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IOT BASED SMART POULTRY ENVIRONMENT MONITORING SYSTEM

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Abstract: The world has been concerned about the issues related to the environment. The successful implementation of the Internet of Things (IoT) has been posed by the emergence of the Internet of Things (IoT) and the move toward smart approaches like smart cities, smart buildings, and smart grids. However, success is only real when the problems can be solved. The environment of a poultry house is proposed to be protected and monitored using Internet of Things technology in this paper. The proposed hardware, which is based on software, is capable of monitoring environmental parameters like air temperature, humidity, oxygen concentration, CO2 level, and NH3 concentration. Effective data collection of the aforementioned parameters, as well as source coordination and control, is the responsibility of the wireless sensor. The equipment is executed effectively at various destinations inside the poultry shed. The experimental setup was found to be extremely accurate and effective. This plan will procure a protected climate and benefit to the poultry business.

Index Terms **- Arduino, DHT11, MQ2 Sensor, IR Sensor.**

I. INTRODUCTION

These days, the chicken poultry industry is a significant industry for manageable food supply in our country. The advancement of a programmed chicken taking care of machines can be extremely valuable to the development of the poultry business, the exhausters for controlling the temperature and removing harmful gasses is the most significant assignment and work concentrated task. In a typical poultry farm, these manual procedures are necessary, so that smart poultry farms can take the place of manual activities and make poultry work easier. One kind of smart system—an automatic food feeder in a container—and an exhauster fan to control the environment's temperature are needed for the implementation of smart poultry farms. Framework is planned in such a manner that the client can remotely control the framework through necessary applications. Human work can also be reduced with this prototype, and intelligent work will be done.

II. LITERATURE REVIEW

The system helps the farmer to monitor the operation of the poultry farm and control the operation of the poultry farm. The system is a combination of wireless sensors and a mobile system that facilitates the management and monitoring of poultry operations. Environmental parameters such as temperature and ammonia gas are also automatically monitored and controlled. The Internet is connected devices to communicate between objects and people. An intelligent system can reduce costs, time and labor. The system replaces human work when feeding food into the container. It solves the work problems of the poultry industry and also mainly includes two parts, the first is to feed the food to a specific storage area and the second is to direct the temperature sensor to the freshness of the chicken food. It improves the poultry climate and lowers labor costs, and saves food and feed chicken in time and avoids food contaminated by insects. The bird system uses hardware and open source software. It also includes temperature, humidity, light intensity and also air quality. The system focuses on providing provisions such as IOT, affordable hardware and open source software. The system identifies many problems in the poultry industry. It saves time, labor dependency and improves a healthy environment and also increases poultry production. The work focuses on poultry farm automation. This article also focuses on environmental parameters such as temperature, humidity and gaseous ammonia, which are monitored and controlled fully automatically. This automation improves the quality of meat production and improves growth. A smart poultry farm focuses entirely on the climate, thus improving the quality of the chickens. The climate of the poultry farm is fully automated. Paper reduces the physical labor of labor along with labor costs. It improves the production of flour in the poultry farm. With the help of a wireless sensor, information about the environment of the poultry is collected and connected to the sensors. Poultry climate control and monitoring is thus at the user's fingertips. This system provides a monitoring system that is useful for the owner to receive information from the poultry farm and also for wireless control. So this system can collect data and work automatically and help maintain the temperature in the poultry farm.

