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Automated greenhouse

AY 2021-25

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Proje

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A University should be a place of light, of liberty, and of learning.

Department of Electrical Electronics and Communication Engineering

Project Team:

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Project Ment

- Jay

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Project Group – Details

Photo	Track	Roll No	Name
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Abstract:

The Automated Greenhouse project seeks to revolutionize agriculture by creating a self-regulating environment that optimizes plant growth through advanced technology. By integrating sensors and actuators managed by a central processing unit, the system continuously monitors and adjusts key environmental factors such as temperature, humidity, light, and soil moisture. This ensures optimal conditions for plant growth, enhancing yield and quality while improving resource efficiency. The greenhouse also features IoT-enabled remote monitoring and control, allowing users to manage the environment via mobile or web platforms. Additionally, the system collects and analyse environmental data to refine cultivation strategies, making it adaptable for various crops and scalable for different greenhouse sizes. Through this automation, the project aims to demonstrate the potential of technology to make farming more efficient, sustainable, and accessible.

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Objective and Goals

Objective

- Design and Development: To design and develop an automated greenhouse that replicate optimal growing conditions for various plants, focusing on temperature and soil moisture regulation.
- Temperature Control: To create a reliable temperature control system that can maintain the greenhouse's internal temperature within a specific range suitable for plant growth, regardless of external environmental conditions.
- Automated Watering: To implement an automated watering system that adjusts water levels based on real-time soil moisture readings, ensuring plants receive the right amoun of water for optimal growth.
- Energy Efficiency: To optimize the greenhouse’s systems to use minimal energy while maintaining desired conditions, making it cost-effective and environmentally friendly for domestic use.

Goals

- Optimize Plant Growth: To create an optimal environment for plant growth by precisely controlling temperature, humidity, and soil moisture levels, thereby improving plant health and yield.

- Reduce Environmental Impact: To minimize the environmental footprint associated with growing produce by promoting local cultivation and reducing reliance on imported fruits and vegetables.

- Enhance Home Gardening Accessibility: To make home gardening more accessible and convenient individuals by automating essential greenhouse functions, enabling people to grow plants and vegetables with minimal effort.

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Project Plan

Tasks	Start date	Days to complete	Milestones	Tasks t comple
Task 1	19-Aug	7	Platform Design Draft	Develop initial concepts for u interface and experience.
Task 2	26-Aug	7	Experimentation Features	Define and de features for experimentati and condition
Task 3	02-Sep	7	Educational Resources	Create a draft educational gu tutorials.
Task 4	09-Sep	7	Community Features	Plan and desi community en features like fo user profiles.
Task 5	16-Sep	7	Technology Integration	Outline and st integration of t like mobile ac IoT devices.

Task 6	23-Sep	7	Sustainability Focus	Develop conte features focus sustainable pr and eco-friend
Task 7	01-Oct	7	Feedback Mechanism	Implement fee collection syst analyze initial responses.
Task 8	07-Oct	7	Expert Collaboration	Establish partn with horticultu and integrate
Task 9	14-Oct	7	Launch and Review	Launch the pla review initial performance, necessary adj
Task 10	21-Oct	7	Final Optimization	Conduct final optimizations user feedback performance c ensuring all fe fully functiona refined for opt experience.

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Literature Survey

SL NO.	Title of the paper	Year	Author	Technolo
1	Automated greenhouse system	06-07 March 2019	Muhammad Raees Armughan Azhar	• **Soil Mois Sensor:** M soil moistu ensure op watering. • **Light Sen (BH-1750** Measures light levels lighting co • **Temperat Humidity (DHT22):** temperatu humidity t optimal gr conditions • **Arduino M** Central pr unit that c sensor da processes controls a

2	Automated Greenhouse Systems	December 26th, 2020	Eric Labbate	• **Water Recyc** Integration w ozone treatm conserve wa and reduce fertilizer cost • **Fertilizer Managemen** Handles vari feed formulas improves efficiency. • **Water Purification:** ozone to ster irrigation wat remove path • **Climate Con** Manages hea cooling, vent lighting, and levels.

3	Automation and monitoring of greenhouse	30-31 December 2017	Muhammad Faizan Siddiqui	• **Ventilation Control**: Managed by integrating DC fans with temperature sensors to regulate internal temperature. • **Light Control**: Managed by integrating artificial lights with light sensors to ensure adequate lighting • **Irrigation Control**: Managed using moisture sensors to activate sprinklers and maintain soil moisture.

4	Automated greenhouse system	06-07 March 2019	Muhammad Raees Armughan Azhar	• **Solar Panels (Polycrystallir Q Cell, 150W):** Provides renewable ene to power the greenhouse system • **Bulbs:** Additio lighting to supplement natural light. • **Android Application:** Developed usi Java and Andr Studio to allow remote monitoring and control of the greenhouse system via smartphone.

