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Brief

To create a system which utilises microprocessors to retain a controlled environment which permits the growth of plants. The product should be able to optimise the environment for a multitude of plant species. The product will have easily adjustable conditions through the use of an intuitive user interface. The processor will adjust humidity (air), moisture (soil), UV light and temperature and read these levels - with the exception of light levels - in attempts to maintain a controlled environment which permits an efficient and quick growth of the plant.

Overview

We will be designing and building a compartment which utilises an Arduino microprocessor to adjust its internal environment making it suitable for the growth of plants. The microprocessor will read data gathered from sensors such as moisture levels, and temperature, then utilise this data in creating a negative feedback loop to control these values. These values will be able to be adjusted through systems such as a gravity feeder, and fan system. The desired temperature, brightness, and moisture levels can be adjusted through a Windows application, which will be designed and built using Visual Studios IDE and compiler. The application will utilise computer serial ports to communicate information to the Arduino, about the desired values which the microprocessor will try to reach through utilising its systems in a negative feedback loop. Due to the use of serial communications a USB port and connecting wire will be required on all devices which utilise this application.

Due to limitations of the Arduino’s voltage output - limited at 5v - a relay will be utilised for the control of systems requiring a higher voltage, such as the solenoid valves. Due to this, two separate power sources will be needed in powering each device. A replaceable 9v battery will be utilised in the powering of each solenoid valve. This reduces the sustainability of our product, but is an unavoidable limitation, due to its required use of low voltage microprocessors.

Technologies

An Arduino Leonardo will be utilised for the control and reading of variables, due to its more precise controlling features such as pulse width modulation, in the controlling of fan speeds, and LED brightness. Due to limitations of Visual Studio Code, our application which modulates the Arduino will only be compatible with Windows operating systems, but this is so the text predictive features of Visual Studio can be utilised, as well as its easy control over serial ports - which are utilised in communication with the microprocessor.

Components that will be utilised throughout the project:

* **5v computer fan (2x)**
* **5v UV light/grow light (x4)**
* **Relay 5v 10A**
* **Liquid valve**
* **Temperature & humidity sensor**
* **Moisture sensor**