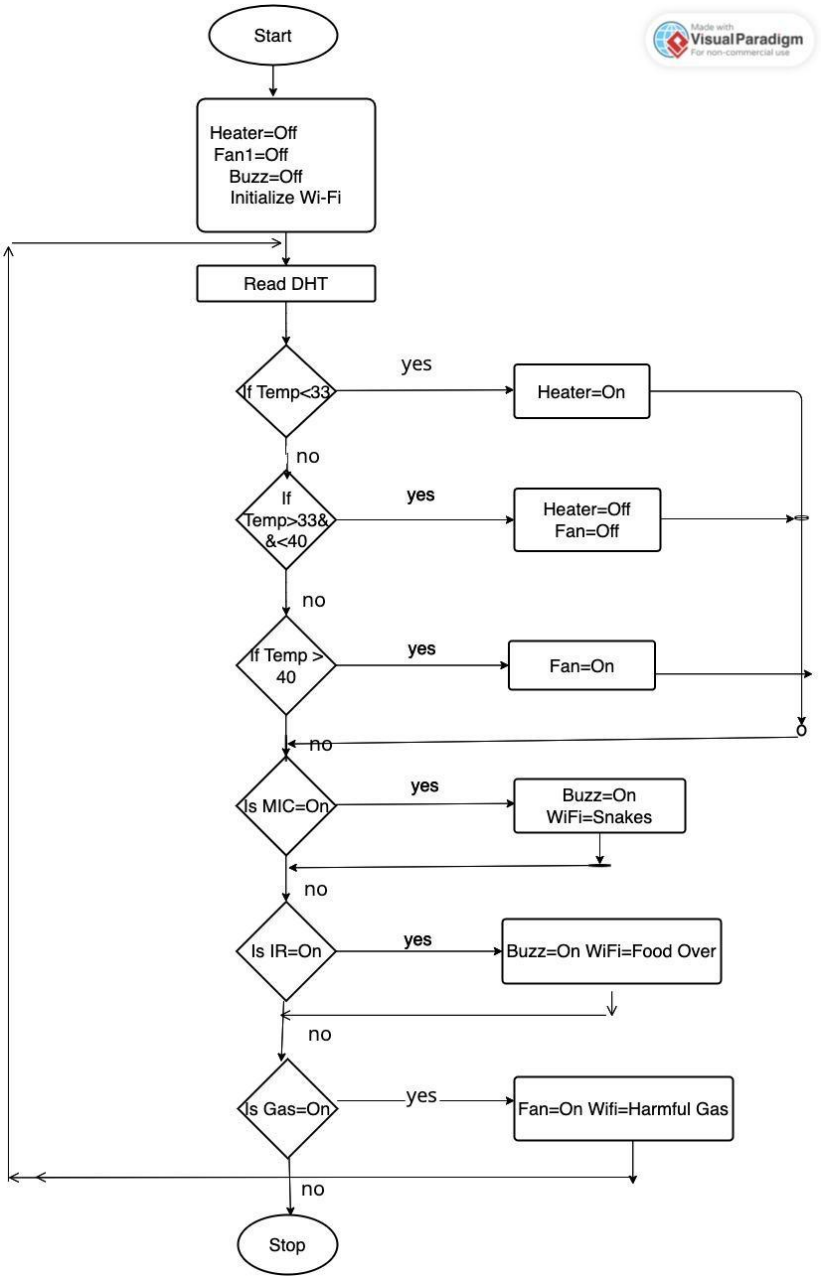
III. PROPOSED SYSTEM, FLOW CHART, MATERIALS AND IMPLEMENTATION

3.1. Proposed System:

Environmental parameters are not monitored in previous work. We have an alarm system for emergencies. It is an automatic system. If any chicken affected the parameters of the environment, it cannot be detected with the naked eye. That is why we proposed to identify this series parameter error in a poultry farm. To develop an IOT based system to make a smart poultry farm. The system supports chicken feeder detection, the system can maintain the temperature to ensure the water mechanism. The system controls humidity and temperature in the poultry farm.

Our proposed system uses sensors to measure weather/environmental factors such as temperature, humidity. The values read by the sensors are processed by the Arduino microcontroller. This project highlights an IoT solution to monitor temperature and humidity, regardless of time and location.

3.2. Flow Chart:



3.3. Materials:

To implement this project we used the following components: Arduino UNO, MQ2 sensor, DHT11 sensor, IR sensor, Relay, Transformer and Fan.

