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IOT Based Smart Management of Poultry Farm

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Abstract— One of the most significant and rapidly expanding economic sectors of India's agriculture sector is poultry. Today, chicken output has been steadily rising due to standard agricultural practices and ethical manufacturing practices. In modern world, automation is essential, and the idea of the Internet of Things (IOT) is developing quickly as well. There is a method for transforming manual systems into automated ones. The goal of the article is to automate management tasks on a chicken farm using IoT technologies. Ammonia gas, light, humidity, and temperature are a few environmental elements that affect chicken health. Manual tasks like meal feeding, providing water, & sanitation are also regulated. Production & caliber of chicken rises if all these variables are kept constant. Additionally, it has the ability to record prior data from the poultry farm.

Introduction

The majority of the nation's population is rapidly expanding their consumption of poultry meat due to its high protein, low calorie, and low cholesterol content. The environment, the process of upgrading, and the ongoing operations all affect how much chicken is produced. Standardized farming practises and effective manufacturing practises have led to a growth in chicken production over the past several decades all over the world. There has also been a significant increase in consumer knowledge of the quality of food products, such as chickens. Being a nutrient-dense diet with a protein-rich, fat-free, and cholesterol-free content, chicken is most consumed produce in the world, according to a survey on agricultural products. In the world of today, automation is very significant. The automation of chicken farms utilizing Mobile communications and wireless sensor networks is the main topic of this article. Automative uses of Internet of Things (IoT) technology. A technology-based approach is suggested for the management of chicken framing that is low cost, asset saving, quality focused, and productive. The poultry industry operates on both a large and local scale. Automating a number of the tasks carried out in a chicken farm is one way to reduce the amount of manual labor. The environment has an effect on the chicken's productivity and health. While manual tasks like food feeding, water supply, and sanitation are handled automatically, environmental parameters like humidity, temperature, light, and ammonia gas are all managed.

Production and quality of chicken increase if all of these variables remain constant.

I. METHODOLOGY

Most businesspeople and farmers employ conventional techniques for raising poultry. The management of traditional poultry farms is inadequate for preserving chicken health and growth. All poultry-related tasks, such as replenishing the water tank, regularly feeding the chickens, cleaning up chicken excrement, and controlling the lighting in the farm, are carried out by hand. As a result, a lot of labor is needed, and some aspects of the current system are taken into account.

There is no effective system in place to handle ammonia gas. The health of chickens is dangerously impacted by ammonia gas. Therefore, infections in poultry are brought on by an excess of ammonia gas. Controlling ammonia gas in farms is crucial.

Natural processes regulate humidity and temperature. The temperature and humidity are not specifically controlled. Increases in the ambient temperature and humidity are also harmful to chicken.

In conventional farms, the chicken receives intermittent manual feedings and waterings. When workers don't deliver feed or water on schedule, it negatively affects the growth and output of chickens. More personnel are also required. Therefore, an automated system is required.

According to research, the chicken must receive adequate light for optimal egg production. For a chicken, 16 hours of light each day are necessary. The sun provides some of the necessary light (for around 12 hours), and the other portion needs to be manually provided. Therefore, proprietors of poultry farms need a suitable lighting setup.

The chicken's health is not preserved by taking the aforementioned elements into account. Along with the aforementioned factors, other factors like manual labor should be taken into account in this project in order to boost production and obtain healthy chicken.

