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A Review: IOT Based Real Time Monitoring and Control System for Mushroom Farm

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Abstract - In recent years, technology in agriculture has grown and some of them have used information technology based on Internet of Things (IoT). The general objective is to combine the cultivation and agriculture using IOT technology. This study is based on cultivation of milky mushrooms with help of automated technology as they have good selling values and require special conditions, namely a humid environment at a temperature range of 20-25º C and also relative humidity level between 85 and 90%. The use of IoT systems in mushroom farms is common for providing effective agricultural solutions. The Arduino used to control the signals based on temperature and humidity and also a GSM module to send the real-time data to an app over the internet. The employment of sensors in a variety of agricultural industries has a significant positive impact on crops and aids in lowering and raising operating costs.

Key Words: Arduino, Temperature, Humidity, GSM module.

1.INTRODUCTION

The milky mushroom (Calocybe indica) is now India's third most widely used commercial fungus. The attractive, sturdy, white sporocarps, extended shelf life, sustainable yield, delectable flavor, distinctive texture, and cholesterol-free foods have all contributed to the mushroom's rapid rise in popularity. They also have essential medical benefits, such as an antiviral impact. Mushrooms are a very good source of protein, vitamins, and minerals. They also have enticing flavors and are devoid of cholesterol. They also have a number of significant therapeutic benefits, including an antiviral effect. Furthermore, a great source of thiamine, riboflavin, nicotinic acid, pyridoxine, biotin, and ascorbic acid are milky mushrooms [1]. Agriculture is one area that needs to be enhanced for the production of food, particularly the growing of oysters and milky mushrooms. Because they are minimal in calories, carbs, fat, and sodium, mushrooms are a popular and valuable food. They include vital minerals and don't contain cholesterol. Lack of temperature and humidity management causes farmers who grow mushrooms to frequently fail, which leads to subpar mushroom yield. By regulating the atmosphere's temperature and humidity, one can increase the production and quality of mushrooms. Regulating these factors and upholding a controlled environment is extremely difficult, yet doing so enables growers to produce good crops and turn mushroom cultivation into a lucrative industry. The use of sensors in a range of agricultural sectors has a good effect on crops and helps to both reduce and increase operating costs. Being heterotrophic organisms, mushrooms are frequently employed in a range of processed foods, medications, and other products. Fungi, a different class of creatures, including mushrooms. They rely on dead and decomposing organic things to develop because they lack the chlorophyll that plants have. They obtain their sustenance from these decomposing substrates with the aid of very small, thread-like structures (mycelium), which penetrate the substrate but are typically not visible on the surface. In India, Milky mushrooms are produced seasonally and in climatecontrolled cropping houses, both of which call for the construction of fundamental infrastructure. When the weather is favorable for the crop.

2. LITERATURE SURVEY

Amit et al [1] in their paper they have proposed that the milky mushroom is a great source of thiamine, riboflavin, nicotinic acid, pyridoxine, biotin, and ascorbic acid in addition to having many other health advantages. They further suggested that adequate maintenance is essential for optimal mushroom development, therefore mushroom producers should prioritize investing in affordable, high-quality spawn. In addition, he stated that the milky mushroom needs temperatures between 25 and 30 degrees Celsius and humidity levels between 85 and 90 percent, and came to the same conclusion.

Yasir et al [2] in their paper they have proposed that microprocessor and sensors are used in the monitoring system's architecture to detect temperature and humidity. Every sensor connected to the cloud system. The information is then sent to the cloud server, where it may be watched over from the monitoring website. In order to keep the temperature of the mushroom cultivation area constant between 25°C and 28°C, this system also regulates the temperature of each sensor node. It does this by sending data to the latte panda minicomputer, which serves as both a sensor node and a bridge. The Arduino nano microcontroller acts the control sensor and the SHT11 sensor is used to measure the temperature and humidity of the atmosphere. The sensor values will be read and sent to the bridge device using the Bluetooth communication deice HC-5. The data then will be sent to the thing speak which acts as a cloud using the POST method. Peltier modules are used as a component of temperature control. This module is activated by Arduino Nano using a relay when the temperature value is above 28° C so that temperature can be lowered again. In conclusion the cooling system worked in accordance with the desired temperature.

