# THE DEVELOPMENT OF QUAIL EGGS SMART INCUBATOR FOR HATCHING SYSTEM BASED ON MICROCONTROLLER AND INTERNET OF THINGS (IOT)

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## ABSTRACT

*For the quail farmers, hatching the eggs in a big number is a problem to producing the quail which incubate by quail parent manually. In this research describe the development of quail eggs smart incubator. The incubator system based on Arduino microcontroller can control the temperature, humidity, and reversal the quail eggs automatically. In addition, Internet of Things (IoT) system can help farmers to monitor the smart incubator from a distance.*

***Keywords**: IOT, Smart incubator, Hatching*

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## 1.INTRODUCTION

The eggs incubator is a device which can control the temperature and humidity for hatching process. By using eggs incubator, the hen does not need to incubate the egg manually. Thus, incubator device can help farmers to hatch an egg to produce the chicken on a big number [1]. Researchers have to build the incubator for various egg, such as for Chicken [2], quail [3], Turtle [4], Partridge [5], and other. For the incubating system, researchers developed the incubator to automate the adjustment system, such as the temperature [6], humidity [2], egg reversal [7], and other [8] [9] which based on the microcontroller [10] [8], IoT [10] [11], and other [12]. In this paper describe the development of quail eggs smart incubator for eggs hatching system. The incubator can control the temperature, humidity, and reversal the quail eggs automatically based on Arduino microcontroller. In addition, the incubator based on Internet of Things (IoT) system using VNC' s software can help the farmers to control and monitoring the smart incubator from a distance. Finally, the quail eggs smart incubator be applied to hatching the quail egg at CV Slamet Quail Farm, Sukabumi, Indonesia for 17th days incubate period.

Japanese quail (Coturnix Coturnix japonica) is poultry species that found in East Asia which contains a very little body and recognizing on the eggshell. Farmers raise the eggs and meat for consumed, attributable to the quail has several nutrition benefits, such as protein, fat, nutriment E, minerals and internal secretion P. Thus, by intense the quail egg or the meat it's superb for body extra nutrients [13] [14]. Egg incubation is that the method to develops the embryo of eggs till hatching by the animal' s parent [1] [7]. whereas the eggs setup could be a device sort of a box which can management the temperature, humidity/moisture, and different changes to develop the embryo of the egg till hatch [15]. during this decade, the man of science developed a wise eggs setup which might management the temperature, humidity, eggs reversal or the opposite adjustment combination supported the microcontroller [1]. Moreover, the setup else the observer supported web of Things (IoT) so as the farmer may be observation the setup on the gap [16]. For the quail farmers, hatching the eggs in a very massive variety could be a downside to producing the quail that incubate by quail parent manually. Moreover, the season will influence the embryo development of the quail to hatch method [17]. So, researchersdeveloped the technology which might be hatching the egg and a method

to extend the qual production, for example, the eggs setup [9] and prediction the quail gender on the egg [18]. To develop the eggs incubator, we tend to must grasp and listen the temperature, humidity, and another adjustment in order to develop the embryo proper. For Japanese quails especially, the incubation period is seventeen to nineteen days [1] [7] [19], the temperature is 36.5oC − 37.5 ± 0.5oC [7] [2] and also the humidness vary is 50% − 65% [2] [15]. within the incubating process, AN egg should be revolved for four5o each 4 hours to avoid the embryo continue the shell [20]. Egg quality is one in all the success factors to hatch. If the egg quality is bad, the chance for the egg to hatch is low. Thus, before the egg progressing to incubation process, the farmer should check the egg quality first

