

Smart Poultry Farm Climate Controller Using ESP32, DHT11, MQ7, LDR & IoT Relay Automation

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Abstract: *Global chicken production has steadily expanded in recent years as a result of improved manufacturing and uniform agricultural management. According to the global study on agricultural goods, chicken is the most popular product since it is becoming a nutrient-rich food that provides less calories than other poultry varieties and more protein, fat, and cholesterol. Over the past several days, there has been a significant increase in demand for high-quality chicken food and a greater awareness of the security of food items like chickens worldwide. The technology-based approach to low-cost, resource-saving, quality-focused management and productivity of chicken processing is highlighted in this publication. In order to monitor chicken farming and regulate environmental conditions using smart devices and technologies, this study sought to investigate the usage of an intelligent system that employed an integrated framework and a smartphone. In terms of food, agriculture plays a crucial role in the Republic of Asian countries. For example, eggs and chicken meat are important sources of super molecules, vitamins, and minerals. The chicken industry generates natural waste, which is a crucial source of income and labor for a wide range of farmers and entirely diverse individuals involved in cooperative activities. In India, chicken is the most popular meat. The atmosphere of the poultry farm affects the health of the chickens. Inadequate environmental conditions might lead to both growth and health issues for the chicken. Healthy chicken is in great demand and grows swiftly. By adding features like ventilation, cooling, and lighting to uneven surfaces, walls, and floors, poultry farms' area units are best suited to alter environmental conditions. Birds are protected by a microclimate, which is crucial to their well-being. As a result, a number of analysis and development communities are concentrating their efforts on the adoption of certain Internet of Things (IoT) technologies, such as RFIDs, wireless sensor networks, or less expensive connected devices, to enable remote observation of conditions in food transport scenarios and extremely fine roughness on the entire agri-food supply chain, as an example from production to consumption.*

Keywords: IoT, RFID, Poultry, Farming, WSN, Sensor

I. INTRODUCTION

However, the majority of current IoT solutions still use highly centralized cloud infrastructures, where transparency is usually lacking. This inevitably creates security risks in addition to availability, knowledge lock-in, confidentiality, and audibility.

This idea suggests a substitute paradigm by using cutting-edge, modern technologies to create ancient chickens with more intelligence. Through sophisticated sensors and microcontrollers, the excellent farm gives the microcomputer



statistics on environmental factors like temperature, humidity, smoke, weather, etc. The farm is connected to other intelligent equipment that automate chicken farming, such as microcontrollers, sensors, and application programs. Due to the growing global population, poultry farming is becoming more and more popular. Monitoring a chicken farm might be highly beneficial for producing a lot of chicken meat and satisfying consumer demand. Nonetheless, a variety of environmental conditions influence a chicken's development, which in turn influences the production of chicken meat for human consumption. The purpose of this study was to identify the many sensors and materials that can be included into the smart chicken farming system design, which emphasizes environmental parameter monitoring. In addition to producing sustainable and healthful chicken meat, this initiative aims to analyze data for qualitative and quantitative research so that consumers may profitably purchase fresh meat. These days, the chicken poultry sector is crucial to our nation's sustainable food supply. The creation of an automated chicken feeding machine may be highly beneficial to the expansion of the poultry business. The most crucial and labor-intensive tasks are the soil mixture for a healthy atmosphere and the water sprinkler for temperature management [1]-[5]. A typical chicken farm requires several manual procedures. By creating a smart poultry farm, manual labor will be replaced and poultry job will be made simpler. One type of smart system for an automatic food feeder in a container, a water sprinkler to regulate the environment's temperature, and a soil mixture to lower gas levels in the poultry environment are all used in the implementation of a smart poultry farm. The system's architecture allows the user to remotely operate it using an Android mobile application. With this prototype, smart work will be completed and human labor is also reducible. Utilizing the cloud computing methodology, sensors have been developed and proven to be an intelligent and effective way for farmers to remotely control their operations, which significantly lowers costs, time, and labor. Farmers benefit from increased production and profit as a result [6]-[10].

The poultry farm is a vital sector in the agricultural industry, both nationally and globally, for food production and supply. Monitoring and maintaining the optimum living conditions for poultry are essential steps that must be taken to produce poultry of the highest quality. To be able to provide quality poultry, the optimum environment must be maintained and monitored. If there are tools that can help notify the unique environment of the henhouse, it can help farmers solve the problems in monitoring methods conducted by the poultry farmers. Technology advancement plays a great role in the development of the development of the agricultural sector, including poultry farming. The study aims to create a prototype of smart poultry developed automatically to keep the area's ammonia gas content and temperature level in control. The humidity and temperature will be measured as well and will be controlled by a fan and heat lamp. In addition, the provision of food and water can be accomplished on a timely basis without manual intervention [11]-[15].

