**THE DEVELOPMENT OF QUAIL EGGS SMART INCUBATOR FOR HATCHING SYSTEM BASED ON MICROCONTROLLER AND INTERNET OF THINGS**

**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. The quail eggs smart incubator be applied to hatching the quail eggs at CV Slamet Quail Farm, Sukabumi, Indonesia show the best result to hatching the quail eggs. The quail eggs has been successfully hatch normally is87.55%, 0.41% hatch but defective, 1.84% hatch but dead, and 10.20% not hatch by 490 eggs in 17th days of incubate period.

**INTORDUCTION**

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. Researchers have to build the incubator for various egg, such as for Chicken, quail, Turtle, Partridge, and other. For the incubating system, researchers developed the incubator to automate the adjustment system, such as the temperature, humidity, egg reversal, and other which based on the microcontroller, IoT, and other.

**EXISTING SYSTEM**

Farmers raise the eggs and meat for consumed, because of the quail has many nutrition benefits, such as protein, fat, vitamin E, minerals and sex hormone P. Thus, by consuming the quail egg or the meat it is very good for body additional nutrients. Egg incubation is the process to develop the embryo of eggs until hatching by the animal’s parent the hen need to incubate the egg manually. So those hens have to incubate the eggs or incubate machine used to incubate the eggs. But controlling the heat and humidity will be hard. It is hard to know each segment having right amount of heat and air.

**EXISTING SYSTEM DISADVANTAGE**

* It is difficult to monitor the incubator
* It is hard to give right amount to heat and air
* It is not cost effective

**PROPOSED SYSTEM**

The general process of the quail eggs smart incubator based on Arduino Microcontroller. When the hardware system is started, Arduino microcontroller will be active to control the temperature sensor, humidity sensor, and eggs reversal system. The control process is divided into 3 section; Section 1 is the temperature control which monitored by DHT 11 sensor. When the incubator temperature is lower than 36.5oC the system will turn on the Lamp, and if more than 38.5oC the system will turn off the Lamp. On section 2 is the humidity control which monitored by DHT 11 sensors. When the incubator humidity is lower than 55%RH the system will turn on the heater, and if more than 65%RH the heater will turn off. The final section is an egg reversal which monitored by the time module. When the system has turned on for 4 hours, the Synchronous Motor will reverse the egg for 45o to the right. For the next 4 hours, the Synchronous Motor will reverse the egg for 45o to the left, and repeatedly The data gets from microcontroller Arduino by serial communication. The data is processed becomes the graphical interface of Temperature vs Time and Humidity vs Time. To develop the quail eggs smart incubator hardware, the main tools/components which used such as; personal computer, Arduino Microcontroller, DHT 11 sensor (temperature and humidity sensor), power supply, Synchronous motor, blower, LCD, 5-watt lamp, relay, RTC Time module, and other. Fig. 4 is the schematic design of the quail eggs smart incubator. The schematics show that the component which connects to Arduino microcontroller board, they are; DHT sensor, lamp, relay, Motor, LCD, blower fan, and heater.

**PROPOSED SYSTEM ADVANTAGE**

* It is easy too control.
* It is cost effective.
* We can see data through internet.
* Accurate measurement of temperature.

**BLOCK DIAGRAM**

POWER SUPPLY

GSM/GPRS

LCD

FAN

LIGHT

MOTOR

HUMIDITY SENSOR

TEMPERATURE SENSOR

ARDUINO

**HARDWARE REQUIREMENT**

* Arduino
* Temperature sensor
* Humidity sensor
* Motor
* Light
* Fan
* GSM/GPRS
* LCD

**SOFTWARE REQUIREMENT**

* ARDUINO IDE