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IOT BASED SMART POULTRY FARM

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ASTRACT

The incorporation of sensors to monitor temperature, humidity, air quality, and fire hazards in real time is transforming poultry management through an Internet of Things-based smart poultry farm system. When there are any reading irregularities from these sensors, notifications are generated, allowing for timely intervention. Furthermore, smart automation assures regular resource provision by automating routine tasks such as watering and feeding. Automatic cooling and fire detection systems improve the birds' living conditions. The use of IoT technology enhances farm management and livestock welfare outcomes, monitoring capabilities, and operational efficiency.

INDEX TERMS - Livestock welfare, Automation,

Resource Management, Fire Detection, Farm Efficiency

Sensor Technology

I. INTRODUCTION

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 affects 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.

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.

II. PURPOSE OF SMART POULTRY FORM

A smart poultry farm's main objective is to revolutionize conventional methods of managing chickens by applying state-of-the-art technology to boost output, productivity, and animal welfare. Through the integration of sensors that continuously monitor a variety of environmental parameters, including temperature, humidity, air quality, and fire hazards, smart poultry farms offer the best living circumstances for their birds. Farmers can swiftly resolve any irregularities or potential issues thanks to this proactive monitoring, which lowers the likelihood of disease outbreaks, illnesses linked to stress, and other detrimental effects on the health of chickens.A vital part in making routine hen care tasks like feeding and watering easier. Automated systems reduce the need for manual labor and the risk of mistake by ensuring that resources are given consistently and on time. This improves the birds' overall health and performance in addition to increasing operational efficiency. Moreover, by preserving appropriate temperatures and lowering potential safety risks, automated cooling and fire detection systems provide additional lines of defense, safeguarding the infrastructure and the animals alike. A vital part in making routine hen care tasks like feeding and watering easier. Automated systems reduce the need for manual labor and the risk of mistake by ensuring that resources are given consistently and on time. This improves the birds' overall health and performance in addition to increasing operational efficiency. Moreover, by preserving appropriate temperatures and lowering potential safety risks, automated cooling and fire detection systems provide additional lines of defense, safeguarding the infrastructure and the animals alike.

III. RELATED WORKS

[1]**T. Malini; D. L. Aswath**;-This article offers guidance on how to configure an Internet of Things (IoT) based smart poultry farming system with IoT components in the most efficient manner. The data is transferred to the cloud by the ESP32 Wi-Fi Module, while the Arduino Nano interacts with multiple sensors to determine the drawbacks of clearly defined borders.

[2] **R. Sandhiya; T. VamshiMohana; -** To address every difficulty, the study proposed a smart chicken system. Environmental factors have a significant impact on poultry birds' health, thus humidity and temperature are constantly checked and tracked. The website was created so that folks who care for poultry might obtain exact information about the health of their birds and use it to make informed decisions.

[3] **Mohammed HanifLashari; Ali AsgharMemon;** - The provided based on software hardware may monitor environmental metrics such as air temperature, humidity, oxygen content, CO2 concentration, and NH3 concentration. The wireless sensor is in charge of source coordination and control, as well as effective data collection for the aforementioned parameters. The equipment has been successfully placed in many locations throughout the chicken shed. The experimental setup proved to be exceedingly precise and productive.

[4] **R. Sasirekha; Kaviya R** - The goal of this project is to automate management duties on a chicken farm using IoT technologies. Temperature and humidity are two environmental factors that influence chicken well-being. By monitoring the chicks according to their cycle, the owner is kept informed. When making high-quality items, the weight of the bird is important. If these conditions remain consistent, the number and quality of chicken will increase.

[5] **Mangesh Kale; Sarita Charkha -** The paper explains that the Raspberry Pi and Arduino Uno may communicate via the USB interface and serial peripherals. The Arduino Uno is used to read sensor data, while the Raspberry Pi functions as an embedded web server. An embedded web server enables the adoption of Internet of Things (IoT) principles. This project aims to monitor and manage environmental parameters in chicken farms such as temperature, humidity, light intensity, and air quality.

[6] **FatriaJumaraAdha; MdGaparMdJohar;** - Automation is crucial in today's world, and the concept of the Internet of Things (IOT) is constantly expanding. There are attempts underway to convert manual operations to automated ones. The essay focuses on automating chicken farms with Internet of Things technologies to complete a variety of management chores. A variety of environmental factors influence chicken health, including temperature, humidity, light, and ammonia gas levels. Manual chores such as cleaning, feeding, and water supply are all managed.

