SMART POULTRY HOUSE MONITORING SYSTEM USING IOT

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Abstract—In modern India, the poultry industry is one of the largest and fastest growing segments of the agrarian economy. Due to standardized farming management and excellent manufacturing practices, chicken output has been steadily increasing in recent years. Automation is crucial in the modern world, and the Internet of Things (IoT) concept is also evolving rapidly. It is possible to automate manual processes using acertain technique. The project's objective is to use IoT technologies to automate management-related chores on a chicken farm. Environmental factors like temperature and humidity are just a few that have an impact on chicken wellness. By keeping an eye on the chicks according to their cycle, the proprietor is informed. The weight of the chicken is taken into consideration for high - quality manufacturing. If all these factors remain consistent, chicken production and quality increase.

Keywords- IoT, Alarm, Sensor, Coop, Chicken detection, Temperature, Light, Water level,Humidity, Node MCU, Thingspeak, MyMQTT.

1. INTRODUCTION

Chicken poultry is one of the important economic segments in the agricultural sector Chicken production has been increased gradually due to the standardized farming management and good manufacturing practices. There are few parameters that affect the health of achicken such as temperature, water, and food supplies[1][15]. These parameters need to be controlled in order to maintain the production and quality of chicken. With the advent of automation, a traditional chicken coop management system can be improved. Therefore, this study focuses on the development of an automated chicken coop management system prototype. Among the main hardware used for the project is the NodeMCU andsensors to control and monitor the parameters like temperature, water, level in the chicken coop[2-4]. The parameters can also be monitored through a mobile Thingspeak application. And the notifications appear on the MyMQTT application. The

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results indicate that with a more systematic control of the environmental factors that affect the health of a chicken, an ideal environmental condition can be achieved and maintained in the chicken coop [5][11][14].Chickens are prone to being attacked by many predators during the night. In order to keep your flock safe and alive, a good solution is to have an enclosed structure for the chickens to go in during the night. Rather than having to go out every night to lock them up in this structure, or early in the morning to let them roam the pasture. A good solution would be an automatic door installed on the structure [6][13][17]. This works with the help of the IR sensor. When the chicken is detected, the door will be opened and when the chicken is not detected the door will close this principle is used in the elevators. The door can be designed to include many different functions. These functions will be involved in how it opens and closes, and how it is set to open or close.

2. LITERATURE SURVEY

"Artificial Intelligence and IoT based Monitoring of Poultry Health" presents a thorough analysis of the monitoring of poultry health using Internet of Things (IoT) platforms and Artificial Intelligence (AI) methods. The IoT devices using various types of sensors, video/image processing and classification capabilities, along with vocalization (sound) based Poultry livestock analysis, are being researched for tracking the poultry farm and bird health[1][9]. The ability to use current technology to constantly monitor huge farms with millions of birds and increase output is supported by the availability of increasingly affordable computational resources devices, and in the diet are eggs and poultry, so poultry farm administration should prioritize the use of cutting-edge technological solutions. Drawbacks: prone to mistakes have lengthy polynomial running durations in general.

Many poultry producers carry out a variety of tasks manually on their farms. Due to their inability to properly automate the monitoring and control of environmental variables like temperature, humidity, light, and air quality as well as to ensure a sufficient supply of feed and water, they consequently suffer a significant loss [2][12].
The chicks are negatively impacted by these variables, and if they are not controlled, the chicks may experience health issues. As a result, the babies consume less feed, which raises their mortality rate and increases their vulnerability to illness. In order to handle automating those factors, this paper created an embedded poultry farm. The system can detect changes in environmental parameters and react appropriately to maintain an ideal environment for the chicks' better health. The poultry farm's productivity and climatic circumstances are improved by the automated system, which is good for the broiler chicks. Complicated to install and manage; difficult to use in massive parallel computing [7-8].

