DESIGN AND IMPLEMENTATION OF IOT BASED POULTRY FARM MONITORING SYSTEM

A Project report is submitted in partial fulfillment of the requirements for the award of Degree of Bachelor of Science in Electrical and Electronic Engineering.

Submitted by

MD Shablo Mia	ID: 203-33-1349
Hasan	ID: 211-33-1364
Md Hashin Rayhan Akash	ID: 211-33-1371

Supervised by

Sutapa Debnath

Lecturer (Senior Scale)

Department of Electrical and Electronic Engineering

Department of Electrical and Electronic Engineering

Faculty of Engineering

DAFFODIL INTERNATIONAL UNIVERSITY

NOVEMBER, 2025

DECLARATION

We hereby declare that this project "**DESIGN AND IMPLEMENTATION OF IOT BASED POULTRY FARM MONITORING SYSTEM**" represents my own work which has been done in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering, and has not been previously included in a thesis or dissertation submitted to this or any other institution for a degree, diploma or other qualifications. We have attempted to identify all the risks related to this research that may arise in conducting this research, obtained the relevant ethical and/or safety approval (where applicable) and acknowledged my obligations and the rights of the participants.

Signature of the candidates

MD SHABLO MIA

____

MD SHABLO MIA
ID: 203-33-1349

Hasan

____

Hasan
ID: 211-33-1364

Hashin Rayhan Akash

____

Md Hashin Rayhan Akash
ID: 211-33-1371

APPROVAL

The project entitled **"DESIGN AND IMPLEMENTATION OF IOT BASED POULTRY FARM MONITORING SYSTEM"** submitted by **MD SHABLO MIA (203-33-1349), Hasan(211-33-1364) & Hashin Rayhan Akash(211-33-1371)** has been done under my supervision and accepted as satisfactory in partial fulfillment of the requirements for the degree of **Bachelor of Science in Electrical and Electronic Engineering** in **November, 2025.**

Signed

Sutapa Debnath
15,01,2025

Sutapa Debnath
Lecturer (Senior Scale)
Department of Electrical and Electronic Engineering
Faculty of Engineering
Daffodil International University

Dedicated

To

Our Parents

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

GSM	Global System for Mobile Communications
LCD	Liquid Crystal Display
I2C	Inter Integrated Circuit
SCL	Serial Clock
SDA	Serial Data

LIST OF SYMBOLS

Symbol	*Name of the symbol*
uC	Microcontroller

ACKNOWLEDGEMENT

First of all, we want to give thanks to **Almighty Allah**. With his blessing we are able to complete our work with best effort. We want to pay our utmost respect to our Supervisor **Sutapa Debnath, Lecturer (Senior Scale)** of the **Department of EEE, Daffodil International University** for who has given us the chance to work on an impactful idea and taken care of every issue of development of this concept. Then we would like to take this opportunity to express gratitude to our supervisor for being dedicated in supporting, motivating and guiding us throughout this project. This project can't be done without her useful advice and help. Also thank him very much for giving us the opportunity to work with this project.

ABSTRACT

This project presents the design and implementation of an IoT-based poultry farm monitoring and pet feeder system utilizing the NodeMCU microcontroller, Blynk IoT platform, and various sensors and actuators, including the DHT11 sensor, servo motors, relays, heater, humidifier, and water pump. The system enables real-time monitoring and control of environmental conditions such as temperature and humidity, ensuring optimal conditions for poultry health and well-being. The pet feeder functionality automates feeding as per 0 to 6 weeks 10 to 40 grams 6 to 12 weeks 40 to 56 grams 12 to 18 weeks 40 to 72 grams 18 to 20 weeks 72 to 85 grams also minimizing human intervention and ensuring consistent feeding. The sensor DHT11 reads the following data. shown on the Blynk application, this will enable the system to be checked and operated remotely. This intelligent software will boost productivity, lessen the number of human resources, and increase the wellbeing of animals. poultry farming Asian care and pet care.

CHAPTER 1
INTRODUCTION

1.1 Introduction

Internet of Things (IoT) has transformed many industries, especially due to its rapid development. which involved agriculture and animal husbandry. Intuitive agricultural applications, which are driven by the IoT. are being adopted more to enhance efficiency, labor, and enhance productivity. Two of such uses are poultry farming and keeping pets. as being key sectors that can be of significant influence by technology through automating the monitoring. and feeding tasks. This project is aimed at the creation of an IoT-based system of. observing the state of the environment in a poultry farm and controlling automated pet. nourishing, utilizing such technologies as NodeMCU, Blynk, and other sensors and actuators. The poultry breeding business is such that there should be very specific control of various environmental parameters. as temperature and humidity to warrant the health and productivity of the birds. On the same note, pets need to have proper feeding schedules at the right time to ensure they are well-feeding. health and well-being. Conventional ways of handling these tasks are usually labor. vigorous and liable to failures. The following challenges are considered in this project through the use of: These processes to be automated and made easier through IoT-based monitoring and control systems. The core of the proposed system is a NodeMCU microcontroller, which is the core of the IoT platform. communication with different parts to become functional. The DHT11 sensor checks the real-time temperature and humidity levels and makes sure that the poultry is not spoiled. environment is not out of the ideal range. A heater and humidifier operated by a relay. be used to regulate the environmental conditions dynamically with sensor data. There is also a servo motor that operates the pet feeding mechanism releasing food at. pre-determined or on-demand. A water management system is included with the help of a pump. supply, so that poultry and pets are constantly kept hydrated. To enhance user interaction and remote monitoring, the system not only takes advantage of the Blynk platform. Blynk is an easy to use interface to visualize live data, control. instructions, and setting working settings through a smartphone. This allows users to view the poultry farm or pet feeder remotely, adjust it and get notifications. concerning critical events, e.g.

extreme temperatures or low food contents.This project is aimed at enhancing the efficiency of poultry farming and taking care of pets in general. delivering a scalable, affordable and reliable IoT solution. By automating routine the system decreases human intervention, minimizes tasks and facilitates remote control. improves the well-being of poultry and pets, reduces errors and improves the latter. The integration of readily NodeMCU, DHT11, servo motors, relays and the Blynk are all available components. platform is affordable and easy to implement and therefore accessible to. small-scale farmers and domestic pet owners. This system architecture is discussed in this paper. It would be component selection, and software design, after which it would be analyzed in terms of performance. and potential scalability. By proving how the IoT can be implemented in animal. care, this project will help develop intelligent farming and pets. solutions.

1.2 Problem Statement

Farming and keeping of poultry and pets should have a continuous check up and prompt interventions. guarantee the welfare and health of animals. Conventional techniques of handling chicken. checking livestock, and taking care of pets is a time-consuming effort done manually. eating, human-intensive, and subject to human error. Additionally, maintaining optimal environmental factors like temperature and humidity of poultry or Pets may require feeding and water on time, which may be considered a challenge especially when feeding large animals. busy or remote owners. These predicaments are compounded in situations where the farmers are involved. or pet owners are not physically able to check on the animals because of either work, travelling, et cetera. commitments. The unavailability of automation and real-time monitoring may result in the negative. factors, including unhealthy eating habits, adverse environmental conditions, etc. slowness in responding to urgent cases, which eventually affects the health and productivity. of animals. In order to overcome these issues, it is necessary to have an IoT-based solution that. combines sensors, actuators and smart controls in order to automate and monitor poultry farm. condition and feeding procedures of pets. This solution should: Environmental Monitoring. Conditions: Meters and regulators of vital parameters of temperature and humidity. with the help of sensors such as DHT11, heaters, and humidifiers to achieve the best living. conditions for poultry. Automate Feeding and Watering Use servos, relays, and pumps to feed pets or poultry with feed and water at designated intervals or at predetermined times. on real-time needs. Make it remotely monitor and control: Learn on the NodeMCU. microcontroller and Blynk platform to visualize real-time data, send alerts and remote control a device via a smartphone application. Optimize and minimize Human Intervention: Offer an automated system that limits human intervention, and is timely. optimizes the utilization of resources, and actions. This proposal will plan and put into effect an. Farm monitoring and pet feeding system IoT based poultry farm using components like NodeMCU, DHT11, servo motors, relays, heaters, humidifiers as well as pumps. The proposed system will improve the care of animals, decrease workload, and offer a smart. and permanent solution to the contemporary farming and pet management problems.

1.3 Objectives

- **To check the environmental factors like temperature and humidity real-time with DHT11 sensor and to provide the best conditions poultry health and comfort.**
- **To control a servo to feed pets and poultry by controlling their eating schedule. motor-driven with the NodeMCU and Blynk application.**.
- **To control the level of temperature and humidity in the poultry environment utilizing relays to manage a heater and a humidifier, so as to keep things perfect growth conditions.**
- **To have remote control and monitoring of the farm and feeding system with the help of the Blynk app, users are provided with real-time notifications. and data visualization.**
- **To maintain the supply of water by using a water pump to regulate the supply of water to the poultry or pets, dehydration is prevented, a constant supply is assured.**
- To make the systems more reliable and efficient in terms of energy consumption through the integration of IoT. automation and devices, less human intervention and human operation. costs.

1.4 Brief Methodology

NodeMCU is used as the poultry farm monitoring and pet feeder system based on the IoT. the control system, which is the core node that incorporates many sensors and actuators to make it efficient monitoring and automation. The methodology to be used in designing is as outlined below: and deployment of the system: Hardware Setup: NodeMCU (ESP8266): Core in the system. microcontroller, that offers Wi-Fi connectivity when it needs remote monitoring and control.DHT11 Sensor: Measures temperature and humidity in the poultry environment, ensuring proper climate control. Servo Motor: Automates the pet feeder mechanism to dispense food at scheduled intervals. Relay Module: Controls high-power devices such as the heater, humidifier, and water pump. Heater & Humidifier: Maintains optimal temperature and humidity for the poultry. Water Pump: Ensures water supply for the poultry as needed. Software and Connectivity: Blynk Platform: Provides a user-friendly mobile app interface for real-time monitoring and control of the poultry farm parameters (temperature, humidity) and feeder schedules. Firmware Development: The system is programmed using the Arduino IDE, where code for sensor readings, actuator control, and Wi-Fi communication is uploaded to NodeMCU. Functional Workflow: Sensors continuously monitor environmental parameters (temperature and humidity) and send data to NodeMCU. NodeMCU processes the sensor data and communicates with the Blynk server via Wi-Fi, enabling remote monitoring through the Blynk mobile app. Based on preset conditions or manual control via the app: The heater and humidifier are activated/deactivated using relays to maintain optimal environmental conditions. The servo motor dispenses food at scheduled times, ensuring the poultry or pets are fed automatically. The water pump is turned on/off as required to maintain the water supply. System Integration and Testing: Components are tested individually to ensure proper functionality. The integrated system is tested under various conditions to validate real-time monitoring, automation, and manual control capabilities. Deployment and Monitoring: The system is deployed in a poultry farm or pet care setting. The Blynk app allows the user to monitor environmental parameters, control devices, and receive alerts if conditions deviate from set thresholds. This methodology ensures a cost-effective, scalable, and user-friendly IoT solution for automating poultry farm management and pet feeding.