[7] **Shubham Mitkari1, AshwiniPingle**- The method suggested is applicable to both farming and chicken farms. It is used to prepare the soil, spray plants, and fertilise them. In a chicken farm, it is utilised to provide food in containers, regulate temperature with a water sprinkler and remove air with a soil mixture. The user will profit from the proposed system.

[8] **G. Dency Flora; R. Sandhiya; P. Santhiya; -** The goal is to reduce chicken mortality while increasing healthy hen production in order to boost productivity by computerising the observation and control process and utilising the Internet of Things (IoT). The cycles that start automatically when the aforementioned parameters exceed the edge levels can help to slow the rate at which hens perish on the ranch. In addition, the framework sends the client a preprogrammed readiness warning by SMS, email, and online messaging apps. A Web point of interaction is similarly designed to screen and display these boundaries.

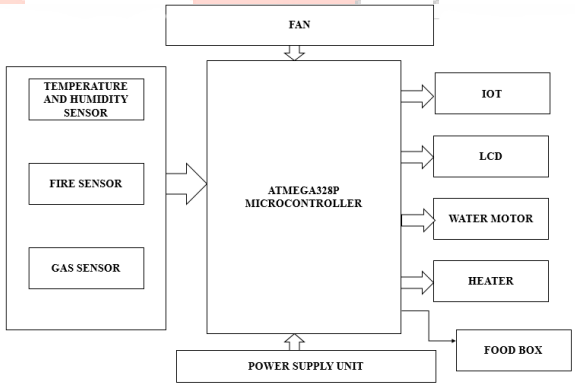
[9] **NoridayuManshor; Amir Rizaan Abdul Rahiman -** To ensure that the system works effectively, monitor the temperature and humidity levels in a chicken house on a frequent basis. To avoid scenarios that result in high temperature increases, it must be monitored around the clock. This article focuses on an Internet of Things (IoT) solution for monitoring temperature and humidity anywhere, at any time, as well as energy connectivity.

[10] **Dr.ZuhaibBaig , Pallavi M -** The industry's labour concerns can be addressed by employing the recommended technology to feed the hens rather than hiring workers, and a semi-automated technique can be implemented in the poultry business. Global chicken output has continuously increased as a result of improved manufacturing processes and uniform farming practices. According to the world's agricultural product report, chicken is the most popular produce since it contains more protein, less fat and cholesterol, and less calories than other poultry species.

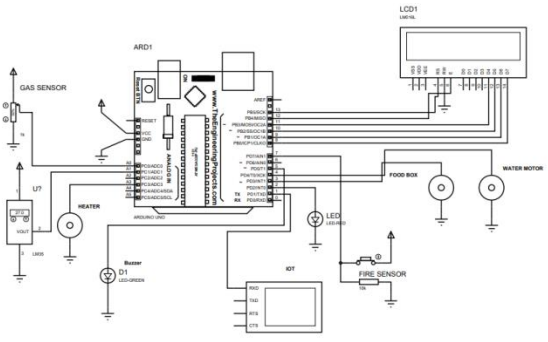
IV. PROPOSED SYSTEM

The system is a revolutionary advancement in chicken farming technology that has the potential to revolutionise crucial farm operations. Through a network of sensors placed throughout the chicken house, the system continuously monitors environmental parameters like temperature, humidity, air quality, and fire hazards in real time. The vast amount of data is processed centrally, facilitating prompt intervention through warnings and early identification of circumstances that deviate from ideal ones. Moreover, integrated automation features improve resource management and guarantee regular resource supply by streamlining important tasks like watering and feeding. These preventive measures, such fire detection equipment, successfully lessen risks to infrastructure and animals. This innovative approach leads to significant improvements in monitoring capabilities and operating economy, as well as better results for both farms. This innovative approach, which combines automation and Internet of Things technology, significantly boosts monitoring and operating efficiency, leading to better farm management and chicken welfare results. Preventive methods, such the use of fire sensors, effectively lessen risks to infrastructure and livestock. Furthermore, real-time monitoring of environmental factors including temperature, humidity, air quality, and fire hazards is made possible by the establishment of a network of sensors throughout the chicken house. The vast amount of data is processed centrally, facilitating prompt intervention through warnings and early identification of circumstances that deviate from ideal ones. Moreover, integrated automation features improve resource management and guarantee regular resource supply by streamlining important tasks like watering and feeding.

