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Smart Egg Incubator

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ABSTRACT: The purpose of this project is to design and develop the system of an egg incubator that is able to incubate various types of egg, named as Development of Smart Egg Incubator System using Arduino (SEIS). The SEIS will fill up with the humidity sensor that can measure the condition of the incubator and automatically change to the suitable condition for the egg. The health of egg is very important for the development of embryo within the egg. Improper control means that the temperature or humidity is too high or too low. In this project, the bulb is use to give the suitable temperature to the egg. By using the cooling fan, it makes sure the humidity and ventilation in good condition. The status condition in the SIES will appear on the LCD screen display. To make sure all part of egg was heated by bulb, DC motor is very useful to rotate iron rode at the bottom side and automatically change the position of egg. The entire element will be controlled using Arduino. The Arduino is a type of microcontroller that can process data from sensor and will execute the control element to change the condition of SEIS.

KEYWORDS: Temperature, Humidity, Incubation, Arduino Microcontroller, GSM Module,

I. INTRODUCTION

The process by which birds hatch their eggs and the embryo develops inside the egg is called incubation. The consistent temperature necessary for its development over a predetermined period of time is the most important aspect of incubation. Brooding is the process of sitting on eggs to incubate them, particularly in domestic poultry. In order to enhance output, the majority of egg-laying varieties of chicken have had their predisposition to sit on a clutch of eggs, often known as broody, carefully bred away. Most species rely on the body heat of the brooding parent to maintain a consistent temperature, but some groups most notably the Megapodes use geothermal heat or heat from decomposing vegetable matter, which essentially creates a massive compost. The majority of species rely on the body heat of the brooding parent to maintain a consistent temperature, but certain groups most notably the Megapodes use geothermal heat or heat from decomposing vegetable matter, which essentially creates a massive compost heap. Additionally, humidity is important since excessively dry air can cause the egg to lose too much water to the atmosphere, which may make hatching challenging or impossible. Due to evaporation from the egg, an egg will often get lighter and have more air space inside it as incubation goes on. Factory farming is the term used to describe the industrial raising of farm animals indoors under highly mobile conditions. Using economies of scale, modern machinery, modern medicine, and international trade for financing, purchases, and sales, it is limited and part of industrial agriculture, a collection of practices that evolves as laws and technology change. The goal of industrial agriculture is to produce the most at the lowest cost. One of the innovations that offers opportunities, particularly for those who aspire to be exceptional farmers, is the egg incubator. There is a quick and simple method for creating a product. The egg incubator that is now

on the market will be improved by this idea. For different kinds of eggs, the systems will automatically regulate the incubator's humidity and temperature. An egg incubator's task is to take over the animal's responsibility of incubating an egg until it hatches.

II. LITERATURE SURVEY

1. Smart Eggs Incubator System ,MF Omar, HCM Haris, MN Hidayat, Ismail... - International Journal of ..., 2016 - ijsst.info.

Designing and creating the Smart Egg Incubator System (SEIS) is the aim of this project. The temperature and humidity sensor will be inserted into the SEIS. Lamps are used as heaters in this project to provide the eggs with the proper temperature. The development of the embryo inside the egg depends critically on the egg's health. It is possible to maintain proper ventilation and humidity by utilizing water and regulating the fan. The LCD screen display will show the SEIS's current status. The Arduino UNO will be used to control the entire component. One kind of microcontroller that can process sensor data and run a control system to alter the SEIS's state is the Arduino UNO. The average temperature and humidity are 32% and 36%, respectively. Because the SEIS is portable, the final outcome of this project will be easy to utilize.

2. Intelligent Egg Incubator, KB Azahar, EE Sekudan, AM Azhar - International Journal of Recent, 2020 - lamintang.org.

The design and development of an incubator for chicken eggs is presented in the research. The goal is to create an "Intelligent Egg Incubator" that can autonomously hatch chicken eggs. A temperature control mechanism that regulates the incubator's temperature was incorporated into the design by the author. A temperature sensor, heating and cooling components, and a controller make up this system. The incubator's cooling unit will start to lower the temperature if it reaches a predetermined threshold, and the heating element will begin to raise the temperature if it falls below another threshold. In addition, the author employed a motion sensor to track the eggs' motions. The owner of the incubator will be notified about the condition of the eggs whenever there is any movement within it.

3. Design and implementation of a remotely monitored Smart egg incubator, OM Fredrick, UT Umar, AN Edmund - International Journal of , 2021 - researchgate.net.

