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AUTOMATED SMART SERICULTURE FOR ENHANCEMENT OF SILK PRODUCTION

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Abstract: Sericulture principally refers to the production of silk by the parenting of the silk producing organisms. In the present world when everything can be controlled and operated automatically, there are still a countable important sector in our country where robotization has not been borrowed or not been put to a full-fledged use. One similar field is the sericulture. The reports from the Central Silk Board suggests that India ranks second in the world for total silk production, but it's only 15, as 85 of it's from China. This low quantum of silk production is due to the lack of robotization in sericulture process. This administered system involves the eradication of the difficulties faced by the agriculturists in manual sericulture farm.

The system involves the combined operation of the Microcontroller and GSM module providing automated control features to the farm and the user. The temperature automatically, the temperature, and humidity are recorded by the sensor to which fan with cooler effect and heater is connected when more than the required temperature is noted, then the fan will automatically on and makes the temperature suitable for the survival of silkworms. In the winter season's the temperature fall below the required temperature, the heater gets on and provides proper temperature. After obtaining the proper temperature, the fan and heater get off automatically. To monitor the temperature from a remote location, we use two thermostats. One is inside of the silkworm shed and another is outside of the shed. So, that is how the temperature was increasing and decreasing in a total day. For every 15 min, the reading of thermostats was automatically sent to the remote location for storing and monitoring of temperature in the day, week, month, year. By using this procedure, the problem of continuous monitoring can be reduced manually, analysis of temperature was estimated.

Keywords: Silkworm, Sericulture, Wireless Sensors, Microcontroller, GSM, Temperature, Humidity

I.INTRODUCTION

Sericulture means producing the silk by silkworms rearing and its acceptances with science. The queen of fabrics is called as silk because of its smoothness, glimmer magnificence, gracefulness, life, flexible properties. Fabricate of silk is long and involuted process. Or The fabric queen is called as silk, because of its smoothness, reliability. The process of silk production is lengthy and complex. Silkworm is the tamed louse. The silkworms ingest the mulberry leave during the period of larva and it produces the luxuriant or lush silk thread in the formation of cocoon. Cocoon mass, shell mass and shell ratio can be affected by the seasonal environmental conditions. The environmental condition is change day by day and season by season, so we need to maintain the temperature and humidity for the sustainable production of the cocoon.

Also, mulberry plantation, which is the only food for the silkworms, requires regular irrigation which is both time consuming and also requires the presence of farmer on land. The report given by the Central Silk Board demonstrates that India appreciates the agreeable alternate position in the aggregate silk creation next just to China. It's realized that varieties in the ecological elements will tremendously impact the development and enhancement of silkworm. India represents the 15-16 of the aggregate creation when varied with China's 85. This enormous oneness exists because of the absence of automation in sericulture process and it's watched that everything is manual which incorporates the treatment of silkworms; measures produced to drop the results of atmosphere on silkworm raising, encouraging of silkworm and raining of medicine powder. Since the strategies taken after by the ranchers are obsolete, this project extends a study of mechanization in the sericulture homestead for enhance the accept of both subjectively and quantity.

II.LITERATURE SURVEY

[1] **Management of Climatic Factors for Successful Silkworm (Bombyx mori L.) Crop and Higher Silk Production:** A Review by V K Rahmathulla said that the seasonal differences in the environmental components considerably affect the genotypic expression in the form of the phenotypic output of silkworm crops such as cocoon weight, shell weight, and cocoon shell ratio. The variations in the environmental condition's day to day and season to season emphasize the

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need for management of temperature and relative humidity for sustainable cocoon production. The present review paper discusses in detail the role of temperature and humidity on the growth and development of silkworms including recent studies on heat shock protein. The study also discusses the influence of air and light on silkworm development. In addition to this study emphasizes the role of various environmental factors on embryonic development of silkworm egg, nutritional indices of silkworm larva, and reproductive potential of the silkworm moth. The study also highlights the care to be required during silkworm spinning and the influence of temperature and humidity on post cocoon parameters of the silkworm. The study included future strategies to be taken for the management of climatic conditions for successful cocoon crops.

