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NOVEL ALGORITHMIC ELECTRIC POWER SAVER STRATEGIES FOR REAL-TIME SMART POULTRY FARMING USING TINYML THROUGH DESIGN THINKING

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ABSTRACT
The majority of the poultry farming industries in India continue to function in a conventional manner. The three states in India that produce the most poultry meat are Haryana, West Bengal, and Uttar Pradesh. Empathy part is the farming industries must prioritize maintaining food quality. A researcher stated that the use of smart sensors in chicken farming is another viable technology for ensuring food safety. The atmospheric conditions of a poultry farm, such as humidity, temperature, ammonia gas, lights, and a few others, are mechanically controlled in this research's smart poultry configuration framework to enhance the development of chicks. Additionally, the water layer has been controlled by the use of a sensor component. Through the use of a computer or mobile internet, the manager of the concerned poultry farm has access to information on the interior atmospheric conditions of the poultry farm. Defining this procedure it controls humidity, temperature, ammonia gas, and water volume without the need for a person, thanks to a cooling fan, exhaust fan, ventilator, and DC motor. TinyML techniques are used to train values based on a threshold in order to forecast and control the state of the entire system. TinyML enables smart decisions to be made by devices without transferring data to the cloud, improving efficiency and privacy. As a result of this idea, it is feasible to reduce power usage and save money. It can also use fewer people and reduce costs by consuming less power.
***Keywords*:** Poultry Farm, Temperature, Humidity, Ammonia Gas, Exhaust Fan, Light, TinyML , Design Thinking.

I INTRODUCTION
In order to supply consumers with fresh meat at a reasonable price, this initiative aims to deliver sustainable and healthy poultry meat. Additionally, data from quantitative and qualitative investigations are evaluated. The chicken poultry industry is evolving into a crucial sector for our nation's sustainable food supply. The growth of the poultry sector can be significantly boosted by the development of clever poultry farming. The most crucial and time-consuming task is automating the humidity, temperature, ammonia gas, lights, and a few other components to encourage the growth of chicks[1]. These manual processes are required in a typical poultry farm. It will be simpler to replace physical labour and poultry work by creating a smart poultry farm. Use a smart system to regulate the lighting, temperature, humidity, and gas levels around the birds in order to build a smart poultry farm. The setup of the system enables remote control of the prototype by a user. This prototype will enable the completion of smart work and the reduction of human labour[3]. The Project TinyML idea also uses this smart farming application.

Tiny ML:
A subfield of machine learning and embedded systems research called TinyML examines the kinds of models that could be applied to small, low-power devices. In contrast to conventional consumer CPUs, which consume 65 to 85 watts of power, and standard consumer GPUs, which consume 200 to 500

watts, a typical microcontroller needs electricity on the order of milliwatts or microwatts. That consumes a thousand times less energy than that. Due to their low power consumption,

II LITERATURE SURVEY

2.1 Smart Poultry Farming

Today, there is a demand for chicken farming because of the expanding global population. To produce a lot of chicken meat and meet consumer demand, monitoring a farm of chickens could be quite helpful. However, a variety of environmental factors can affect a chicken's growth, which can also have an effect on how much chicken meat is produced for human consumption. In order to build system architecture for smart chicken farming that focuses on environmental parameter monitoring, the study's objective was to identify the various sensors and materials that could be used[1].

2.2 Incorporating Smart Sensing Technologies into the Poultry Industry

Rising production input costs in Ireland and around the world are driving innovation in the poultry industry. By incorporating so-called "Precision Livestock Farming" practises into the supply chain for the poultry industry, producers can enhance their management systems. Among the critical environmental elements that affect poultry production are air temperature, relative humidity, light, air speed, and air quality (especially CO2 and NH3 concentrations). Improvements backed by cutting-edge tools and techniques are also researched[3]. The assessment of these parameters and their impact on bird welfare are evaluated according to current industry practise. The possibility of integrating these systems is also discussed.

2.3 Revolutionizing Poultry Farming Through Iot Technology

The Internet of Things-based Smart chicken Farm represents a fundamental change from the established chicken farming practises. The temperature, humidity, lighting, feeding, and watering systems, among other components of the farm, are monitored and managed by this system using cutting-edge technology. The IoT sensors and gadgets are linked to a single platform, enabling real-time environmental monitoring and management on the farm. The system makes sure that the circumstances on the poultry farm are ideal for the health and welfare of the birds, increasing output and profitability[4]. Remote monitoring of the farm's circumstances and warnings for any unusual changes allow the farmers to take prompt corrective action. This IoT-based solution includes machine learning algorithms that examine the information gathered from the sensors and give the farmers useful information. The farmers can decide on the best time to collect the birds thanks to these insights on the management of the farm[4].