The microcontroller-based automated smart egg incubator can help produce a significant number of chicks for the establishment of poultry. To ensure a consistent power supply, it uses an automatic transfer switch that prioritizes the grid and moves the load to any available source. A DHT22 sensor is incorporated into the incubation system's automatic temperature and humidity monitoring system to accomplish temperature regulation and guarantee that the parameters are within the desired range. A DC motor was connected to an egg tray to create an egg spinning device that rotated the egg at a 45-degree angle once every hour. The eggs may hatch at around 21 days due to variations in temperature and humidity. To notify the farmer of the state of the farm, a sound sensor detects the sound made by a day-old chick. An LCD shows the incubator's temperature and humidity levels in order to keep an eye on the farm's temperature and moisture content. The technology is versatile since it eliminates the stress of physically visiting the incubator's site by using a GSM module to provide temperature and humidity updates to the farmer upon request.

The outcome demonstrates that the system was able to control the temperature between 37 and 39 degrees Celsius, which was sufficient for the egg to hatch.

4. Development of an egg incubator prototype controlled by an Arduino board to improve the production of a poultry farm, R ECHANDI-PACHECO -Systems & ICTs, 2023 -search.ebscohost.com.

The consumption of chicken meat and eggs has increased globally in recent years, which can be ascribed to improved production efficiency and decreased production costs, which lower consumer expenses. Industrial incubators that can simultaneously incubate 2,000–3,000 eggs are now purchased by large industries that specialize in both egg incubation and chicken raising; however, for a small poultry farmer who owns a SME (small and medium-sized business), that is a significant investment that could ultimately lead to bankruptcy. Nevertheless, that tiny poultry farmer can rear his hens and incubate his eggs despite his own difficulties, which include exterior hazards like foxes and reptiles in addition to controlling humidity and temperature. In order for small poultry producers in Costa Rica to use it and have more exact control over the eggs and chicks that hatch in it, the project's goal is to build a prototype incubator that is intelligent enough to regulate the gestation parameters and has enough capacity. your farm, producing a large number of well hatched eggs without running the risk of dying as a result of abrupt variations in humidity, temperature, or other system.

III. PROPOSED METHODOLOGY

Incubators have been used to hatch huge quantities of eggs and prevent the extinction of some bird species due to the growing population and the increased demand for eggs and birds of various sorts. However, there are a number of issues with these devices, including Issues with egg fertilization and hatching circumstances, including variations in temperature, humidity, ventilation, and turning patterns, require user oversight and intervention. The user must open the incubator in order to keep an eye on what's going on inside and determine whether the eggs have hatched. A clever incubator that could address these issues became necessary. The goal of our project is to create an intelligent system that can facilitate a successful hatching process. The user can select the appropriate sort of egg to hatch with this mechanism, which can hatch a variety of egg types. Because it regulates variables like temperature, humidity, and the turning of eggs and the inspection of embryos to weed out rotten eggs, this incubator should be able to provide the ideal conditions for an egg to incubate. Additionally, it offers the ability to remotely monitor the incubator's operations continuously and notify the user via an application when the process is finished and if an error arises.