1.5 Gantt Chart

Table 1.1: Gantt chart

Phase	Duration in Week	Start	End
Planning and Design	2	Week 1	Week 2
Procurement and Setup	1	Week 3	Week 3
Hardware Implementation	3	Week 4	Week 6
Software Development	4	Week 7	Week 10
Integration and Testing	2	Week 11	Week 12
Optimization and Fine-Tuning	1	Week 13	Week 13
Deployment and Evaluation	1	Week 14	Week 14
Documentation and Reporting	1	Week 15	Week 15

This gantt chart provides a structured approach to implementing our project within approximately 14 weeks, allowing for sufficient time for each phase while maintaining flexibility for adjustments as needed.

1.6 Organization

Here's how we organize the report for our project:

Chapter 1. Introduction

Describe in brief about introduction of our project along with background, problem statement and objectives.

Chapter 2. Literature Review

In this section we describe about related research that similar to our projects and made some comparison from others work.

Chapter 3. Materials and Methods

Explained all the methodology with the system design and Components in detail with diagrams.

Chapter 4. Results and Discussions

Presented the findings and observations from experiments, simulations, and real-world testing.

Chapter 5. Project management

Discussed about the project timeline, tasks, and milestones along with resources and cost management and lessons that we learnt.

Chapter 6. Impact Assessment

Here we discussed about economic, societal, and global impact, environmental and ethical considerations along with utilization of standards or codes.

Chapter 7. Conclusions and Recommendations

Here we conclude about our project, new skills and experiences and future recommendation.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

The integration of the Internet of Things (IoT) into agricultural and pet care applications has revolutionized the way we monitor and manage essential tasks. In poultry farming and pet feeding, IoT technologies have enabled precise control, real-time monitoring, and automation of daily activities, leading to improved efficiency, animal welfare, and resource utilization. This literature review examines existing research, technologies, and methodologies relevant to IoT-based poultry farm monitoring and automated pet feeding systems, providing a foundation for the proposed system. The primary focus of The solution in poultry farming using IoT is to establish the environment that is favorable to control and monitoring of the crucial parameters such as health and productivity of birds as temperature, humidity and feeding intervals. Also, automatic feeding of pets systems seek to make life easier and make sure that pets have the right and prompt attention. Even without their owners, nutrition can be maintained. Connection of sensors, actuators, and IoT platform provides these systems with easy connections and remote control, thus responding to the problems of conventional approaches. Key components of the proposed systems consist of the NodeMCU microcontroller in communication and processing, the Blynk real-time monitoring and control system, the DHT11 sensor. temperature, humidity, and many other actuators, servos, etc. relays, heaters, humidifiers, and pumps. Current literature of these elements and their IoT system applications offer an understanding of design aspects, issues and challenges innovation opportunities. This chapter is a systematic literature review on related literature areas, such as IoT-based dairy farming, automated feeding of pets, environmental tracking, as well as the application of a particular board such as the NodeMCU and Blynk. Through the study of these studies, this review seeks to establish the gaps in existing studies approaches and point out progress that can be introduced into the proposed system. The chapter discusses as well the effects of IoT on pet care and agriculture practices, and with the focus on its possibilities to improve operational efficiency and promote it sustainable practices. With this review, the basis is laid to the development of an all-encompassing and easy to use IoT platform, which combines the functions of monitoring, automation and remote control, to overcome the two areas of poultry living farm control and livestock feeding.

2.2 Related Research

The design of an internet of things (IoT)-based poultry farm monitoring is described by R. Kumar and S. Yadav. system with the usage of NodeMCU, Blynk and temperature sensor like DHT11. humidity monitoring. The system provides monitoring and control of the remotely. in poultry farms, the environmental conditions, enhancing productivity [1]. S. Patel, P. Shah, and N. Sharma create a pet feeder based on the internet of things (IoT) with the help of NodeMCU and Blynk. automatic feeding of pets. It offers the users a real time monitoring interface. feed pets remotely thereby improving the care given to pets [2]. A. Gupta and M. Singh describes a system of an automated poultry farm based on IoT, temperature, etc. Correlation among humidity, light and light monitoring with DHT11 sensors and NodeMCU. The system allows external access and provides the best environment to poultry health [3]. H. Das, S. Singh, and R. Yadav writes about the combination of a servo motor and a pet that is controlled by a relay. feeder including NodeMCU that assists in the automatism of the feeding process and control. pet interactions through the IoT-based applications such as Blynk [4]. S. Patel and R. Joshi focuses on regulating and testing the humidity, water and temperature of poultry. farms based on NodeMCU and Blynk. There is a heater and pump provided in the system as well. modifying environmental factors [5]. K. Kumar, A. K. Sharma and S. Mehta are. The proposal of design and development of a smart pet care system is introduced, which uses the IoT. have integrated parts such as NodeMCU, DHT11 sensors and a servo motor to automatically drive pet. nourishing and offering the control of the environment [6]. N. Gupta, V. Patel, and A. Singh refers to a monitoring system based on temperature and humidity sensors (DHT11). in conjunction with NodeMCU to control the environment of poultry farming, such as real-time alerts via Blynk [7]. Agarwal and M. Mehta discuss the application of IoT in. coming up with a pet feeder system where the pet owners can remotely feed their pets using. Blynk and NodeMCU. The system also has a camera, which monitors pets in real time. [8]. R. Jain, S. Kumari, and D. Bhatnagar is concerned with the IoT-based management. system for poultry farms. It encompasses real time observation of the environmental conditions. with DHT11 sensors, and automatic regulation of temperature, humidity and food. using

NodeMCU [9]. M. Sharma, A. Kapoor and S. Kumar illustrate an IoT-based. self-controlling temperature, humidity, and ventilation of poultry farm system based on sensors, such as DHT11, and actuators, such as heaters and humidifiers to provide the best. poultry farming conditions [10]. P. N. Yadav and Sharma, present a smart pet. remote The remote is based on a feeder system that uses NodeMCU and a mobile application (Blynk). operation. It emphasizes the benefit of the IoT in enhancing the care of pets through a robotic feeding schedule. [11]. S. Singh, N. Chauhan, and R. Mehta talks about the design of a poultry that is automated. farm system The system monitors the environment using NodeMCU, Blynk, and other sensors. equipments, and an automatic feeding mechanism to promote efficiency in farm. operations [12]. Kumar and M. Soni is devoted to the creation of IoT-based pet. feeder system which controls food dispensing with servo motor. It also integrates Remote control and monitoring with the use of Blynk app [13] and NodeMCU. L. Chouhan, R. Mehta, and S. Aror is a poultry farm monitoring system based on IoT with real. cloud computing time data collection and control. It discusses how NodeMCU is to automate the processes in the farm like feeding, ventilation, and temperature. regulation [14]. P. Verma and A. Bansal point out the architecture of a smart pet care system. that is an IoT-based system that automates feeding and environment monitoring of. controlling temperature and humidity with Blynk, NodeMCU and sensors used by pets. [15].

2.3 Compare and Contrast

Similarities Core Technology: The studies use all the technologies based on the IoT with NodeMCU. Blynk and the IoT platform as the remote monitoring tool and the Microcontroller as the main microcontroller. and control. Sensors and Actuators: All the projects apply the DHT11 sensor on temperature. and humidity control, which underscore their importance in keeping the environment under control. Automation of poultry and relays is also usually achieved by means of servo motors. pet feeder systems. Automation and Remote Monitoring: Poultry systems (e.g., [1], [3], Remote operation and are highlighted in [9], [10]) and pet feeder systems ([2], [4], [11], [13]). to ensure better efficiency and ease of use. Both applications rely on Blynk to ensure real time control and data visualization. Environmental Control: Some pet care systems ([6], [15]) and poultry ([1], [5], [9]) are studied. other environmental control and monitoring features with heaters, humidifiers, and pumps. Differences Applications

Domain: Poultry systems ([1], [3], [5]) concentrate on the productivity and the best conditions of poultry. health, e.g. regulating ventilation, temperature, and humidity. Automation of pet feeding schedules and monitoring are the goals of pet feeder systems([2], [4], [8], [13]). activity, improving the convenience of pet care. Particular Components: Poultry systems. have climate management heaters ([5], [10]) and pumps ([5]) that are needed. poultry welfare. Pet feeder systems are also designed with other features like cameras. to monitor pets in real-time ([8]) and special feeding systems ([4], [13]). System Complexity: Multiple environmental Poultry systems such as that of [1] and [14] are complex. They are more complex than simpler pet feeding in that they have control mechanisms. mechanisms. The primary concern of pet feeders is the dispensing of food ([11], [13]). monitoring, having fewer supplementary environmental controls. Cloud Integration: Studies as in [14] they use cloud-based data collection and control systems, improving poultry systems scalability. The simpler systems of pet feeders ([8]) are typically used. installations that were aimed at direct communication using mobile applications such as Blynk. Target Outcome: The goal of Poultry monitoring systems is to maximize productivity and welfare of animals in farms. Pet feeder systems are focused and centered on convenience and enhancing the capabilities of pet owners. take care of their pets by a distance. Application areas Insights and Observations discuss how IoT technologies may lead to substantial improvement of the old processes, be it animal husbandry or pet keeping. Although the technology stack has some overlaps, Depending on the context of application, the objectives and complexity of the systems vary. Future designs may consider the combination of features, e.g. the incorporation of advanced environmental. I should control into pet care systems, or place pet check-ups in poultry farms, to expand the range of these solutions and their application. This is a comparative analysis highlighting. the adaptability and versatility of IoT systems in various areas.

