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IoT Based Poultry Farm Lighting Fogger and Smart Feeding Trolley

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ABSTRACT

This paper's primary goal is to automate a poultry farm. During summer seasons the temperature sensor senses the internal temperature of the farm, if it exceeds the fixed temperature it turns on the fogger pump to spray the water. The lighting system is controlled by a microcontroller to turn on and off the light at a fixed time to save unnecessary power consumption. The proposed system can be used to feed chickens in place of a worker, thereby alleviating labor shortages in the poultry industry and introducing an IoT (semi-automated) method. It is used to feed the food in the trolley and control the temperature using a fogger on a poultry farm. Temperature, humidity, and light are all environmental variables that influence chicken wellbeing, and light is supplied by an electric lamp for effective egg development. High-temperature conditions directly affect the chicken welfare and productivity, it's most important to keep the poultry farm at a constant temperature. With these considerations in mind, we created a fogger that uniformly sprays water in the poultry farm cages, greatly reducing temperature.

Keywords: Poultry farm,Temperature sensor,Fogger Pump,Servo motor,Wi-Fi,IoT,Feeding Trolley,Lighting,Poultry farm cages.

1. INTRODUCTION

This system reduces the manpower in the field of feeding, egg collecting, and spraying water. It can also be monitored and controlled from anywhere using a Wi-Fi module. [1] The microcontroller instructs the Servo Motor to deliver the feed to the feeder in fixed timing by rotating the shafts in the container. If any interrupts near the trolley, it stops and intimates the owner through Wi-Fi. Once the interrupts are cleared, again the trolley starts moving. The conveyor belt collects the egg and gathers it at the end of the cage. It can be collected and arranged by workers. During summer seasons the temperature sensor senses the internal temperature of the farm, if it exceeds the fixed temperature it turns on the fogger pump to spray the water. The drinking water is cooled by using Pelletier which is operated and powered by a solar panel. The lighting system is controlled by a microcontroller to turn on and off the light at a fixed time to save unnecessary power consumption. Solar panels are used to reduce power consumption.

Poultry is currently one of India's most significant rising economic segments in the agricultural sector. [2] Agricultural sector has been slowly increasing around the world as a result of centralized production performance and improved intensive agriculture.

In today's world, automation is important, and the idea of the Internet of Things (IoT) is quickly gaining popularity. There is a strategy for transforming conventional systems into automated systems.

The paper discusses how IoT technology can be used to automate poultry farms and perform different tasks. [3] Chickens' health and development are directly affected by high temperatures, so it's important to maintain a consistent temperature on the poultry farm tasks relating to management Temperature, humidity, light, and manual labor, as well as food delivery, water supply, and sanitation, are all controlled environmental factors that affect chicken health. [4] If all of these conditions are maintained, chicken performance and efficiency would improve. [5] A web-based management and monitoring system can also be used to control and track the farm.

Any device with developed detectors and the potential to collect and relay information between devices even without human intervention is referred to as a "thing" in the Internet of Things. [6]

The integrated technology in the entity allows it to communicate with both domestic and foreign states, it helps with decision-making.

Each of your devices will learn from the experiences of other devices in the same way that humans do. By encouraging people to connect with, contribute to, and communicate with objects, the Internet of Things aims to improve human interdependence. I realize that this sounds a little perplexing, so let's look at an example to help us understand.

A user accepts to the tester text a suggestion that includes his criteria, logic, mistakes, and anomalies. [7] If there are any issues, the Tester tells the Developer once more. To create a smart application in this way, several iterations are needed.

A normal temperatures sensor gathers information then transfers it across the channel, where it is being used to change the temperatures of a number of unit sensors. [8] For example, a sensor will conduct tests heavily on external conditions then measure the appearance accordingly. You may also reduce the composition of your air conditioner as desired. This is how machines connect, collaborate, and engage with one another.

1.1 BENEFITS OF THE IoT

Since the Internet of Things, [9] it provides data management of devices via the online platform is becoming increasingly popular, via sensors and the internet, it has opened up possibilities for integrating and specifically connecting the physical world with internet structures. [10] The connectivity of such numerous portable systems will allow optimization in almost every field as well as the development of advanced applications. As a result of less human interaction, precision, productivity, and economic gain have all increased. Storage technologies, smart infrastructure, automated mobility, even intelligent buildings are among the technology covered. The following are some of the most significant benefits of the Internet of Things:

• **Enhanced Customer Interaction** – By automating the action, the Internet of Things (IoT) improves the consumer experience.