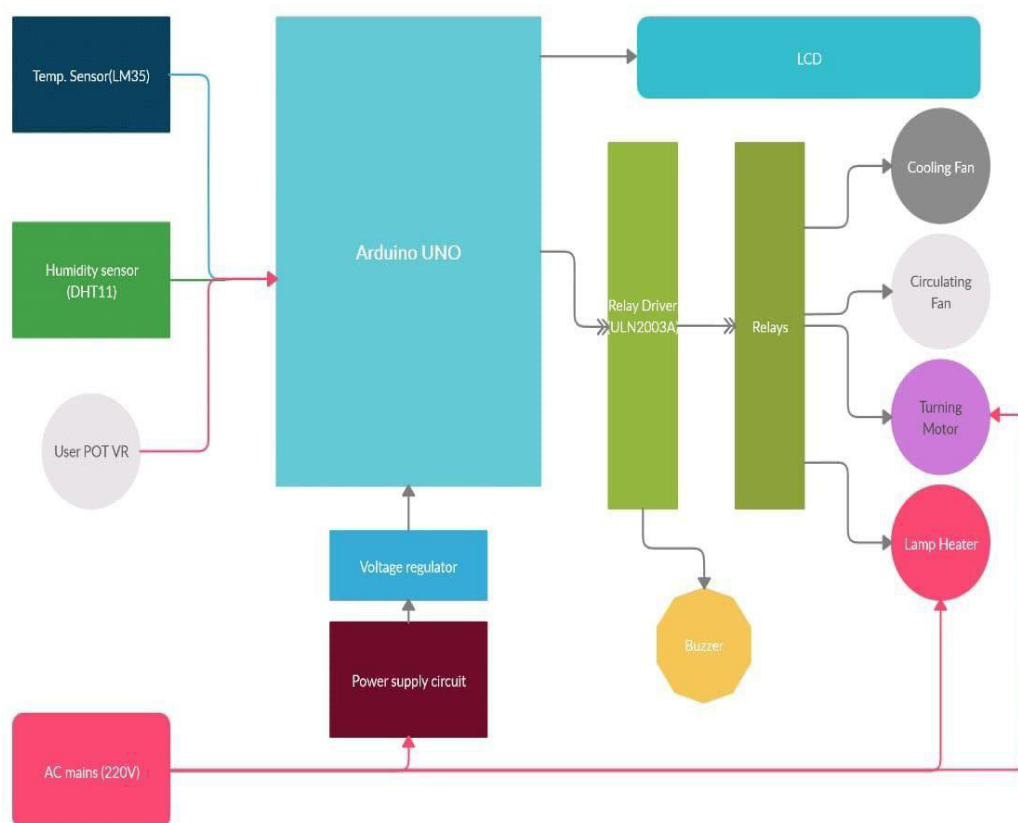


Fig.1. Block diagram

3.1 Temperature Control:

We require a temperature-sensing, heating, and cooling control system in order to regulate the temperature. We must effectively distribute the heat indoors as well. We will therefore also require a circulating fan. Therefore, we'll employ these things to create this system:

- A heater
- A cooling fan
- A circulating fan
- Relays to turn on/off the heater and fan

- Temperature sensor

3.2 Heater:

In the big incubator, large heater elements are used but for our small one, we will use simple incandescent lamps as our heater. A 100Watt lamp for this purpose will be enough. To reduce the light intensity, we can use lamps in series which will draw the same 100Watts and will generate the same heat but the heat will be more spread than using the single lamp. If you want to use more lamps in series, it will be less intensity of light but the heat will be more spread.

3.3 Cooling:

We can use cooling fans for cooling. We can utilize the well-known cooling fans, but the massive system requires a large fan. It is best to place this cooling fan outside to inside [usually we use inside to outside method most of the time]. This method has the advantage of lowering the CO₂ content of the air while simultaneously cooling the interior temperature. Do these two tasks simultaneously by positioning yourself in this manner.

3.4 Circulating Fan: For cooling, we can use cooling fans. The big system needs a large fan, however we can use the well-known cooling fans. This cooling fan should ideally be placed outside to inside [we often utilize the interior to outside way most of the time]. The benefit of this approach is that it lowers the air's CO₂ level while also lowering the interior temperature. Position yourself so that you may complete these two jobs at the same time.

3.5 Power Supply: With a backup power source, the automated egg incubator can hatch 150 eggs (75 setters and 75 hatchers) every 21 days, guaranteeing uninterrupted operation even without a steady power source. By connecting to a battery, an inverter guarantees a 12-hour continuous power supply, preserving a warm interior atmosphere. The incubator's temperature is maintained between 36 and 38 degrees Celsius by the thermostat-controlled heater. The incubator can easily transition to grid power for maintenance, brownouts, or the wet season in the event of a power outage.

IV. CONCLUSION

Keeping hands clean is crucial to preventing illness and the transfer of germs, particularly during pandemics when improper hand washing with soap and clean water can lead to the spread of numerous diseases. According to the World Health Organization's (WHO) regulation, hand washing should be done for 20 seconds and then allowed to dry. This was the basis for the system requirement. One of the most effective ways to stop or lessen the spread of the corona virus is to use a hand drier in conjunction with a non-contact automated hand wash. All the standards are met, according to tests. It adheres flawlessly to the WHO's recommended hand washing and hand drying regimen. Since power outages occur frequently, future work might involve solar-powered automatic hand washing. We can also incorporate fog recycling.

RESOURCES & CONSUMABLES REQUIRED

- 1) Arduino UNO
- 2) Temperature Sensor
- 3) Humidity Control
- 4) Relay switch
- 5) Turning
- 6) LCD Display

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