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IOT BASED GREENHOUSE MONITORING AND CONTROLLING SYSTEM

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ABSTRACT

Smart Greenhouse Monitoring and Control Systems have become increasingly popular due to their ability to optimize plant growth and improve crop yields. In this study, we developed a Smart Greenhouse Monitoring and Control System using a Atmega328 microcontroller consisting of temperature sensor, light sensor, soil moisture sensor, LDR sensor, LCD display module, 12v DC fan, Bulb and pump. The system continuously monitored and controlled the environmental conditions within the greenhouse, including temperature, humidity, soil moisture, and light intensity. We evaluated the performance of the system in a greenhouse setting and found that it effectively maintained the desired environmental conditions for plant growth. The results demonstrate the potential of Smart Greenhouse Monitoring and Control Systems to improve the efficiency and productivity of greenhouse agriculture.

Keywords: Atmega328 Microcontroller Consisting Of Temperature Sensor, Light Sensor, Soil Moisture Sensor, LDR Sensor, Humidity, Soil Moisture, And Light Intensity.

I. INTRODUCTION

The agriculture is the backbone of India's economic activity. More than 50% of India's population relies on agriculture and it contributes about 14% to the overall GDP. Greenhouse Technology is the technique of providing favourable environment condition to the plants. It's a greenhouse where plants such as flowers and vegetables are grown In IOT - based smart greenhouse farming, a system is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, etc.) automating the irrigation system. These systems use data analysis and decision-making algorithms to adjust environmental conditions in real-time, ensuring that the optimal conditions for plant growth are maintained. In this study, we developed a Smart Greenhouse Monitoring and Control System using a Atmega328 microcontroller consisting of temperature sensor, light sensor, soil moisture sensor, LDR sensor, humidity, soil moisture, and light intensity. The system continuously monitored and controlled the environmental conditions within the greenhouse, providing the status of the greenhouse condition through a text message to the owner. We evaluated the performance of the system in a greenhouse setting and found that it effectively maintained the desired environmental conditions for plant growth. This paper presents the details of our Smart IoT based Greenhouse Monitoring and Control System, along with an evaluation of its performance and potential applications in greenhouse agriculture.

II. METHODOLOGY

To control the greenhouse plants we are going to use different sensors and actuators. To control the temperature we are going to use temperature sensors and to detect soil moisture we are going to use soil moisture sensors. For detection of water level when the supply is less we are going to use water pump.