III PROBLEM STATEMENT

An essential sector for our nation's sustainable food supply is the chicken poultry business. The growth of the poultry business may benefit greatly from the development of automatic poultry monitoring. The current system includes manual gas monitoring as well as manual temperature and humidity sensing. By using the suggested system, labour shortages in the sector could be resolved and an automatic process could be implemented in the chicken industry.

IV PROPOSED METHODS

The proposed system can be used in poultry farms for the automation of poultry employing gas monitoring, temperature detection, and humidity detection. The gas sensor is positioned with the welfare of the chicken in mind and alerts the user to the presence of dangerous gases like ammonia. Notifies the user of the water level. A temperature and humidity sensor is used to monitor and maintain the temperature and humidity in the poultry farm. When light is detected by light sensors in the farm of LED light, the farm is illuminated while it is still dark.

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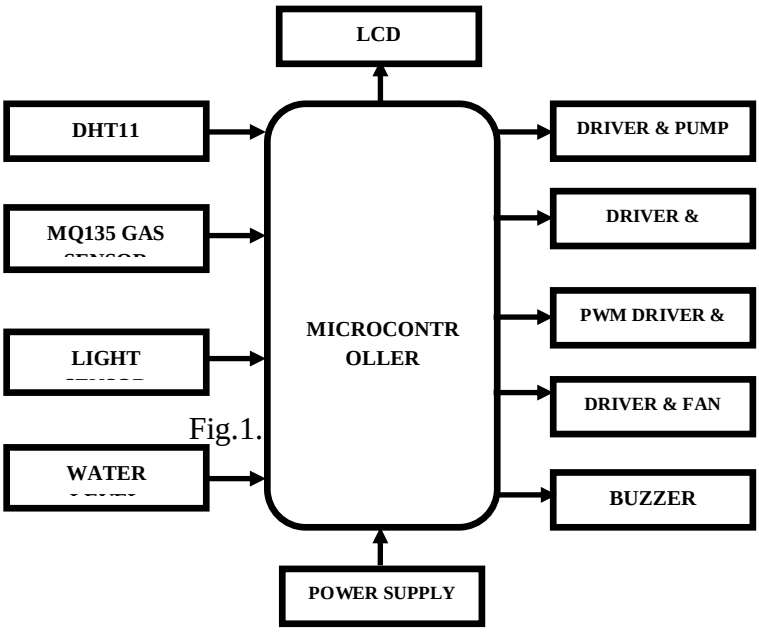

Fig.1.

V RESLUT & DISCUSSION

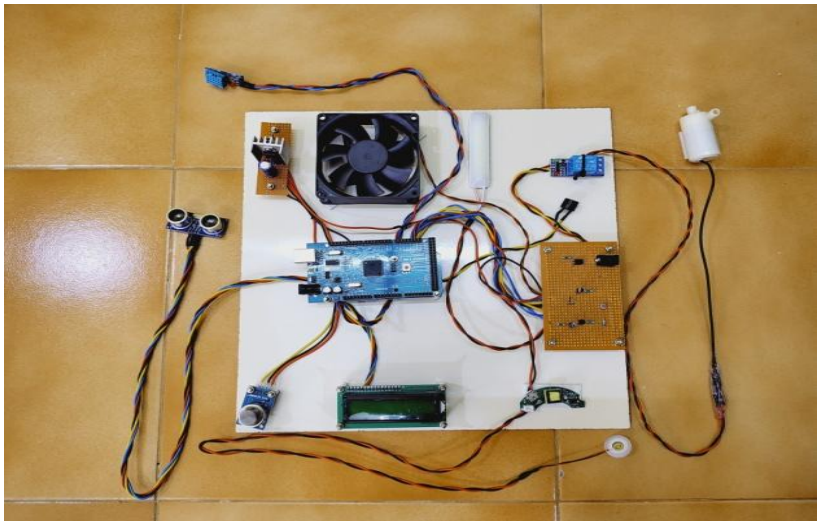

Fig.2.Hardware Prototype Module

The project's controller is an Arduino Mega 2560. A TEMPERATURE SENSOR measures the farm's temperature and humidity, a GAS SENSOR MQ-135 measures the farm's ammonia levels, and an LDR SENSOR measures the farm's light intensity. The farm uses a ULTRASONIC SENSOR to measure the water level.

