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Automated System for Sericulture

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Abstract: *The raising of silkworms for the production of silk is known as sericulture or "silk farming." Temperature, Humidity, and Light Intensity are crucial factors in the development of silkworms; appropriate encouragement must be provided in accordance with requirements at each stage. Variations in the environment are thought to play a significant role in the development and growth of silkworms. IoT is a new paradigm that allows various objects to perceive one another and communicate with one another over the internet using wireless smart phones. The exhaust fan, heater, and sprinkler are examples of automatic actuators that keep the system's humidity and temperature within acceptable ranges. The unique feature of this model is a system that uses sensors to monitor temperature, humidity, and light intensity. If there are any changes to the settings, GSM will immediately send an alert to the user's mobile application via Wi-Fi and an internet connection. This model's objective is to obtain silk without sacrificing both quantity and quality. To maintain the needed environmental conditions, the system allows for scheduled programming via the Arduino IDE software. The IDE software is loaded on an Arduino board and is programmed to verify and modify the data.*

Keywords: *Sericulture, Silkworm, Silk Farming, etc.*

I. INTRODUCTION

According to a report by the central silk board, India is the second-largest producer of silk worldwide. As opposed to China, which produces 85% of the world's silk, India contributes only 15% to its production. The process of growing silkworms to produce silk is known as sericulture. Sericulture focuses mostly on raising silkworms in order to prepare silk.

Silk production is a labor-intensive, meticulous process that takes a lot of time. The silkworm, which harvests active silk fibre in the form of a cocoon by eating mulberry leaves during the early stage, known as the larval stage, is one of the most important housetrained species. The absence of mechanization in the sericulture section is the main factor that may be identified for the significant discrepancy. The weight of the cocoon to shell ratio, as well as the cocoon quality, are both impacted by the seasonal fluctuations in the silkworm-rearing house's environment. Consequently, the environment modification in the silkworm-rearing house has an impact on the silk's quality.

This project recommends using an automation in sericulture to increase the output and quality of silk thread. According to the research, environmental factors play a significant role in the harvest of silk. The quality and quantity of silk may be improved by managing the many environmental conditions during the silk worm's life, including temperature, humidity, and light intensity. According to studies, for each moult, which is the silk worm's growth stage, a certain set of environmental requirements must be met in order to get the highest possible silk yield.

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II. LITERATURE REVIEW

In order to accomplish a superior comprehension of how the issue can be solved, all the various research and let it review has taken into consideration for the project's better enhancement. And here we will focus on finding some other projects with similar features to be compared to the to the proposed project idea.

M.A. Dixit, Amruta Kulkarni, Neha Raste, Gargi Bhandari, to regulate the physical parameters, a zone-based cascade-based intelligent sericulture automation system is suggested. The system is made up of an intelligent master controller facility, an actuator system, and a data collecting subsystem.

V K. Rahmathulla, the development, survival, and occurrence of disease in silkworms are affected by several environmental factors. This study covers the best circumstances for higher sericulture output. Additionally, it looks at how a species' capacity for growth and reproduction is influenced by its environment.

Mohamed Rawidean Mohd Kassim & Ahmad Nizar Harun, the development, survival, and occurrence of disease in silkworms are affected by several environmental factors. This study covers the best circumstances for higher sericulture output. Additionally, it looks at how a species' capacity for growth and reproduction is influenced by its environment.

Abdulla Tanveer, Abhishek Choudary, Divya Pal, Rajani Gupta, Farooq Hussain This suggested solution is an embedded system that will regularly monitor and regulate the greenhouse's microclimatic characteristics. Sensors, an ADC, a microcontroller, and actuators make up the system. By minimising human interaction, the technology increases agricultural productivity while removing systemic challenges.

Manikantan, Priya, Puneet, Rahul, this study offers a cost-effective wireless sensor network-based PA system that can assist farmers in remotely monitoring their fields. This article also provides a general overview of how the prototype might be implemented utilising other wireless technologies.

III. METHODOLOGY

The methodology involves gathering and analyzing the requirements for the Smart Baby Stroller project. In this phase, the team has identified the technical, functional, and non-functional requirements for the project.