2.4 Summary

The literature demonstrates a widespread application of the IoT technologies in poultry farms monitoring. and pet feeding systems, demonstrating the flexibility of such components as NodeMCU, Blynk, and DHT11 sensors. In other works, the main goals are to real-time remote monitoring, which is possible through automation, environmental control, and real-time. connectivity to mobile and cloud-based infrastructure. The main conclusions: IoT Infrastructure: The main microcontroller of all the design is the NodeMCU, because it is cheap and has low-cost. Wi-Fi capabilities. Blynk offers a user-friendly interface of real-time visualization. and system control. Environmental Monitoring In poultry systems, there is the DHT11 sensor. check temperature and humidity, and actuators such as heaters, humidifiers, and pumps ensure that it is kept optimum. The pet care systems are more concerned with automation of feeding. powered with servo motors and may at times be fitted with cameras to monitor pets in real time. Automation and Convenience: Automation of poultry feeds, ventilation and more. climate management, to improve productivity and welfare of poultry. Pet feeder systems provision of feeding schedules and allow control remotely, which is convenient to pet. owners. Scalability and Integration: Poultry systems are getting more integrated with cloud-based. scalability and state of the art data analytics. Pet feeder systems consider more basic app-based interfaces, which should be easier to use by individual pet owners.

CHAPTER 3
PROJECT DESIGN

3.1 Introduction

The Materials and Methods chapter provides a detailed overview of the components, tools, and techniques used to "DESIGN AND IMPLEMENTATION OF IOT BASED POULTRY FARM MONITORING SYSTEM" . This section describes the hardware and software employed in the project, along with the step-by-step process for system development.

3.2 System Design

Here we describe about our whole system's design diagram, flow chart, simulation, equipment etc in details.

3.2.1 Block Diagram

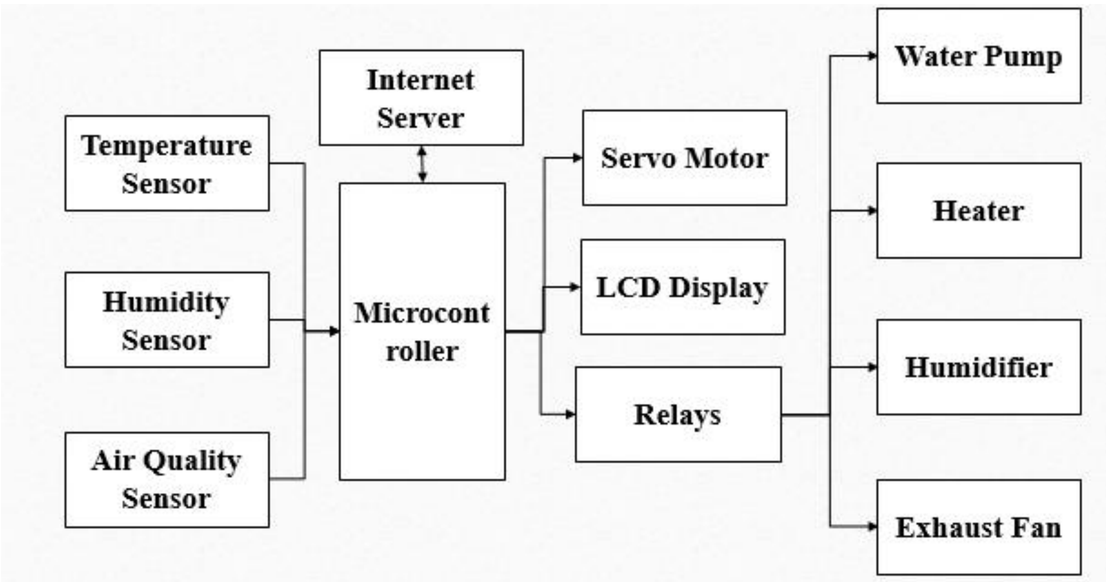

Figure 3.1: Block Diagram of the project

This diagram represents a system architecture for an automated environment monitoring and control system. It integrates sensors, a microcontroller, and output devices to manage environmental conditions effectively. Sensors: Temperature Sensor: Measures ambient temperature. Humidity Sensor: Monitors air moisture levels. Air Quality Sensor: Assesses air cleanliness or pollution levels. Microcontroller: Acts as the central processing unit, receiving data from sensors and interfacing with the Internet server for remote monitoring and control. Internet Server: Enables remote access and control of the system via the Internet. Output Devices: LCD Display: Provides real-time data visualization. Relays: Act as switches to control electrical devices. Servo Motor: Is an adjustment of the mechanical parts. Water Pump: Controls water flow Water pump: Water flow is controlled by this. irrigation or cooling. Heater: This keeps ambient temperature warm or increases ambient temperature. Humidifier: Humidifies air to maintain the humidity. Exhaust Fan: is a device to remove stale air or reduces temperature. The system can be used in areas such as green houses, smart. homes, or industrial automation, and offer an intelligent automated method of maintaining. best environmental conditions in a poultry farm.

3.2.2 Flow Chart

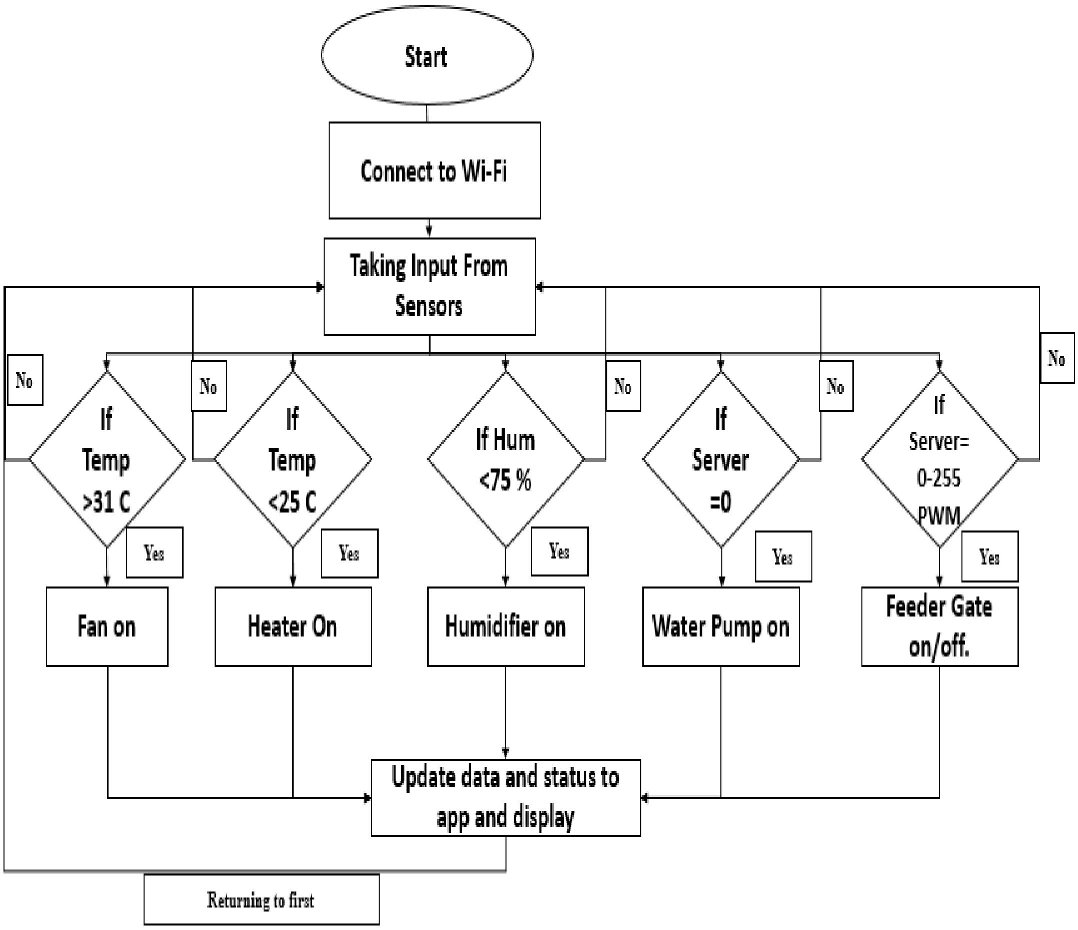

Figure 3.2: Flow Chart of the project

This flowchart describes the working process of the automated system of measuring and regulating the environmental parameters with the help of the sensors and the objects connected to it. 1. Start: The system is started in its operation. 2. Connect to Wi-Fi: With a Wi-Fi connection, the system connects to a remote monitoring and communication network. 3. Receive Sensor Reading: The sensors provide real-time information about the environmental conditions of temperature, humidity, and air quality. 4. Data Validation: The system verifies the validity of the data of each sensor: Assuming the data is valid, either a certain device (fan, heater, humidifier, water pump or feeder gate) is turned on or off in accordance with the predefined conditions. In case of invalidation of data no action is taken against that device. 5. Control of Devices: Fan: On or off depending on the needs of air circulation. Heater: It is set to ensure the desired temperature is maintained. Humidifier: This is used to control the amount of humidity. Water Pump: ON -Irrigating or maintaining water flow. Feeder Gate: Opened or closed depending on the operations. 6. Data Update: The system pushes the gathered information and device positions to an application or display linked in order to allow users to monitor. 7. Go Back to Start: This loop is used to make the process repetitive to guarantee real-time monitoring and control. This flow chart points out an effective procedure of decision-making with regards to environmental automation systems, so as to have dynamic response to sensor information.

3.2.3 Circuit Diagram

The following is a circuit diagram of an IoT-based automation system of environmental. monitoring and control with such components as NodeMCU, sensors, relays, and others. actuators. The following are the explanation of the major components and their functions: Key Components NodeMCU (U1): This is a microcontroller that has inbuilt Wi-Fi and serves as the hub of the whole network. regulating and communication with every part of the system. DHT (RHT03 Sensor): This sensor measures humidity and temperature. The sensor signal is fed to the data signal. into NodeMCU in order to monitor and control it. Gas Sensor (MQ3): Detects the existence of gases in the environment and sends messages to NodeMCU which can trigger. appropriate actions. LCD Display (I2C LCD): It will provide a real-time view of information like temperature, humidity, system status, which are linked through the I2C interface easily. communication. Relay Modules: These are combined in order to control high-power devices such as: Humidifier: Keeps the humidity at the required level. Exhaust Fan: Ensures proper ventilation by regulating airflow. Water Pump: Dispenses water automatically when needed. Servo Motor (DGServo 9g): Controls a feeding gate, likely used for automated dispensing of feed or material. Power Supply (U4): Supplies power to the NodeMCU and other components through a regulated voltage source.