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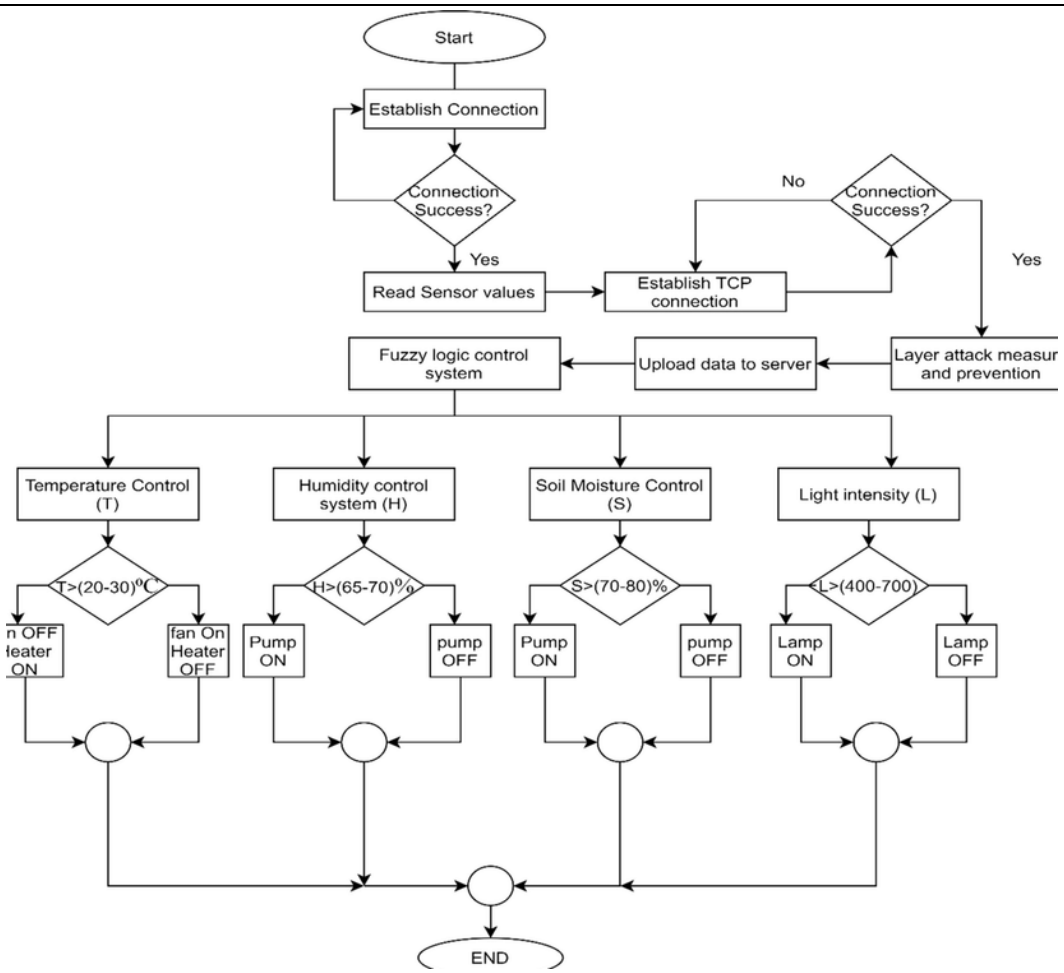

Figure 1: Flow Chart

Algorithm:

- The connection is established after starting, if it succeeds then sensors values are read.
- After that, TCP connection is established.
- After successful establishment, various controls like temperature control, humidity control, soil moisture control and light intensity controls are checked.
- The range of the sensors are checked. If the value exceeds then the devices gets turned ON and after reaching specific level it gets OFF..

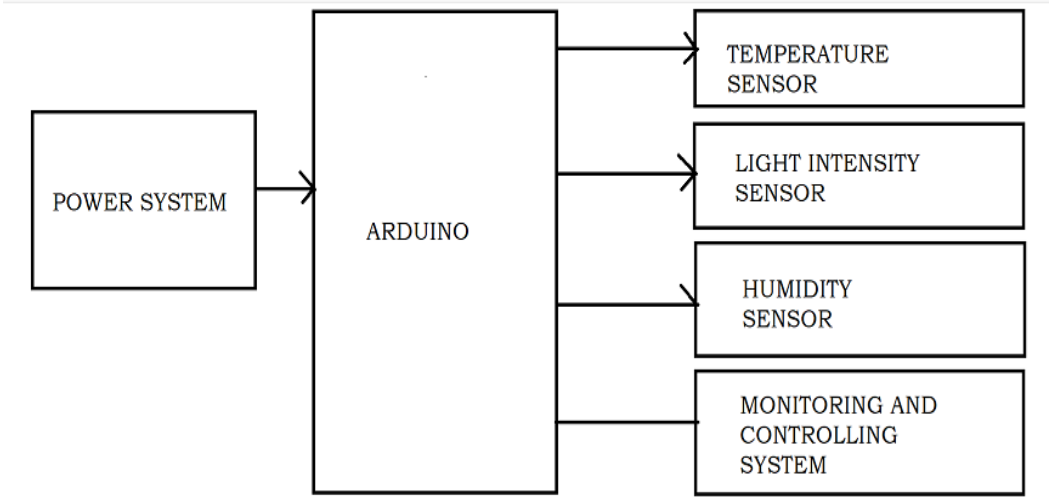

Figure 2: Architectural Diagram of IoT based greenhouse monitoring and controlling system

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Architectural diagram contains various steps:

- Power system.
- Arduino
- temperature sensor, light intensity sensor, humidity sensor and monitoring and controlling system.