3.3.1. Arduino UNO:

The Arduino Uno is a type of Arduino board that is an open source board that uses an on-board ATmega328p microcontroller. The Arduino Uno contains a set of analog and digital pins, which are input and output pins used to connect the board to other components. A total of fourteen I/O pins are placed internally, six of which are analog input pins. The card has a USB connection that can be used as a power source for the card. The board is used to design electronic projects and circuits. The Arduino UNO is classified as a microcontroller that uses the ATmega328 as a controller. Arduino UNO board only Type I Arduino board. The Arduino board is the most widely used of all Arduino boards. The board contains 14 digital I/O pins, 6 of which are analog input pins, one power connector, one USB connector, one reset button, ICSP header and other components. All these components are attached to the Arduino UNO board to make it work and can be used in the project. The board is charged via a USB port or can be charged directly from the board's DC power.

Fig.1. Arduino UNO

3.3.2. MQ2 Sensor:

The MQ2 gas sensor is an electronic sensor used to measure the concentration of gasses such as LPG, propane, methane, ammonia, hydrogen, alcohol, smoke and carbon monoxide in the air. The MQ2 gas sensor is also known as a chemiresistor. It contains a sensor material whose resistance changes when exposed to gas. This change in resistance value is used to detect the gas. The MQ2 is a metal oxide semiconductor gas sensor. The gas concentration in the gas is measured using the voltage distribution network of the sensor. This sensor operates on 5V DC. It can detect gasses with a concentration of 200-10,000 ppm. The modular version of this sensor can be used without connecting to any microcontroller and is useful when only one specific gas is detected. It can only detect gas. But if it is necessary to calculate ppm, the sensor must be used without the module.
This sensor is also used to monitor air quality, provide gas leak alarms and ensure compliance with environmental standards in hospitals. In industry, they are used to detect leaks of harmful gasses.

Fig.2. MQ2 Sensor

3.3.3. DHT11 Sensor:

The DHT11 is an inexpensive digital sensor for measuring temperature and humidity. This sensor can be easily connected to any microcontroller like Arduino, Raspberry Pi etc. to measure humidity and temperature instantly. The DHT11 humidity and temperature sensor is available as a sensor and a module. The difference between this sensor and the module is the pull-up resistor and the trigger LED. DHT11 is a relative humidity sensor. This sensor uses a thermistor and a capacitive humidity sensor to measure the outside air. The DHT11 sensor consists of a capacitive humidity sensing element and a thermistor for temperature measurement. The humidity measuring capacitor has two electrodes, between which there is a moisture-retaining substrate for insulation. The change in capacitance value occurs along with the change in humidity level. The IC measures, processes the changed resistance values and converts them to digital. To measure temperature, this sensor uses a negative temperature coefficient thermistor, which causes its resistance value to decrease as temperature increases. In order to achieve a higher resistance value even with the smallest temperature change, this sensor is usually composed of semiconductor ceramics or polymers. The temperature range of the DHT11 is 0 to 50 degrees Celsius with an accuracy of 2 degrees. The humidity range of this sensor is 20-80% with an accuracy of 5°. The

sampling rate of this sensor is 1 Hz. it gives one reading every second. The DHT11 is small in size and has an operating voltage of 3-5 volts. The maximum current used for measurement is 2.5 mA.

Fig.3. DHT11 Sensor

3.3.4. INFRARED SENSOR:

An infrared sensor is an electronic device that emits light to sense some aspect of the environment. An IR sensor can measure the heat of an object and detect movement. This type of sensor measures infrared radiation instead of just emitting it, which is called a passive IR sensor. In general, all objects in the infrared spectrum emit some form of thermal radiation. The principle of operation of the infrared sensor is similar to that of the target detection sensor. This sensor contains an IR LED and an IR light emitting diode, so combining the two can be used to make a light switch or otherwise an optocoupler. The physical laws used in this sensor are Planck radiation, Stephan Boltzmann and Weins shift. An IR LED is a type of emitter that emits IR radiation. This LED looks similar to a regular LED and the radiation it produces is invisible to the human eye. Infrared receivers detect radiation primarily using an infrared transmitter. These infrared receivers are available in photodiode form. IR LEDs differ from regular LEDs in that they simply detect IR radiation. Here, the transmitter is an IR LED, while the receiver is an IR LED. An infrared light emitting diode reacts to the infrared light produced by an infrared LED. The resistance of the photodiode and the change in output voltage are related to the received infrared light. This is how an IR sensor works. When the infrared transmitter emits radiation, it reaches the target and some of the radiation is reflected back to the infrared receiver. The IR receiver can determine the sensor output depending on the strength of the response.