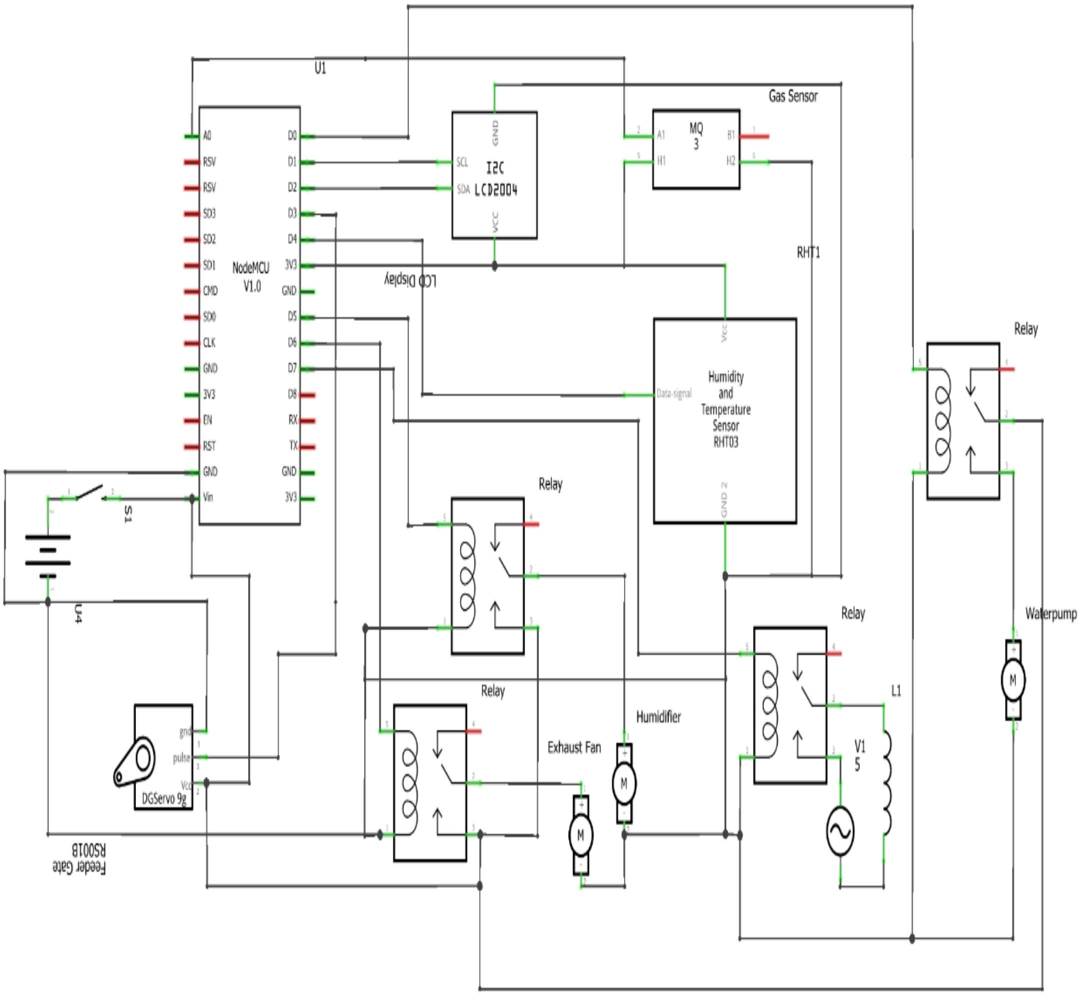

Figure 3.3: Circuit diagram.

3.3 Components

Components List:

Table 3.1: Required Component List

SL NO	NAME	Quantity
1	NodeMcu	1P
2	Servo motor	1P
3	Lcd display	1P
4	Jumper Wire	40 P
5	Battery	1P
6	Relay module	1P
7	Temperature and Humidity sensor	1P
8	Gas Sensor	1P

3.3.1 Node MCU

NodeMCU is an open source Lua based firmware for the ESP8266 WiFi SOC from Espressif and uses an on-module flash-based SPIFFS file system. NodeMCU is implemented in C and is layered on the Espressif NON-OS SDK. The firmware was initially developed as is a companion project to the popular ESP8266-based NodeMCU development modules, but the project is now community-supported .General-purpose input/output (GPIO) is a pin on an IC (Integrated Circuit). It can be either input pin or output pin, whose behavior can be controlled at the run time. NodeMCU Development kit provides access to these GPIOs of ESP8266. The only thing to take care is that NodeMCUDev kit pins are numbered differently than internal GPIO notations of ESP8266 as shown in below figure and table. For example, the D0 pin on the NodeMCUDev kit is mapped to the internal GPIO pin 16 of ESP8266.

Table 3.2: Pin of Node MCU

Pin Names	GPIO Pin number
D0-D8	GPIO16, GPIO5, GPIO4, GPIO0, GPIO2, GPIO14, GPIO12, GPIO13, GPIO15
D9/RX	GPIO3
D10/TX	GPIO1

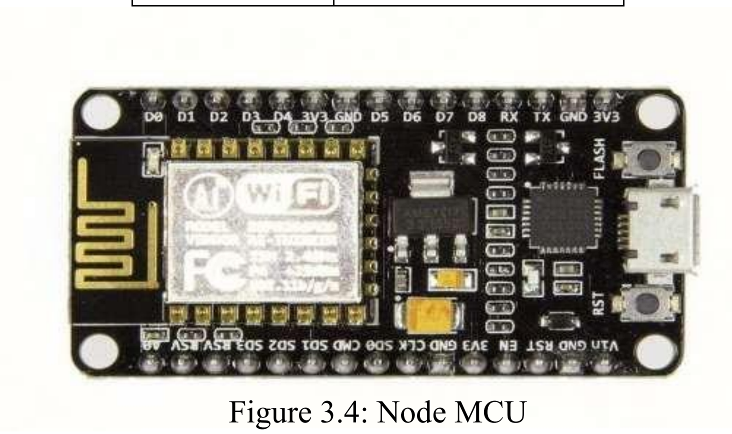

Figure 3.4: Node MCU

3.3.2 Servo Motor

An electric motor known as a servo motor may spin or move to a certain location, speed, or torque in response to a controller's input signal. The word servo is derived from the

Latin word servus, which means slave or servant. This is in line with the traditional usage of servo motors as backup drives for the primary drive system. Modern servo motors may, nevertheless, deliver excellent performance and precision as the primary drives in a variety of applications.

Figure 3.5: Servo motor

3.3.3 LCD Display

This is a 16-character x 2-line Green background Super Twisted Nematicon (STN) LCD with built-in HD44780 equivalent controller (also known as alphanumeric displays). Interfacing is simplified with 4 bit or 8-bit communications and programming code is widely available for many different controllers and systems.

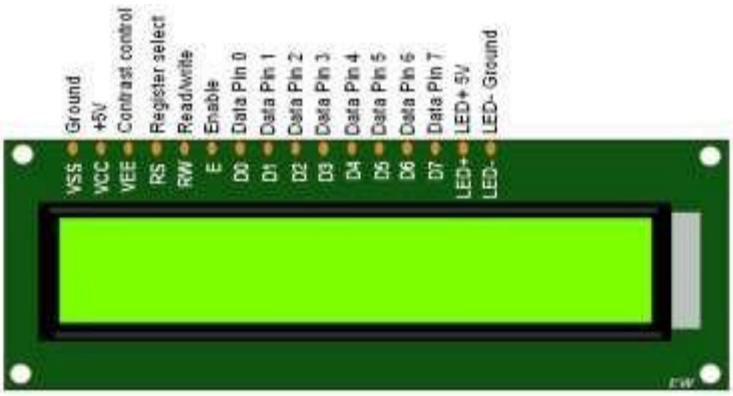

Figure 3.6: LCD Display

3.3.4 Jumper Wire

A jump wire (also known as jumper wire, or jumper) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the Components of a breadboard or other prototype or test circuit, internally or with other.

Fig 3.7: Jumper wires

3.3.5 Battery

We need two power supply for our system. One for full device and one 12 volts DC for our pump. As 5 volts power supply we use two 18650 Li-Po battery which is connected through bms.

Figure 3.8: 18650 Li-Po Battery.

3.3.6 Relay

An electrical switch controlled by an electromagnet is known as a power relay module. A separate low-power signal from a microcontroller activates the electromagnet. The electromagnet pulls to either open or close an electrical circuit when it is energized. Basic relay consists of an iron yoke which offers low reluctance path to. magnetic flux, a coil of wire that has been wound round a soft iron core or solenoid, a slideable iron armature and a set of contacts. The armature is forced open by a spring and when the relay is de-energized it creates a break in the magnetic circuit.

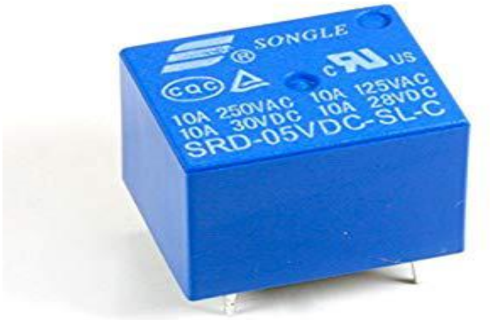

Figure 3.9: Relay

Table 3.3: Specifications of relay module

General Specification	
Operating Voltage (VDC)	3 ~ 5
Trigger Voltage (VDC)	5
Trigger Current (mA)	20
Switching Voltage (VAC)	250@10A
Switching Voltage (VDC)	30@10A
Operating Temperature (°C)	-40 to 85
Opt. Relative Humidity(RH)	20% ～ 85%
Storage condition (°C)	– 65 to 175
Length (mm)	43
Width (mm)	26.3
Height (mm)	17
Weight (gm)	14

3.3.7 Humidity and Temperature Sensor

The DHT11 is a low-priced sensor that is commonly used to measure temperature and humidity. It is commonly employed in electronics and IoT applications because it is simple, inexpensive and cheap. support of microcontrollers such as arduino and NodeMCU. The DHT11 is a digital sensor supplying calibrant temperature and humidity readings, and therefore it is simple to be integrated into other programs. Key

Characteristics Temperature: 0 0 C to 50 0 C and accuracy of +2 C. Humidity: 20-90 percentage of relative humidity (RH) of ±5. Power Supply Power supply: 3.3V to 5 V, compatible with. most microcontrollers. Interface: Interface is based on single-wire digital communication protocol. data transfer. Sampling Rate: Whereas 1 reading per second (1 Hz) is the maximum sampling rate. Compact Size: Measures around 15mm, 12mm and 5.5mm. How It Works The DHT11 is composed of: A temperature sensor Thermistor.A Capacitive Humidity Sensor to measure relative humidity. A Microcontroller that processes the sensor readings and outputs them in a digital format.

