iCubator

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https://github.com/anuvgupta/iCubator

Overview

iCubator is a smart plant incubation environment that monitors and controls soil moisture, soil pH, air humidity, sunlight levels, and other significant factors contributing to plant growth via an IoT device and a web control panel. Metrics obtained by sensors are used to give vital information to the user, and also to recalibrate the environment to promote plant growth. User input about the outward appearance of their plant is also used to determine how much influence the automated system should have over the environment.

Context and goals

Managing one's own plants and growing one's own produce, while a financially and emotionally rewarding/satisfying experience on its own, can be a time-consuming and painstaking process in the midst of national health crises such as the present. The iCubator minimizes the amount of labor required by the user to maintain his or her environment while also providing detailed insight into otherwise obscure details about the plant.

Priorities for making iCubator:

Priority 0 (MVP): Measure soil moisture for a single plant, water plant based on metrics, and report data to a server that displays data on a basic web frontend.

Priority 1: Create a user-friendly app interface, and allow the user to set a desired moisture level for the plant's soil.

Priority 2: Add authentication and account management.

Priority 3: Add the ability to manage multiple iCubator environments from one account.

Priority 4: Expand to more metrics including soil pH, sunlight levels, & air humidity.

Priority 5: Modify the amount of influence the system has over the plant environment based on user input about the outward appearance of the plant.

Priority 6: Add social media sharing functions.

Priority 7: Use weather data to modify sunlight conditions via motorized curtain/shades.

Priority 8: Incorporate Machine Learning analysis of solid moisture and user input.

Proposed solution

Backend: Node.js web server & websocket server.

Frontend: Basic user interface with login page, iCubator devices page, modify iCubator environment settings.

Devices: Arduino connected to ESP8266 via serial. Arduino connected to moisture sensor, pH sensor, motors, pumps, etc. ESP8266 connected to Node.js server via websocket client.

Resources

Look into water delivery technologies (pump, motorized cup).
Research machine learning techniques.

Timeline

Week 1:

All members - Team formation and project ideation

Week 2:

All members - Fleshing out idea and writing this design doc

Week 3:

All members - Start working on learning relevant technologies & buy parts

Week 4:

Jack & Rohan - Learn JavaScript & Node.js

Deeps & Anuv - Learn about Machine Learning

Week 5:

Jack & Anuv - Create the server framework

Deeps & Rohan - Develop basic user interface framework and reading Arduino sensor feedback

Week 6:

All Members - Midpoint review. Evaluate the progress you've made so far and where you thought you would be. Revisit goals based on this progress and make changes to the team and project if necessary. Possible game night.

Week 7:

Jack & Deeps - Incorporate social media platform into design

Anuv & Rohan - Work on ESP8266 client & connecting device to the server

Week 8:

Jack & Anuv- Research and develop pH control

Deeps & Rohan - Research and develop sunlight control

Week 9:

Jack & Anuv - Incorporate ML analytics into moisture control

Deeps & Rohan - Incorporate weather data into sunlight control

Week 10:

All members: meet & assemble & test the device

Week 11:

All members - Finish up the project and put it on devpost. Put everything on the Devpost and make a video demo

Week 12:

All members - Reflect on how the project went and discuss how your team would like to continue with the project