Fig.4. Infrared Sensor

3.3.5. RELAY:

A relay is a simple electromechanical switch. While we use normal switches to manually close or open a circuit, a relay is also a switch that connects or disconnects two circuits. But instead of manual control, the relay controls the electromagnet with an electrical signal, which in turn turns another circuit on or off. Relays can be different, for example, electromechanical, semiconductor. Electromechanical relays are often used. The relay works on the principle of electromagnetic induction. When current is applied to an electromagnet, it induces a magnetic field around it. The picture above shows the operation of the relay. A switch is used to supply DC to the load. In the relay, the copper coil and the iron core act as an electromagnet. When a DC current is applied to the coil, it begins to pull the contact as shown. This is called energizing the relay. When the accessory is removed, it returns to its original position. This is called de-energizing the relay. Relays acts as a protective barrier to the electrical system and minimize damage to equipment connected to the system from overcurrents/voltages. A relay is used to protect the devices connected to it. They are used to drive high voltage circuits with a low voltage signal in application audio amplifiers and some types of modems.

Fig.5. Relay

3.3.6 TRANSFORMER:

It is a device that transfers electrical energy from one alternating current circuit to one or more circuits by increasing or decreasing the voltage. A transformer is used to operate low voltage equipment to reduce the voltage of the normal circuit. It is also used to boost the voltage of electrical generators so that electricity can be transmitted over long distances. The transformer works according to Faraday's law of mutual induction. Faraday's Law of Electromagnetic Induction states that when there is a change in the magnetic flux connected to a circuit, an electromotive force current is induced in the circuit. The transformer consists of two separate windings placed over a laminated silicon steel core. The winding to which the alternating current is connected is called the primary winding and to which the load is connected is called the secondary winding. It works with alternating current only because the mutual induction of the two coils requires alternating current. When an alternating current of a certain voltage is supplied to the primary winding, an alternating current is generated in the core of the transformer, which is connected to the secondary winding and as a result an emf called Mutually Induced emf is induced in it.

Fig.6. Transformer

3.3.7 FAN:

Exhaust fans are used to ensure adequate ventilation of the poultry. They help remove bad odors and damp air from the room and keep the room filled with fresh air. This helps to cool down the temperature in the poultry environment.

