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SERICULTURE FARM USING AUTOMATION

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Abstract: Silkworm rearing is a part of the agro-based sector known as sericulture. The method of raising silkworms now in use has to be improved. With the aid of electrical and electronic components, every step in this project has been developed to give the farm with total protection. By implementing automation in feed supplementation, temperature management, and moisture control, it helps farmers. Several temperature ranges and levels of moisture are needed for silkworm growth. The arduino microcontroller, temperature, and moisture sensors are used to establish this. This project will provide farmers with financial assistance so they won't have to spend as much time on the sericulture farm

Keywords: Silkworm, Silk, Automation.

I. INTRODUCTION

The roots of the term "sericulture" are the Latin word serio or the Greek word sericos, both of which imply "silk," and "culture," an English word that imply "rearing." So, "raising of silk generating organisms" for silk production is known as sericulture. The phrase "sericulture" frequently refers to a coordinated set of activities that begin with mulberry cultivation (mulberries serve as the silkworms' primary source of nutrition), continue with silkworm rearing, and conclude with cocoon disposal.

No other fibre compares to silk in terms of shine, elegance, durability, softness, and tensile properties, making it the most precious natural fibre used in textiles for centuries. [Ling Shi] Silk is frequently referred to as the "queen of textiles" and no other fibre has the same properties. The mulberry silkworm (Bombyx mori L.), one of the most prominent domesticated insects, makes silk thread by consuming mulberry leaves from the mulberry plant [1]. Unlike other insects, the silkworm has a highly different capacity for adjusting to environmental changes. The silkworm is particularly sensitive to environmental changes and cannot tolerate a wide range of alterations because of its specific distinctions from other insects.

One of the most significant domesticated insects is the mulberry silkworm, which uses mulberry leaves as a casing to manufacture silk string [2]. The silkworm differs from other creepy crawlies in its capacity to adapt to shifting ecological variables. Silkworms are very different from other creepy crawlies, which makes them incredibly sensitive to environmental changes and unable to thrive in a variety of species. India is only second to China in the world in terms of total silk production, according to a Central Silk Board report. India, on the other hand, only contributes modestly.

China produces 85% of the world's silk, while India only makes up 15%. The sericulture process's lack of automation is the primary cause of this significant gap [3]. Sericulture is a rural agro-based industry that is ideal for countries with agricultural economies and a shortage of rural labor. It is primarily a rural sector of the economy [4], with high labor costs that necessitate some earnings in foreign currency.

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II. OBJECTIVES OF THE PROPOSED SYSTEM

- The goal is to lessen the difference in humidity and temperature needed for silkworm rearing.
- To give farmers access to control for remote monitoring.
- To lower maintenance costs.
- In order to offer automation.

III. LITERATURE SURVEY

Title: Intelligent control system for Sericulture

M.A. Dixit et al. proposed a sericulture-specific intelligent control system [1]. This study's findings point to an automated approach to artificial intelligence in plants. Zone-based cascade control of physical parameters is one strategy that could be used. These pre-cocoon phases' mechanisms are now entirely manual, basic, and stupid. A smart master controller facility, a data store of previous corrective actions, a subsystem for data acquisition that corresponds to the rearing unit's designated zones, and inexpensive actuators in the zones like fans and lamps make up the system. The master control supports the best course of corrective action and communicates the decisions to the selected actuator sub-system on the basis of abiotic information obtained from the relevant data collecting sub-system.

Benefits: The system uses accessible and affordable actuators to improve power efficiency.
Cons: The lack of GSM module.

Title: Arduino based automated sericulture system.

Manjunath et al. [2] proposed an automated sericulture system based on the Arduino microcontroller. This project combines the ARDUINO microcontroller with GSM-based technology to provide mechanization and supervisory control for sericulture cultivates. In order to keep the climate conditions in a growing state, this model controls and faculties them. The actuators are small and simple to access, and they are only turned on when needed. Financial and resource resources are effectively utilized in the proposed design. The model can be used to gradually monitor the ranch's natural surroundings, according to a pilot test. The Seri cultivator is now farther away from the raising unit. The framework is user-friendly. Future projects will all make use of the Internet, Wi-Fi, and the Internet of Things. IOT). The interior of the ranch was found to be in its natural state during the initial test. The rearing unit and Seri culturist no longer interact closely. The framework is easy to use. Future ventures will use the Web, Wi-Fi, and the Web of Things (IOT) to control correspondence and safeguard information.

Benefits: Incorporates the utilization of Wi-fi and IOT for automation.
Cons: Absence of Data acquisition.

