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Smart Eggs Incubator System

Siddhi Mohite, Siddhi Kalbhor, Ishita Ganvir
Electronics and telecommunication engineering, JSPM'S Bhivrabai sawant institute of technology and research, SPPU.

Abstract:-Theincubatormachineisusedtoincubatechickeneggsintochicks.Incubatingchickeneggsusinganincubator requires a total incubation period of between 21 – 22 days. The system combines IoT sensors, actuators, and microcontrollers to manage and monitor the incubation process remotely.
Keywords:-Sensor,Relay,WifiModule,PeriodofIncubation.

I. INTRODUCTION

TheSmartEggsIncubatorSystemisoneoftheinventionsthatprovideopportunityespeciallyforwhowanttobesuccessfulfarmer.TheSmartEggs Incubator System will automatically controllingthetemperatureandhumidity.

Smart Eggs Incubator System is a technology that provides opportunity for farmers to produce chicks from egg without the consent of the mother hen. The most important difference between natural and artificial incubation is the fact that the natural parent provides warmth by contact rather thansurrounding the egg with warm air.

To design and develop an IoT-based smart egg incubator that automates the process of egg incubation, ensuring optimal environmental conditions for improved hatchability.

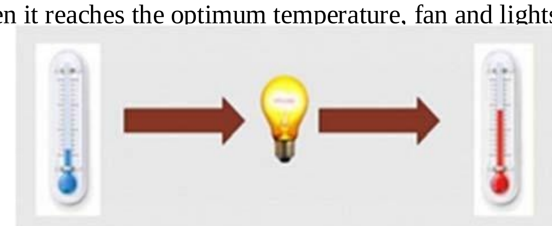
A. SpecificationsofSmartEggsIncubatorSystem:-

A1.TechnicalSpecifications:

Technical specification of Smart Eggs Incubator System.Itisconsistofeggscapacity,whattypeof eggs it can hatch, sizes, weight, power,voltageandfrequency.

A2.Sensor:(automaticmode)

The DHT11 Sensor will detect the temperature andhumidity,itwillhelptomonitorandmanagethe temperature and humidity accordingly needed by the eggs to hatch.when the temperature is below the optimum temperature,the light goes on. The goal is that the temperature will rise to the optimum temperature. When the temperature is above the optimal temperature, the fan will turn on to lower the temperature. Whereas when it reaches the optimum temperature, fan and lights will be off.



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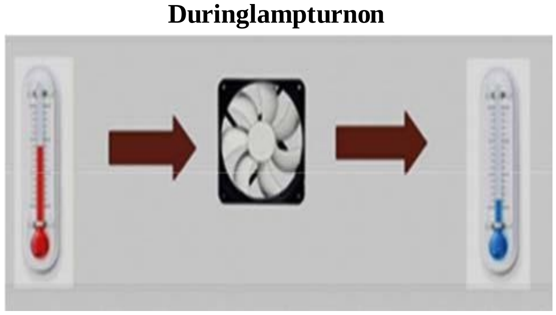

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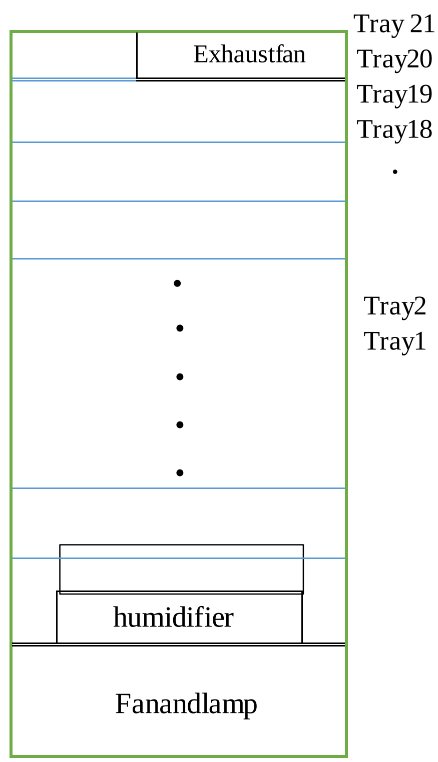
A3.Relay:(manualmode)
you can control the system by pressing the appropriate button to turn on the light or fan, turn off both, turn offthe alarm, and switch between automatic or Manual mode. Actually relay is a switchthatcandisconnectandreconnectthepower supply.