Figure 3.10: Humidity and Temperature sensor

3.3.8 Humidifier

Humidity varies depending on the season, the weather and where your home is. In general, humidity levels are higher in the summer and lower in the winter. It's ideal to keep the humidity in your home between 30% and 50%. Humidity that's too low or too high can cause problems.

Features:

- 5V USB ultrasonic mist generator driver board and spray plate.
- Low driving voltage, low power, low impedance, stable waveform, high conversion efficiency.
- Round ring spray plate, Center spray, 5um ultra-fine spray aperture, 740 ultra-dense spray holes.
- The surface of the atomizing sheet adopts oxidation-resistant silver coating to protect the plating process, long service life.
- Adopts environmentally friendly electronic components.

Figure 3.11: Humidifier

3.3.9 Exhaust fan

One of the most often used electronic air-conditioning appliances, particularly in homes, is the electrical fan. While not as effective as other electronic devices for temperature regulation, such as air conditioners, electrical fans have a lower total power cost and are more ecologically friendly since they don't produce compounds that might be harmful to the ozone layer. As a result, electrical fans are still often utilised, particularly in residential areas for those with low incomes and leased homes (i.e., accommodations).

Figure 3.12: Exhaust Fan

3.3.10 Water Pump

A mini water pump is a compact, lightweight, and energy-efficient device designed to move or circulate small volumes of water. It is commonly used in applications where space and power consumption are limited. Mini water pumps are available in various types and designs, including submersible, centrifugal, and diaphragm pumps, and they are often powered by low-voltage DC sources, making them ideal for IoT, robotics, and small-scale automation projects. Key Features Size: Small and portable, suitable for tight spaces.

Figure 3.13: Water Pump

3.4 Design Analysis

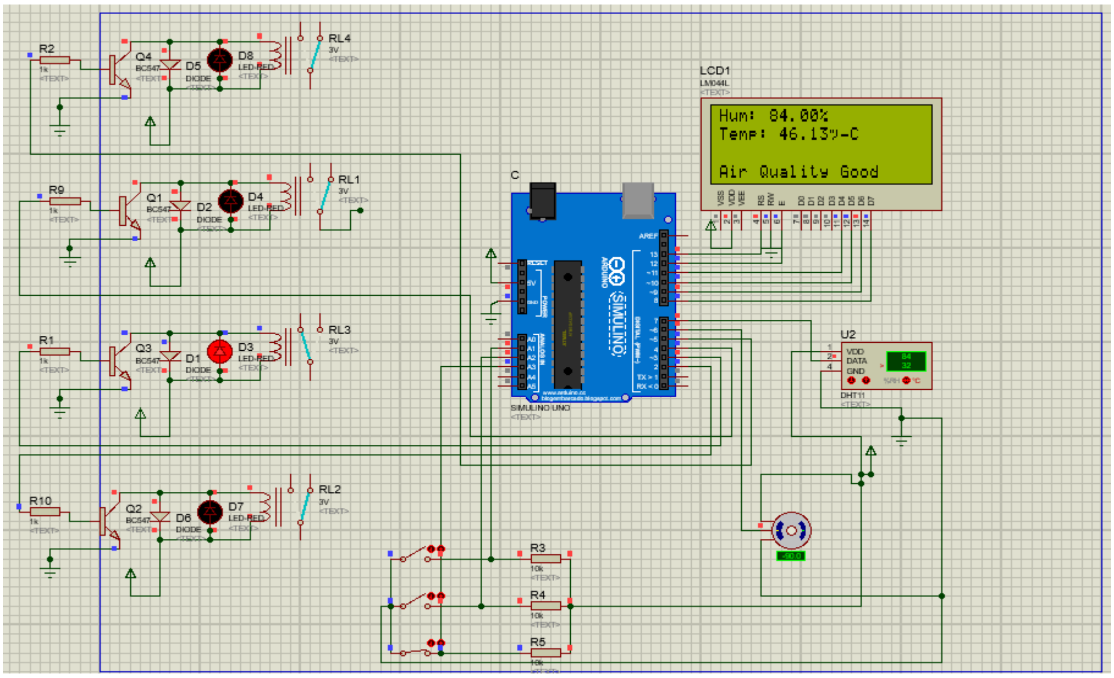

Figure 3.14: Circuit Simulation

This simulation shows an automated poultry farm environmental monitoring and control system built around a microcontroller, likely an Arduino board. It integrates multiple components for sensing, processing, and controlling various environmental parameters. Key Components: 1. Microcontroller: Acts as the central unit to process data from sensors and control output devices. Connected to the sensors, relays, and LCD for managing the system. 2. Sensors: Humidity Sensor: Measures the air's moisture content. Temperature Sensor: Monitors ambient temperature. Air Quality Sensor: Assesses the quality of the surrounding air. 3. LCD Display: Shows real-time data such as humidity, temperature, and air quality status. 4. Relays: Control high-power devices (e.g., fan, heater, or water pump) by acting as switches based on the microcontroller's commands. Each relay is connected to a diode to prevent back-current damage. 5. Indicator LEDs: Represent the operational status of each relay or device. 6. Other Components: Pull-up/pull-down resistors for stable circuit operation. Transistors for driving the relays. Working: 1. Data Collection: the microcontroller is fed with data by the sensors. 2. Data Processing: The microcontroller analyzes the readings and decides what actions are required to have the best environmental conditions. 3. Device Control: Relays are turned on/off to control the other devices that are connected.