•**Technological Advancement** – The Internet of Things has aided in technological advancement.

• **Less Waste** – Our existing observations are merely surface-level, but IoT provides real-time data that aids resource management and decision-making.

2. EXISTING SYSTEM

The fogger system is operated by two workers if thermometer exceeds the fixed temperature the worker notes the temperature and turn on the fogger pump and walk around the poultry farm to note that all over of the poultry farm were cooled down. The poultry farms internal temperature is not constant, because poultry farm consists of 4 sections and each section is 150 feet, so the inner temperature may differ for every 150 feet, while the fogger system is operated manually all the 4 section will on/off at the same time due to the non-constant temperature inside the poultry farm leads to rise in temperature so again the fogger pump is turned on.

Fig.2.1 Existing Fogger System

Fig.2.2 Existing egg collection system

The lighting system of poultry farm is operated by a single worker, light should be turned on by the worker when the lumen falls down and turn off when the lumens increase the light should be turned off by the worker if they fail to turn on the light at evening time it leads to loss of feed intake so it finally ends lack of production.

The feeding system of poultry farm is operated by eight workers, feeding trolley should be operated twice in a day 4.00am and 4.00pm, there is only one control unit to turn on and off of the trolley even in case of emergency.

Fig.2.3 Manual Feeding system

3. PROPOSED SYSTEM

The fogger system is automated by using temperature sensor. If the inner temperature exceeds the reference value, the fogger pump is turned on automatically. Fig.6.1 shows the lighting system of poultry farm is automated, the light is turned on when the lumen falls down and turn off when the lumens increase the light will be turned off. Fig.6.2 shows the feeding system is automated by the electronic control panel and the leveling of feed is automated and the accidents are also avoided. Fig.6.3 shows the cage of the chicken which is used for catch the chicken and make use of it.

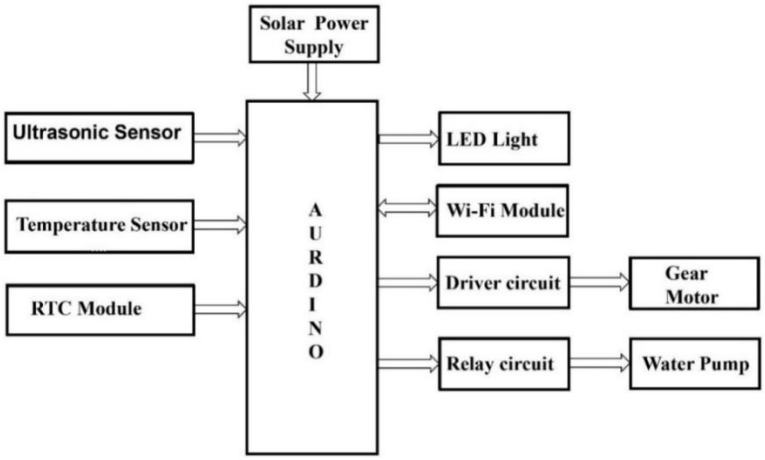

Fig.3.1 Block Diagram of the Proposed Work

4. METHODOLOGY

4.1 ARDUINO UNO

The ATmega328-based microcontroller board. A 16 Analog inputs generator, a Circuit level, a control port, a power jack, and a restart button are among the 20 optical input/output pins

Arduino is an open-source design and manufacturing prototyping framework with a user-friendly GUI. Arduino is made up of an additional block power cord and software that runs on the laptop that is used to compose and transfer programming code to the Arduino hardware.

4.2 GEAR MOTOR – 100 RPM

A gear (also known as a dropdown box) is a circular metal part with chop pieces, either pedals, that coordinate of another horned portion that drive wheels. Case structure change a power source's rpm, pressure, even path. Because of their gear ratio, gears nearly often induce a torque shift, resulting in mechanical gain, and hence can be classified as a simple machine.

A motor driver IC is attached between the microcontroller and the DC motor to solve the problems in their interfacing. A motor driver is a small current amplifier that drives a motor. Directly connecting a DC motor to a microcontroller is not a good idea. Since the maximum current that an 8051 microcontroller will sink at 5 volts is 15 mA. A DC motor, on the other hand, needs much higher currents. It also needs higher voltages (depending upon the type of motor used). Another thing to keep in mind is that the back emf generated by the motor will interfere with the microcontroller's proper operation, and reversing the direction can harm the controller. We can't attach a DC Motor directly to a microcontroller for these reasons.