B. MechanicalDesign:-
In mechanical design is focus on construction of theSmartEggsIncubatorSystem.Itstartswiththe built of the casing. The material was used are:-Plywood, Heatlon sheet, tray.
The Smart Egg Incubator can fill up to 80 eggs. Dimensional measuring of the Smart Egg Incubator is 50cm long x 36cm width. For this, 2 bulbswereplacedatthebottomofthestructure of the Smart Egg Incubator. The structure is in vertical format. Bottom layer of structure for the lampandfan.Abovelayerforthehumidifier.
Abovethistherewillbe21stackoftrays.Attopof the structure there will be exhaust fan.



SystemStructure

C. IoT-basedDevelopedIncubator:-
IoT is one of the latest technologies finding its application in different areas. It describes the physical objects interfaced with sensors connecting and sharing the information with other devices or systems through the internet. For example, we added the IoT feature in the developed prototype infant incubator system.For sensing purposes, separate sensors fortemperatureandhumidityareused. Thesensing information goes to the processing unit. The processed information gets published on blynk, an IoT analytics platform.

II. METHODOLOGY
The projectdevelopment was divided into three main parts. There are mechanical design electronic design and software design.The maximum temperature in Smart Egg Incubator is 32.5 °C and the minimum temperatureis31°C.So,thelampwillbeonuntilthe ircuittemperatureachieves32.5°C.Atthe32.5°C,

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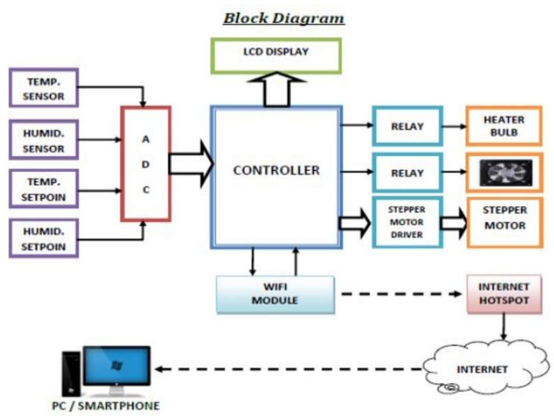
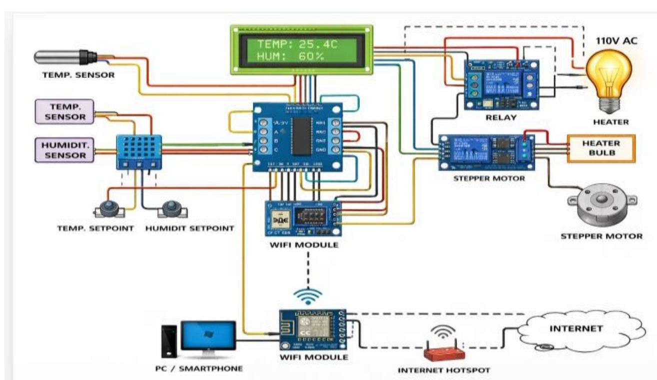
the lamp will be off and the fan will be on until temperature decrease to 31 °C. At 31 °C, the fan will be off and the lamp will on until the temperature increase to 32.5 °C. So, the range of temperature in SmartEggIncubatorwillbemaintainedbetween31 °C to 32.5 °C. The lamp is user to increase the temperatureinthesystem.Thefanisuserfordecrease the temperature. To maintain the temperature in system,lampandfanwillbeturnonandoff.Itcontrol by using ESP8266 wifi module and sensor.

Componentsused



Blockdiagram



CircuitDiagram

III. RESULT AND DISCUSSION

TheIoT-basedsmartchickeggincubatorsystemwas successfully developed and tested to maintain optimal conditions required for egg hatching. The system effectively monitored and controlled key parameters such as temperature, humidity, and egg rotation using sensors and automated mechanisms.

During testing, the temperature was consistently maintained within the ideal range of 31°C to 32.5°C with minimal fluctuations, while humidity levels were controlled between 60% and 70% during incubationandincreasedtoaround70%–75%during the hatching phase. The automatic egg turning mechanism operated at regular intervals, ensuring uniform heat distribution and proper embryo development.