3.5 Hardware Implementation

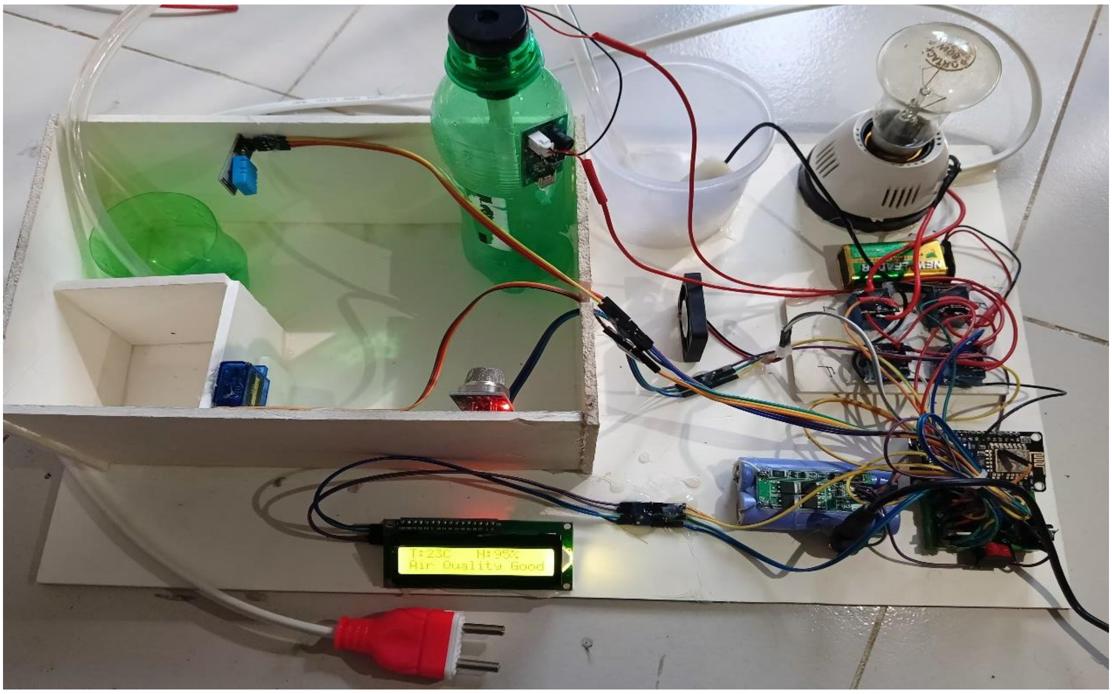

Figure 3.15: Final Hardware Outlook

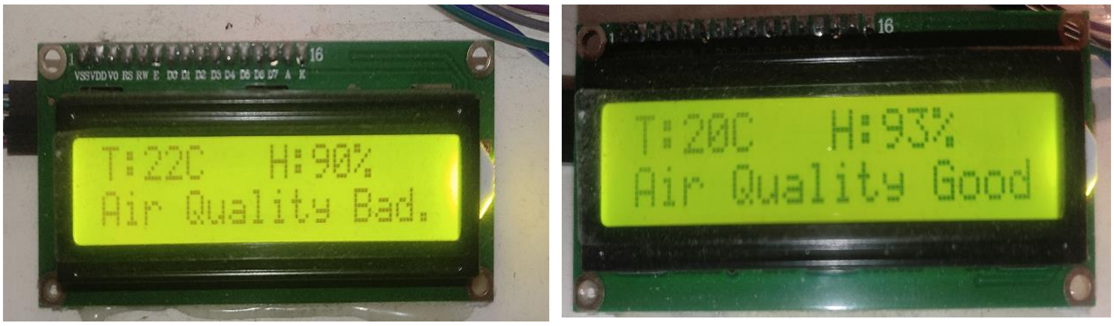

Figure 3.16: Air quality Status on Display

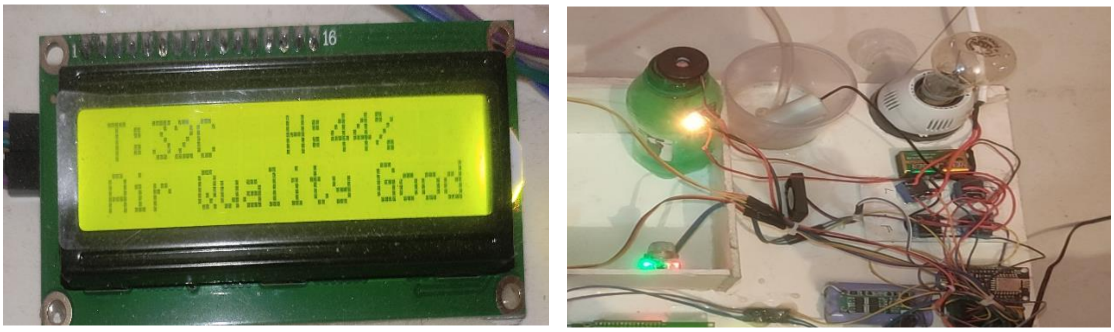

Figure 3.17: Humidifier of Due to Lower Humidity

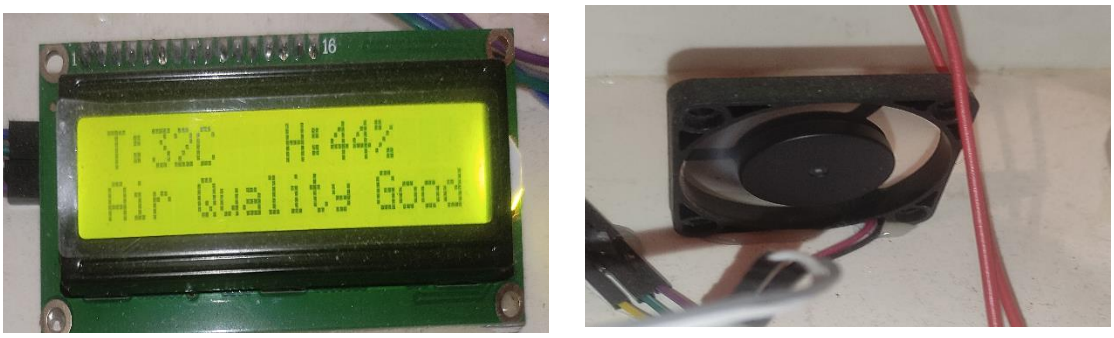

Figure 3.18: Fan of Due to Higher Temperature

3.5 Summary

The chapter highlights the adoption of the IoT technology and automation to improve. convenience, efficiency and accuracy in the management of poultry farming and pet care. It offers an open road between component selection and system deployment, which guarantees a strong and working design.

CHAPTER 4
RESULTS AND DISCUSSIONS

4.1 Results

The poultry farm monitoring and pet feeder system based on the IoT is effective in automating. and oversees necessary activities. There is a summary of the major findings: Environmental. Monitoring: The system can measure the temperatures and humidity perfectly with the help of the. DHT11 sensor. The Blynk app shows real-time data, thus assuring the users. aware of environmental conditions. Automated Control: The heater, the humidifier and exhaust fan keep optimum temperature and humidity, automatically switched on. based on pre-set thresholds. Water is dispensed by the water pump when necessary, and assures. regulatory hydration in poultry and pets. The servo motor: Feeding Automation. controlling the feeder gate effectively, the food is dispensed either on a schedule basis or by the user. Blynk app controls. IoT Integration: Blynk app gives a smooth interface. remote control and monitoring, which allows users to customize settings and receive. notifications in real-time. Energy Saving: The system is very efficient, switching on. they will turn on devices only when needed which will save energy. User Alerts: Notifications when the conditions are critical, e.g. high temperature, low humidity, low water, etc. enhance system reliability.

Table 4.1: Result Analysis

SL No	Parameter	Condition	Result	Condition	Comment
1	Temperature	Less than 28 C	Cold Environment	Heater on	Farm temperature is low so heater on for warm up the temperature.
2	Temperature	Greater than 35 C	Hot Environment	Fan On	Farm temperature is high so fan on for cool down the temperature.

3	Humidity	Less than 65 %	Humidity Low	Humidifier On	Farm Humidity is low so humidifier on for balance the humidity.
4	Air Quality	Sensor LOW	Air Quality Poor	Notification and display alert.	If Air quality poor the system will send alert notification about air quality
4	Server data	One or Zero	Pump On/Off	Water Feeder	A button of mobile app pressed and then water filling.
5	Server data	1-180	Servo run	1=off, 0=on	It will dispense food as per mobile app button press.

4.2 Discussions

The poultry farm monitoring and pet feeder system, which is based on the Internet of Things, is a solution to essential issues. difficulties with operating poultry farms and taking care of pets through the use of automation and IoT-based remote monitoring. The discussion analyzes the system. performance, benefits, constraints and possible enhancement.

CHAPTER 5
PROJECT MANAGEMENT

5.1 Task, Schedule and Milestones

Task, Schedule, and Milestones of IoT-Based Poultry Farm Monitoring and Pet Feeder System

Task:

A Poultry Farm Monitoring and Pet Feeder System based on IoT Design and Implementation. with the help of NodeMCU, Blynk, DHT11, servo motor, relays, heater, humidifier, and water. pump.

Schedule:

- ➢ Research and Planning:
- ➢ Carry out a survey of the existing IoT-based monitoring and feeding systems.
- ➢ Specify system requirements, e.g. accuracy of data, automation levels, etc. user interface capabilities.
- ➢ Prepare an elaborate project plan containing activities, milestones and timelines. Selecting Hardware: Within the scope of this project, I have selected the appropriate hardware required to run the research environment.<|human|>Hardware Acquisition: In the context of this project, I have acquired the right hardware to operate the research environment.
- ➢ locate and acquire the necessary hardware:NodeMCU (ESP8266)
- ➢ Sensors: DHT11 for temperature and humidity, and gas sensor (MQ3).
- ➢ Actuators: Servo motor, relays, heater, humidifier, exhaust fan, and water pump.
- ➢ Power supply units and connectors.
- ➢ Verify the quality and compatibility of components.
- ➢ Integrate hardware and software into a cohesive system.
- ➢ Conduct functional testing:
- ➢ Verify accurate sensor readings.
- ➢ Test automation of actuators based on environmental conditions.
- ➢ Ensure successful data communication with the Blynk app.

Milestones:

- Completion of Research and Planning Phase
- Description: Finalize project objectives, requirements, and timelines.
- Hardware Procurement
- Description: Acquire all required hardware components.
- Hardware Assembly

5.2 Resources and Cost Management

All the components e collected from online electronic shop. Our total cost around 5285 taka for equipment along with currier charge. And we didn't spend money for the development software cause all the software was free and open source (Arduino IDE and Fritzing and Blynk).

Table 5.1: Cost Management

SL No	Equipment Name	Price (BDT)
01	NodeMCU	440
03	MQ 135 Sensor	280
04	DHT 11 Sensor	220
05	Relay *4	440
06	LCD Display	580
07	Bread Board	85
08	Fan	120
09	Pump	160
10	Heater Bulb	100
11	Humidifier	350
12	Battery	150
13	Power Supply	680
14	Servo Motor	180
15	Others	1500
	Total	5285 TK

5.3 Lesson Learned

Integration Challenges with IoT Components Combining multiple sensors (e.g., DHT11) and actuators (e.g., servo motors, relays, pumps) requires careful planning of connections and power management to avoid interference or system failure. Understanding the compatibility and limitations of NodeMCU as the central controller is critical for smooth integration. Efficient Power Management The system's reliance on actuators like the heater, humidifier, and water pump emphasizes the importance of designing an efficient power supply. Voltage regulation and proper grounding were essential to prevent component damage. Data Accuracy and Sensor Limitations Sensors like DHT11, while affordable, have limitations in terms of accuracy and response time. This highlighted the need for regular calibration or the potential use of higher-precision sensors for better results. Importance of Real-Time Monitoring and Alerts The implementation of real-time monitoring through Blynk proved invaluable in managing environmental conditions and feeding schedules remotely. Alerts for anomalies, such as intense temperatures or the presence of high humidity, demonstrated the usefulness of IoT. systems in the minimization of manual labor. Automation Factors-In Productivity Automation. The control of feeding, temperature and humidity minimized the human intervention greatly, resulting in the adoption of more regular poultry management and feeding of pets. This improved productivity and provided optimal environmental conditions to the health of poultry and pet. well-being. Scalability of IoT System The design of the system noted the possibility. for scalability. More sensors and actuators are also available and can be added where necessary. option to increase size of farms or prolonged functionalities. What is important is the User-Friendly Interface. The simplicity and ease of use of the Blynk app testified to the significance of a simple and intuitive one. remote monitoring control interface. Potential user feedback was useful. optimise the app to be more user friendly. Hardware Durability and Environmental Conditions Climate such as dust, was a challenge in the toilings of a farm. temperature variations, humidity and humidity. Fences and security systems were required to protect hardware components. By the year 2016, nearly every country in the world will have implemented the system.<|human|>Communication and Network Reliability The Wi-Fi connection was required to be stable in order to monitor and control it in real-time using the Blynk. Poor or patchy connectivity may interfere with the activities of the systems and this proves to be a necessity. to provide additional communication means of emergency systems.

Chapter 6

IMPACT ASSESSMENT OF THE PROJECT

6.1 Economical, Societal and Global Impact

1. Economic Impact

1. **Cost-Effective Automation**

    - The system is economical as it uses cheap materials. like NodeMCU and DHT11 sensors. This minimizes the initial investment of. Comparisons between the small-scale poultry farmers and pet owners and traditional systems.
    - Robotization of such operations as feeding, temperature, and humidity. reduces labor expenditure and enhances efficiency.

2. **Improved Productivity and Revenue**

    - Automated feeding saves resources and time to the owners of pets to improve better pet. health and saving of veterinary costs caused by lack of care.

Scalability and Long-Term Savings

- The system can be extended to bigger farms or other functionalities, delivering economic payoffs in the long-term.
- Anomalies are detected early and result in the saving of expensive equipment and loss. livestock..

2. Societal Impact

1. **Enhancing Livelihoods of Small Farmers**

    - Small poultry farmers are in a position to take advantage of this technology to enhance their. income and productivity, which will allow them to compete with larger operations.
    - The decrease in labor necessities results in the freeing up of time to perform other tasks and enhance the same. living standards of farmers and their families.

2. **Improved Animal Welfare**

    - Automation and real-time surveillance make sure that there is a consistent care of poultry and pets, improving their wellness and health.
    - The system minimizes the chances of human mistakes e.g. overfeeding or negligence. environmental conditions.

3. **Education and Technology Adoption**

    - Coercion and uptake of IoT technologies in rural and underserved areas. nisces, a promotion of technological literacy.
    - Evokes the idea that IoT can be used to solve a practical problem, which is inspiring. new technologies in the field of agriculture and livestock.

4. **Convenience for Pet Owners**

- Pet feeders available in remote control are convenient to busy pet owners, as they allow them to do so. them to take care of their pets when they are not at home.

3. Global Impact

1. **Sustainable Farming Practices**

- The IoT-based monitoring will guarantee the most efficient use of resources, including water and. energy, adding to environmental farming.

- Minimizes waste through accurate regulation of feed and water-delivery, which is consistent. and world objectives of sustainability.

2. **Addressing Global Food Security**

- Increased productivity in poultry farming contributes to meeting the growing demand for food, particularly protein, in a world with a rising population.
- Supports efficient and responsible farming practices that can be adopted globally to combat food scarcity.

