Smart Poultry Farm Monitoring System

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Abstract - In India today, poultry is one of the most significant and rapidly expanding economic sectors of the agricultural industry. Various factors of the environment such as temperature, humidity and ammonia gas play a significant part in poultry operations. In the modern world, automation is essential, and the idea of the Internet of Things (IoT) is developing quickly as well, there is a method for turning manual systems into automated systems. Sensors are used to monitor temperature, humidity and ammonia gas and also manage manual jobs like food feeding and water supply system. All the sensors are connected to the microcontroller which can monitor all data. The person in charge can able to get the internal environmental situation of poultry farm by receiving a message on registered mobile number. Thus the system design provides an efficient automated poultry farm monitoring system to monitor the healthy atmosphere for chickens in poultry farm without human interference.

Keywords - Environmental factors, Monitoring, wireless sensors, Chicken farm, Food Feeder, Water Supply, IoT.

I. INTRODUCTION

Global chicken production has extended over the last few decades as a result of consistent farming management, desirable production approaches, and other elements. Also, there's a large demand for high-quality chicken meals due to extra information on the safety of meal merchandise like chickens. The general public of farmers improves chicken using traditional techniques. The management of standard chicken farms is insufficient to maintain the fitness and boom of the chicks. An era-primarily based method is usually recommended for the management of chicken farming that is low cost, asset saving, satisfactory centered, and productive. If we will hold ideal environmental situations for chicken growth in addition to supplying them with an important amount of meals and water, the chickens will grow well and live healthfully. The monitoring of the farm can also be done through IoT primarily based gadget, which keeps track of the chicken farm from anywhere and at any time.

A. *Intelligent Poultry Management System*

Sensors are used in smart poultry farms to keep tabs on the surroundings of the birds. Comparable sensors are hired for NH3 tracking (ammonia gas). Microcontroller is used to measure parameters which include temperature, humidity, water level, and ammonia gas. The sensors are connected to a microcontroller, and the data is then dispatched to a mobile software program. Data is shown within the application for operators to research and

watch. Operators can quickly check on environmental conditions from a distance using the information in the application [2].

B. *Need for an Intelligent Farm*

A sensor integration platform can assist us in effectively tracking environmental parameters. Utilizing automated systems also reduces the need for human mistakes and effort. When using a Smart Sensing Platform to keep an eye on environmental factors will make an operator's job simpler and more productive in a poultry farm. It's crucial to keep the atmosphere around chickens healthy. Feed is the most crucial element affecting chicken weight gain. High quality, nourishing, and fresh feed are requirements. Giving chickens the right feed will lead to excellent health, proper growth, and eventually high farm productivity. To support healthy chicken development, feed should contain a well-balanced combination of vitamins and minerals. Various commercial chicken feeds are available today [2].

An operator of poultry can choose the feed with ease from these choices. Birds' nutrient intake can differ from location to location and is influenced by several variables, including the seasons and climatic changes. Chickens must be fed the right quantity of feed for optimal growth. Modern technology has many advantages over conventional methods that are very helpful to farmers. It is possible to create a food control system for poultry using a wireless sensor network and a DC motor system. By doing this, food waste will be prevented, and the amount of labor required to tend and watch over chickens will be decreased. It's also crucial to provide them with an adequate supply of clean, fresh water. Providing enough is essential for healthy development. An operator of poultry can choose the feed with ease from these choices. Birds' nutrient intake can differ from location to location and is influenced by a number of variables, including the seasons and climatic changes. Chickens must be fed the right quantity of feed for optimal growth. Water is also used to avoid bacterial diseases from spreading. By using guidelines for water acidification, many bacterial diseases can be avoided. The pH of drinking water should typically be kept at or below 4.0 (bird level). The management of water quality in poultry farms is crucial for the development of the chickens. Water supplies for poultry need to be constantly and continuously monitored by farm operators. Regular participation in this exercise is recommended. Water nutrients typically go unnoticed until there is an issue. Operators must concentrate on giving the poultry on the farm clean, sufficient amounts of water. All the water sources, including the water pipelines in the poultry must be provided attention [2].