Software Required:

The software required for the implementation of the Automated Control System for Sericulture is listed below.

1. Arduino IDE
2. Proteus

Hardware Required:

The software required for the implementation of the Automated System for sericulture is listed below.

1. Arduino Nano
2. DHT11 Sensor
3. GSM
4. LCD
5. Exhaust Fan
6. LDR Sensor

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7. Heating Coil
8. Relay

Design of the System:

The block diagram that follows illustrates the project's methodology shows how the NODE MCU ESP8266 development board, which is used in the project, is connected to a number of sensors and actuators, including a light intensity sensor that is an LDR sensor, a temperature and humidity sensor that is a DHT11 sensor, a temperature and humidity controller, a light controller, and a slack lime sprayer.

The Arduino Nano will accept input from sensors, deliver it to mobile apps via IoT devices, and operate the controllers that our mobile device uses to receive commands.

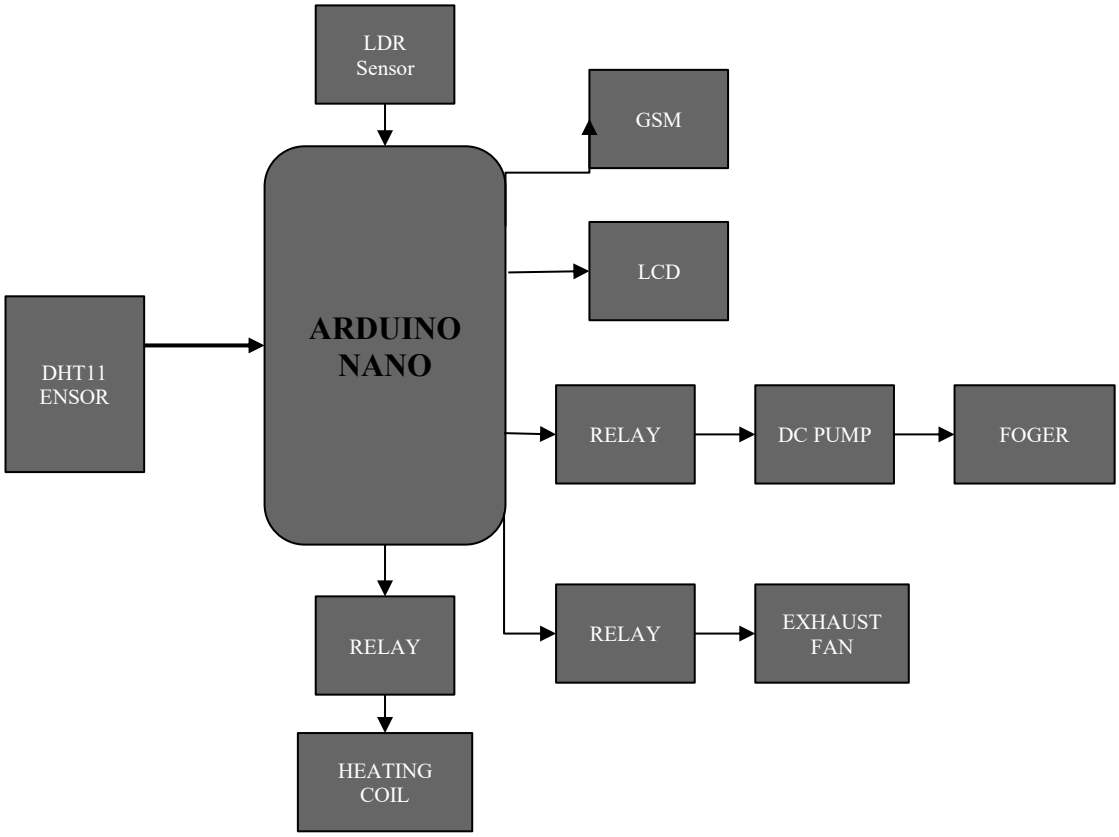

Figure 1: Block Diagram

An LDR is a resistor whose resistance alters in response to variations in the quantity of light hitting it. When light intensity is increased, the LDR's resistance goes down. This characteristic enables us to utilise them to create light sensor circuits, and the value that is read will be transferred to an Arduino Nano so that the user may control the light at the actuator side in accordance with this value. The DHT11 temperature and humidity sensor is a straightforward, incredibly inexpensive digital temperature and humidity sensor. It measures the humidity in the air using a thermistor and a capacitive humidity sensor, and then outputs a digital signal on the data pin that is communicated to the ESP8266 so that the user may adjust the temperature as needed.

