IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

REVOLUTIONIZING POULTRY FARMING THROUGH IOT TECHNOLOGY

[1] Dr. K. MARIYA PRIYADARSHINI, T. MAHESH [2], J. NAGA BABU [3],

P. ARUN KUMAR [4].

[1] ASSISTANT PROFESSOR IN DEPT OF ECE IN ANDHRA LOYOLA INSTITUTE OF ENGINEERING AND TECHNOLOGY IN VIJAYAWADA-520008, A.P.

[2, 3,4.] STUDENTS FROM DEPT OF ECE IN ANDHRA LOYOLA INSTITUTE OF ENGINEERING AND TECHNOLOGY IN VIJAYAWADA-520008, A.P.

ABSTRACT: 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. 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.

INTRODUCTION

Poultry farming has been a critical part of the agricultural industry for centuries, providing an essential source of protein to the global population. However, traditional poultry farming methods have several limitations, including the inability to monitor and control the environment effectively. This lack of control can lead to poor animal welfare, reduced productivity, and increased mortality rates. The introduction of the Internet of Things (IoT) technology in agriculture has enabled farmers to overcome some of these limitations by providing real-time monitoring and control of various aspects of the farming process. The IoT-based Smart Poultry Farm is a new approach to poultry farming that utilizes this technology to create a more efficient and sustainable system. The system incorporates various sensors and devices that are interconnected and communicate with a central platform. These sensors monitor the farm's environment, such as temperature, humidity, lighting, and feeding and watering systems. The data collected from the sensors are analysed by machine learning algorithms, providing actionable insights to the farmers. This analysis enables them to make informed decisions about the optimal conditions required for the birds' health and productivity. The IoT-based Smart Poultry Farm also allows farmers to remotely monitor the farm's conditions and receive alerts in case of any abnormalities, enabling them to take timely action to prevent any negative impacts on the birds' welfare. Nowadays, chicken poultry industry is an important industry for sustainable food supply in our country. The development of an automatic chicken feeding machine can be very useful to the growth of the poultry industry, the Soil mixture for healthy environment and also water sprinkler for control the temperature is most important task and labour-intensive task. These manual processes are needed in normal poultry farm. In order to replace manual Activities and poultry work easier with making smart poultry farm. For implementation of smart poultry farm to use one kind of smart system for Automatic Food Feeder in container and water sprinkler for control the temperature of environment and also use the soil mixture for reducing the Gas in poultry environment. System is designed in such way that user can remotely control to the system through android mobile application. Using this prototype Human work is also reducible and smart work will be done. Throughout the last few decades, there has been an increased degree of knowledge about food safety around the world, as well as a strong demand for higher quality food. Several governments have been pushed to implement new procedures in order to convert all manual farms into automated farms. In this approach, smart poultry farms

have a significant influence on chicken growth. This research focused on new technology for poultry farming that regulate all environmental elements such as temperature, humidity, and ammonia gas, all of which impact chicken growth. If the environmental conditions are not suitable, the hens may have digestive, respiratory, and behavioural changes. If chickens can be provided with an appropriate environment and adequate water, Climate has a significant impact on chicken growth. The environment of a smart poultry farm may be modified using heater, cooling fans.

LITERATURE SURVEY

Poultry farming is a vital sector of the agricultural industry, contributing significantly to food production worldwide. Efficient management of poultry farms requires careful monitoring of environmental parameters to ensure the health, welfare, and productivity of the birds. In recent years, there has been growing interest in the development of advanced monitoring systems utilizing various technologies to optimize poultry farm management practices. This literature survey aims to explore existing research and developments in the field of poultry farm monitoring systems, focusing on the integration of Arduino Uno microcontroller and associated sensors and actuators. 1. Importance of Environmental Monitoring in Poultry Farming Environmental factors such as temperature, humidity, light intensity, and air quality have a significant impact on the well-being and performance of poultry. Research studies have highlighted the importance of maintaining optimal environmental conditions within poultry houses to minimize stress, reduce mortality rates, and maximize growth rates. Effective environmental monitoring enables poultry farmers to identify and mitigate potential risks such as heat stress, respiratory diseases, and poor ventilation, thereby improving overall farm productivity and profitability. 2. Role of Arduino Uno in Poultry Farm Monitoring Systems Arduino Uno microcontroller, with its open-source hardware and software platform, has emerged as a popular choice for developing monitoring and control systems in various domains, including agriculture. Its affordability, versatility, and ease of programming make it well-suited for applications in poultry farming. Several research studies have demonstrated the integration of Arduino Uno with sensors such as DHT11 (temperature and humidity), LDR (light intensity), water level sensors, and actuators such as relays, fans, heaters, and motors to monitor and control environmental parameters in poultry houses. 3. Sensor Technologies for Poultry Farm Monitoring A wide range of sensors are employed in poultry farm monitoring systems to measure key environmental parameters. The DHT11 sensor is commonly used for monitoring temperature and humidity levels, providing real-time data to ensure thermal comfort and humidity regulation for poultry. Light Dependent Resistors (LDRs) are utilized to measure light intensity inside poultry