[2] **Implementation of Sericulture Farm Automation using Sensor Network and GSM Technology** Guna Sheela T J, Renuka V Tali, Prathiba S N, Shilpa A P proposed a system. The proposed framework is an embedded system that will nearly screen and control the natural parameters of raising a house on a customary premise. The framework comprises sensors, ADC, Microcontroller, and Actuators. The sensors circuit includes four analog sensors in particular temperature, stickiness, light, and CO2 senor, and fire sensor, the digital one. The microcontroller is customized such that it will have the edge values and the ability to screen and control the framework. The yield of simple sensors is given to ADC then to the microcontroller. At the point when any of the specified parameters surpasses the security edge which must be kept up, the sensors sense the variety and the microcontroller gets this information at its info ports in the wake of being changed over to an advanced shape by the ADC. The information and conditions in the raising house will be sent to the agriculturist's portable through GSM. The microcontroller then plays out the fundamental activities through the motor driving circuit by utilizing the actuators until the surpassed parameter has been taken back to its ideal level. For instance, the temperature information will be contrasted and edge, on the off chance that it is surpassed or underneath as far as possible then the temperature control unit, will be fuelled on. A comparable process is done for the rest of the sensors. On the off chance that any feeding process and pharmaceutical splashing needs to complete then, the farmer can imply the microcontroller through GSM to make the required move. The framework likewise utilizes LCD show for ceaselessly cautioning the client concerning the conditions inside the homestead. Consequently, the whole setup moves toward becoming signs of progress toward becoming easy to use.

[3] R. Ashwitha, Vidhya Vikraman, S. Shashank, Veeramma M. Angadi, J. Sindhu proposed **WSN Based Intelligent Control System for Sericulture.** The “WSN Based Intelligent Control System for Sericulture" gives automation and guided environment in sericulture advances, this venture gives mechanization and supervisory control in sericulture cultivates by employing Node MCU and IoT technology-based invention. These model facilities and controls the natural variables like temperature, intensity, and light power along with the food feeder and solution sprays. Required edge values for parameters like temperature, relative humidity, and light intensity can be stable based on environmental circumstances. The proposed framework is financially affordable and power effective arrangement. Implemented test of this prototype system validates that the proposed. The system can work gradually to observe the environmental conditions inside the silkworm raising house. The proposed system reduces the manpower and reduces the chance of errors. The model is convenient to implement and use. The current system requires continuous internet and connectivity. In the future, this can be overcome by using the GSM module to send the notification directly on the farmer’s mobile through the SMS without using the internet connectivity.

III.METHODOLOGY

we decided to apply mechanization in the parenting room to monitor and maintain the needed temperature and light for the healthy growth of silkworms by using a DHT11 sensor, Gas sensor, fan, and Heating element.

Fig.1: AUTOMATED SMART SERICULTURE FOR ENHANCEMENT OF SILK PRODUCTION circuit

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ESP32 Dev Module:

Microcontroller is the brain of this project. In this, the microcontroller receives inputs from the sensors. Then process the received inputs. By considering the output of the sensors, the microcontroller turns ON the respective actuators. ESP32 Dev Module is controlling all the sensors i.e., DHT11 sensor, Gas sensor, Fire sensor, and actuators i.e., Fan, Heating element.

DHT11 Sensor:

It is used to detect the temperature and humidity of the silkworm's room. And it is interfaced in ESP32 Dev. If there is a change in the values of the temperature and moisture in the silkworm's room then the controller on the fan and heating element to maintain the optimal environment.

