SMART INCUBATOR

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ABSTRAK

Sistem pengeraman telur ayam direka untuk mengurangkan penetasan telur anak ayam yang cacat dan mengurang risiko kerosakkan telur ayam yang disebabkan perubahan cuaca yang tidah menentu. Prinsip Penukar Analog ke Digit (ADC) digunakan dalam sistem ini untuk memanipulasi suhu yang diukur dalam peti pengeraman, kemudian mengekalkan sistem tersebut kepada suhu yang telah ditetapkan. Suhu yang telah diukur akan diproses dan mengawal keseluruhan sistem penetasan tersebut. sistem ini mengambil masa selama 20 hari untuk proses penetasan dengan mengawal kepanasan lampu. Sistem ini adalah sistem yang mudah selia dan murah, dengan demikian, matlamat penghasilan ‘smart incubator’ tercapai..

ABSTRACT

Smart Incubator is designed to reduce abnormal chicks and to reduce the risk of damage eggs caused by uncertain environment. The principle of Analog to Digital Converter (ADC) is used to manipulate the temperature in the incubator, then, regulated the system at specific temperature. The measured temperature will be processed by using an embedded system, which controls the overall system. This system will take 20 days to hatch eggs by controlling the heating bulb. The system easy to handle and at low cost, thus, it achieve the objective of the smart incubator.

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CHAPTER 1

INTRODUCTION

Nowadays, more important agriculture and livestock farming as an example of the field continues to grow with further technologies developments. More technologies were creating to further develop the field. For achieve this goal, the project is created with efficient, quick and easy to operate. Project is "Smart Incubator" that serves as chicken egg incubation more systematic. With the use of this Incubator hatching eggs are more successful when compared with incubation manually. This project will create more focused on controlling an electronic system that uses more electronic components to enable it to operate.

The main purpose of this project is designed so that the hatching eggs were more successful than the incubation manually. The construction of this project is used almost 95% of wood as the main ingredient. In the projects, microcontroller software applied to control temperature and heater created by lighting. This microprocessor is connected to

the relay circuit so that it can control the bulbs and fans automatically. In addition, to calculate the number of days that had been set on the circuit microprocessor.

If the temperature is supplied in excess of 37°C-38°C and it can be detected by a digital temperature sensor circuit, while the relay circuit will turn off the bulbs in 5 minutes to reduce the temperature inside the incubator. If the temperature is less than 37C, the temperature will be set back by the count up and down switch. The project requires a temperature of about 37°C to 38°C to ensure that the incubation of the eggs were more evenly so that the result obtained are of better quality. Egg incubation takes about 20 days before he was transferred to the hatchery.

1.1 Objective

a) The objectives are to learn and study to design a prototype 'Smart Incubator' by using software and hardware that can incubate the eggs by using conveyor directly using to the incubation.
b) In addition, with a constant supply heat, it can prevent the egg from the occurrences of adhesive coating on the shell egg and prevent embryos from sticking to the lining. With this, the better quality of hatching eggs can be improves.
c) To built the systems that can easy monitoring by farmers. 'Smart Incubator' was produced.
d) To make egg incubation process more orderly, safe and quality.

1.2 Scope of The Project

The scope of this project is combining of hardware part and programming part. The hardware part consists of electronic circuit for the microcontroller, digital temperature sensor, 7 segments, relay, power supply circuits, motor power window and power supply 12V.

The software consists of Microcontroller AT89S51, two circuit microcontrollers are used for control the entire project. Then, sensors are used to detect the eggs and continue to be brought to the incubation with the conveyor. This project started with the research about the related information via the books and internet. Besides that, the lecturer's guidance is also important for the development. Sketch about the project will be done based on the information gathered.

1.3 Problem Statement

According to speech release by secretary general Ministry of Agriculture & Agro-based Industry "*Malaysia though blesses with fertile soil, abundant rainfall and suitable climate for food production is still a net food importer and has never achieved a food trade balance surplus. Realizing the opportunity and potential for the development of this sector, the Ministry of Agriculture and Agro-based Industry was entrusted with the responsibility to develop the agro food sector into a competitive entity and contribute significantly to national income. Efforts in transforming the sector is indeed a Herculean modern farming methods but also entails the need for a mindset leap among the community from the old stigma of agriculture being a backward and low skill activity*" [1]. Alternatively, the Smart Incubator is designed to improve the available eggs incubator in order to change the traditional farming method to advance and modern farming method. Besides, by introducing the smart incubator may help our country achieve a food trade balance surplus.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Incubation is the process by which birds hatch their eggs, and to the development of the embryo within the egg. The most vital factor of incubation is the constant temperature required for its developments 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 also called broody, and most egg-laying breeds of poultry have had this behavior selectively bred out of them to increase production. [2]

In most species, body heat from the brooding parent provides the constant temperature. Some species begin incubation with the first egg, causing the young to hatch at different times; other begin after laying the second egg, so that the third chick will be smaller and more vulnerable to food shortages. Some start to incubate after the last egg of the clutch, causing the young to hatch simultaneously.