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An LCD display will show the temperature and humidity values that the DHT11 sensor reads. A slack lime spray will be used once each day to maintain cleanliness, absorb moisture, and control humidity. The user's mobile device will get all of this information through the internet, enabling remote monitoring and management of their sericulture farm.

IV. IMPLEMENTATION

The circuit diagram (Figure 1) and block diagram (Figure 2) show the Working setup of the sericulture system.

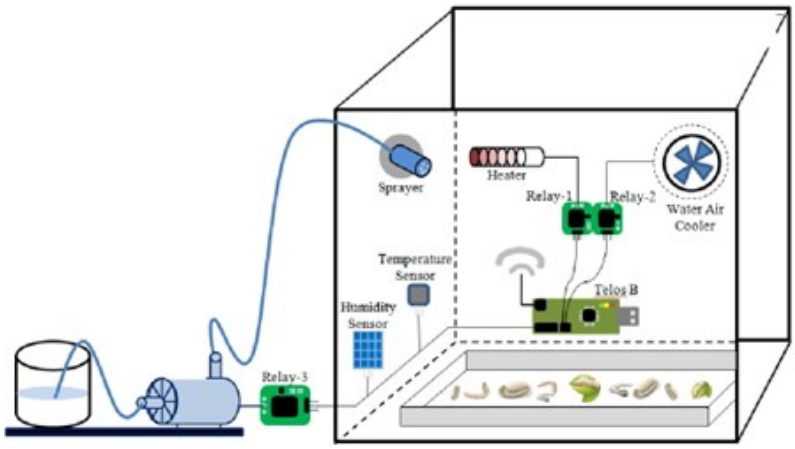

Figure 2: Working Diagram

Sensor Integration:

We need to integrate various sensors into the Sericulture Box to gather important data such as temperature, humidity, and Light. This can include sensors such as temperature sensors, humidity sensors, and LDR sensor.

Data Processing and Analysis:

The data gathered from the sensors will be sent to Arduino Nano, which will process and analyze the data in real-time. This will help us to detect any changes in the environment condition and take appropriate action if necessary.

Display and Alerts:

A display screen can be added to the sericulture box to show the Silkworm current condition, along with other relevant information such as the outside temperature, humidity, etc.

Remote Monitoring and Control:

The sericulture system can be connected to a mobile using SMS, which will allow farmer to monitor their silkworm condition.

Power Management:

A rechargeable battery can be used to power the Sericulture system and all its components. The battery can be charged via a USB cable, and the sericulture system can also be equipped with a solar panel to extend the battery life.

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V. RESULT

In the proposed system, there is an analyzing of the execution parameters of Silkworm rearing house such as temperature, humidity and light intensity using IoT. The variation in the parameters such as temperature and humidity of silk worm rearing house is sensed by the sensors and is shown on OLED and is sent in the agriculturist mobile application and planned important changes will be completed. In case if the temperature increases then the fan will be turned on and if it decreases the heater will be turned on, if light intensity is low then light will on.

VI. CONCLUSION

This “IoT Based Automated Sericulture System” gives automation and guided control in sericulture advances by employing Node-MCU and IoT technology-based invention. The proposed system facilities and conduct the environmental conditions to be reserved inside the silkworm rearing house. Required edge values for parameters like temperature, relative humidity and light intensity can be stable based on the environmental circumstances. On the basis of requirement fan, light, and heater is turned on and off based on required environmental condition. The planned system is financially affordable and power effective organization. Implemented test of this prototype system validates that the proposed system can work gradually to observe the environmental conditions inside the silkworm raising house. The proposed system reduces the man power and reduces the chance of errors. The model is easy to implement and use.

The current system requires continuous internet connectivity. In Future this can be overcome by using GSM module to send the notification directly on the framer’s mobile through the SMS without using the internet connectivity.

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