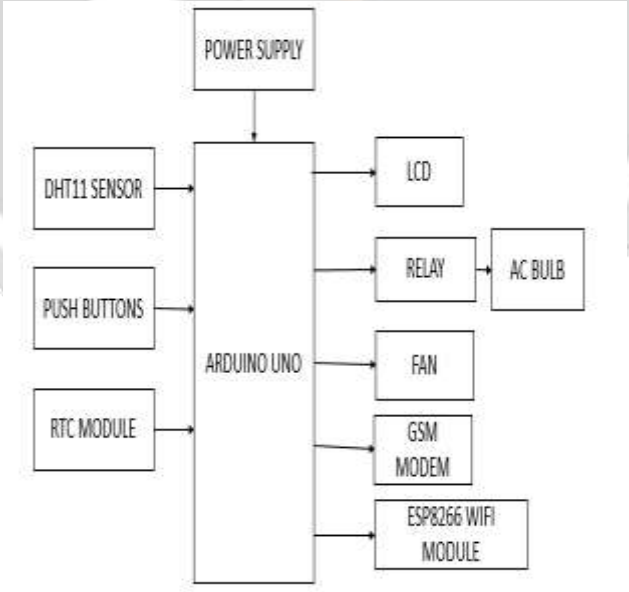
## 2. EXISTING SYSTEM:

Automatic egg incubators which are extensively used are higher than incubating eggs with a solid temperature of ± 39ºC [5]. However, there also are weaknesses in the egg incubator due to the fact the temperature in the egg incubator can bring about chicks which have hatched to die if they may be too lengthy in the machine [6]. For this reason, it's miles important to innovate an egg incubator this is greater powerful and green in tracking the improvement situations of the egg being incubated [7]. So that bird farmers can display the situation of the eggs which have hatched in actual time in order that the chicks do now no longer experience death

## 3. PROPOSED SYSTEM:

In this paper describe the development of quail eggs smart incubator for eggs hatching system. The incubator can control the temperature, humidity, and reversal the quail eggs automatically based on Arduino microcontroller. In addition, the incubator based on Internet of Things (IoT) system using WEBSITE can help the farmers to control and monitoring the smart incubator from a distance. The advantage of this smart incubator are; easy to controlling and monitoring, saving farmer’ s energy, the eggs need a short time to hatch, and low cost. Therefore, this system better than other conventional eggs incubator. So, the 2018 International Conference on Information and Communications Technology (ICOIACT) 410 development of quail eggs smart incubator can be applied to quail egg farmer industries.

### 3.1.BLOCK DIAGRAM:




## 4. MODULE DESCRIPTION:

### 4.1. ARDUINO UNO:

**Arduino Uno** is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.
Arduino can be used to communicate with a computer, another Arduino board or other microcontrollers. The ATmega328P microcontroller provides UART TTL (5V) serial communication which can be done using digital pin 0 (Rx) and digital pin 1 (Tx). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The ATmega16U2 firmware uses the standard USB COM drivers, and no external driver is needed.


Fig :Arduino UNO

**4.2.ESP8266 WIFI module:**

**ESP8266** is a very user friendly and low cost device to provide internet connectivity to your projects. The module can work both as a Access point (can create hotspot) and as a station (can connect to Wi-Fi), hence it can easily fetch data and upload it to the internet making **Internet of Things** as easy as possible. It can also fetch data from internet using API' s hence your project could access any information that is available in the internet, thus making it smarter.

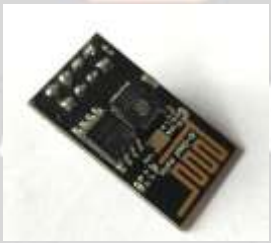


Fig:WIFI module

**4.3.GSM modem:**

A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. The modem (modulator-demodulator) is a critical part here.

These modules consist of a GSM module or GPRS modem powered by a power supply circuit and communication interfaces (like RS-232, USB 2.0, and others) for computer. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.