Wajiran [3] in his paper he has proposed an internet of things (IOT) and wireless sensor network based controlled and real-time monitoring system for mushroom cultivation areas. WSN is a network of tiny sensor nodes that are used to measure environmental conditions. With the help of this system, farmer could monitor and examine the field's temperature, humidity, and co2 levels as well as the presence of pests and illnesses. The report also outlines the benefits of utilizing this technique, including costed savings and increased yield of mushrooms. In the paper the control and real-time monitoring system for mushroom cultivation fields utilizing WSN and IOT technologies was suggested. It may gauge the field's pest and disease activity as well as the temperature, humidity, and co2 levels. The study also found that by offering improved controlled and monitoring, this approach could lower expenses and increase mushroom yields.

Subedi et al [4] in their paper they have proposed a technique where farmers' production and efficiency could be increased by implementing contemporary agricultural technologies, such as the internet of things and a monitoring system that used sensors to track temperature, humidity, wetness, and light intensity in white button mushroom farms. After being saved on a cloud platform, the data was subsequently transferred to a distant monitoring station using a low power node MCU (microcontroller unit). For the benefit of farmers, this method automates production while minimizing human labor. In this study came to the conclusion that farmers could remotely monitor the environmental conditions of their mushroom farm by employing contemporary agricultural technology, such as the internet of things and sensors. A low-power node MCU (micro-controller unit) transmits the sensor data to a remote monitoring station, where it was stored in the cloud. Farmers in Nepal may benefit from this technology because it automates production and reduces the needed for human labor.

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Najmurrokhman et al [5] in their paper they have proposed that the oyster mushrooms could be grown under controlled conditions of temperature, humidity, and planting medium. The temperature and humidity control system that monitors and maintains the temperature between 22°C and 28°C and the humidity at 60% to 80% uses a DHT-11 sensor, Arduino uno microcontroller, MCU esp8266, and an internet-of-things platform called Cayenne. A computer or mobile device with the Cayenne program loaded could constantly provide information on humidity and temperature. The design and execution of a prototype temperature and humidity-controlled system for oyster mushroom growth was the main strategy covered in this studied.

Tonage et al [6] in their paper they have proposed that the node MCU ESP8266 Wi-Fi module could be used to build an IoT-based home automation system. Through a web browser on either a PC or a mobile device, this system would enable users to manage their appliances. All of these devices could be connected via relays that were managed by the IOT based real time monitoring and controlled used node MCU. This project aims to provide users with total controlled over remotely controllable elements in their homes, such as lighting, temperature controlled etc., enhancing their comfort and eased when controlling various aspects of their home.

Durani et al [7] in their paper they have proposed that wireless connectivity and automation could be used to connect any gadget in a home. With the aid of a NodeMCU ESP8266, an Android app, and an internet connection this system dubbed smart automated house application uses the IOT (internet of things) to enable users to control essential home amenities like lights, fans, Ac's, water pumps, and gardens. Through wireless connections, the mobile app made for Android could be used to monitor circuit devices while used the Blynk app to control them. According to the demands of the user, up to 8 additional sensors or appliances could also been connected.

Raju et al [8] in their paper they have proposed that an automated home system could be developed using the Internet of Things (IoT). This was accomplished by employing a node-MCU board as an interface for hardware modules to connect and monitor various appliances, sensors, lights, fans, and other appliances over the internet. Additionally, it offers features for intruder detection made possible by motion sensor technology, as well as environmental monitoring capabilities, including temperature sensing and humidity analysis. An android app named Blynk serves as a remote controlled for all linked system components, enabling remote management of all these operations.

Dela et al [9] in his paper he has proposed that the microcontroller and fuzzy logic algorithm could be used to enhance mushroom growing. With temperature sensors, humidity sensors, an Arduino-Uno microcontroller using fuzzy logic, and a wireless sensor network, this would produce a regulated environment (WSN). According to the study, oyster mushrooms grow best in environments with humidity levels of 70% or higher and temperatures between 22 and 29 °C. Additionally, it was found that automated controls were more effective in controlling humidity than manual ones operated by people.