2.2 Incubation Periods

Bird	Incubation Period (days)
Chicken	20 – 22
Duck	26 – 28
Goose	25 – 28
Ostrich	35 – 45
Parrot	17 – 31
Pigeon	10 – 18
Quail	21 – 23
Swan	33 - 36
Turkey	28

Table 2.1: Incubation Period [2]

2.3 Egg Incubation in the Market

There are many egg incubators at market nowadays. They come with several features that differentiate their product with other. However, they use the same principle in creating their product. For example, Automatic Forced-Air Incubator [3] uses a light bulb to increase the temperature in the incubator, while, Mini Eco Eggs Incubator [4], uses heater coil for the same purpose. In this project, smart incubator makes the other eggs incubator as literature review in order to provide an automatic eggs incubator at low cost and easy to handle.

2.3.1 Automatic Forced-Air Incubator

Automatic model with a capacity / load the eggs of 100 eggs, also can accommodate nearly 300 quail eggs. For operating an automatically diverting eggs for up to 8 times a day by the installation of electric motor, timers and relays. Using a thermostat brand products Caemz Italy known for its precision control of temperature up to 1 degree Celsius, clear digital thermometer displays the temperature of incubator operation, the blower fan is temperature resistant and moisture and heat lamps are easily replaced with 5 watt, low and save electricity.

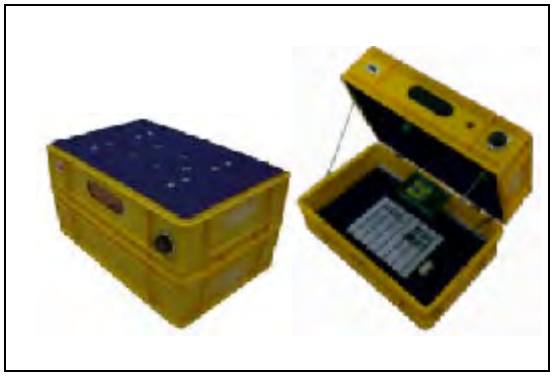

Figure 2.1: Automatic Forced-Air Incubator

2.3.2 Manual Forced-Air Incubator

Model with manual capacity of 60 eggs, can accommodate nearly 200 quail eggs. Operation simultaneously over the use of egg tray egg incubator can be operated from the outside without opening the incubator. Using a thermostat brand product Caemz Italy known for its precision control of temperature up to 1 degree Celsius, clear digital thermometer displays the temperature of incubator operation, the blower fan is temperature resistant and moisture and heat lamps are easily replaced with 5 watt, low and save electricity. [3]

Figure 2.2: Manual Forced-Air Incubator

2.3.3 The Mini Eco

The Mini Eco holds 10 hens' eggs (or equivalent) and provides the fine temperature control to ensure consistent and reliable hatches. Temperature is monitored on a purpose built liquid-in-glass thermometer and although factory set, the electronic temperature control allows fine tuning of the temperature setting if required.

Figure 2.3: The Mini Eco Incubator

2.3.4 The Mini Advance

It provides automatic egg turning with auto stop 2 days prior to hatching, countdown to date-of-hatch and temperature alarm on its digital display to know the status of hatch. Eggs are turned by rotating egg disks. Two disks are available, one for 7 eggs of all sizes up to duck (supplied as standard) with a second small egg disk holding 12 eggs up to the size of pheasant available as an optional extra.[4]

Figure 2.4: The Mini Advance Incubator

2.4 Eggs Incubator Features

Types Of Eggs Incubator	Features
Smart Incubator	i. Using light bulb for heating process. ii. Using switch count up & down for enter the temperature. iii. Using fan keep the heat. iv. 7 segment display to show the value of temperature in the incubator and setting value. v. Using digital temperature sensor to detect the temperature at the incubator vi. Using AT89S51 microcontroller to control the overall process.
Automatic Forced-Air Incubator & Forced-Air Incubator	i. Using light bulb for heating process. ii. 12V DC motor for eggs rotational purpose. iii. Using the digital thermometer to display the temperature in the incubator. iv. The thermostat is used to manipulate temperature values. v. Using control box to control the hatching process.