In "A Preliminary study on Poultry Farm Environmental Monitoring Using Internet of Things and Block-Chain Technology" the poultry industry's adoption of blockchain and the Internet of Things (IoT) is discussed. To sustain and increase poultry production, environmental factors such as temperature, humidity, air quality, and lighting are crucial. For a large poultry farm, particularly one run in the old- fashioned manner, it is essential to monitor all environmental factors [3][10]. Recently, IoT and block chain have been used to automatically watch and manage the farm. It has been shown to lower costs and improve the management of chicken farms. In the beginning, temperature data are stored in JSON format and monitored using IoT-based temperature and humidity sensors. According to the findings, the data was effectively sent to the IOTA block chain. Block chain will guarantee customer transparency and data security. Cons: Expensive; difficult to execute in real time; heavy.

Malodor emission from chicken farms is a significant environmental problem. The

electronic nose (e-nose) system in-lab developed for measurement and analysis of the livestock farm odors is proposed as a basic study of malodor monitoring in poultry farms. Eight gas sensors, chosen especially for the primary volatile compounds emitted from livestock farms, make up this electronic nose. A sensor chamber, a sensor array, a microcontroller, signal conditioning circuits, and wireless sensor networks are the primary elements of this e-nose. Our e-nose device can categorize various smells and determine theirintensity. The acquired data were interpreted using principal component analysis and a hierarchical cluster analysis pattern recognition method. In this study, a chicken farm was investigated using a mobile e-nose and an e-nose station that can track odors in real time. Agas detector was also used to quantify volatile organic compounds, hydrogen sulfide, and ammonia [4][16]. The outcomes have demonstrated that an electronic nose can locate the source of bad odor, categories various smells, and keep track of bad odor in a poultry farm in real time. Ammonia gas was primarily discovered inside the chicken house, where it is the main source of odor. Drawbacks: usually have long polynomial running times and cannot satisfy the demands of the network industry today.

Vehicle sensing accuracy and coverage are essential for automated driving. However, a single autonomous vehicle's present sensing capacity is quite constrained in the complex road traffic environment, resulting in numerous sensing dead zones or frequent misdetection. In this article, we suggest creating a Vehicular Fog Computing (VFC)architecture to perform cooperative sensing among numerous nearby vehicles moving as a platoon [5]. The platoon's sensing coverage and accuracy are improved using the greedy and Support Vector Machine (SVM) algorithms respectively, based on our VFC design. Additionally, the sensing coverage and accuracy by the proposed algorithms can be greatly improved with minimal computational complexity, according to simulation findings based on real- world traffic datasets. Cons: Expensive message upgrading; prone to mistakes.

3. SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

Most of businessmen and farmers use traditional poultry farming methods. The existing systems are manual, more complicated, and expensive. The measurements of temperature and humidity are not very precise. The current systems operate comparatively poor and inaccurate. Additionally, the expense of upkeep is high. Inaccurate temperature and humidity readings may affect the coop's atmosphere. The way the door is opened and closed under the existing system at dawn and dusk poses a serious risk to the chickens. The automated closure and opening at dawn and dusk can endanger the chickens' lives because the automated chicken coop's main goal should be to monitor and regulate the chickens to protect them from predators like snakes and foxes. The current technology cannot securely store the analyzed data. An authorized person is needed to access the system because the user interface is rather complicated. The current systems are not particularly user-friendly, nor are they particularly environmentally friendly. It makes use of manual labor within the system.

Drawbacks:

Complexity, Very expensive, Power outages

3.2 PROPOSED SYSTEM

Poultry Pal using the IoT concept is a predator-proof coopthat doesn't have a latch they are nearly impossible for predators to pry open. With traditional chicken coop doors that have a latch, some predators can easily figure out how to open a latch and enter the coop. hence our poultry pal is more efficient for raising the chickens safely, along with this the

temperature, humidity, and water sensor are used for maintaining the chickens' health
The user will be notified about the values in the MYMQTT application and the monitoring of the data can be viewed and stored in the ThingSpeak cloudapplication.

4. HARDWARE USED

Node MCU, Servo Motor, Water level Sensor,DHT11, Piezo Electronic Buzzer, PIR Sensor, IR sensor, LED, Connecting Wires.