II. PROPOSED SYSTEM

The objectives of this project have been successfully achieved. All sensors used have worked well in measuring the temperature, humidity, feeding, and drinking of the chicken in the cage. This is because, the formation of a good design circuit, has produced an orderly and functional system. The platform that has been used in this project is the Blynk cloud system. With the use of this platform, poultry farmers can monitor all readings through devices such as Smartphones or Personal computers no matter where he or she is. As this objective has been achieved, the problem of poultry farmers monitoring has been overcome with this platform. Lastly, a system has been developed that can control temperature, humidity, feeding, and drinking parameters automatically. Previously problems related to this objective, poultry farmers need the use of a large number of workers to control all processes involved such as monitoring temperature and humidity at all times to maintain temperature and humidity in a controlled state. With the achievement of this objective, poultry farmers can reduce the use of workers because all processes have been able to be controlled automatically.

Traditional chicken-raising systems face significant problems due to inefficiencies and environmental concerns. Among these challenges are changing environmental elements such as humidity and temperature, which can affect bird well-being and productivity. Furthermore, relying entirely on manual monitoring and intervention makes it difficult to



recognise and handle problems promptly, endangering birds and increasing operating costs. Further to the practical obstacles, traditional ways of raising hens for food may increase environmental issues. Wasteful resource use, such as utilising too much water and feed, can deplete natural resources and increase farms' environmental effect. Inadequate waste management practices can also contaminate land and water, harming both the environment and the public's health.

The implementation of an Internet of Things (IoT) smart poultry farm system presents a potential solution to these problems. This system enables real-time monitoring and management of poultry farm conditions by combining numerous sensors that detect environmental characteristics such as temperature, humidity, and air quality. Deviations in sensor readings can prompt alarms, allowing for proactive intervention and helping to avoid detrimental effects on bird productivity and health. The highly automated capabilities of the Internet of Things (IoT)-based system assure consistent resource provision while saving waste by automating routine tasks such as watering and feeding. This reduces the environmental impact of chicken farming by improving operational efficiency and using fewer resources. The intelligent farm system's automatic cooling and fire detection functions serve to limit the possibility of fire-related incidents while also providing a safe and comfortable environment for the birds. By addressing these critical areas of poultry farm management, Internet of Things (IoT) technology promotes environmental stewardship and sustainability while also increasing operational efficiency and production.

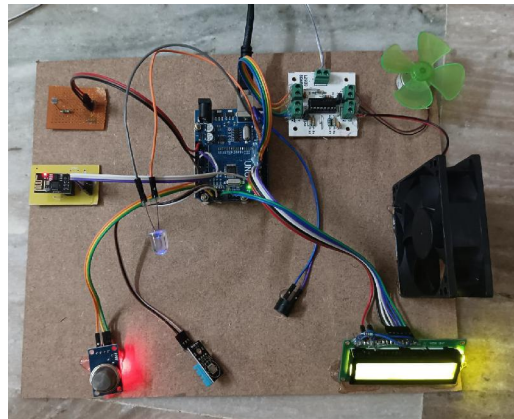


Figure.1. Hardware Model of the Proposed System

A comprehensive solution to the problems with conventional poultry farming techniques can be found in an IoT-based smart poultry farm system. This innovative approach not only addresses environmental concerns and improves farm management outcomes and poultry welfare, but also paves the way for a more sustainable and environmentally friendly poultry farming industry by facilitating real-time monitoring, proactive intervention, and efficient resource management. The IoT based Smart Poultry Farm is a revolutionary approach to the traditional method of poultry farming. This system uses advanced technology to monitor and control various aspects of the farm, such as temperature, humidity, lighting, feeding, and watering systems. The IoT sensors and devices are connected to a central platform, which allows real-time monitoring and control of the farm's environment is shown in Figure 1. The system ensures that the poultry farm's conditions are optimal for the birds' health and well-being, leading to increased productivity and profitability. The farmers can remotely monitor the farm's conditions and receive alerts in case of any abnormal changes, enabling timely action to be taken. This IoT-based system also incorporates machine learning algorithms that analyze the data collected from the sensors to provide actionable insights for the farmers. These insights enable the farmers to make informed decisions regarding the farm's management, including the optimal time to harvest the birds. Automation is extremely important in today's environment. This study focuses on poultry farm automation utilizing a wireless sensor network and a mobile communication system. Chicken is the most popular products in today's globe since it is a nutrient-dense food with more protein, less fat, and less cholesterol than other poultry. In this