III. IMPLEMENTATION

To implement the Smart Greenhouse Monitoring and Control System, the following steps are to be taken:

1. Hardware system: The hardware components are assembled accordingly as per the hardware description provided in Section III. .Atmega microcontroller is being used in this system.

2. Software Installation: The message of the status of greenhouse plants is sent to the admin of the greenhouse system. By this way the admin gets the track of the greenhouse plants.

3. Sensor Data Collection: Python scripts were developed to collect data from the sensors at regular intervals.

4. Actuator Control: when temperature of the greenhouse exceeds over a certain level or range then the fan gets on and if the level touches to the specific range it gets off..

5. Web-Based User Interface: The interface provides controls for the actuators, allowing the user to turn on or off the fan, motor pump, and LED light.

6. Remote Access: The Atmega microcontroller is connected to the internet using a wireless network adapter, allowing the user to access the text message. The implementation of the Smart Greenhouse Monitoring and Control System gets successful, and the system is able to effectively monitor and control the greenhouse environment. The system is tested for weeks and is found to be reliable and easy to use.

A: Offline system: Data are only stored on the sensor storage.

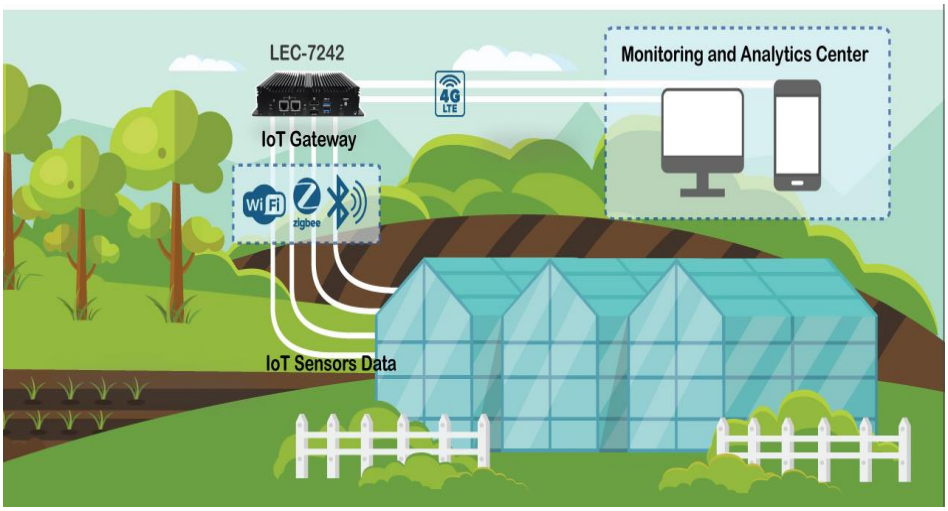

Figure 3. IoT based greenhouse monitoring and controlling system.

The project will go accordingly as shown in the above fug.

Sensors and actuators are being used where the sensors senses the level of the parametes such as temperature, soil humidity, light intensity.

When the level exceeds the devices of specified parameters turns ON and gets turned OFF when touched to intended level.

Message of the status is sent to the admin of the greenhouse.

IV. CONCLUSION

In this project, we designed and implemented an IoT based Greenhouse Monitoring and Controlling System using a Atmega microcontroller, sensors, and actuators. The system is able to effectively monitor and control the greenhouse environment, maintaining optimal conditions for growth of the plants.. The system is designed to collect data from sensors and control the actuators based on the data collected through it. The implementation of the system was successful, and the system was found to be reliable and easy to use. The system is able to maintain optimal conditions for plant growth and reduce the need for manual intervention. This system allows the user to monitor and control the greenhouse environment effectively.

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