Fig.7. Fan

3.4. IMPLEMENTATION:

```
#include <DHT.h>
#define DHTPIN 5
#define DHTTYPE DHT11
DHT dht(DHTPIN, DHTTYPE); //Defining the pin and the dhttype
const int MIC=7;
const int gas=6;
const int ir=4;
const int buzz=11;
const int cfan=2;
const int efan=3;
const int htr=8;
int   h=0;
int   t=0;
void setup()
{
  pinMode(MIC,INPUT);
  pinMode(ir,INPUT);
  pinMode(gas,INPUT);
  pinMode(buzz, OUTPUT);
  pinMode(cfan, OUTPUT);
  pinMode(efan, OUTPUT);
  pinMode(htr, OUTPUT);
  Serial.begin(9600);
  digitalWrite(buzz, LOW);
  digitalWrite(cfan, LOW);
  digitalWrite(efan, LOW);
  digitalWrite(htr, LOW);
  dht.begin();
  }
void loop()
{
  h = dht.readHumidity();
  t = dht.readTemperature();
  Serial.print("TEMPERATURE:");
  Serial.print(t);
  Serial.println("C");
  Serial.print("HUMIDITY:");
  Serial.println(h);
  Serial.println("%");
if(t<33)
{
digitalWrite(htr, HIGH);
digitalWrite(cfan, LOW);
Serial.print("ALERT,TEMPERATURE DOWN,HEATER IS ON\n");
delay(500);
}
if((t>=33)&&(t<40))
{
digitalWrite(htr, LOW);
digitalWrite(cfan, LOW);
}
if(t>=40)
{
digitalWrite(cfan, HIGH);
digitalWrite(htr, LOW);
Serial.print("ALERT,HIGH TEMPERATURE,COOLING FAN IS ON\n");
delay(500);
}
   if(digitalRead(MIC)==HIGH)
   {
   digitalWrite(buzz, HIGH);
   Serial.print("ALERT,SNAKES DETECTED\n");
   delay(1000);
   digitalWrite(buzz, LOW);
   }
   if(digitalRead(ir)==LOW)
   {
```

```
  digitalWrite(buzz, HIGH);
  Serial.print("ALERT,FOOD OVER\n");
  delay(1000);
  digitalWrite(buzz, LOW);
  }
  if(digitalRead(gas)==HIGH)
  {
  digitalWrite(efan, HIGH);
  Serial.print("ALERT,HARMFUL GASSES DETECTED,EXHAUST FAN IS ON\n");
  delay(500);
  }
  else
  {
  digitalWrite(efan, LOW);
  }
}
```

IV. Results:

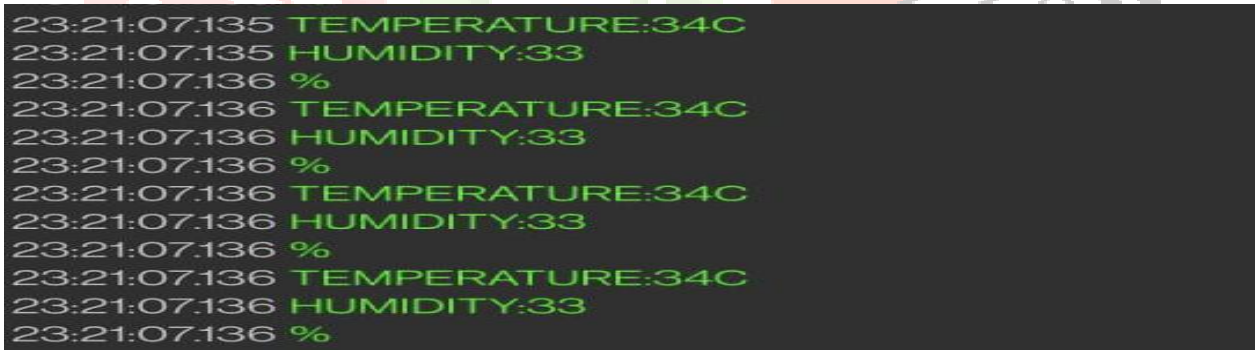
Totally there are four cases of outputs:

Case-1:

If the temperature is less than 33 degrees Celsius.Then the heater will turn ON.

Case-2:

If the temperature is between 33 degrees Celsius and 40 degrees Celsius.Then the heater will turn OFF.



Case-3:

If the temperature is above 40 degrees Celsius.Then the Cooling Fan turns ON.

Case-4:

If any harmful gasses are detected.Then the Fan turns ON.

Case-5:

if Infrared Sensor and Mic is ON.

IV. Conclusion:

IOT is an innovative poultry technology that can transform a manual farm into a modern semi-automated poultry farm. In addition, the system could run on any mobile application to help the owner monitor the poultry farm, such as food feeding, object detection, watering and reducing unwanted gas. The proposed system can reduce labor and chicken feeding, reduce unwanted gas, maintain farm temperature, and is fully automatic. Thus, this system reduces costs, time, labor and environmental pollution.

V. References:

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