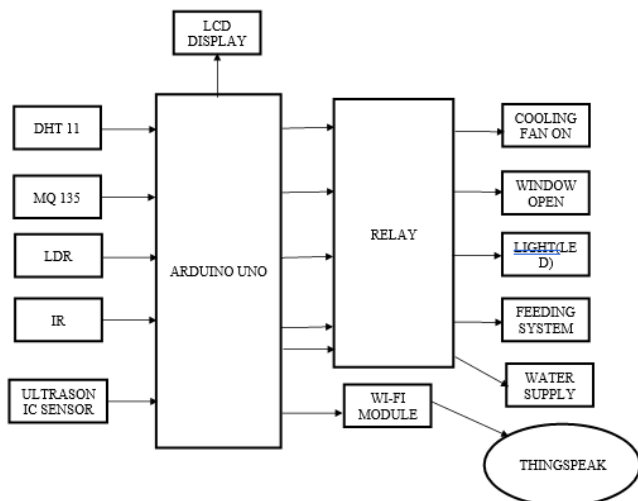


Fig 1. Block representation of the suggested system

a generalised block diagram of the Internet of Things-based system which consists of a microcontroller and remote sensors, is shown in Fig. 1. Uno Arduino is used as the controller. Data is gathered by Arduino Uno from several sensors installed in a chicken farm. Examples include Ultrasonic sensors, infrared sensors, light sensors, ammonia gas sensors, temperature and humidity sensors, and more.

Control system for ammonia gas:

Ammonia gas is discovered by a sensor in a chicken farm's atmosphere, and an Arduino receives the information. Put a value on the threshold. The relay activates when the threshold value for ammonia gas is reached, turning on the exhaust fan.

System for regulating humidity and temperature:

The sensor is positioned in the chicken farm to measure the temperature and humidity of the surrounding area. When the temperature and humidity levels surpass the threshold, the exhaust fan and ventilation window will turn ON.

Water Supply System:

This system is designed to provide water to the cage system on occasion. An ultrasonic sensor is used for this. It will decide the water level. The water pump will start and fill the tank with water when the water level falls below the set level. The water tank will automatically turn off when it is full, preventing water waste.

Feeding System:

A food supply gadget will occasionally provide nourishment to the chicken.. With this approach, less labor is needed, and feed waste is also prevented.

Light System:

The chicken needs adequate light to produce the most eggs, according to study. The chicken requires 16 hours of light every day, 12 of which must come from sunlight and the other eight from an electric light source. The automation is finished.

FLOWCHART FOR THE PROPOSED SYSTEM

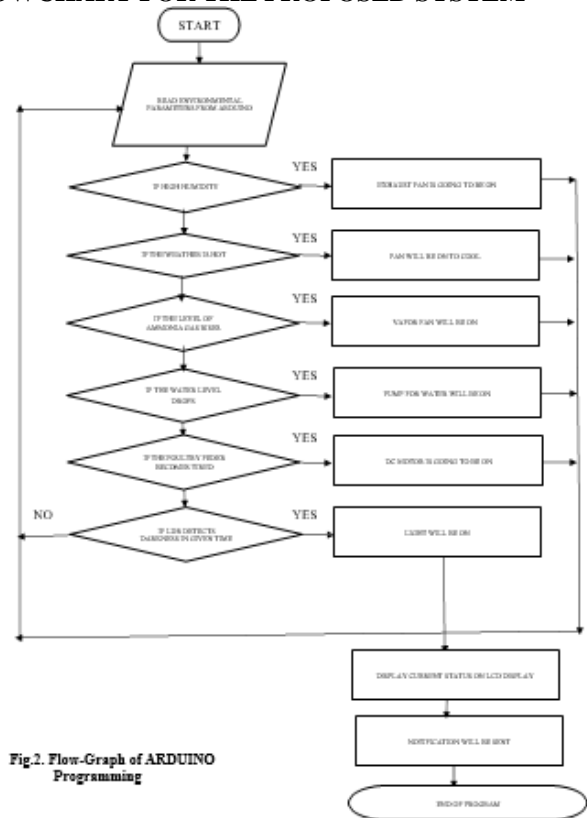


Fig.2. Flow-Graph of ARDUINO Programming

the functionality of the working model.