V. SYSTEM ARCHITECTURE



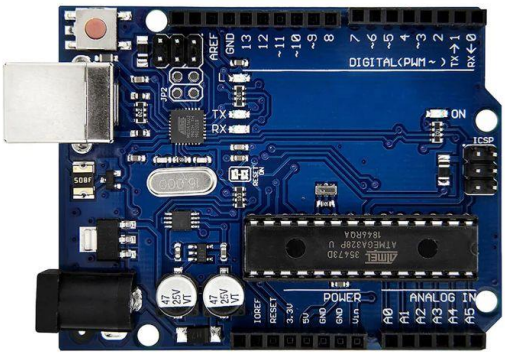
VI. SCHEMATIC DIAGRAM



VII. COMPONENTS REQUIREMENTS

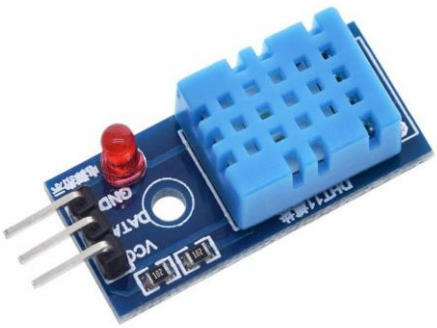
a) ATMEGA328P MICRO CONTROLLER

The ATmega328P microcontroller is a popular option for many embedded applications. It features a large number of peripherals, such as analog-to-digital converters, timers, UART, SPI, and I2C interfaces, in addition to a high-performance 8-bit AVR RISC architecture. The ATmega328P is perfect for applications that require limited space and battery power because to its compact size and low power consumption. Because of its compatibility with the Arduino development environment, it may be used for rapid development projects and prototyping, making it more appealing to a wider range of developers and enthusiasts. The ATmega328P microcontroller offers a strong platform on which to build a wide range of embedded systems, from modest sensor nodes to substantial Internet of Things devices.



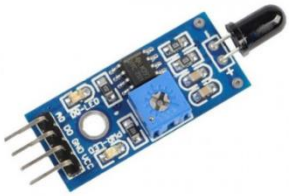
b) TEMPERATURE AND HUMIDITY SENSOR

An inexpensive temperature and humidity sensor that may be utilised for many different purposes is the DHT11 temperature sensor. It is easy to integrate into microcontroller-based applications because it operates via a single-wire interface and includes a digital signal output. The DHT11 is perfect for spaces with limited space and battery-powered devices due to its compact size and low power consumption. Its simplicity and low cost make it a popular choice for education, hobbyist projects, and applications where precise readings are not necessary, even though its precision is not as good as that of more sophisticated sensors. A simple and affordable substitute for measuring temperature and humidity in a variety of electronic projects and applications is the DHT11 temperature sensor.



c) FIRE SENSOR

An integral part of fire detection and alarm systems is a fire sensor, often known as a flame detector or fire detector. By detecting different characteristics like heat, smoke, or light generated by the fire, these sensors are meant to identify the presence of flames or fire. They can employ a range of technologies, including infrared (IR), heat, and smoke detection, to identify potential fire dangers. In order to alert neighbours and stop the fire from spreading farther, the sensor sounds an alarm or turns on suppression systems when it notices a fire or flame. In order to safeguard people and property in residential, commercial, and industrial settings during a fire, fire sensors are essential for early detection and quick response to fire emergencies.



d) GAS SENSOR

A device used for identifying the various gases present in the environment is a gas sensor. Toxic gases that can jeopardise human health and safety, including as carbon monoxide, methane, and hydrogen sulphide, are frequently detected by them in industrial settings. In order to find leaks of propane or natural gas in homes and buildings, gas sensors are also utilised in residential settings. The sensor alerts occupants and initiates appropriate action by sending an electrical signal or setting off an alarm when it detects the target gas. Gas sensors are crucial for environmental monitoring, worker safety, and averting gas-related mishaps or disasters.

e) HEATER

A heater must be kept running in order to maintain the proper humidity levels for a number of uses, such as industrial processes, agricultural settings, and indoor climate management. A humidity sensor in this system continuously measures the ambient humidity. The controller activates the heater to adjust the humidity when the level falls below the designated setpoint. For instance, the heater is turned on to increase moisture levels by evaporating water or preventing over-evaporation if the humidity is too low, indicating dry conditions. On the other hand, to avoid condensation and the growth of mould, the heater may be turned off or its intensity lowered if the humidity is very high, signifying an excess of moisture.