houses, facilitating the adjustment of artificial lighting systems to mimic natural daylight cycles and optimize bird behaviour and productivity. Water level ensors are essential for monitoring water supply systems, ensuring adequate hydration for poultry and preventing water shortages or flooding incidents.

PROPOSED METHOD

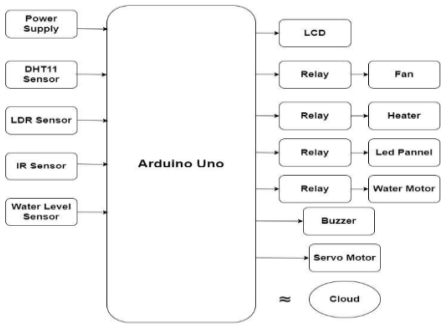


Fig: Block Diagram

The proposed poultry farm monitoring system integrates various components, including Arduino Uno microcontroller, DHT11 temperature and humidity sensor, LDR (Light Dependent Resistor), water level sensor, relays, buzzer, fan, heater, motor, LED panel, Wi-Fi module, and LCD (Liquid Crystal Display), to create a comprehensive solution for monitoring and controlling environmental conditions within poultry houses. This section outlines the components and functionalities of the proposed system, detailing how each component contributes to the overall monitoring and management of poultry farm environments.

SYSTEM OVERVIEW

The poultry farm monitoring system is designed to monitor key environmental parameters such as temperature, humidity, light intensity, and water level, while also providing control capabilities for essential farm equipment such as ventilation, heating, lighting, and water supply. The system utilizes Arduino Uno microcontroller as the central processing unit, which interfaces with various sensors and actuators to collect data and execute control commands based on predefined thresholds and user inputs.

The system incorporates multiple sensors to monitor environmental conditions within poultry houses: DHT11 Sensor: Monitors temperature and humidity levels, providing real-time data on thermal comfort and humidity regulation for poultry. LDR (Light Dependent Resistor): Measures light intensity inside the poultry house, allowing for the adjustment of artificial lighting systems to simulate natural daylight cycles and optimize bird behaviour and productivity. Water Level Sensor: Monitors water levels in poultry house water supply systems, ensuring adequate hydration for birds and preventing water shortages or flooding incidents. Actuator Control The proposed system utilizes relays to control various actuators for environmental regulation: Fan Control: Relays are used to control ventilation fans, enabling automatic adjustment of airflow to maintain optimal temperature and air quality within the poultry house. Heater Control: Relays control heating elements to provide supplementary heat during cold weather conditions, ensuring thermal comfort for

poultry. Motor Control: Actuates motors for controlling feed dispensers and automated poultry house curtains, facilitating efficient feed distribution and natural ventilation. LED Panel Control: Utilizes relays to control LED panels for lighting control, offering energy-efficient lighting solutions to promote bird growth and welfare.

User Interface The system incorporates an LCD (Liquid Crystal Display) for real-time data visualization and user interaction. The LCD displays environmental parameters such as temperature, humidity, light intensity, and water level, allowing poultry farmers to monitor conditions within the poultry house at a glance. Additionally, the LCD provides menu options for setting thresholds, configuring control parameters, and viewing system status and alerts.

To enable remote monitoring and control capabilities, the proposed system integrates a Wi-Fi module with Arduino Uno. The Wi-Fi module connects the monitoring system to a local Wi-Fi network or the internet, allowing poultry farmers to access real-time data and control the system remotely using smartphones, tablets, or computers. Remote monitoring capabilities offer flexibility and convenience, enabling farmers to manage poultry houses efficiently from anywhere, thereby improving operational efficiency and response times to critical events or emergencies. The proposed poultry farm monitoring system offers a comprehensive solution for monitoring and controlling environmental conditions within poultry houses. By integrating Arduino Uno microcontroller, sensors, actuators, and wireless connectivity, the system enables poultry farmers to optimize environmental parameters, enhance bird welfare, and improve overall farm productivity and profitability. With its user-friendly interface and remote monitoring capabilities, the system empowers farmers to make informed decisions and take timely actions to ensure the health and well-being of their poultry stock.