C. *Internet of Things-Based Monitoring System Design*

With the Internet of Things (IoT), specific objects can transfer data over a network without requiring human intervention. A poisonous gas, temperature, and humidity monitoring system in chicken coops is one example of an Internet of Things application [6].

D. *Internet of Things*

The Internet of Things (IoT) is a system in which individuals and inanimate items are given unique identities and the capacity to transfer data over a network without the need for source-to-destination or human-to-computer communication. With the help of intelligent sensors and networked gadgets that communicate with one another through the internet, the Internet of Things (IoT) promises to improve life. There are now many commonplace devices with sophisticated sensors that can be operated online. Using clever sensors, analog data is transformed into digital data and immediately supplied to the microcontroller [6].

II.EXISTING SYSTEM

The majority of businesspeople and ranchers raise chickens using conventional techniques. The management of traditional poultry farms is insufficient to sustain the health and growth of the chicks. All poultry-related tasks, such as filling the water tank and occasionally feeding the chicks, are carried out mechanically. As a result, a lot of work is required. Some of the components of the present system that are taken into consideration include the following [1]:

A. Ammonia Gas:

There is no effective mechanism in place to manage ammonia gas. The health of chicks is dangerously impacted by ammonia gas. Therefore, diseases in chickens are brought on by an excess of ammonia gas. Finding ammonia gas in a field is crucial.

B. Temperature and Humidity:

In a poultry farm, there is no proper system to monitor temperature and humidity. The rise in environmental temperature and humidity is also dangerous for the chicks. The chicks will quickly succumb and perish from heat prostration when high temperatures are coupled with high humidity (over 75%).

Disadvantages :

1) The system requires more manpower.
2) The more dangerous ammonia gases are not detected by the device.
3) It is more cost-effective because of manpower and the lack of appropriate maintenance.

III.PROPOSED SYSTEM

The proposed system keeps track of almost all variables, including environmental parameters like temperature, humidity, and ammonia gas as well as manual tasks like food feeding and water supply systems, and a fully automated system is developed to handle these tasks. This system reduces the need for labor while promoting the health and growth of chicks. It is used to monitor farm operations and the internal environment. Farmers are additionally given tracked factors like [1]:

A. Ammonia gas detection:

A sensor detects ammonia gas in the atmosphere of a poultry farm, and the data is sent to a microcontroller.

B. *Humidity detection: Temperature and*

In the poultry yard, the sensor is positioned to measure the humidity and temperature there.

*C. Water supply System**:***

The water supply system is made to periodically provide water to the cage system. For this, a level monitor is employed. It will decide the water level. The water pump turns on and fills the water reservoir when the water level falls below the predetermined level. You don't waste water because the water tank automatically shuts off when it is filled.

D. Food feeding System:

Use large-capacity storage containers to store food. Where there is feed, there is enough feed for several days. Bowl refilling occurs when the feed is low and placed on the back level. This reduces feed waste and safer for birds in

E. Notification Provider:

This initiative uses a mobile application to deliver notifications. It can store data, visualize it, display sensor data, and do many other cool things.

ADVANTAGES

1) The proposed method transforms conventional farming into intelligent farming.
2) It gives the owner of a flock of poultry prompt and precise information about various parameters.
3) The System is more affordable and less costly for everyone who wants to start a side business in poultry farming, not just those who already own chickens.
4) A wireless sensor network is used to track various parameters intelligently, including temperature, humidity, gas, and others.
5) Improved chicken product production and health.