f) FAN

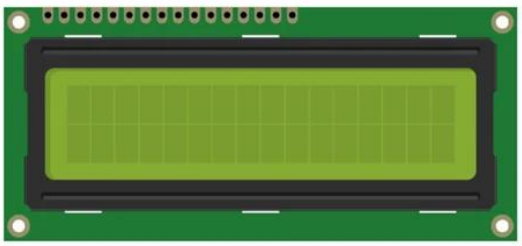
A temperature sensor in this system keeps track of the outside temperature continually. The controller activates the fan to either bring in cool air or drive out hot air when the temperature above a predetermined threshold. For instance, the fan is turned on to move air around and dissipate heat if the temperature rises over the designated setpoint, indicating overheating, and to keep the interior temperature comfortable. On the other hand, should the temperature drop below the predetermined point, the fan can be turned on to blow warm air from a heating system about, ensuring constant warmth. By dynamically adjusting fan speed in response to real-time temperature readings, this control system effectively adjusts thermal conditions, increasing comfort, energy efficiency, and optimal performance in a range of applications.

g) WATER MOTOR

A water motor is a mechanical device that moves water from one place to another. It is sometimes referred to as a water pump or engine. Typically, it consists of an impeller, a housing, and a motor that powers the impeller's rotation. Water is drawn into the pump and expelled out of it via a greater pressure or flow rate output as a result of suction created by the spinning impeller. Water motors are employed in many different applications, such as industrial processes, irrigation, drainage, and home water distribution. They come in a range of sizes and forms, from little, handheld pumps for household usage to massive pumps for municipal or agricultural water delivery.

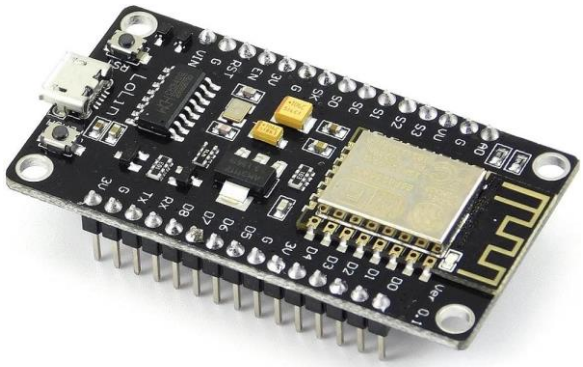
h) LCD DISPLAY

The LCD (Liquid Crystal Display) flat-panel display technology for visual output. A layer of liquid crystal material is positioned between two transparent electrodes and two polarising filters in this configuration. The liquid crystals align and regulate the flow of light when an electric current is supplied, resulting in the display of text or images. Digital watches, calculators, computer monitors, televisions, and other consumer gadgets all make extensive use of LCD screens. They have a tiny form factor, good image quality, and low power consumption, among other benefits. LCDs can also show data in a range of formats, including pictures, movies, and alphanumeric characters.



i) IOT

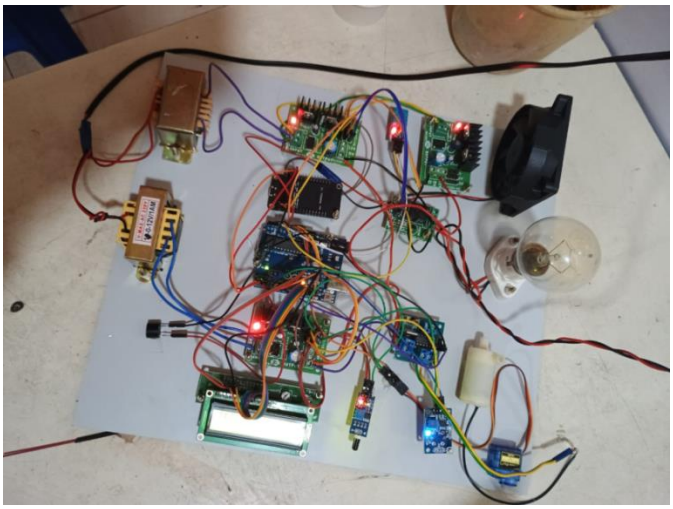
The popular ESP8266 Wi-Fi module, NodeMCU is a flexible development board for Internet of Things (IoT) applications. Users can remotely monitor and control connected devices or sensors via the internet by connecting NodeMCU to the Blynk app. Blynk is an easy-to-use platform that allows you to create configurable interfaces using widgets such as gauges, sliders, and buttons that can be connected to virtual or GPIO pins on the NodeMCU. This allows customers to use the Blynk app on their smartphone or tablet to view real-time data from sensors or operate actuators. Without requiring much programming knowledge, users may create IoT apps for home automation, environmental monitoring, and other purposes with ease using NodeMCU and Blynk.

