# Automatic Detection, Controlling and Monitoring of Temperature in Sericulture Using IOT

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**Abstract-**. The sericulture industry plays a vital role in the global economy by producing silk, which is highly valued for its lustrous texture and numerous applications in textiles, fashion, and industrial sectors. Maintaining optimal temperature conditions is crucial for the successful growth and development of silkworms during various stages of their life cycle. Any fluctuations in temperature can adversely affect their growth, resulting in reduced silk production and quality. This project focuses on the development of an automatic detection, controlling, and monitoring system for temperature in sericulture using IoT. By leveraging IoT devices, sensors, and data analytics, the project aims to provide real-time temperature monitoring, precise control, and proactive alerts to sericulturists, enabling them to maintain optimal temperature conditions for silkworm rearing.

**Index Terms** – NodeMCU*, Temperature Sensor (DS18B20)*, Relay*, Cooler*, Heater*.

## I. INTRODUCTION

India rank 2nd globally in the field of silk production says the in the report by central silk board. On the other hand, only 15% of global silk production is contributed by India as compared to China which produces 85% of silk. Sericulture is the field in which production of silk is done by raising the silkworm. Sericulture mainly deals with the preparation of silk by nurturing the silkworms.

Production of silk is very time taking as well as dedicate and difficult method. Silkworm is considered as one of the utmost essential housetrained creatures that harvest dynamic silk-fiber in the shape of cocoon by ingesting mulberry leaves throughout the initial that is larval stage. The foremost cause that can be recognized for enormous difference is absence of mechanization in the sericulture department. The seasonal changes disturb the environmental change in the silk worm rearing house, which affects the weight of cocoon and shell ratio, as well as cocoon quality. Hence, the quality of silk is affected due to the environmental change in the silkworm rearing house. To improve the production and quality of silk thread, usage of automation in sericulture is suggested in this paper. Research shows that the environmental parameters perform a vigorous part in the harvest of silk. By controlling the numerous environmental factors such as temperature, humidity, and light intensity throughout the lifespan of the silk-worm promises enhancement in the silk quality and quantity. It has been researched that each moult that is growth period of silk-worm necessitates a particular set of standards of environmental factors to reach an optimal income of silk.

## II. LITERATURE SURVEY

"An IoT-Based Wireless Sensor Network for Temperature Monitoring in Sericulture" by R. Sharma et al. This study presents an IoT-based wireless sensor network for temperature monitoring in sericulture. The authors design a network of wireless temperature sensors that are placed in different areas of the sericulture farm. These sensors collect temperature data and transmit it to a base station using wireless communication. The data is then analyzed and displayed on a graphical user interface for real-time monitoring. The paper demonstrates the effectiveness of the proposed system in maintaining optimal temperature conditions for silk production.

## III. METHODOLOGY

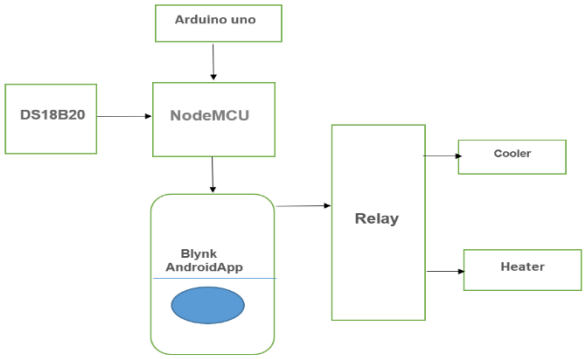


**Fig: - Block diagram**

As shown in the above figure, the system contains sensors, NodeMCU and actuators. The system contains of three sensors that is temperature, humidity and light. NodeMCU is programmed and has capacity to monitor and control the model with the provided threshold values. The scheme contains both the software part and hardware apparatuses. The main purpose of the program design is to mechanize the action of the controller. Printed circuit board is loaded with the code via selected ports to achieve the required task. It is easiest way to control the whole procedure based on the circumstances given in the code.