5. SOFTWARE USED

- Arduino IDEVersion1.8.13
- Operating System Windows 7 and above (64bits)

6. LIST OF MODULES

1. Coop Open and close using Infrared sensor
2. Detecting the presence of chicken in the coop withpassive infrared sensor.
3. DHT11 detects the range of temperature andhumidity
4. Water level depth sensor identify the level of water incoop

1. Coop Open and close using Infrared sensor

In the coop, the chicken is recognized using an IR sensor; if the chicken is spotted, the door automatically opens and closes, notifying the user via their mobile device with the attached wi-fi password. IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infraredsensor can detect these radiations. There are five basic elements used in a typical infrared detection system: an infrared source, a transmission medium, optical component, infrared detectors or receivers and signal processing. Infrared lasers and Infrared LEDs of specific wavelength used as infrared sources. The three main types of media used for infrared transmission are vacuum, atmosphere and optical fibers. Optical components are used to focus the infrared radiationor tolimit the spectral response

Fig 1- IR SENSOR

2.

Detecting the presence of chicken in the coopwith passive infrared sensor

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low power, easy to use and don't wear out. For that reason, they are commonly found in appliances and gadgets used in homes or businesses. They are often referred toas PIR, "Passive Infrared", "Pyro electric", or "IR motion" sensors' are basically made of a pyro electric sensor(which you can see above as the round metal can with a rectangular crystal in the center), which can detectlevels of infrared radiation Everything emits some low- level radiation, and the hotter something is, the more radiation is emitted. The sensor in a motion detector is actually split in two halves. The reason for that is that weare looking to detect motion (change) not average IR levels. The two halves are wired up so that they cancel each other out. If one half sees more or less IR radiation than the other, the output will swing high or low.

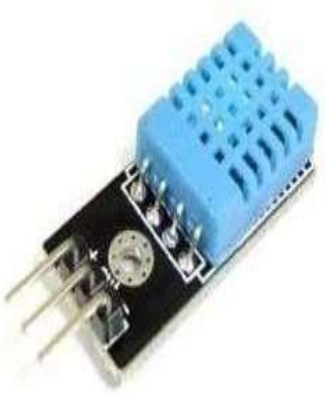
Fig 2- PIR SENSOR

3. DHT11 detects the range of temperature andhumidity

DHT11 humidity and temperature sensor is available as a sensor and as a module. The difference between this sensor and module is the pull-up resistor and a poweron LED. DHT11 is a relative humidity sensor. To measure the surrounding air this sensor uses a thermistor and a capacitive humidity sensor.DHT11 sensor consists of a capacitive humidity sensing element and a thermistor for sensing temperature. The humidity sensing capacitor has two electrodes with a moisture holding substrate as a dielectric between them. Change in the capacitance value occurs with the changein humidity levels. The IC measure, process this changed resistance values and change them into digital form. For measuring temperature this sensor uses a Negative Temperature coefficient thermistor, which causes a decreasein its resistance value with increase in temperature. To get larger resistance value even for the smallest change in temperature, this sensor is usually made up of semiconductor ceramics or polymers. The temperature range of DHT11 is from 0 to 50 degree Celsius with a 2-degree accuracy. Humidity range of this sensor is from 20 to 80% with 5% accuracy.

The sampling rate of this sensor is 1Hz.i.e., it gives one reading for every second DHT11 is small in size with operating voltage from 3 to 5 volts. The maximum current used while measuring is 2.5mA.DHT11 sensorhas four pins- VCC, GND, Data Pin and a not connected pin. A pull-up resistor of 5k to 10k ohms is provided for communication between sensor and micro- controller. DHT11 uses only one wire for communication. The voltage levels with certain time value defines the logic one or logic zero on this pin. The communication process is divided in three steps, first is to send request to DHT11 sensor then sensor will send response pulse.