Barik et al [10] in their paper they have proposed that the internet of things (IOT) played a significant part in our daily lives, according to the main conclusions of this researched report. This was accomplished by carefully observing the crucial variables that

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produced insightful data about how these electronic gadgets function. The information gathered could then be utilized to make decisions, such as managing heating and cooling systems remotely, or for long-term analysis. In order to measure the surrounding temperature, humidity, and soil moisture content of plants, sensors such as the Arduino Uno with Raspberry Pi, HUT 211D sensor device, and the ESP8266 wi-fi module were used. Finally, experimental findings demonstrated successful real-time measurements of the temperature and humidity around us as well as precise measures of measured the moisture content of the soil around plants used an Arduino uno and raspberry pi board.

Najmurrokhman et al [11] in their paper they have proposed a technique to grow the oyster mushrooms successfully at altitudes between 500 and 1000 meters above sea level, in a humidity range of 60 to 90%, and at temperatures below 30 degrees Celsius. The creation of a prototype temperature and humidity management system employing a fuzzy logic controller was also covered in the study. This controller employs three fuzzy sets, triangle membership functions, and two temperature and humidity inputs. The output was the speed of a cooling fan. The humidity and temperature setpoints of the fuzzy logic controller were 27 °C and 60–90%, respectively. According to the findings of the experiments, it took between 1 minute and 27 and 8 minutes and 10 seconds to reached the setpoint.

Varuni et al [12] in their paper they have proposed that automated irrigation system using a wireless sensor network and GPRS module was discussed in this research study. by regulating the amount of water utilized in each cycle. In order to transmit data via modules, which could be accessed remotely via mobile phones or PCs, this system used sensors to measure the soil moisture levels. Additionally, this technology may have other uses besides agriculture, such as tracking changes in environmental factors like temperature or air quality over time. The several sensor data collection techniques, networked device communication protocols, and environment, as well as their suggested solution, which combines software algorithms and hardware devices liked microcontrollers to enable automation with no needed for user input.

Garcia et al [13] in their paper they have proposed that a technique for water management was crucial in nations with restricted water availability and that the effects of global warming had increased the demand for adaptation strategies. Commercial sensors used in irrigation systems for agriculture could also be pricey, which made it challenging for smaller farms to adopt them. However, suppliers now provide inexpensive sensors linked to nodes, making these kinds of systems more accessible. Last but not least, improvements in IOT (internet of things) and WSN (wireless sensor network) technologies enable us to created smart irrigation systems by tracking variables liked watered quantity/quality, soil characteristics, weather conditions, etc. while also talking about challenges & best practices associated with their implementation.

Sarah et al [14] in their paper they have proposed an IOT-trainer design that provides seven straightforward experiments to comprehend the ideas of the internet of things. Three categories could be used to categorize these experiments: internet of things (IoT) devices, connectivity, and cloud or application systems. All the necessary parts, including the ESP8266 (NodeMCU-12e and Espa01), Arduino Uno, XBee, and others, were inexpensive and simple to set up and readily accessible on the market for these studies. Platforms for tunneling a network connection, such as Things Speak and Webhost, were also open source and free to use. Learners would gain a fundamental grasp of how infrastructure functions in relation to internet of things technologies by used this low-cost trainer design.

Babu et al [15] in their paper they have proposed that the node MCU ESP8266 Wi-Fi module could be used to build an IoT-based office automation system. Users of this system had been able to used voiced commands and real-time controlled of their workplace equipment used any smart phone and the IFFT service provided by google assistant. The node MCU board, relay driver module, and power supply were needed for this project's hardware components, and the Arduino IDE, Blynk app, and IFFT were needed for its software. The user's smartphone would finally use the node MCU wi-fi module to broadcast and received input data.

3. CONCLUSION

It is also concluded that for the efficient cultivation of the milky mushroom the temperature ranging between 25º-30º C and humidity ranging from 85-90% [1]. The existing technology doesn't allow the user to control or receive the real time data using internet. It is found that using GSM module connected to the Arduino at the cultivating room with the phone through an app. So that the user can monitor the change in the environment from a very large distance and also gets the privilege to control them. The interfaced system will send the data continuously over the internet and thus putting the user at ease. Hence this would greatly help in cultivation of milky mushrooms

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