Title: Automated smart sericulture system.

R. Arun et al. developed a smart, automatic sericulture system [3]. A smart monitoring and automated actuation sericulture system based on the Internet of Things (IoT) will be described in detail in this essay. Through the use of the internet, the sericulture will make it possible for the end user to control and monitor the system in real time. The implemented prototype successfully controls the deployed environment's state and keeps an eye on its parameters in real time. There are a number of advantages to remote monitoring, which is automated to the appropriate system state. The prototype will operate in real time for the purpose of system control and monitoring..

Advantage: It is based on image processing for identifying the infected silkworms.
Disadvantage: Absence of motor driver circuit.

Title: IOT based automated sericulture system.

[Khaja Moinuddin and co. 4] proposed an Internet of Things-based automated sericulture system. This essay goes into great detail about how humidity and temperature affect the growth and development of silkworms, as well as recent research on heat shock protein. In addition, it discusses the effects of light and air on silkworm development. The growth of the embryo in a silkworm egg, the nutritional status of the larval stage, and the moth's capacity for reproduction are all examined in this study as well. It focuses on how temperature and humidity affect silkworm post-cocoon parameters and the importance of caution when spinning silkworms. The study looked into different ways to control the climate so that

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cocoon harvests were successful.
Advantages: Sensor based cascade control of physical parameters thus improve the quality of silk farm with less human intervention.
Disadvantage: Absence of monitoring the climatic conditions using cloud.

Title: Smart Sericulture system based on IOT and image processing technique.

Shwetha Rokhade et al. proposed a digital image processing and IOT-based smart sericulture system [5]. This exposition gives a reasonable outline of specialized development in horticultural fields like sericulture that are fizzling. It also talks about the system and the methods that can be used to boost production and quality in sericulture. This concise communication describes the difficult task of keeping an eye on silkworm health and environmental variables like humidity, temperature, and rainfall. By directing ecological factors and guaranteeing right casing conglomeration, the nature of silk might be all the while moved along. The overall goal of the development is to offer an innovative solution for the sericulture business that is both reasonable and easy to keep up with.

Advantages: It controls temperature, and moisture using fans and heaters
Disadvantage: Absence of food supplement.