Additionally, real-time data transmission to a cloud platform enabled remote monitoring and timely alerts whenever parameters exceeded set limits. As a result, the system achieved ahighhatchingsuccessrateofapproximately85%to 95%, demonstrating performance comparable to or better than traditional manual incubation methods

IV. CONCLUSION

The IoT-based smart chick egg incubator provides an automated and efficient solution for egg hatching by maintaining optimal temperature and humidity conditions. It reduces manual effort through real-time monitoring, control, and automation of key processes like egg turning. The system improves hatchability, accuracy, and reliability compared to traditional methods. Overall, it is a cost-effective and scalable solution for modern poultry farming, with potential for future enhancements like AI integration and solar power.

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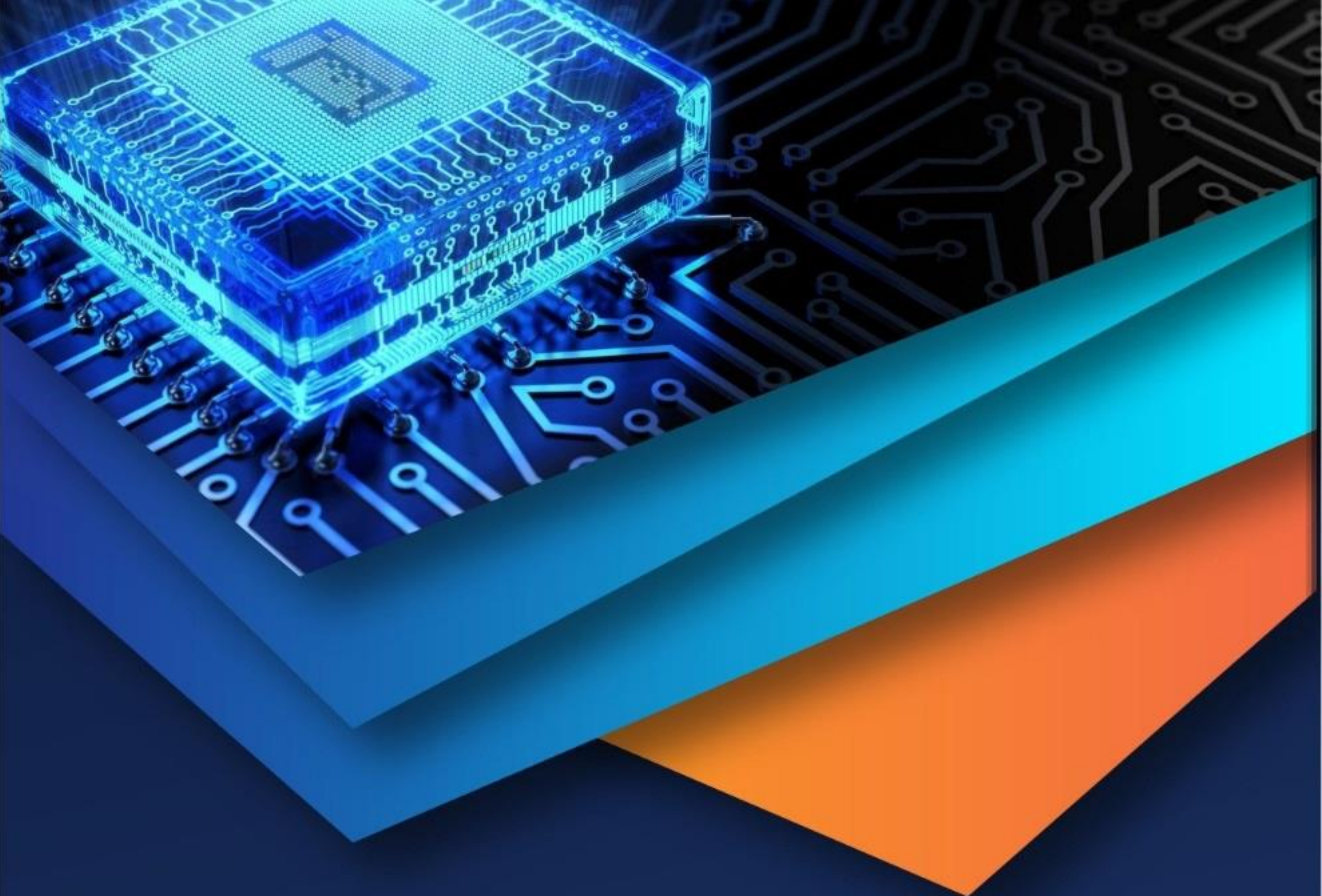

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