5.1 ARDUINO:

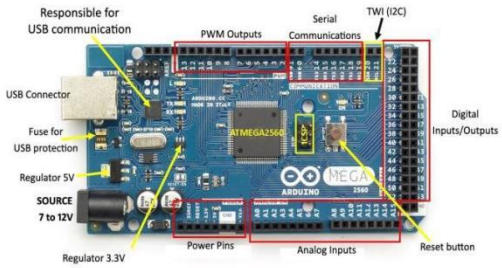

Fig.3. Arduino

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The Arduino prototype platform is built on user-friendly hardware and software. A circuit board with a programmable microcontroller and ready-made software called Arduino IDE are the components that make up the device. This software is used to create and upload computer code to the circuit board. The micro-controller's functionalities are condensed into a more manageable container using Arduino's standard form factor.

5.2 WATER PUMP:

Fig.4. Water Pump

In order to move the water, a water pump primarily uses the positive displacement principle and kinetic energy. These pumps use AC power or DC electricity to activate the water pump's motor.

5.3 DHT 11 SENSOR

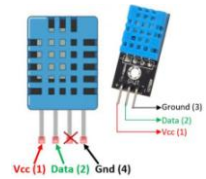

Fig.5. DHT 11 Sensor

A dedicated NTC for temperature measurement and an 8-bit microprocessor for serial data output of the temperature and humidity values are both included in the widely used DHT11 temperature and humidity sensor.

5.4 Ultrasonic Module HC-SR04

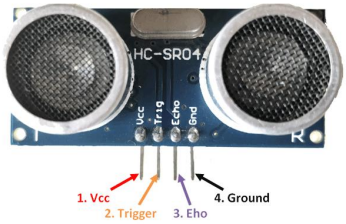

Fig.6.Ultrasonic Module HC-SR04

The SONAR and RADAR systems, which are used to calculate distances to objects, provide the basis for how the ultrasonic sensor operates.

5.5 ULTRASONIC HUMIDIFIERS

Fig.7.Ultrasonic Humidifiers

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The DC 5V Ultrasonic Humidifiers Power Circuit Board with Atomizing Chip Moisture Film Humidification Atomization Machine can use a 20mm-diameter atomization plate tablet. The cavitation caused by sound waves is the basis for how this ultrasonic humidifier piezoelectric transmitter module functions. It only needs a DC3-12V power source to transform into a small ultrasonic atomizer. Because sound waves are compressed and rarefied. Water droplets are moving so quickly that they can no longer maintain their liquid form and rapidly turn into vapour. A piezoelectric filament is what causes this vibration.

5.6 MQ135

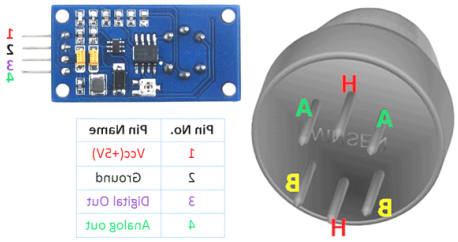

Fig.8.MQ135

Hazardous gases and smoke, such as ammonia (NH3), sulphur (S), benzene (C6H6), and carbon dioxide (CO2), can be detected by the MQ-135 Gas Sensor. This sensor has a pin for both a digital and analogue output, just as the other gas sensors in the MQ series. The concentration of these gases in the environment can be roughly estimated from the analogue voltage that the analogue output pin generates.

5.7 RELAY DRIVER

Fig.9. Relay Driver

An electromechanical device called a relay uses an electric current to open or close the contacts of a switch. The single-channel relay module contains switches and connectors that are simpler to use, as well as indicators that show if the module is powered and whether the relay is on or off. It is a lot more complicated than just a relay, though.

5.8 LDR (LIGHT DEPENDENT RESISTOR)

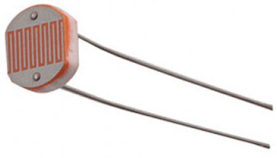

Fig.10.LDR

An LDR, also known as a photoresistor, adjusts its resistance in response to illumination. When the resistor is placed in a dark environment, its resistance will be a few Mega ohms; but, as light is gradually shone on the sensor, the resistance will begin to drop to a few Ohms. The LDR may now be used as a light sensor more easily thanks to this capability. Because it can determine how much light is shining on it, it can anticipate the days and nights.

5.9 BUZZER

Fig.11. Buzzer

A buzzer, often known as a beeper, is a primarily electrical signalling device used in cars, microwaves, and game shows. The control device frequently beeps or buzzes continuously or sometimes as a warning and, upon detection, illuminates the light adjacent to the relevant button or control panel.

VI CONCLUSION

In order to maintain a healthy environment and promote the growth of the poultry, this system's primary goal is to provide an automated, controlled poultry farm. It does this by monitoring and controlling environmental factors like temperature, humidity, and ammonia gas, all of which have an impact on the development of the poultry, as well as by providing a light sensor that detects the presence of light and turns on LED lights when there is darkness to cool the fan and exhaust fan while atomizing the poultry farm in terms of temperature, ammonia gas, and water volume.

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