

Development Of Microcontroller Based Smart Egg Incubator System

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Abstract - The purpose of this project is to design and develop the system of an egg incubator that able to incubate various type of egg named as Smart Egg Incubator System for Various Types of Egg (SEIS). The SEIS will fill up with the temperature and 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 light heater is use to give the suitable temperature to the egg. By using the water and controlling fan, it is can make 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 lamp, synchronous 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 microcontroller (Aurdino ATMEGA 328). This type of microcontroller can process a data from sensor and will execute the control element to change the condition of SEIS. This project will be a user friendly product since the SEIS can move to other place. It will secure by user must enter the password before activate the system.

Keywords - Smart Egg Incubator System (SEIS), Aurdino, Incubator, Humidity, Temperature, Parameter monitoring.

I. Introduction

Incubation is the process by which birds hatch their eggs, and to development of their embryo within the egg. The most vital factor of incubation is the constant temperature required for its development over a specific period. Especially in domestic fowl, the act of sitting on eggs to incubate them is called brooding. The action or behavioral tendency to sit on a clutch of eggs is called broody, and most eggs laying breeds of chicken have had this behavior selectively bred out of them to increase production. As incubation proceeds, an egg will normally becomes lighter, and the air space within the egg will normally become larger, owing to evaporation from the egg. Egg incubator is one of the invention that provides opportunity especially for who want to be an excellent farmer. This is one of the easy & fastest way that can make a product. The function of egg incubator is to take over the animal job to incubate an egg until hatching. The system will automatically control the temperature and humidity of the incubator for various types of eggs. The function of egg incubator is to take over the animal job to incubate an egg until hatching.



Fig. 1: LCD display showing the monitoring of system

II. Egg Incubator

The success of this type of project depends on proper care and incubation of the hatching eggs so healthy, vigorous chicks are produced. Many times a producer carefully attends to the incubation process but disregards the care of the eggs before they are placed in the incubator. Even before incubation starts the embryo is developing and needs proper care. Hatching eggs suffer from reduced hatchability if the eggs are not cared for properly. The size and type of incubator selected depends on the needs and future plans of each producer. Many different models are available. For continuous settings, separate incubator and hatcher units are recommended. If all eggs in the unit are at the same stage of incubation, a single unit can be used. It is essential that the room has a good ventilation system to supply plenty of fresh air. Keeping the units indoors makes it easier to maintain uniform temperature and humidity.

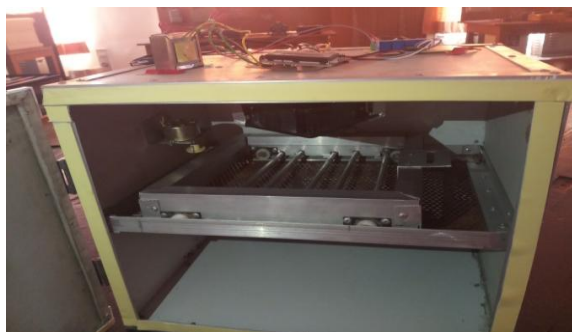


Fig. 2: Egg Incubator

A. Period Of Incubation -

For example, chicken eggs require 21 days to hatch, but for the other species of poultry varies is different.

Table 1: Period of incubation for various types of eggs

Species	Incub. Period (days)	Temp (F.) ¹	Humidity (F.) ²	Do not turn after	Humidity Last 3 days ²	Open vent more
Chicken	21	100	85-87	18th day	90	18th day
Turkey	28	99	84-86	25th day	90	25th day
Duck	28	100	85-86	25th day	90	25th day
Muscovy Duck	35-37	100	85-86	31st day	90	30th day
Goose	28-34	99	86-88	25th day	90	25th day
Guinea Fowl	28	100	85-87	25th day	90	24th day
Pheasant	23-28	100	86-88	21st day	92	20th day
Peafowl	28-30	99	84-86	25th day	90	25th day
Bobwhite Quail	23-24	100	84-87	20th day	90	20th day

B. Hardware Description -

The system hardware consist of Microcontroller (Aurdino ATMEGA), temperature & humidity sensor(DHT22), LCD, motor and other components. The figure below shows the diagram of the whole system. The hardware construction of incubator is illustrated.

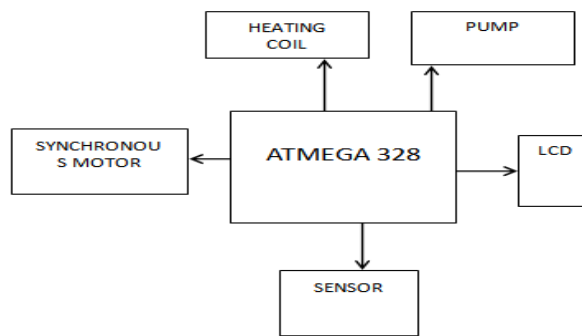


Fig. 3: Schematic diagram of proposed incubator

III. Methodology

Refer to the figure no. 4 below, it show about the flow chart of the SEIS.

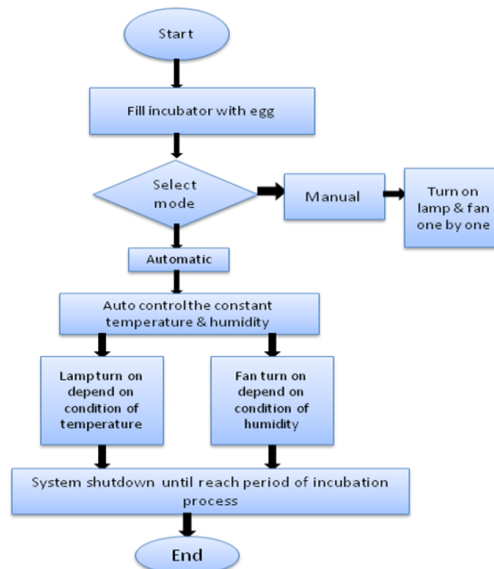


Fig. 4: Flow chart of SEIS

It starts with fill the Smart Egg Incubator with egg. After that select the mode of system i.e., automatic or manual. If manual operating system is selected, it is setting for test mode. To determine whether the fan and lamp in the system are function or not. During the auto mode, the system will be operate automatic depend on temperature & humidity in SEIS.