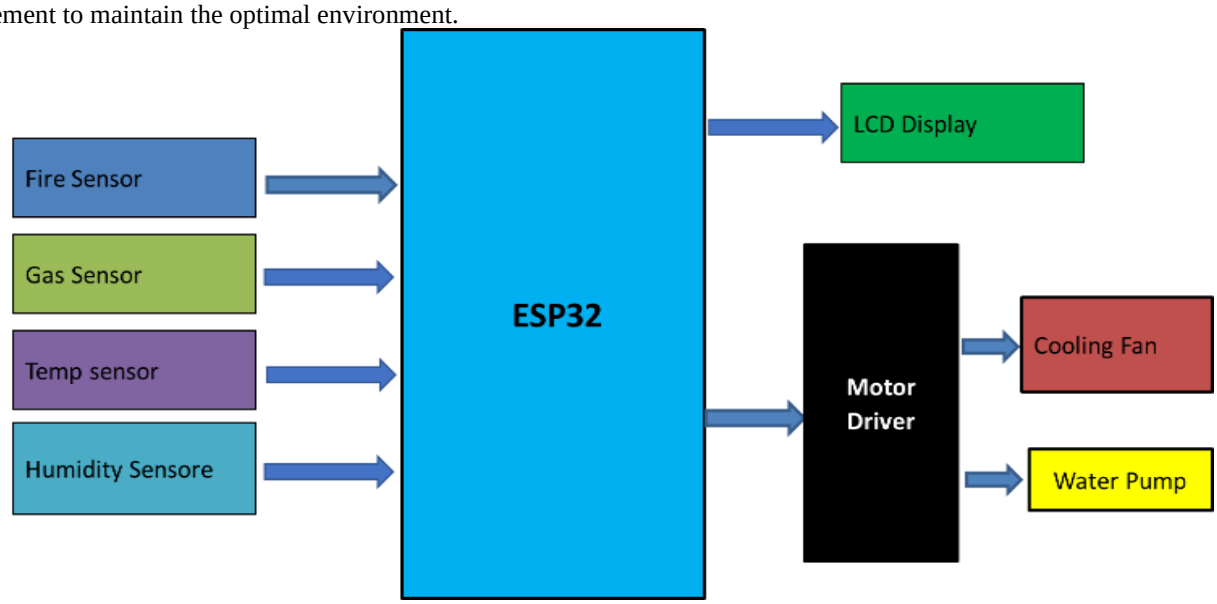

Fig:2 Block diagram of the proposed system.

Fire Sensor:

It is used to detect the fire in the silkworm's room. And it is interfaced in ESP32 Dev. If due to an accident if the fire occurs in the silkworm's room, then the controller switches on the water pump. And sends a message to the farmer.

GAS sensor:

It is used to detect hazardous gases. And it is interfaced with ESP32 Dev. If any release of hazardous gases occurs. Then the controller sends an alert to the farmer and switches on the fan.

Relay:

Relay is a switch and it is operated electrically. DC motor, display, and fan are the three systems of actuation whereas using the three circuit of relays. The actuators are enabled by the switching operation of the relay and it is utilized in desired time. The signal power is low and is controlled by the relay circuits. The signal is repeated in one circuit and the other circuit will be retransmitted. To perform the logical operations in computers and telephonic exchanges.

Motor Pump:

In our project we are using motor to spray the medicine if any infected silkworms are detected and for the process of irrigation for the mulberry plantation in the field. The motor pump is small in size and cost is less, and it is operated in the range of 3-6volts supply power. The consumption of the current is less i.e., 220 milliamps in one hour 120 liters should take-up.

Fan:

In our project we have used fan as exhaust fan in order to cool the inner temperature of the silkworm's rearing unit, when the temperature became high.

LCD Display:

We are using inter integrated circuit 16x2 lcd module, which is used to display up to 16 characters with 2 lines. This lcd is interface with ESP32, it is used to display the results of all sensors like temperature, humidity.

Heating Element:

In our project we have used heating element in order to maintain the inner temperature of the silkworm's rearing unit, when the temperature became low.

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Fig.3: Blynk Application of our project

In this application whenever temperature, humidity, fire, gas sensor reaches to maximum limit, it will alert the owner by sending messages.

IV.CONCLUSION

This Automated smart sericulture for enhancement of silk production Gives automation and guided control in sericulture. The proposed system facilities and conduct the environmental conditions to be reserved inside the silkworm rearing house. Required edge values for parameters like temperature, and relative humidity can be stable based on the environmental circumstances. On the basis of requirement fan, pump, and heater is turned on and off based on required environmental condition. The planned system is a 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 manpower and reduces the chance of errors. The model is easy to implement and use.

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