## IV. COMPONENTS REQUIRED

**NODE MCU:** The NodeMCU ESP8266 development board comes with the ESP-12E module containing the ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth an Deep Sleep Operating features make it ideal for IoT projects.

**DS18B20:** The DS18B20 is one type of temperature sensor and it supplies 9-bit to 12-bit readings of temperature. These values show the temperature of a particular device. The communication of this sensor can be done through a one-wire bus protocol which uses one data line to communicate with an inner microprocessor. Additionally, this sensor gets the power supply directly from the data line so that the need for an external power supply can be eliminated. The applications of the DS18B20 temperature sensor include industrial systems, consumer products, systems which are sensitive thermally, thermostatic controls, and thermometers.

**RELAY:** The single-channel relay module is much more than just a plain relay, it contains components that make switching and connection easier and act as indicators to show if the module is powered and if the relay is active.

**COOLER (FAN):** A cooler fan is a mechanical device that consists of rotating blades enclosed within a frame. It is designed to move air and facilitate heat transfer, thereby cooling down the target object or area.

**HEATER (PELTIER MODULE (TEC1- 12706)):** The TEC1-12706 Peltier module is a commonly used thermoelectric cooling device. It is made up of two ceramic plates, which are sandwiched together with a series of p-type and n-type semiconductor elements. The module is designed to generate a temperature difference across the plates when an electric current is applied, allowing for efficient heat transfer.

**Fig 1: NodeMCU**

**Fig 2: Temperature Sensor (DS18B20)**

**Fig 3 Relay**

**Fig 4: Cooler (Fan)**

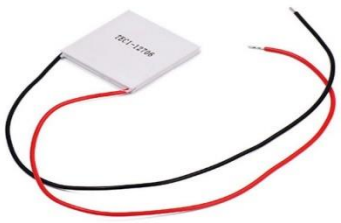

**Fig 5: Heater (PELTIER MODULE (TEC1- 12706))**

## V. APPLICATIONS:

- Sericulture Farms.
- Silkworm Incubation.
- Mulberry Plantation.
- Climate Control in Silkworm Rearing Rooms.
- Remote Monitoring.
- Data Analysis and Optimization.

## VI. 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. The resultant outputs are shown in figures below shows the variation in temperature, this can be seen in the mobile using application by the farmer.

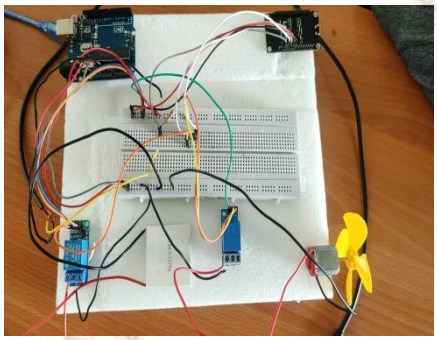

**Fig 6: Circuit Connection**

**Fig 7: Inside of the Model**

**Fig 8: Outside of the Model**

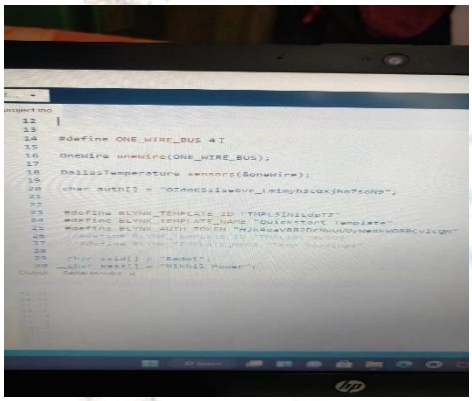

**Fig 9: Program output in the system**


**Fig 10 and Fig 11: Output received in mobile phone**

## VII. CONCLUSIONS

This gives automation and guided control in sericulture advances by employing NodeMCU 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.

## VIII. REFERENCES

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