The maximum temperature in Smart Egg Incubator is 37 degree cent. and the minimum is 35 degree cent. So, the lamp will on until the temperature achieves 37 degree. At 37 degree the, the lamp will be off and the fan will be on until temperature decrease to 35 degree and vice versa. The lamp is use to increase the temperature in the system and fan is use for decrease the temperature in the system & the whole system will be controlled by using aurdino.

Circuit Diagram -

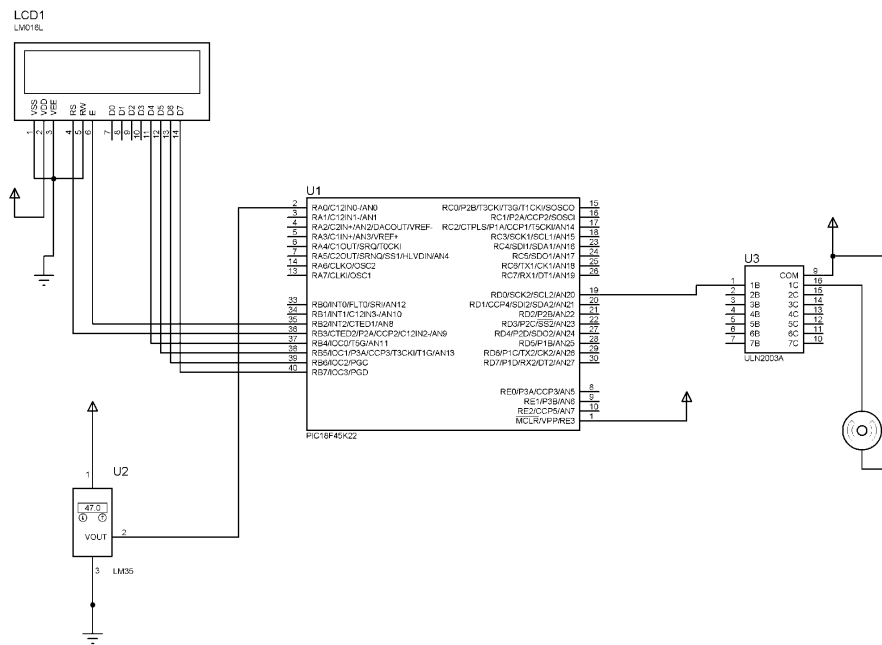


Fig. 5(a) : Circuit diagram of SEIS

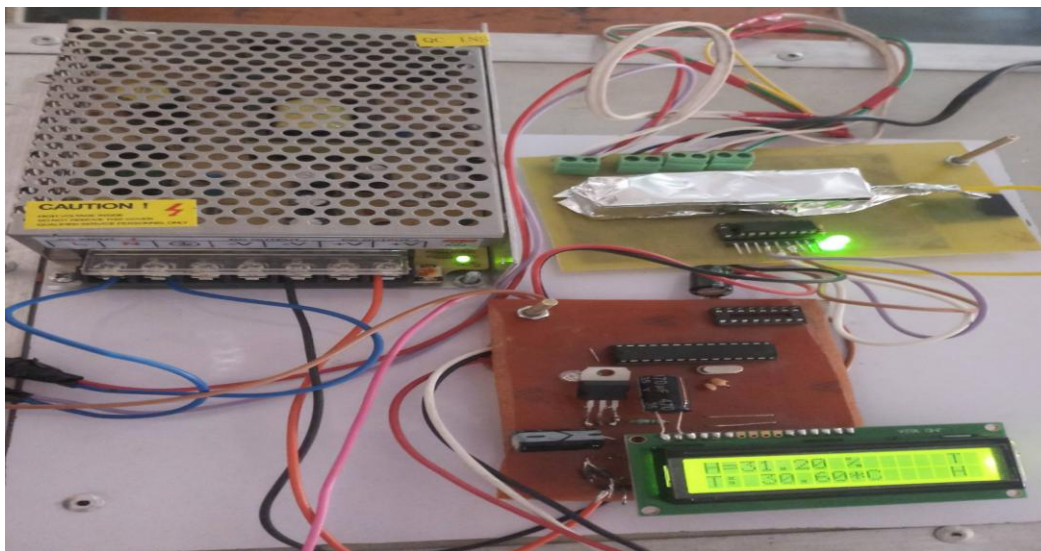


Fig. 5(b): Cuircuit

IV. Candling Of Eggs

In candling system, it can be detected between infertile eggs and dead embryos. Candling system can help to determine if the chick is developing according to expectations. It is shown below with the help of fig. 6.



Fig. 6(a): Candling of Eggs



Fig.6(b): Development of Embryo in Egg

V. Result And Discussion

The proposed system was applied on actual environment for measuring required data included the incubator humidity and temperature.

VI. Conclusion

In project 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 SEIS also can hatch of different poultry eggs are within a similar range, such as guinea fowl, turkeys, ducks, goose, guinea fowl, quail and ostrich. A controller was implemented and applied to achieve smart incubator. Its need low cost and power when compared with classical systems. Also the controller economical in power consumption. This controller has this advantage since, the system motors need low power.

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