Introduction

I enjoy being able to garden and grow my own vegetables. However, with all that I have going on in life sometimes it is hard to find the time to give them the proper care that they need to grow. I think that the skills that I have learned in this class have given me the ability to solve this problem. I want to use my Raspberry Pi to develop a system that will be able to take temperature readings, light level readings, moisture level readings, and water the plant when it is necessary.

Project Requirements

Software: For the software side of things, I plan to turn my Raspberry Pi into a Linux, Apache, MySQL, PHP server, otherwise known as a LAMP server. Therefore, I plan to use a simple Python script to gather information from all my sensors and water the plant if the moisture level indicates that it is necessary. Crontab will be used to run this simple script at the beginning of every hour. The script will push all the data gathered during the execution to a MySQL (MariaDB is the actual version being used, it is a fork from MySQL) database, also running on the Pi. Apache2 will be installed on my device to run a webserver to display all my information, and it will be accessible from the internet. This webpage will use the previously mentioned database to show the most recent readings from all sensors, as well as have the functionality to perform readings from specific sensors on demand.

Hardware: On the hardware side, I have several sensors and actuators that I plan to use to complete these tasks. Like my projects previously, I will be making use of the waterproof DS18B20 temperature sensor to gather temperature readings. I will also be using an HW-080 resistive moisture sensor to detect moisture levels in the plant soil. A simple photoresistor will be used in conjunction with an ADC module to read light levels in the same area as the plant. A OV5647 (model B0033) 5MP camera module will be used to take a picture of the plants progress every time the automatic script is called. Lastly, a relay HAT will be installed on the Pi with three individual relays which will control the following: an EK1893 submersible water pump, a ZE-4F180 12V solenoid valve, and the previously mentioned moisture sensor (powered on by the relay to prevent fast corrosion due to constant power).

Flow of Operation

At the top of every hour, crontab will run my automated python script. The script will take a picture and save it within the file structure of my Apache server with the current date as the filename. A copy of the new image will also be made with the name of “recent” which will be overwritten on every run and will be used to display the most recent image on the web server. After the picture is taken, the moisture level, temperature, and light level will all be polled, and current values will be stored in the database. If the soil moisture level is not past the threshold set, the relays will send power to the pump and solenoid valve so that the plant is given more water.

On the Apache server, which can be accessed from the internet outside of the local network, the landing page will display the most recent data from each sensor and the most current picture all of which will be pulled from the database. If a more recent reading is required, there will be a button to request the Pi to take a reading individually for each respective sensor. There will also be a navigation bar that will allow you to view every reading in the database for each respective sensor, as well as a gallery to view every image that has been taken of the plant.