study, environmental characteristics of a poultry farm such as temperature, moisture are automatically monitored and regulated in order to promote chicken development. The sensor module is also used to manage and monitor the water level. By connecting all of the sensor modules to the microcontroller, two sensor data are obtained and then posted to the web page via the IOT module. The person in charge of the poultry farm can obtain information on the farm's internal environmental state by accessing the internet on a Computer or a mobile phone. This system will manage temperature, humidity, ammonia gas, and water level without the use of a human interface by using a cooling fan, heater, water motor. It will turn on the gadgets based on the threshold values.

The bulk of poultry farms in India, particularly broiler farms, rely on human monitoring and management. The chicken poultry sector is critical to our country's long-term food supply. The invention of an automatic chicken feeding equipment might be extremely beneficial to the poultry industry's growth. Temperature, fan, moisture, heater, food and water distribution are the major criteria in chicken production. These variables have a significant impact on broiler output. This study presents an IoT-based monitoring system for chicken farms, as well as tools to regulate such parameters. The proposed study focuses on developing a system configuration that includes farm monitoring and control utilizing cutting-edge technologies such as IoT, low-cost hardware, and free software. The device employs particular sensors to detect notable changes in its surroundings and tells the user via his mobile phone via an app. For each parameter, a threshold is specified, and when the detected data exceeds it, related devices may be remotely activated to bring the value below the threshold. As a result, we may save time while improving local hygiene. The created system makes use of Internet of Things (IoT) technologies. A temperature sensor is part of the system architecture (DHT 11). The temperature and moisture content are subsequently shown on the LCD viewer and supplied to the microcontroller for transmission to the cage manager's mobile phone. The Arduino UNO Mega is the device that processes the aforementioned components. After a review of the literature and observations on numerous similar systems, it was determined that the DHT-11 sensor is extremely useful for use in this research design since it can generate two data sets at once, namely temperature and humidity. The goal is figuring out how to design and develop a prototype utilizing IoT for monitoring and operating broiler chicken coops with many sensors. The goal of this research is to create an IoT device for laying hens utilizing a variety of IoT sensors. The objective is that this IoT gadget would aid lay hens in their daily duties. The use of Internet of Things (IoT) technology in chicken farm management is also being advocated in order to improve chicken health and meat quality. With the ATmega328p Microcontroller, the findings may be recorded. The code is processed by the microcontroller and shown on the LCD display, while the ESP8266 Wi-Fi module connects to Wi-Fi and sends data to the IoT device server. Lastly, IOT allows data to be monitored from anywhere in the world.

It has features that integrate all of the hardware components employed. Every module's presence has been carefully thought out and arranged, adding to the unit's optimal performance. Second, the project was effectively executed employing very advanced ICs and expanding technologies. As a result, the paper's concept has been effectively created and tested. The article "Wireless DC Motor Speed and Direction Control Using Bluetooth" was created to operate a DC motor using PWM and control through Bluetooth module, with the system capable of monitoring motor speed on an LCD display. The RPM of a DC motor is measured using an infrared sensor. We can control the DC motor with a PWM signal.

III. CONCLUSION

The suggested project approach would create a hardware model using the IOT Technology to operate a dc motor. As a result, the speed and temperature of a dc motor may be controlled and monitored via IOT. This paper discusses the real-time monitoring and control of a system designed to protect a dc motor. For real-time monitoring, the system is coupled with IOT. The suggested solution provides precision, reliability, and lowers the motor's failure rate. In this case, we utilized a microcontroller (ATMEGA328P) as a data gathering system. A potentiometer may be used to control the speed. The technology described in this work may be employed in a variety of industrial applications, and it is relatively inexpensive and contributes to the stability of the system. Although the proposed system provides a strong



foundation for smart poultry farming, several enhancements can further improve its capabilities. Future work will focus on integrating computer vision techniques for real-time poultry health monitoring and disease detection using cameras. The system can be extended to include automated egg counting and bird weight monitoring to support production analytics. Additionally, the integration of solar power can make the system more energy-efficient and suitable for remote rural areas. Advanced data analytics and machine learning models can be incorporated to predict environmental changes and optimize farm operations proactively. Expanding the system to support multilingual voice alerts and large-scale farm deployment will further enhance usability and scalability.

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