IMPLEMENTATION OF POULTRY FARM MONITORING SYSTEM:

This section provides a detailed overview of the implementation of the poultry farm monitoring system utilizing Arduino Uno microcontroller, DHT11 temperature and humidity sensor, LDR (Light Dependent Resistor), water level sensor, relays, buzzer, fan, heater, motor, LED panel, Wi-Fi module, and LCD (Liquid Crystal Display). The implementation process encompasses hardware setup, sensor and actuator integration, software development, and system testing. Hardware Setup a. Arduino Uno Setup: Begin by connecting the Arduino Uno microcontroller to a power source and a computer for programming. Install the Arduino Integrated Development Environment (IDE) on the computer and ensure that the necessary drivers are installed for the Arduino Uno board. b. Sensor Integration: Connect the DHT11 temperature and humidity sensor, LDR, and water level sensor to the Arduino Uno

board according to their respective pin configurations. Ensure proper wiring and secure connections to enable accurate sensor readings. c. Actuator Integration: Connect relays to control the fan, heater, motor, and LED panel. Wire the relays to the corresponding actuators and ensure compatibility with the Arduino Uno board. Test the connections to verify proper operation of the actuators. d. Buzzer Installation: Connect the buzzer to the Arduino Uno board, ensuring correct polarity and wiring. Test the buzzer to ensure audible alerts can be generated when necessary. e. Wi-Fi Module Setup: Install the Wi-Fi module and configure it to connect to a local Wi-Fi network. Establish communication between the Wi-Fi module and the Arduino Uno board using serial communication or the appropriate communication protocol. f. LCD Installation: Connect the LCD display to the Arduino Uno board, ensuring proper wiring and compatibility. Upload the necessary libraries and test the LCD display to ensure it can show real-time data and user interface elements.

a. Arduino Sketch Development: Develop the Arduino sketch (program) to read data from the sensors, process the data, and control the actuators based on predefined thresholds and user inputs. Implement algorithms for environmental monitoring, threshold detection, and actuator control to ensure optimal farm management. b. User Interface Design: Design the user interface for the LCD display to visualize realtime data, display system status, and provide menu options for user interaction. Implement menu navigation, parameter settings, and alert notifications to enhance user experience and usability. c. Wi-Fi Communication: Develop code to enable communication between the Arduino Uno board and the Wi-Fi module. Implement protocols such as HTTP or MQTT to transmit data to a remote server or cloud platform for storage, analysis, and remote monitoring. System Testing and Calibration a. Sensor Calibration: Calibrate the sensors to ensure accurate and reliable measurements of temperature, humidity, light intensity, and water level. Adjust calibration parameters as needed to minimize errors and improve sensor accuracy. b. Actuator Testing: Test the actuators, including the fan, heater, motor, LED panel, and buzzer, to ensure they respond correctly to control commands from the Arduino Uno board. Verify that actuators operate within safe limits and do not cause any adverse effects on the poultry environment. c. Integration Testing: Perform integration testing to ensure seamless communication and coordination between sensors, actuators, and the Arduino Uno microcontroller. Verify that data is collected accurately, control commands are executed correctly, and the system operates as intended under various environmental conditions. Deployment and Monitoring Once testing is complete, deploy the poultry farm monitoring system in the poultry house. Monitor system performance and environmental conditions in real-time using

the LCD display and remote monitoring capabilities enabled by the Wi-Fi module. Make any necessary adjustments or optimizations to the system based on feedback and observations from farm operations. The implementation of the poultry farm monitoring system involves careful hardware setup, sensor and actuator integration, software development, and thorough testing to ensure reliable and accurate operation. By leveraging the capabilities of Arduino Uno microcontroller, along with various sensors, actuators, and wireless connectivity options, the system enables effective monitoring and control of environmental conditions within poultry houses, thereby enhancing bird welfare, productivity, and overall farm management. Ongoing monitoring and maintenance are essential to ensure continued system performance and optimization of poultry farming operations.