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Analysis - SWOT

Strengths

01. Efficiency
02. Scalability
03. Sustainability

Weaknesses

01. High initial costs
02. Technical complexity
03. Data security
04. Maintenance

Opportunities

01. Market expansion
02. Partnerships
03. Collaborations
04. Educational

Threats

01. Competitive mark
02. Environmental ris

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Analysis – 4W1H

Why: The project was created to improve farming by using advanced technology to optimize plant growth, increa and enhance resource efficiency.

What: An automated greenhouse system that adjusts environmental factors like temperature, humidity, light, and moisture using sensors and a central processing unit.

Where: It can be implemented in various sizes of greenhouses, adaptable to different crops.

When: The project is a modern development, focusing on current agricultural needs.

How: The system integrates IoT-enabled remote monitoring, sensors, and actuators, allowing control via mobile platforms while gathering data to refine strategies

Refined Objective: The Automated Greenhouse project aims to develop a self-regulating, sensor-driven system t optimizes environmental conditions to enhance plant growth, increase yield, and improve resource efficiency.

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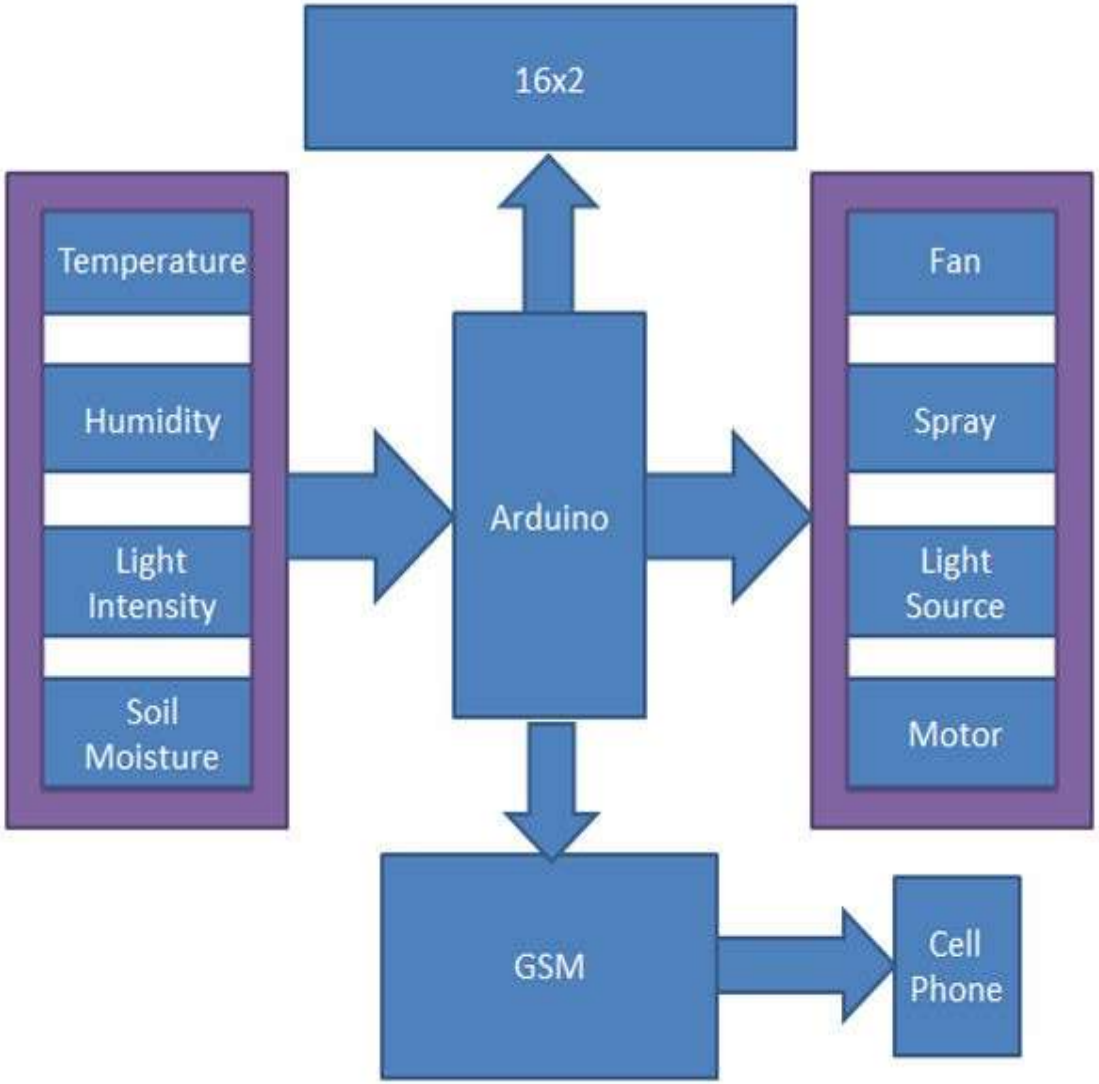
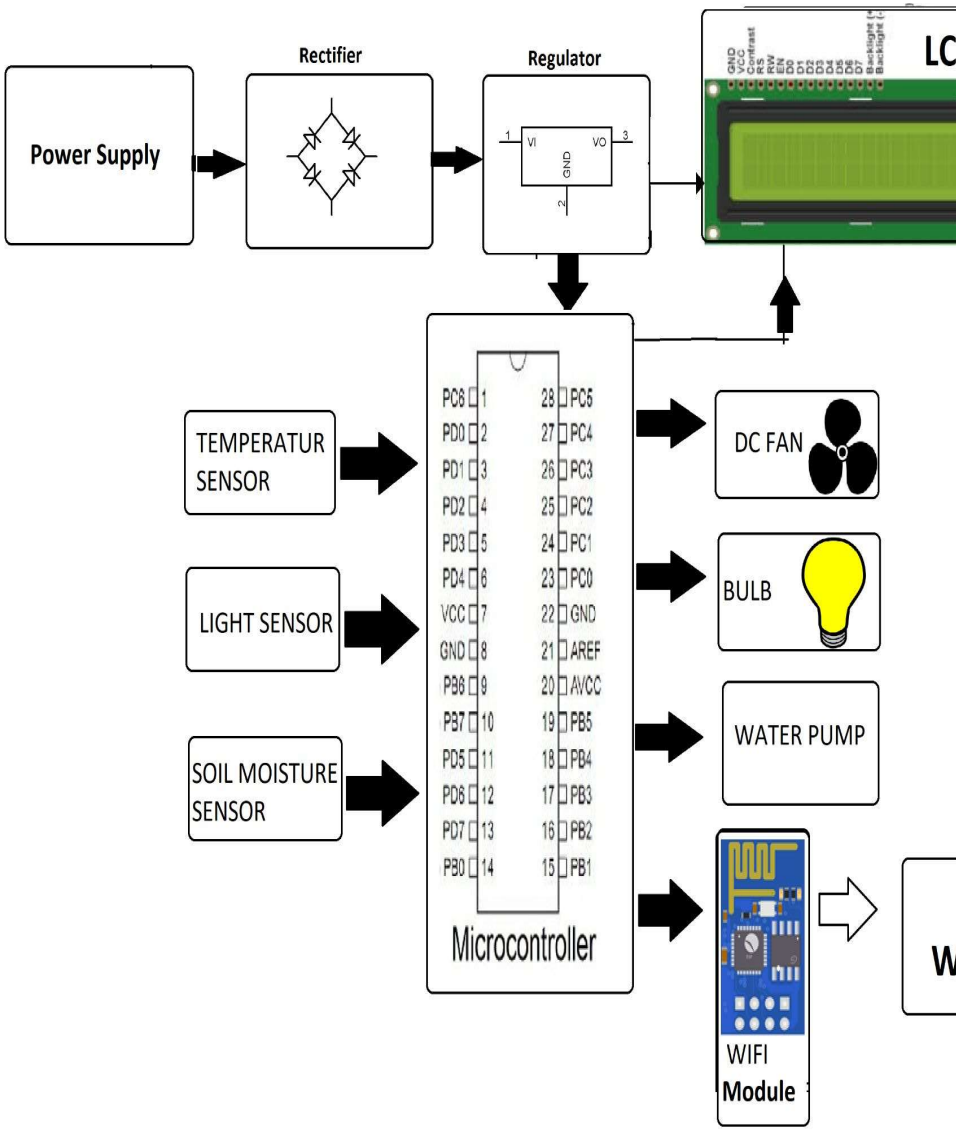
Architecture

Structural Diagram



Behaviour Diagram



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Contribution

Team Progress and Movement

- Execution of code
- Connection
- Testing
- Process Improvements
- Adaptability and Flexibility

Individual Contribution

Key contributions: VARUN KUMAR N

- Literature Survey
- Documentation

Key contributions: M.NIVAS

- Performing Tasks
- Doing Analysis

Key contributions: M.NAGASAI

- External Work
- Mentoring

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Conclusion & Future Work

Summary and Conclusion:

The Automated Greenhouse project successfully demonstrates the potential of integrating advanced technology in agriculture, showcasing how automation can revolutionize farming. By leveraging sensors, actuators, and a centra processing system, the project achieved real-time monitoring and optimization of critical environmental factors lik temperature, humidity, light, and soil moisture. This innovation leads to more efficient resource use, higher crop improved quality.

Future Work:

Future work should focus on expanding the system's scalability to larger or more complex agricultural setups. Cu modules could be developed for specific crops, allowing growers to optimize the system for various agricultural ne Incorporating renewable energy sources, such as solar panels, could make the automated greenhouse more energy-efficient and environmentally sustainable. Future work can explore optimizing the power consumption of t for better overall sustainability.

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THANK YOU