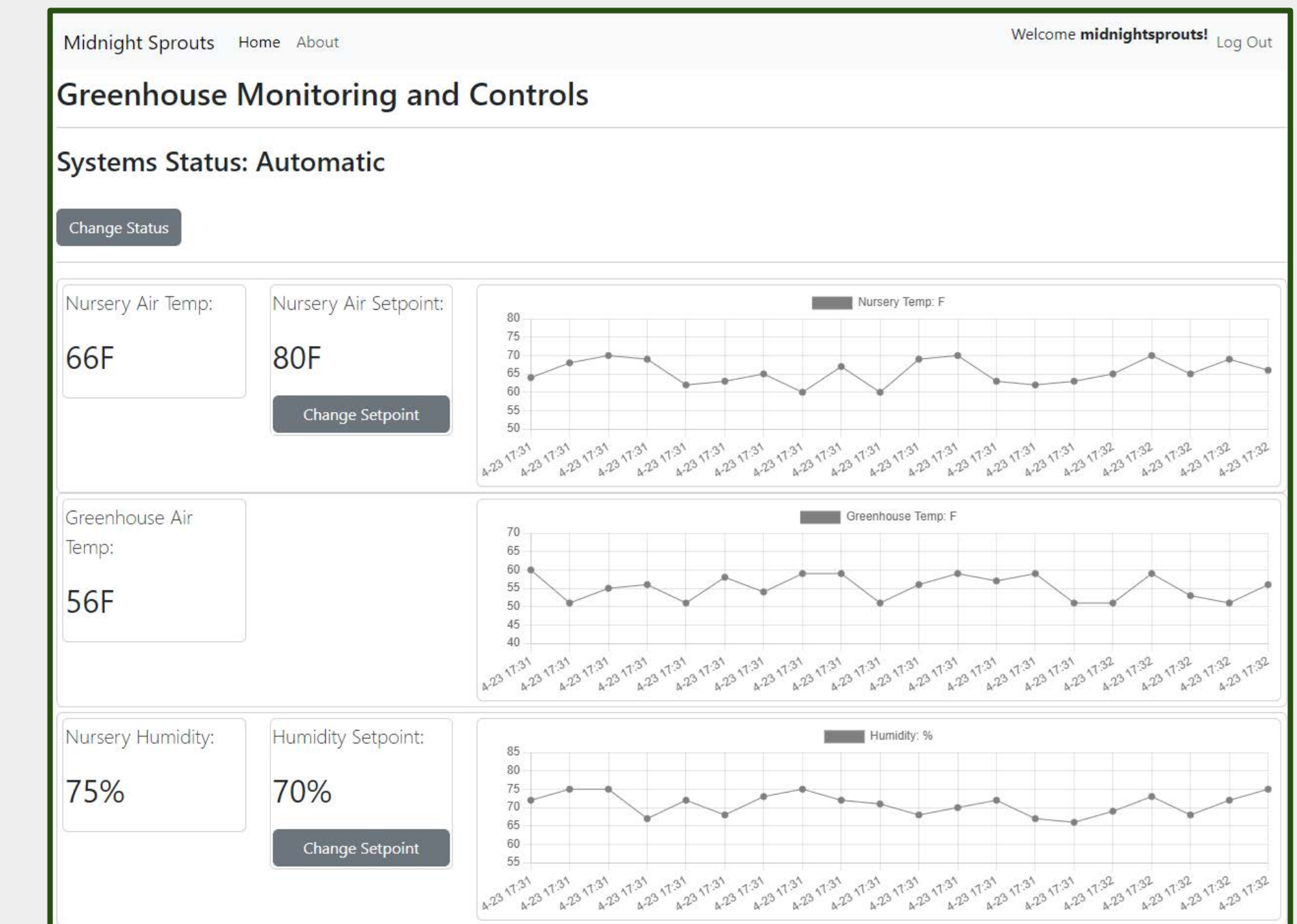
Discussion

Automation of daily responsibilities helps build efficiency, frees up individuals for other tasks, and ensures tasks with a schedule are accomplished exactly on a timetable. This lends perfectly to starting seedlings in a cold environment, where environmental controls are a necessity. By reducing the work barrier to growing food, this project hopes to help boost access to local and nutritious food. This control scheme can easily be scaled to allow for year round hydroponically grown produce.

Conclusions

Web based automation using a Raspberry Pi as a server provides some challenges, but it offers a standalone solution that is easily scalable and resilient.