Fig 3 - DHT11



4. Water level depth sensor identify the level of waterin coop

Water is kept in the chicken coop entrance for the chicken to drink anytime it needs to. In the event that there is no water in the coop, this water level sensor will assist in sending a notification to the user's mobile device**.** Water Level sensors mainly used to monitor and regulate levels of a particular free-flowing substance within a contained space. These substances are usually liquid, however, level sensors also, and used to monitor some solids such as powdered substances.Level sensors widely used industrially, as level acts as animportant monitoring parameter. This is a low cost easy to use. This water level sensor module has a series of parallel exposed traces to measure droplets/water volume in order to determine the water level. Very Easy to monitor water level as the output to an analog signal is directly proportional to the water level. This is a probe type water level sensor. This type works on the principle single point probe sensor principle**.** Point Probe sensors are mostly capacitive type or Resistive. The sensor will have dielectric constants. They measure changes in the value ofcapacitance when the sensor is dipped into the liquid. The change corresponds to Level variation. Two types of sensors are available, one with high dielectric constants and another with low dielectric constants. This sensor will work with the different range ofsolids, liquids and mixed materials. These sensors also available both in contact or non-contact type sensor.

It is important to know whether the sensor works with all types of material or tank. The sensor requires calibrationfor the specific type of material as the dielectric constant varies and for tank design

Fig 4- WATERLEVEL SENSOR

7. SYSTEM ARCHITECTURE

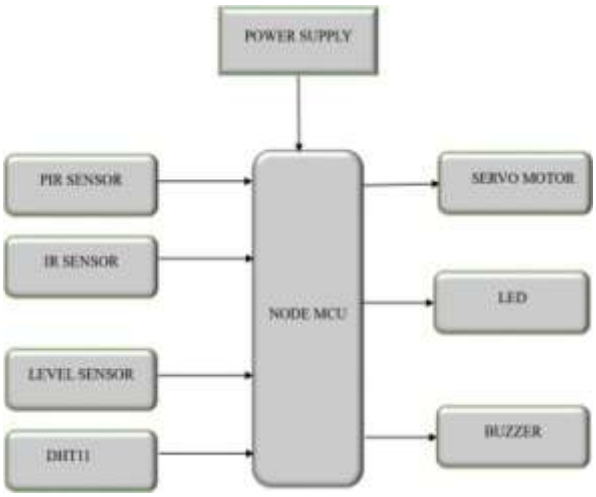


Fig 5 ARCHITECTURAL DIAGRAM

8. RESULTS AND OUTPUT

Fig 6- PROPOSED STRUCTURAL MODEL

Fig 7- OUTPUT FOR MODULE 1

Fig 8- OUTPUT FOR MODULE 2

Fig 9- OUTPUT FOR MODULE 3

Fig 10- OUTPUT FOR MODULE 4

Fig 11-MyMQTT Application

9. CONCLUSION AND FUTURE ENHANCEMENT

9.1 CONCLUSION

Smart Poultry House Monitor is an Internet of Things (IoT)-based technology that enables temperature, water and humidity monitoring from a smartphone. As a result, it is a reliable and effective solution for automating the opening and closing of chicken coop doors. It provides convenience and safety for the chickens, while reducing the workload for the farmer, and is suitable for use in a wide range of environments. And this is also environmentally friendly. The user will be able to determine the condition of the chickens based on the data. In addition to chicken houses, this technology has the potential to be used to monitor any type of controlled environment, including homes and workplaces. Future upgrades to the system, whether they pertain to the hardware or software, may be made. This work can be improved upon by offering prediction functions to analyze the data that has been gathered for a better report in the research experiment and the production of high- quality animals.

9.2 FUTURE ENHANCEMENT

Overall, the future enhancement of our project is toimplement emergency shutdown in case of any hazards, enhanced feeding techniques and to enhance alternate efficient methods to improve the range of the sensors and the user interface should be made simpler for easier access. These optimizations can increase efficiency, productivity, and sustainability, while also improving animal welfare and food safety. As the technology continues to evolve, it is expected that IoT will become an increasingly important tool for the poultry industry, helping to meet the growing demand for safe, healthy, and sustainable food.

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