Project Title: Automated Control System for a Small-Scale Greenhouse

Group Number: 16 | Student Index Numbers: 200313P 200314U 200315A

1. **Introduction**

Greenhouse farming is an efficient and productive way of growing crops in a controlled environment. Maintaining proper temperature, lighting, and humidity levels are crucial to the success of greenhouse farming. In this project, we propose the development of an automated control system for a small-scale greenhouse box. The system will use Arduino and LabVIEW to monitor and control the temperature, lighting, and humidity levels in the greenhouse box.

2. **Objectives**

- To design and develop an automated control system for a small-scale greenhouse box using Arduino and LabVIEW.
- To monitor and control the temperature, lighting, and humidity levels in the greenhouse box.
- To ensure the optimal growth conditions for the plants in the greenhouse box.
- To create a user-friendly interface for controlling and monitoring the greenhouse box.

3.Proposed Methodology

- Design and Develop the Control System:

selecting and assembling the necessary hardware components (Arduino board, temperature sensor, humidity sensor, and lighting system.) We will also develop the LabVIEW program to interface with the hardware and control the environmental conditions in the greenhouse box.

- Calibration and Testing:

Once the control system is developed, we will calibrate the sensors to ensure accurate readings of temperature and humidity. We will also test the system to ensure it is functioning correctly and that the environmental conditions in the greenhouse box can be controlled as desired.

- Implementation and Data Collection:

After calibration and testing, we will implement the control system in the greenhouse box and begin collecting data on the environmental conditions. We will collect data on temperature, humidity, and lighting levels and use this data to evaluate the performance of the control system.

- Data Analysis and Optimization:

Using the data collected during implementation, we will analyze the performance of the control system and identify areas for optimization. We will then adjust the system to optimize environmental control in the greenhouse box.

- User Interface Development:

Finally, we will develop a user-friendly interface for controlling and monitoring the environmental conditions in the greenhouse box. This will allow users to adjust settings and monitor conditions remotely, improving the efficiency and ease of use of the control system.

3. **Project Timeline**

Week	Process
Week 1 (Project Planning and Hardware Selection)	project scope, objectives, and requirements, Research
	select the necessary hardware components, such as Arduino board, temperature sensor, humidity sensor, and lighting system.
Week 2 (Hardware Assembly and Software Development)	Assemble the hardware components and test their connectivity
	Develop the LabVIEW program to interface with the hardware and control the environmental conditions in the greenhouse box.
Week 3 (Calibration and Testing)	Calibrate the temperature and humidity sensors to ensure accurate readings
	Test the control system to ensure proper functionality and environmental control in the greenhouse box.

Week 4 (Implementation and Data Collection)	Implement the control system in the greenhouse box and start collecting data on temperature, humidity, and lighting levels.
Week 5 (Data Analysis and Optimization)	Analyze the data collected during implementation to evaluate the performance of the control system
	Identify areas for optimization and make necessary adjustments to improve environmental control in the greenhouse box
Week 6 (User Interface Development)	Develop a user-friendly interface for controlling and monitoring the environmental conditions in the greenhouse box
	Integrate the interface with the LabVIEW program and hardware components.
Week 7 (Final Testing and Documentation)	Test the complete system to ensure it meets project requirements and user expectations
	Create documentation of the system, including hardware and software specifications, user guide, and maintenance instructions.
Week 8 (Project Review and Presentation)	Review the project outcomes and evaluate its success in achieving project objectives
	Prepare and present a final report on the project, including a demonstration of the control system and user interface.

4. Estimated Budget

Arduino Board	**Rs.3500**	**Jumper wires**	**Rs.200**	**Thermal sensor**	**Rs.180**
Bread board	**Rs.300**	**Motor**	**Rs.600**	**Light intensity sensor**	**Rs.500**
Tap+Pipe	**Rs.600**	**Humidity sensor**	**Rs.330**	**Battery**	**Rs.800**

Estimated Total : Rs.7,110

5. References

- Arduino Official Website: https://www.arduino.cc/
- LabVIEW Official Website: https://www.ni.com/en-us/shop/labview.html
- "Greenhouse crop production in the United States: An overview" by H. Lieth and R. Whittinghill, 2015.
- "Smart Agriculture Monitoring and Control System Using Arduino and Cloud Computing" by A. Hamdan, N. Al-Turjman, and A. Abuarqoub, 2019.
- "Design and Implementation of an Automated Greenhouse Control System Based on the Internet of Things" by D. Wu, Y. Liu, Y. He, and J. Chen, 2020.
- "Design and implementation of automatic greenhouse control system based on LabVIEW" by J. Zhang, Y. Wang, and X. Liu, 2018.
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