4.3 RELAY

Relays are used where a circuit needs a separate low frequency or when several pathways will be regulated by only a simple circuit. Relays were originally used as signal repeaters in deep sharing knowledge, refreshing the signal coming in through one network by transmitting it on another.

4.4 RTC MODULE

A real-time clock keeps track of the actual time and can be used to plan activities for a particular time. Without an external 5V power supply, the RTC will run for at least 9 years (17 years on average). It keeps track of seconds, minutes, hours, days of the week, months, and years, with leap-year compensation, and stores data in 2100 56-byte non-volatile RAM.

4.5 ULTRASONIC SENSOR

Ultrasonic sensors work by measuring the properties of acoustic waves that are above the human audible range, usually about 40 kHz. They work by sending out a high-frequency sound pulse, then receiving and analyzing the echo pulse's properties.

4.6 TEMPERATURE SENSOR

A temperature sensor is an electronic instrument that tracks, controls, or signals temperature changes by calculating the temperature of its surroundings and translating the input data into electronic data. The output voltage increases as the temperature rises. The output analog voltage can be converted to digital form using an ADC and then processed by a microcontroller.

4.7 LED

A light-emitting diode (LED) is a light source with two leads. As run, as a sufficient power is applied to the ends, particles inside the system reassemble with incident photons, electrical energy is a form of pulses. This mechanism is known as electroluminescence, and the colour of the light is measured by the absorption edge in the dielectric material.

4.8 BATTERY

A battery charger, also known as a battery pack, secondary cell, or accumulator, is an electrical battery that can be powered, discharged into a charge, and replenished on multiple occasions. It differs from a disposable or main battery, which is delivered completely charged and discarded after usage. This unit is made up of at least one electrochemical cell. While rechargeable batteries are initially more expensive than rechargeable cartridges, they have a reduced average cost of ownership and a smaller environmental footprint so that they can be refueled many times until getting fixed.

5. RESULT

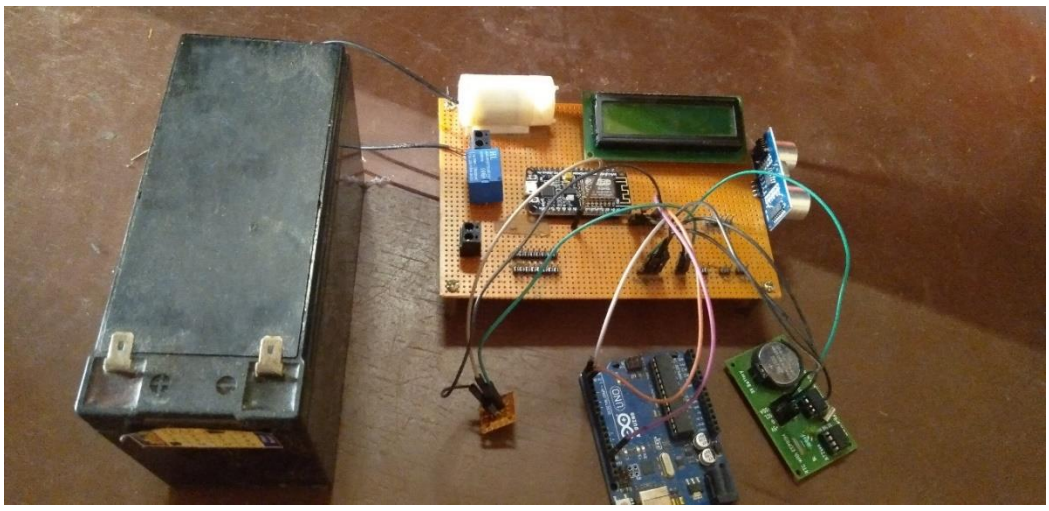

Fig.5.1 Interfacing a Microcontroller with a Battery

Fig.5.2 Trolley Model

Fig.5.3 Cage of the Chick

6. CONCLUSION

In this poultry farm system, RTC have been used in a variety of different applications to automate the light and trolley, Ultrasonic sensor used for avoiding accident, fogger system reduces inner. Finally, node MCU used to control entire poultry farm remotely using Internet of Things. This project was developed in view of the low cost, avoid accident, reduce man power, low power consumption ease of manufacture, and ease of

use. In future we can extend, we may install a fire alarm device and an automatic fire extinguisher system, as well as more details about the poultry farm, such as vaccination reminders.

7. REFERENCES

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