IV. METHODOLOGY

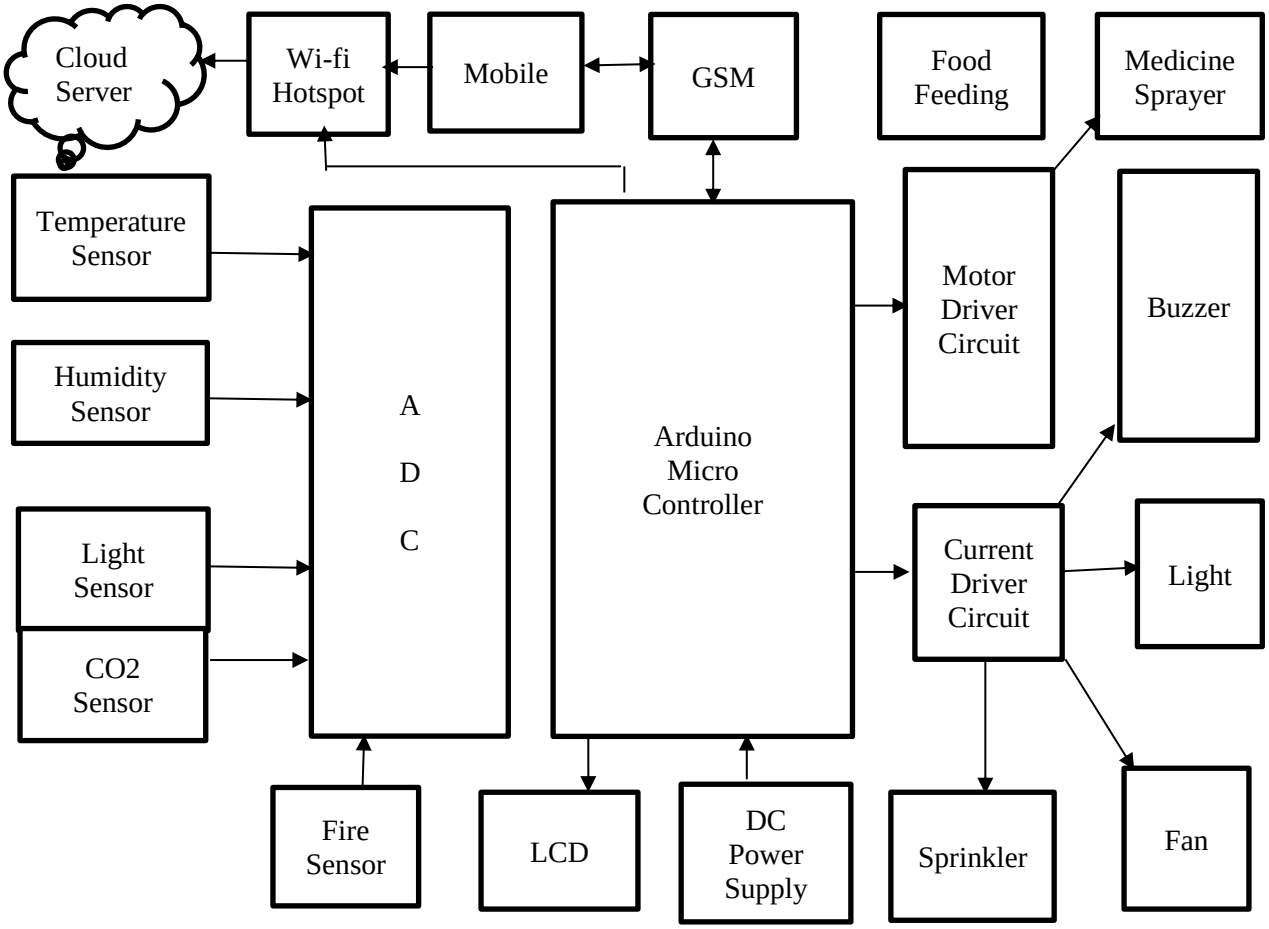

Fig 1: Block diagram of Sericulture Farm using Automation

Fig. 1 displays a proposed system block diagram for sericulture farm automation.

The system just recorded parameters like temperature and humidity. It was unable to even get the data necessary to analyse it afterwards. To increase both the quantity and quality of silk produced, the proposed solution is an embedded system that would continuously monitor and control the climatic conditions of a sericulture farm. It also eliminates the issues with the

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system by minimizing human input to the greatest extent possible.

The system is composed of sensors, an analogue to digital converter, a CPU, and actuators. The microcontroller reads this information from the data at its input ports after being converted to a digital form by ADC whenever a meteorological variable, such as temperature, humidity, light intensity, or air quality, crosses a certain threshold. This change must be preserved to safeguard the sustained conditions required for silkworm growth. Relays are then used by the microcontroller to execute the necessary actions up until the parameter is back at its optimal level. As the system's brain, a microcontroller makes the configuration both affordable and effective. The system also makes use of an LCD display to provide the user with ongoing information about the state of the sericulture farm. In the event that the settings are not controlled, a buzzer will sound to alert the farmer. Between the farmer and the microcontroller, the GSM acts as a channel. It helps with communication transmission and can be controlled by commands. A WIFI hotspot will be used to store the data in the cloud server for later usage.

This arrangement is made to be user-friendly in every way. As a result, this system addresses the above-mentioned drawbacks of the current configurations and is designed to be a cost-effective, flexible, and simple-to-maintain substitute.