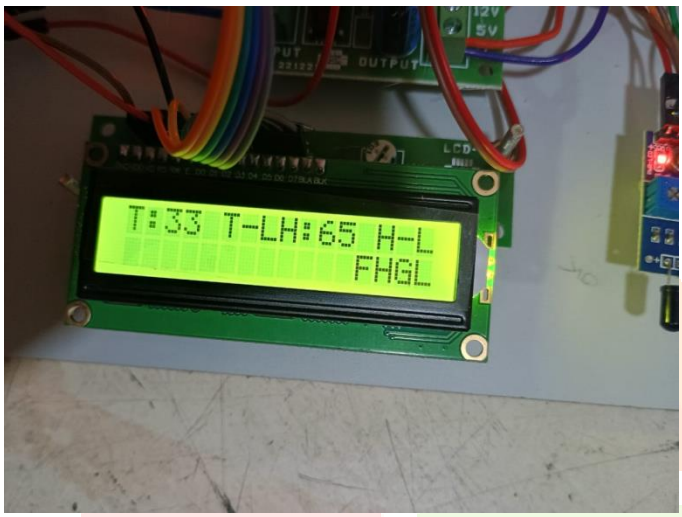


VIII. RESULT AND DISCUSSION

It was evaluated using a variety of tests and comparisons and includes both the Arduino Uno and NodeMCU code for IoT with Blynk app connectivity. First, to ensure measurement accuracy, the temperature and humidity sensor results were compared to established benchmarks or calibrated equipment. Furthermore, under various conditions, the responsiveness and dependability of the control mechanism, which changes parameters such as heater or fan operation based on sensor inputs—were evaluated. This involved determining the system's ability to maintain acceptable environmental conditions over long periods of time within a particular tolerance range. The results analysis revealed that both the Arduino Uno and NodeMCU code implementations achieved acceptable levels of accuracy for sensor readings and control actions. The sensor data from the systems showed a significant correlation with the expected values, demonstrating that they can measure accurately. The control systems also displayed robustness and responsiveness in maintaining the desired setpoints for temperature, humidity, and other parameters while successfully responding to changes in the external environment. The Arduino Uno and NodeMCU are both viable options for developing IoT solutions with Blynk app connectivity, according to performance comparisons between the two coding platforms. The main subjects of discussion were potential enhancements to the implemented system and its practical implications. Although the accuracy level was adequate for the majority of applications, there may be potential for improvement by installing better sensors or calibrating the system. Additional software code optimisations, such as improving control logic methods or incorporating error-handling capabilities, may improve the system's dependability and efficacy. Furthermore, the scalability, security, and UI design of the Blynk app integration were examined, highlighting possible areas for future development and modification to meet specific user requirements and preferences. The findings and discussion emphasised the system's efficacy while also identifying areas for improvement in order to achieve even better levels of performance and user satisfaction.

IX. RESULT





X. CONCLUSION

Streamlining and strengthening environmental monitoring and control systems. The system's ability to precisely measure environmental characteristics such as temperature and humidity while also properly operating devices such as heaters and fans to maintain specified conditions has been demonstrated through rigorous design and testing. This effective combination of hardware and software components demonstrates the adaptability and dependability of the Arduino and NodeMCU platforms, as well as the user-friendly Blynk app interface, resulting in seamless IoT solutions for a wide range of applications.This approach has various benefits, including greater convenience and efficiency. The system maintains stable and optimal environmental conditions while automating monitoring and control processes, decreasing the need for manual intervention. This saves both time and resources. Furthermore, the Blynk app's remote accessibility allows users to monitor and change settings from any location with an internet connection, increasing convenience and flexibility. The successful deployment of this IoT system paves the way for future advancements in smart environmental control technologies by streamlining operations, increasing productivity, and enhancing resource management, energy efficiency, and user satisfaction.

XI. REFERENCE

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