BLOCK DIAGRAM

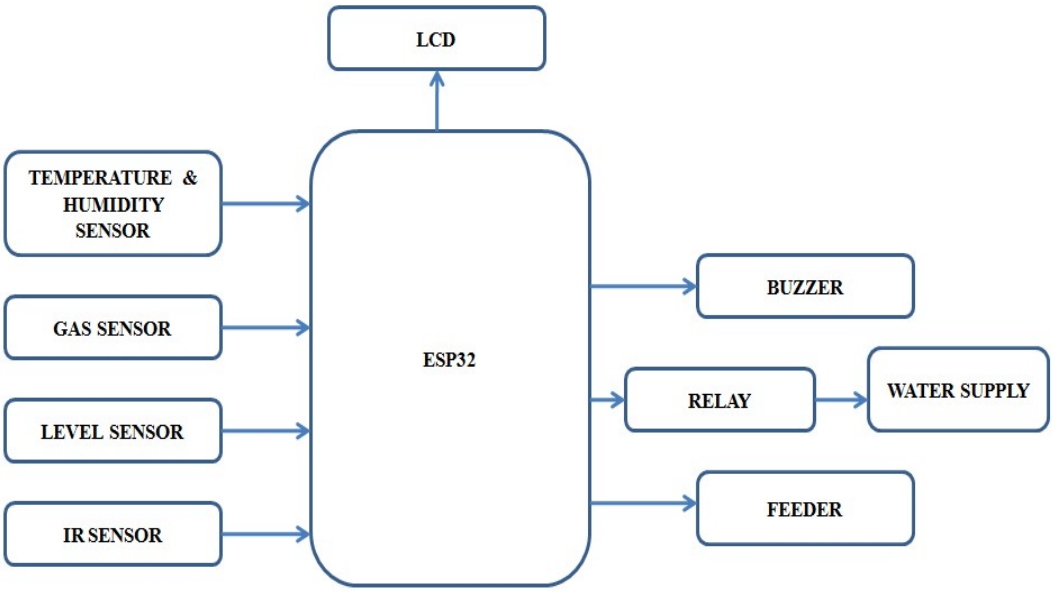

Figure 1. Smart poultry farm monitoring system

A. Dht22-

It is a digital temperature and humidity sensor with a cheap price tag. In a chicken farm, this sensor is used to determine the temperature and humidity levels.

B. Mq135-

Detects a wide range of gases. It is employed to find the amount of ammonia in a poultry farm. This sensor, like the others in the MQ line of gas sensors, has a pin for both digital and analog output.

C. IR sensor-

It is used for the feeding apparatus that is mounted above the chicken feeder. It determines whether the feed is present in the feeder or not.

D. Relay-

Acts as a switch. Therefore, here relay circuit is used which is capable of handling and switching high-voltage circuits.

E. ESP32 microcontroller-

ESP32 is a dual core 80MHz to 240 MHz CPU**.** It is a line of an inexpensive, low-power system on a chip microcontrollers with built-in dual-mode Bluetooth and Wi-Fi.

F. Level sensor-

It is a device that is designed to monitor and measure liquid levels.

G. Feed sensor-

It is suitable for detecting feed grain and start/stop of filling.

H. Software Design-

It requires software or a program made specifically for the ESP32 microcontroller. The preparation phase of computing starts with the initialization of the employed sensors, such as the MQ-135, DHT-22, etc. The sensor

is then calibrated, specifically between the sensor output and the range of values the ESP32 microcontroller receives. The ESP32 microcontroller calculates the amount of temperature and ammonia gas that the sensor reads, displays it on the LCD viewer, and sends it to a smart-phone after receiving the sensor reading data [6].

IV.CONCLUSION

The embedded technology transforms a conventional farm into a "Smart Farm" or "Intelligent Farm," which is novel for the chicken farming industry. The system may also integrate with smart-phone applications, enabling the user to keep an eye on environmental contexts like temperature, humidity, ammonia gas, and water level in real time. It also describes how a poultry farm's food control mechanism and water level control mechanism work. The farmers will find the intelligent system to be very user-friendly and able to cut costs, time, and effort. This ideal method will more effectively supply humans with food by increasing the quantity and caliber of chicken. Additionally, this method will aid in reducing environmental pollution and enhancing consumer health when it comes to chicken.

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