- At a chicken farm, all environmental elements are read by the system sensors. The RTC module initialises real-time.
- Arduino is used to keep track of sensor readings and take appropriate action.
- Send high output to the port if the input value exceeds the threshold values; otherwise, the parameters will be read again if the input value is less than the threshold values. Along with activities and systems like the water level system, the food feeding system, and the cleanliness system, four environmental variables—temperature, humidity, ammonia gas, and light—are being monitored.
- The exhaust fan will turn on if the relative humidity rises.
- When the temperature reaches the preset point, the cooling fan will start to run, and if the ammonia gas concentration rises, the ventilation window will be opened. Similar to this, the water pump and DC motor will turn on as the water level drops and the feeder is empty, respectively.
- The light and DC motor (used for the cleaning system) will turn on at the predetermined time when the RTC module is turned on.
- When the LDR detects darkness, the lamp is ON in emergency conditions.
- Important notifications are sent to the webpage, and the LCD displays the situation as it is right now.

Table1. Threshold Parameters for The Prototype

PARAMETERS	THRESHOLD VALUE
Temperature	<= 32 degree Celsius
Humidity	<= 60%RH
Quality of the Air	<=40 ppm
Light	<=50 Lux

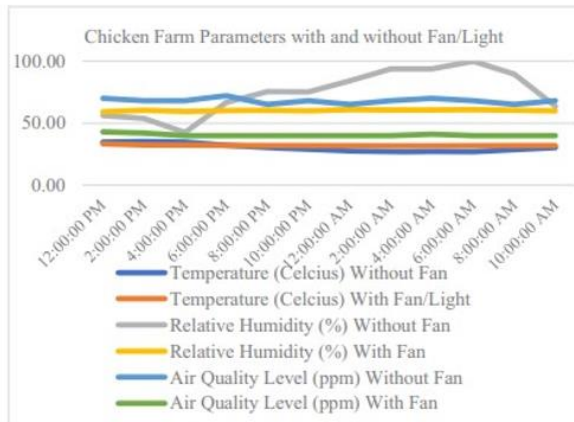


Fig 3. Parameters of a poultry farm with and without a fan and a light

- The graphed readings from the DHT22 and MQ135 sensors, both with and without a cooling fan, exhaust fan, or light, are shown in the following Figure. The findings demonstrate that a steady atmosphere inside the barn with a temperature of about 32 degrees Celsius, maintained by a cooling fan and light, is great for raising healthy chicks.
- Usage of the fan and light provides more constant relative humidity (RH) (about 60%) than it would without them, according to the relative humidity standards, which helps the chicken within the barn grow healthier.
- The third parameter, the reading from the air quality sensor, shows that utilising an exhaust fan lowers the level of contaminated air, bringing the value to around 40 ppm.

Another feature of a poultry farm is this productivity that is crucial. Maintaining these characteristics, together with adequate hygiene, appropriate food, and water, will help to lower the chicken farm's mortality rate, which will increase productivity.

A. Not only in India but throughout the entire world, poultry farming has been a practise for a very long time. But in recent years, it has been done so in a scientific way. In India and other parts of the world, backyard poultry have evolved into commercial poultry farming, a lucrative and respectable business. Small farmers and landless laborer's find support in the poultry farming industry since it can be used as a secondary or supplemental source of income. In reality, India's agricultural sector now cannot function without chicken farming. As a result, An effective automated monitoring system is provided by the project architecture as proposed. Typical poultry farms can become a modern one by utilising IoT., automated chicken farm. The chicken's growth and health are improved with this automated poultry farm. Therefore, a chicken owner can run a successful poultry farming business and earn a good living.

B. Future enhancement:

FUTURE UPGRADES INCLUDE THE ADDITION OF A FIRE ALARM SYSTEM, THE CREATION OF AN AUTOMATIC FIRE EXTINGUISHER SYSTEM, AND THE ADDITION OF MORE WEBSITE CONTENT REGARDING A POULTRY FARM, SUCH AS REMINDERS FOR BIRD VACCINATIONS AND EMPLOYEE INFORMATION. FOR POLY HOUSES AND FOOD PRESERVERS, THE SAME APPROACH CAN BE USED.

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