RESULTS AND DISCUSSION

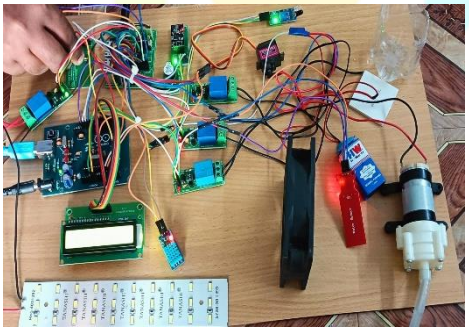


Fig: Kit Based Result

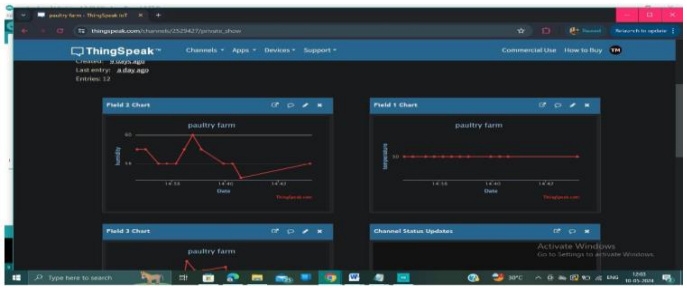


Fig: Humidity and Temperature Output

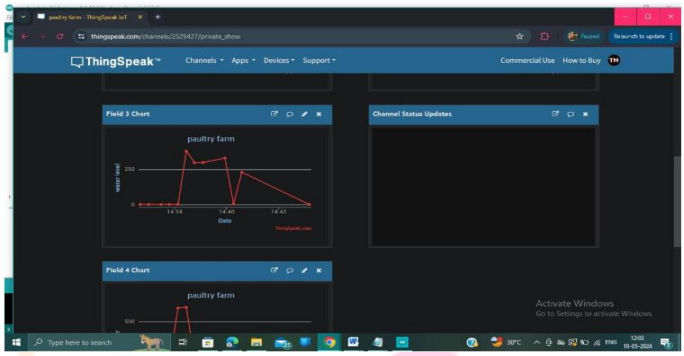


Fig: Water Level Output

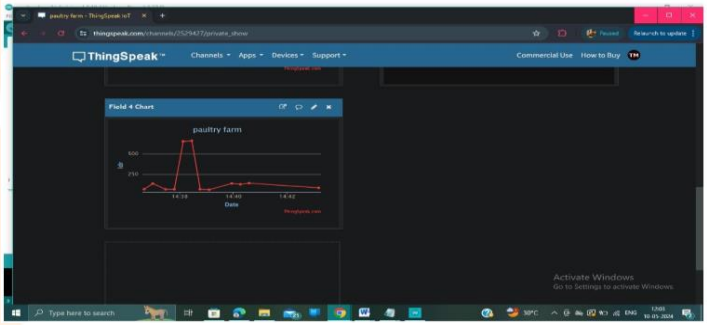


Fig: IDR Output

CONCLUSION AND FUTURE SCOPE

CONCLUSION

The poultry farm monitoring system developed using Arduino Uno microcontroller, along with various sensors, actuators, and wireless connectivity options, represents a significant advancement in poultry farming technology. Throughout this paper, we have discussed the design, implementation, advantages, and applications of the monitoring system, highlighting its potential to revolutionize poultry farm

management practices. In conclusion, the poultry farm monitoring system offers several key benefits for poultry farmers: Enhanced Efficiency: By automating the monitoring and control of environmental parameters such as temperature, humidity, light intensity, and water levels, the system improves operational efficiency and reduces labour requirements. Improved Productivity: Optimal environmental conditions within poultry houses promote the health, welfare, and productivity of poultry stock, leading to higher growth rates, feed efficiency, and egg production. Real-time Monitoring and Alerts: The system provides real-time monitoring of environmental parameters and generates alerts or notifications in response to critical events or emergencies, enabling prompt intervention and risk mitigation. Remote Accessibility: With its integration of Wi-Fi connectivity, the monitoring system enables remote accessibility and control capabilities, allowing farmers to monitor poultry houses and manage environmental conditions from anywhere, at any time. Data-driven Decision Making: By collecting and analysing data on environmental parameters, farmers can make informed decisions based on real-time insights, optimizing farm management practices and improving overall performance.