3. **Climate Adaptation and Resilience**

- Automation systems enable farmers to adapt to changing climatic conditions by providing precise environmental control, protecting poultry from extreme weather events.

4. **Global Technology Collaboration**

- Demonstrates the potential of IoT to solve local and global challenges, fostering collaboration between nations and institutions for innovative agricultural solutions.
- Encourages the sharing of technology and expertise, promoting equitable access to modern farming tools in developing countries.

5. **Reduced Carbon Footprint**

- Energy-efficient designs and optimal resource usage contribute to lower greenhouse gas emissions, supporting global climate change mitigation efforts.

6.2 Environmental and Ethical Issues

1. Environmental Issues

1. **Energy Consumption**

- The system requires continuous power to operate sensors, actuators, and NodeMCU. The heater, humidifier, and water pump, in particular, consume significant energy. Scaling up the system for larger poultry farms could lead to increased energy demand, potentially impacting the carbon footprint.
- Solution: Using renewable energy sources, such as solar panels, can mitigate energy consumption concerns.

2. **Electronic Waste**

- The use of IoT components like sensors, relays, and microcontrollers contributes to electronic waste if these components are discarded without proper recycling at the end of their lifecycle.
- Solution: Adopting sustainable practices, such as recycling old components or using biodegradable materials, can help address this issue.

3. **Resource Overuse**

    - Natural resources such as water are used by such actuators as pumps and humidifiers. The system can bring wastage in the locality in case it is overused or inefficient. water resources.
    - Solution: Installing intelligent algorithms to improve the usage and use of resources and water. environmental impact can be minimized by consumption.

4. **System Failure and Environmental Impact**

- It may lead to malfunctioning components (e.g., the heater is in the on position). during overheat, which affects the health of animals and consumes energy.
- Solution: Periodic maintenance and automatic fail-safe measures to identify. and respond to malfunctions.

2. Ethical Issues

1. **Animal Welfare**

   - Automation of pet care and poultry farm has some issues regarding diminished human. supervision, which might result in carelessness in attending to individual or unexpected. living circumstances that impact on the welfare of animals.
   - Solution: Although automation is useful in streamlining processes, it is important to have periodical human. Animal treatment needs to be ethically treated by supervision.

2. **Dependence on Technology**

   - The excessive use of IoT systems can decrease the interaction of farm workers or owners may neglect important elements of care that cannot be. automated.
   - Solution: The system must be done in a manner that it complements human care, rather than substitutes it. completely.

3. **Data Privacy and Security**

   - IoT systems produce and send live data concerning the environmental. conditions and operations. This data would be compromised by unauthorized access. user privacy or abuse it.
   - Resolution: The application of safe communication protocols and encrypted data. privacy can be dealt with by storage..

4. **Accessibility and Affordability**

   - Small-scale farmers or pet owners might not be able to access the system because of its expensive nature. with less resources, generating disparity in the use of technology.
   - Solution: It may help to develop low cost options or subsidize them. are more inclusive of the technology.

5. **Potential Job Displacement**

- Poultry farms could also automate, which means that human labor can be minimized. provide jobs to those workers who are dependent on the conventional farming practices.
- Solution: This can be solved by upskilling workers to operate and maintain IoT-based systems. solve this problem, creating new technologies in agricultural work.

6. **Ethical Resource Allocation**

- The development of higher IoT technologies to manage pets could be seen as a misuse of resources, particularly in areas where such basic needs as water and energy are. scarce.
- Solution: Enhancing sustainable design and encouraging the utilization of technology. that essential solutions be applied prior to luxury-based solutions being able to counter this. perception.

6.3 Utilization of Existing Standards or Codes

Implementation of a poultry farm inspection and pet feeder system with the implementation of the IoT. bases on adherence to different standards and codes that are currently in existence so as to achieve safety, efficiency and interoperability. Among the most important standards and codes applied in the system are below:

1.Electrical and Electronic Standards

IEC 61131 (Industrial Automation Standards): The current standard guarantees that the electronic standards meet. parts, such as relays and microcontrollers are robust and work according to the stated conditions. Such parts as relays and NodeMCU should comply with the safety and durability guidelines.

IEEE 802.11 (Wi-Fi Standards): Wi-Fi-enabled microcontroller, such as the NodeMCU, has to adhere to this standard of wireless communication. This will guarantee consistent connectivity of the hardware with the Blynk application to control and monitor remotely.

IEC 60364 (Electrical installations in a building): This is an electrical standard applied to safe electrical connections and power supply of the heater, humidifier, and pump to avoid cases like short-circuiting or overloading.

2. Internet of Things (IoT) Standards

IEEE P2413 (IoT Architecture): Makes the IoT system scalable. and Interoperable architecture. It also gives instructions on how to incorporate sensors (DHT11), actuators (servo motors) and other IoT gadgets (NodeMCU) well.

IoT Reference Architecture: ISO/IEC 30141: Leads the design of the system to provide compatibility of IoT gadgets and cloud-based systems, such as Blynk. app, in order to enable a smooth remote operation.

OWASP IoT Security Standards: Stipulates that the data that is transmitted between NodeMCU is guaranteed. and the Blynk application is safe, and it does not allow unauthorized access to the information and does not expose sensitive data.

3. Sensor and Component Standards

Calibration ISO/IEC 17025 (Calibration of Sensors): To achieve the right data readings, the temperature and humidity monitoring sensor (DHT11) must follow the calibration standards.

IEC 60747 (Semiconductor Devices): This standard is used on the semiconductors in components such as relays, sensors, and the microcontroller used in the NodeMCU that gives guarantee to proper functioning and longevity.

4. Software and Communication Standards

MQTT Protocol Standards: Provides light and dependable communications of data. between the cloud platform and the NodeMCU, which is needed to monitor in real-time. control.

ISO/IEC 27001 (Information Security): Data Confidentiality and Protection of Data Integrity. as part of relaying the information via the Blynk app.

5. Mechanical and Environmental Standards

Mechanical and Environmental Requirement.

ISO 14001 (Environmental Management Systems): Gives a guideline to eco-friendly processes (minimizing the impact on the environment through efficient pumps, heaters, etc.); humidifiers.

ISO 12100 (Safety of Machinery): Assures the mechanical parts such as servo. motors and water pumps will be designed in such a way as to minimize safety hazards when in operation.

6.4 Other Concerns

No other concern is not mentioned in this project.

CHAPTER 7
CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The findings of an IoT-based poultry farm monitoring and pet feeder system based on the use of NodeMCU, Blynk, DHT11, servo relay, heater, humidifier, and pump would probably bring to the fore the following important points on the project: 1. Enhanced Automation and Efficiency The system will be automated to perform the most vital operations like feeding the pets and maintaining the ideal environment (temperature, humidity) to raise poultry. This will minimize the amount of manual intervention and provide more coherent care. The servo relay and pump enable the distribution of water and feed to poultry or pets to be controlled with accuracy thereby enhancing the accuracy of feed. 2. Monitoring and Control Blynk is an easy-to-use mobile interface used to monitor and control the system in real time, which enables the owners of a farm or pets to make adjustments remotely. This makes this more convenient and sensitivity, particularly when instant responses are needed (e.g. controlling levels of temperature or humidity). With the help of the DHT11 sensor, one can get a correct response regarding the current environmental conditions and, therefore, act in advance. 3. Energy and Resource Management The heater and humidifier can be adjusted with the help of the real-time data of the DHT11 sensor to use the energy resource in the best way possible and ensure the appropriate conditions to grow poultry and keep pets comfortable. The system reduces waste through automated scheduling of the feeder and water pump as determined by set timetable or sensor feedback. 4. Scalability and Customization The IoT system is scalable, i.e., it can be developed to perform monitoring of bigger poultry farms or pets. The sensors and devices can be added on an as-needed basis. A programmable threshold and automatic responses will make sure that poultry and pets will get the specific attention they require based on the conditions of the environment or the needs of the animal species. 5. Smart Decisions Every minute of the day, the data is collected with the help of sensors and creates a historical data that may be analyzed and used to make informed decisions. This may involve modification of feeding patterns, streamlining. environmental controls, or preventing problems before they impact on animal health. 6. Better Animal Health and Welfare Animal welfare (environmental control and feeding) and health (temperature and humidity) is reached through the automation of these processes, which in turn makes the poultry have a better growth and promotes the comfort of the pets. 7. Cost-Effective and Accessible The solution will use low-cost building blocks such as NodeMCU, DHT11, and Blynk, and this factor is especially useful in small to medium-sized poultry farms or when an individual owns a pet. The design is available to non-experts who can easily supervise and control the system by utilizing a mobile application due to the IoT. 8. Expansion Opportunity The project reveals the possibility of expanding to other fields of smart farming or. pet care. Further functionalities may be added in the future, like livestock health sensor, artificial intelligence-driven statistics to do optimal feeding, or even security cameras. 9. Challenges and Considerations Although the system has immense advantages, it needs good internet connectivity in order to monitor and control it remotely using Blynk. Power failures or malfunctions of hardware might interfere with the system, which creates the necessity of backup systems or fail-safes. To conclude, the IoT system of a poultry farm monitoring and feeding the pet will help to achieve greater automation, optimization of resources, and real-time data-driven management. It increases the wellbeing of the animals, offers an easy user experience to the farmers or pet owners, and has opportunities to grow and advance in the future.

7.2 New Skills and Experiences Learned

When creating an IoT-based system that monitors poultry farms and feeds animals, it is essential to consider a number of important things. competencies acquired: IoT System Integration: Learning IoT System IoT Programming (NodeMCU). Arduino IDE, incorporation of sensors such as the DHT11 and application of communication protocols. similar to Wi-Fi, HTTP, or MQTT to real time exchange of data. Mobile App Development: Achieving proficiency in the application of Blynk to establish an individualized interface to use in remote-controlling and live. visualization of the environmental parameters (temperature, humidity). Sensors and Actuators: Learning the interface of sensors and actuators of control (e.g., servos, pumps) to make work automated such as feeding and controlling environmental conditions. Automation and Control Systems: Automation logic Design to control temperature. closed-loop feeding times, sensor based humidity, and sensor based feeding, sensor based feeding, sensor based feeding, sensor based feedback, sensor based humidity, control systems.Data Analytics and Troubleshooting: Collecting and analyzing data, troubleshooting hardware/software issues, and making data-driven decisions to optimize system performance. Power Management and Cybersecurity: Managing power consumption, ensuring device safety, and securing IoT communications for privacy and protection. Practical Applications and Entrepreneurship: Developing marketable IoT solutions for farming and pet care, balancing cost with value, and scaling solutions for real-world needs. This project fosters a blend of technical skills (IoT development, sensor integration, automation), practical experience (troubleshooting, power management), and entrepreneurial insights (market applications, cost-benefit analysis).