V. RESULTS

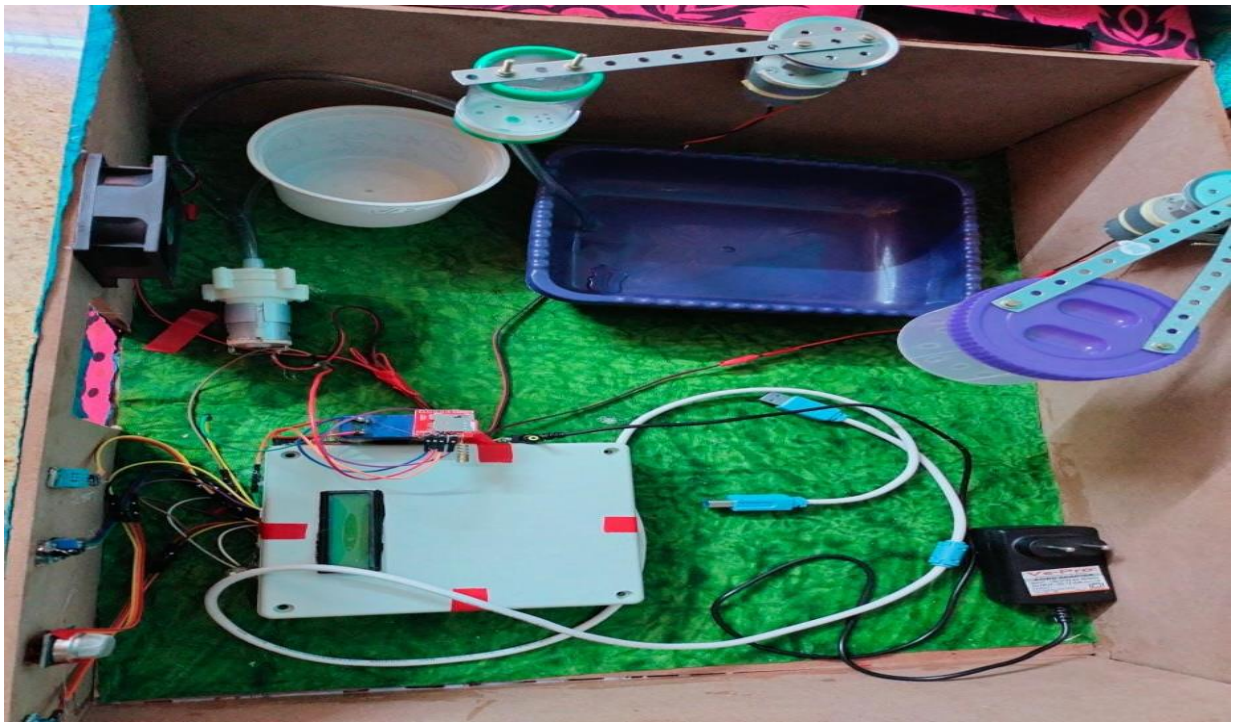

Fig 2: Designed Prototype Model

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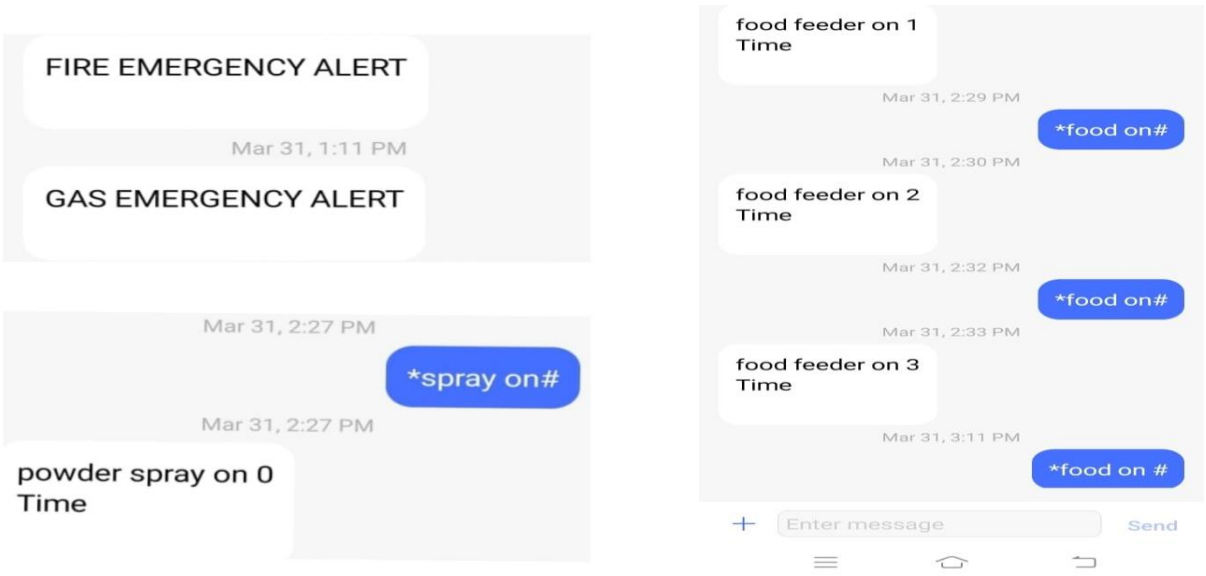

Fig 3: Messages to and from the Farmer

VI. CONCLUSION

Nowadays, automation is a necessity for daily living. The study focuses on the fundamental automation procedures that might be used in sericulture farms.
Through the application of microcontroller and GSM-based innovation, this implementation provides mechanization and supervisory control in sericulture. The suggested model makes it easier and more manageable to maintain the desired climatic conditions inside the sericulture farm. Undoubtedly, this scheme will aid farmers in overcoming their current financial difficulties.

VII. ACKNOWLEDGEMENT

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