Fig:GSM module

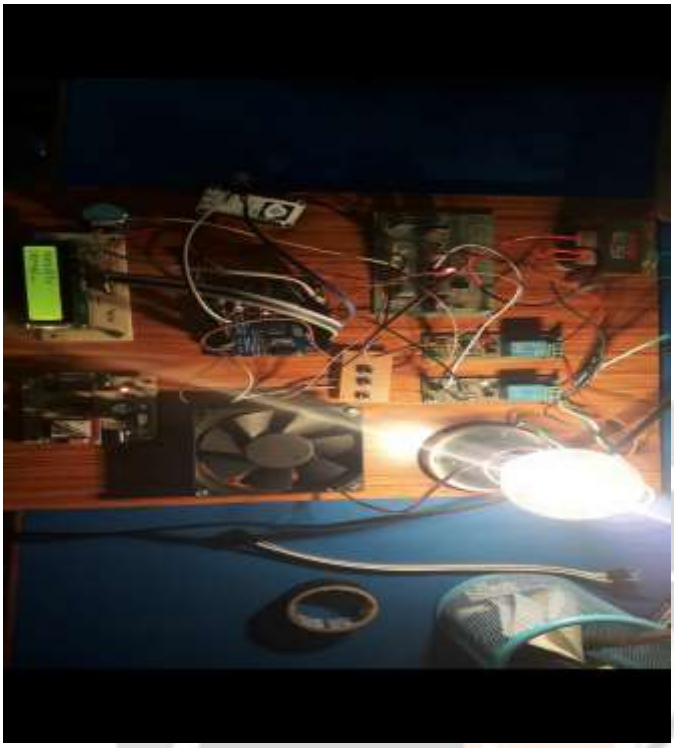
**4.4.DHT11 SENSOR:**

The DHT11 is a commonly used Temperature and humidity sensor. The sensor comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data. The sensor is also factory calibrated and hence easy to interface with other microcontrollers.

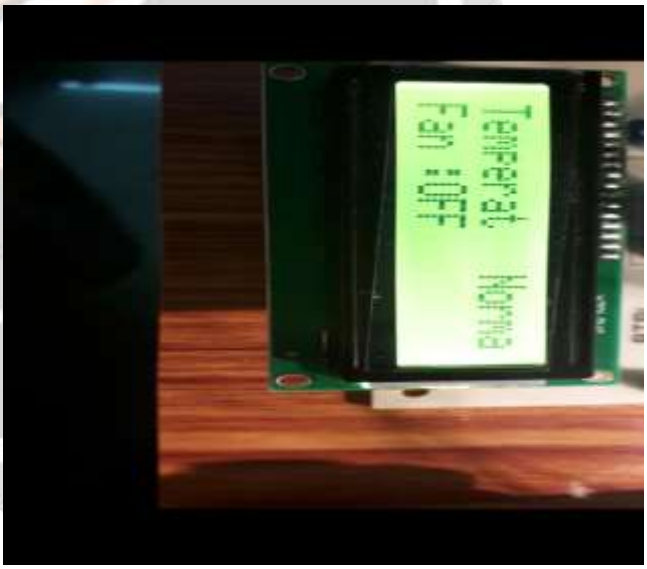
The sensor can measure temperature from 0°C to 50°C and humidity from 20% to 90% with an accuracy of ±1°C and ±1%.

Fig :Humidity sensor

**5.RESULTS:**




Humidity
Normal
PTPL


Temperature Normal
Fan :OFF

## 6.CONCLUSION:

This research has been presented the development of quail eggs smart incubator based on Arduino microcontroller. The system can control the temperature, humidity, and reversal the quail egg automatically. For monitoring process, the interface from Python and VNC software based on Internet of Things (IoT) system has successfully can help the farmers to monitor the smart incubator from a distance. In this paper the component designed is easy to maintain, affordable and portable. Thus having result for days of the testing, an average value of temperature was gotten to be 36°C, average percent humidity value of 32%. The smart incubator also can hatch of different poultry eggs are within a similar range, such as guinea fowl, turkeys, ducks, goose, guinea fowl, quail and ostrich. For recommended for household use, subsistent poultry farmers to increase the production of poultry products.

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