FUTURE SCOPE

While the poultry farm monitoring system offers significant benefits, there are several areas for future research and development to further enhance its capabilities and impact: Integration of Advanced Sensors: Future iterations of the monitoring system could incorporate advanced sensors for additional parameters such as air quality, ammonia levels, and CO2 concentration, providing more comprehensive insights into poultry house environments. Predictive Analytics and Decision Support: Incorporating predictive analytics and decision support systems into the monitoring system could enable farmers to anticipate future trends, identify potential risks, and proactively implement preventive measures to optimize poultry farm management. Energy Efficiency and Sustainability: Future developments could focus on enhancing the energy efficiency and sustainability of the monitoring system, leveraging renewable energy sources, energy-efficient components, and smart algorithms for resource optimization. Blockchain Technology for Data Security: Implementing blockchain technology could enhance data security and integrity, ensuring that environmental data collected by the monitoring system remains tamper-proof and transparent, which is crucial for regulatory compliance and trust among stakeholders. Scalability and Adaptability: As poultry farming operations continue to evolve and expand, future iterations of the monitoring system should be scalable and adaptable to accommodate varying farm sizes, production systems, and environmental conditions.

REFERENCES

[1] DHT11 Temperature and Humidity Sensor. (n.d.). Retrieved from https://www.sparkfun.com/datasheets/Sensors/Temperature/DHT11.pdf Light Dependent Resistor (LDR) Guide. (n.d.). Retrieved from https://learn.sparkfun.com/tutorials/light/lux-ldr-and-analog-inputs

[2] Water Level Sensor. (n.d.). Retrieved from https://www.adafruit.com/product/4646 Arduino Relay Tutorial. (n.d.). Retrieved from https://www.arduino.cc/en/tutorial/relay

[3] Arduino Buzzer Tutorial. (n.d.). Retrieved from https://www.arduino.cc/en/tutorial/tone2

[4] Arduino Fan Control Tutorial. (n.d.). Retrieved from https://www.electronicwings.com/nodemcu/controlling-fan-using-nodemcu-and-relaymodule

[5] Arduino Heater Control Tutorial. (n.d.). Retrieved from https://www.circuitdigest.com/microcontroller-projects/arduino-based-automatictemperature-controlled-fan-speed

[6]Shaharudin, Nurshahirah, Mohd Zamri Hasan, and Syatirah Mohd Noor. "Direct Current (DC) Motor Speed and Direction Controller." Journal of Physics: Conference Series. Vol. 2129. No. 1. IOP Publishing, 2021.

[7]Ahamed, Md Istiaque, et al. "Design a Real Time Temperature Monitoring System to Protect DC Motor." 2019 22nd International Conference on Computer and Information Technology (ICCIT). IEEE, 2019.

[8]Darie, E., R. Pécsi, and M. Culcea. "Speed Control of the Direct Current Servomotor and the Stepper Motor with Arduino UNO Platform." IOP Conference Series: Earth and Environmental Science. Vol. 664. No. 1. IOP Publishing, 2021.

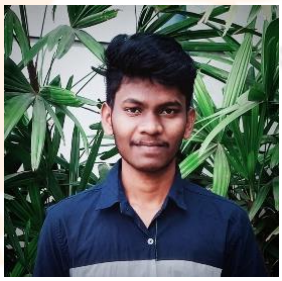
[9] [1] Bhattacharjee, et al., "Speed Control of BLDC Motor through Mobile Application via Secured Bluetooth", Recent Developments in Control,Automation and Power Engineering, Noida, India,May 2018.

[10] R. Chaubey, et al., "Speed and Direction Control of DC Motor using Android Mobile Application", International Journal of Electrical Electronics & Computer Science Engineering, pp. 101-102, 2018

Dr. K MARIYA PRIYADARSHINI pursued her B.tech in ECE from JNTU Hyderabad. She did her M.tech VLSI from Karunya University, Coimbatore, aTamil Nadu. She completed her Ph.D from KLEF Deemed to be University, Guntur. Her areas of interest include SoC, Analog VLSI and IoT.

T. MAHESH Present pursuing BTech in the branch of Electronics and communication Engineering at Andhra Loyola Institute of Engineering and Technology, Vijayawada, Andhra Pradesh, India. mtalluri563@gmail.com.

J. NAGA BABU Present pursuing BTech in the branch of Electronics and communication Engineering at Andhra Loyola Institute of Engineering and Technology, Vijayawada, Andhra Pradesh, India. nagababujillepalli995178@gmail.com.



P. ARUN KUMAR Present pursuing BTech in the branch of Electronics and communication Engineering at Andhra Loyola Institute of Engineering and Technology, Vijayawada, Andhra Pradesh, India. penumulaarunkumar71@gmail.com.