7.3 Future Recommendations

- **AI-Powered Data Analysis**: Integrating AI for predictive analytics to optimize feeding schedules, temperature, and humidity control based on historical data, improving animal health and productivity.
- **Remote Health Monitoring**: Adding sensors to monitor poultry or pet health (e.g., weight, activity levels), enabling early detection of diseases and reducing manual health checks.
- **Integration with Smart Farming Platforms**: Expanding the system to integrate with broader smart farming ecosystems, allowing seamless management of multiple IoT-enabled devices for farm operations.
- **Voice Assistant Integration**: Integrating with voice-controlled platforms (e.g., Alexa or Google Assistant) for hands-free control of feeding, environmental adjustments, and monitoring.
- **Energy Efficiency Optimization**: Enhancing power management by using renewable energy sources (e.g., solar) or incorporating smart energy-saving features to reduce operational costs.

REFERENCES

Sutapa Debnath
15.01.2025

[1] R. Kumar and S. Yadav, "IoT-based poultry farm monitoring system using NodeMCU and Blynk," *International Journal of Engineering and Technology*, vol. 9, no. 3, pp. 202-210, 2018.

[2] S. Patel, P. Shah, and N. Sharma, "Smart pet feeder with IoT using NodeMCU and Blynk," *Proceedings of the International Conference on Computer Science and Information Technology*, pp. 56-62, 2019.

[3] A. Gupta and M. Singh, "Design and implementation of an automated poultry farm system using IoT," *IEEE International Conference on Smart Energy and Communication*, pp. 134-139, 2017.

[4] H. Das, S. Singh, and R. Yadav, "IoT-based automatic pet feeder and monitoring system," *Journal of Artificial Intelligence and Internet of Things*, vol. 7, no. 2, pp. 89-94, 2020.

[5] S. Patel and R. Joshi, "Smart poultry farm environmental control system using IoT," *IEEE Access*, vol. 8, pp. 178431-178438, 2020.

[6] K. Kumar, A. K. Sharma, and S. Mehta, "IoT-based pet care system with automatic pet feeding," *IEEE Conference on IoT and Smart Cities*, pp. 233-237, 2018.

[7] N. Gupta, V. Patel, and A. Singh, "IoT-based poultry farm monitoring and control system using NodeMCU and sensors," *International Journal of Electrical Engineering & Technology*, vol. 10, no. 4, pp. 321-328, 2019.

[8] A. Agarwal and M. Mehta, "Smart pet feeding system using IoT and mobile app control," *Journal of Computer Networks and Communications*, vol. 2019, pp. 1-8, 2019.

[9] R. Jain, S. Kumari, and D. Bhatnagar, "IoT-enabled poultry farm management system," *International Journal of Research in Computer Science*, vol. 10, no. 3, pp. 45-52, 2020.

[10] M. Sharma, A. Kapoor, and S. Kumar, "Automation of poultry farm environment using IoT-based systems," *IEEE International Conference on Computing and Communication Technologies*, pp. 100-104, 2018.

[11] P. Sharma and N. Yadav, "Smart pet feeder using IoT and NodeMCU," *International Journal of Advanced Research in Computer Science*, vol. 9, no. 5, pp. 1212-1217, 2020.

[12] S. Singh, N. Chauhan, and R. Mehta, "Design of an automated poultry farm using NodeMCU and IoT," *International Journal of Science and Research*, vol. 8, no. 6, pp. 1581-1585, 2019.

[13] R. Kumar and M. Soni, "IoT-based smart pet feeder system with automatic food dispensing," *IEEE International Conference on IoT and Artificial Intelligence*, pp. 270-275, 2019.

[14] L. Chouhan, R. Mehta, and S. Arora, "Real-time poultry farm monitoring system using IoT and cloud-based platform," *IEEE Transactions on Industrial Informatics*, vol. 15, no. 2, pp. 1023-1031, 2018.

[15] P. Verma and A. Bansal, "Design of an IoT-based pet care system for automatic feeding and environmental control," *Journal of Internet Technology and Secure Transactions*, vol. 14, pp. 205-213, 2020.

APPENDIX A

TURNITIN REPORT

211-33-1371

ORIGINALITY REPORT

20%	19%	6%	12%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	dspace.daffodilvarsity.edu.bd:8080 Internet Source	8%
2	Submitted to Daffodil International University Student Paper	1%
3	www.computersciencejournals.com Internet Source	1%
4	Submitted to The University of Wolverhampton Student Paper	1%
5	www.gjesr.com Internet Source	1%
6	migratorybirds.fws.gov Internet Source	<1%
7	www.airforcefan.com Internet Source	<1%
8	ijisrt.com Internet Source	<1%
9	store.roboticsbd.com Internet Source	<1%
10	www.amazon.co.uk Internet Source	<1%
11	Submitted to Ibri College of Technology Student Paper	<1%
12	www.mayoclinic.org Internet Source	<1%

APPENDIX B
COMPLEX ENGINEERING PROBLEM SOLVING AND ENGINEERING ACTIVITIES

Complex Engineering Problems (P) Solving		
	Attributes	Statement from students
P1	Range of resources	Involves related research on IoT technologies, poultry farm, some sensor integration (DHT11, Mq 2, Mq 135 gas), and implementation using C++ programming via NodeMCU. Tutorials and documentation on Blynk
P2	Level of interaction	Interaction between sensors, actuators (exhaust fan, pump, heater, humidifier and servo motor), and cloud-based IoT platforms like Blynk ensures real-time monitoring, data visualization, and control.
P3	Innovation	
P4	Consequences of society and environment	IoT-based poultry farm monitoring enhances animal welfare, productivity, and sustainability while reducing waste and environmental impact. However, it introduces risks such as data security, job shifts, and dependence on technology.
P5	Familiarity	
P6	Extent of stakeholder involvement and conflicting requirements	
P7	Interdependence	Communication between sensors, relays, servo motors and cloud-based systems. Dependency on structured C++ programming and modular design enables seamless Hardware - software integration.

Complex Engineering Problems (P) Solving		
	Attributes	Statement from students
A1	Depth of knowledge required	Study on IoT technologies, integration of sensor, use of C++ programming, poultry farming details, NodeMCU, and implementation of IoT protocols via Blynk.
A2	Range of conflicting requirements	
A3	Depth of analysis required	Understanding the working principles of NodeMCU, its interaction with Blynk cloud services, and how various sensors and actuators (fans, pumps, and gas sensors) are controlled through programming.
A4	Familiarity of issues	
A5	Extent of applicable codes	

APPENDIX C
PROGRAM CODE

```
#define BLYNK_PRINT Serial

#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include <DHT.h>

#include <LiquidCrystal_I2C.h>
#include <Servo.h>
#include <Wire.h>
Servo myservo;
LiquidCrystal_I2C lcd(0x27,16,2);


 int hm=D6;
 int fan=D7;
 int light=D5;
  int pump=D8;
 int mq135 = A0;     //smoke sensor is connected with the analog pin A0
int data = 0;

char auth[] = "0Xt_fWhqCuIvdBbBOrprhOUVcnJA4mAY";
char ssid[] = "iot1";
char pass[] = "iot12345";

#define DHTPIN D4

// Uncomment whatever type you're using!
#define DHTTYPE DHT11     // DHT 11


DHT dht(DHTPIN, DHTTYPE);
BlynkTimer timer;



 BLYNK_WRITE(V3)
{
  int f3 = param.asInt(); // parameter as int
  if(f3 == HIGH)
  {
    digitalWrite(pump,HIGH);
    Serial.println("D1 High");
    delay(10);
    }
    if(f3 == LOW)
```

```
 {
  digitalWrite(pump,LOW);
  Serial.println("D1 Low");
  delay(10);
  }
}
BLYNK_WRITE(V4) {
 int Speed = param.asInt();
  myservo.write(param.asInt());
  Serial.println(Speed);}


void sendSensor()
{
          //read A0 pin of NodeMCU
 int h = dht.readHumidity();
 int t = dht.readTemperature(); // or dht.readTemperature(true) for Fahrenheit
 Serial.println(h);
 delay(500);
 Serial.println(t);
 delay(500);

 lcd.setCursor(0,0);
 lcd.print("T:");
 lcd.print(t);
  lcd.print("C");
 lcd.setCursor(8,0);
 lcd.print("H:");
 lcd.print(h);
  lcd.print("%");

 delay(300);

 if (isnan(h) || isnan(t)) {
   Serial.println("Failed to read from DHT sensor!");
   return;
 }

 if (t>35){digitalWrite(fan,HIGH);}else{digitalWrite(fan,LOW);}
 if (t<28){digitalWrite(light,HIGH);}else{digitalWrite(light,LOW);}
 if (h<75){digitalWrite(hm,HIGH);}else{digitalWrite(hm,LOW);}
 Blynk.virtualWrite(V1, t);
 Blynk.virtualWrite(V0, h);

}

void setup()
{
 // Debug console
 Wire.begin();
```

```
 lcd.begin();
 lcd.backlight();
 Serial.begin(9600);
  Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);
  myservo.attach(D3);

lcd.setCursor(0,0);
 lcd.print("Poultry Farm");
 lcd.setCursor(0,1);
 lcd.print("  Monitoring");
 delay(5000);
 lcd.clear();
 pinMode(hm,OUTPUT);
  pinMode(fan,OUTPUT);
   pinMode(light,OUTPUT);
    pinMode(pump,OUTPUT);
    pinMode(mq135,INPUT);
    digitalWrite(light,LOW);
    digitalWrite(pump,LOW);
    digitalWrite(fan,LOW);
    digitalWrite(hm,LOW);
  dht.begin();

 timer.setInterval(1000L, sendSensor);
}

void loop()
{
 data = analogRead(mq135);
 Serial.println(data);
 delay(500);
 Blynk.run();
 timer.run();

if (data>900){
 lcd.setCursor(0,1);
 lcd.print("Air Quality Good ");
 delay(500);

   Blynk.virtualWrite(V2,"Air Quality Good");}
 else {
 lcd.setCursor(0,1);
 lcd.print("Air Quality Bad....");
 delay(500);

   Blynk.virtualWrite(V2,"Air Quality Bad");
}

}
```