Automated Plant Growth System

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*Sponsors:*  
None at this time

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I. **Project Description**

Our Project is originated from the concern of food consumption for future generations. If we are able to optimize and control growth of certain plants we can have a predetermined solution for problems we know will arise with the population growth.

What we plan to do is build a system that can take seeds and maximize plant growth in an enclosed system. We would like to be able to have a system that we can access our plant from anywhere in the world via internet. When you log on to view your plant, our online access point will allow you to adjust certain settings if you wish to do so. Some of the adjustable elements would include water output, and light intensity. Along with regulating these outputs, we would like to also be able to see vital elements of the plant. Temperature, humidity levels, air pollution, growth statistics, visual feed as well as a time lapse of the plants life should be able to be seen online.

If we could take the average statistics of a selected plants growth and yield and compare the same seed in our system and have it yield at least a twenty percent increase then the natural methods we believe we would have proven our system is functional.
Requirements

1. The system shall utilize a soilless, hydroponic environment.
2. The size of the system shall allow for small, above ground plants.
3. The system shall have a sensor which measures and regulates the pH level of the feeding solution.
4. The system shall have a sensor which measures Temperature.
5. The system shall have a sensor which measures and regulates the level of the feeding solution.
6. The system shall have a sensor which measures the oxygen level in its surroundings.
7. The system shall have a sensor which measures the CO₂ level in its surroundings.
8. The system shall have a sensor which measures and regulates the light intensity and wavelength.
9. The system shall have a sensor which measures the conductivity of the feeding solution based on the nutrient content and regulated per the requirements of the plant species.
10. The system shall have a sensor which measures the relative humidity in its surroundings.
11. A software interface shall provide the following features:
   a. Real time graphical display of all measurements
   b. Historical analysis of sampled measurements
   c. Predefined database of growth characteristics which regulate growth of a given species
   d. Provide user defined time lapsed photos of plant
   e. Manual regulation of growth characteristics
12. A wireless interface shall be utilized to connect to the system via standard network protocols
13.

Specifications

1. Life cycle of plant should be documented in a collection of images so that from planted date to viewed day will be a 20 second video.
2. Plants should be selected within natural Floridian air and temperature.
3. System is Dome in structure. The dome should have a twenty inch radius at the center having the light source.
4. Light that is place in center should be measured for specific wavelength output for growth purpose.
5. Max height of the system should be with the respect to the bottom of the dome at thirty six inches from the ground

6. Light bulb placed in center

7. Light source should be 5-15 inches high pending plant lumen requirement

II. Block/Logic Diagrams

The general structure of our project will be a dome. The material that makes the structure of the dome is not as important as the lining of the dome itself. On the inside shell we will line it with a reflective surface so that the light that is at the center is optimized.

The four towers on either side will be in order to lift our structure. With this system we can maximize growth of smaller plants with a dropped dome. As plants grow, we are able to lift system up onto higher levels allowing light and watering system to elevate as plants stay on ground
minimize weight of the system. Our output pumps and light as well as the water all have to be elevated, it may not be wise to raise a large quantity of water. On the image below we see a Birdseye view of our routing of the pipes as well as the area where we will concentrate growth of the plant. It may be beneficial to place the legs of our system in the cross of the PVC pipe.

The growth area should be concentrated around the light itself. What we would like is for the light to be centered and raised with our dome. We believe that PVC pipes will be holding our systems water. Preferably a thinner pipe so as to
Internet flow chart

Live Video Feed –
• Responsible: Samael
• Status: Obtained/ To be researched

On screen Controls –
• Responsible: Desmond
• Status: To be programmed

Pumps –
• Responsible: Samael
• Status: To be purchased

Internet Connectivity–
• Responsible: Douglas
• Status: Research

Internet
→ Live video feed

Controls on screen → Water Levels → Light → Lamp intensity to set level

Pumps to turn on or off
Watering System
Water Tank/ Plant Feed Solution—
  • Responsible: Samael
  • Status: Research

Microcontroller –
  • Responsible: Desmond
  • Status: Research

Water pump control–
  • Responsible: Samael
  • Status: Research

Filter–
  • Responsible: Douglas
  • Status: Research

Data Transmission–
  • Responsible: Douglas
  • Status: Research

III. Budgeting/Finance
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<th>Item</th>
<th>Qty</th>
<th>Projected/Unit</th>
<th>Actual/Unit</th>
<th>Reproduction</th>
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