FINAL YEAR PROJECT REPORT

Controller Based Chicken Incubator System

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Project Report submitted to the
Department of Electrical Engineering, University of Management and Technology
in partial fulfillment of the requirements for the degree of
Bachelor of Science
in
Electrical Engineering

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(15th May, 2013)

Abstract

The purpose of this project is to design and develop a system for an egg incubation which is able to incubate various types of eggs. It is named as “SmartEggIncubator System”. Thesystem will comprise of temperature and humidity sensors, which will measure the conditions of the incubator and will automatically change to the suitable condition for the purpose. 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, an electronic bulb is used as aheater, so as to providesuitable temperature to the egg. By usingwater and controlling fan, the humidity level can be controlled. An LCD screen display is used to display temperature & humidity inside the incubator. To make sure all part of egg, are heated evenly, a motorhas been employed to change the position of egg. The entire system is controlled using programmable Logic Controller (PLC).

Dedication

ALMIGHTYALLAH

&

Our Parents

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Chapter 1 : Introduction

1.1Introduction:

The following report examines the combined work integrated in building an eggincubator for hatching bird eggs; the project was the result of the collective work of students in the ECE 240 – Linear Control System course.

The report sheds the light on the circuits constructed, the mechanical experiencegained and the difficulties faced by them throughout the construction process overthe span of time

1.2 Scopes:

Design a system and hardware for egg incubator with automatic controlled the temperature and humidity using programmable interface controller (PIC) according to types of egg and parameters given by user.

1.3 Project Goal:

With a bit of research we determined it would be the best course of action for several reasons.

The incubator will help farmer produce product in ashort time with large amount of eggs An egg incubator can be considered a replacement for incubate session of animal. The incubator will be large enough to avoid problems of less production. Ideas to incubate many types of egg in one time can be tested.

1.4Incubation:

Incubation is the process by which birds hatch their eggs, and to the development of the embryo within the egg. The most vital factorof incubation is the constant temperature required for its development over a specific period. Especially in domestic fowl, the act of sitting on

eggsto incubate them is called brooding.The action or behavior tendency to a clutch of eggs is also called broody, and most egg laying breeds of chicken have had thisbehavior selectively bred out of them to increase production most species, body heat from the brooding parentprovidesthe constant temperature, though several groups, notably the Megapods, insteaduse geothermal heat or the heat generated from rotting vegetable material, effectivelycreating a giant compost heap. The humidity is also critical, and ifthe air is too dry theegg will lose too much water to the atmosphere, which can make hatching difficult or impossible. As incubation proceeds, an egg will normally become lighter, and the air space within the egg will normally become larger, owing to evaporation from the egg.

1.5 Egg Incubator:

Poultry producers usually become interested in artificialincubation oftheir own chicks. The success of this type project depends on proper care and incubationof the hatching eggs sohealthy, vigorous chicks are produced. Many times a producercarefully attends to the incubation process but disregards thecare of the eggs before theyare placed in the incubator. Even before incubation starts the embryo is developing andneeds proper care.Hatching eggs suffer from reduced hatchability if the eggs are not cared for properly.

1.6 Incubating Conditions:

The condition of incubator is very important element. Poor results are most commonly produced with improper control of temperature and/or humidity. Improper control means that the temperature or humidity is toohigh or too low for a sufficient length of time that it interferes with thenormal growth and development of the embryo.Poor results alsooccur from improper ventilation, egg turning and sanitation of the machines or eggs.

The components than must be control in the incubator are temperature,humidityand ventilation. The temperature must depend onthe types of egg. In order to hatch a good percentage of fertile eggs, an incubator must be able to maintain constant temperature .Thoughdifferent sorts of eggs require different heat levels, most willgrowand hatch well at 99 to 101°F. Sure, that does sound imposinglyprecise, but such accuracy isn't all that difficult to achieve. Rarely is the humidity too high in properly ventilated still airincubators. The water pan area should be

equivalent to one-half thefloor surface area or more. Increased ventilation during the last fewdays of incubation and hatching may necessitate the addition ofanother pan of water or a wet sponge. Humidity is maintained byincreasingthe exposed water surface area.Ventilation Isvery importantduring the incubation process. While the embryo isdevelopingoxygen enters the egg through the shell and carbondioxide escapes in thesame manner. As the chicks hatch, they require anincreased supply of fresh oxygen. Embryosgrow; theair openings are gradually opened to satisfy increased embryonic oxygen demand. Care must be taken to maintain humidity during thehatchingperiod. Unobstructed ventilation holes, both above and below the eggs, are essential for proper air exchange.

1.7 How to Hatch Chicken Eggs:

Chicken eggs have hatching chicken eggs are to maintain a proper temperature, ensure appropriate humidity levels an incubation period of 21 days and require specialized incubating conditions to hatch successfully. Many different types of incubators can be used when hatching eggs, but the most important factors in and turn the eggs regularly during the incubation period. Use these tips to hatch chicken eggs.

1.8 Steps:

Prepare your incubator approximately 1 week prior to getting your eggs. Read all instructions included in the owner's manual.Familiarize yourself with how to operate the fan, light and all other functions of the incubator. Regulate the temperature in the incubator. Placement can influence regulation, so it's important to place the incubator in a location that experiences little temperature fluctuation. The temperature should be between 99C^0 and 102 C^0 F (37.2 C^0 and 38.8 C^0).

Turn the incubator on at least 24 hours before putting the eggs into the incubator.

Acquire the eggs.

- Order the eggs from 1 supplier. Ordering from 1 place helps to guarantee that your eggs are approximately the same age and type.

- Allow the eggs to settle for at least 24 hours before putting them into the incubator. Point the small ends down as the eggs are settling.
- Place the chicken eggs in the incubator. Set the eggs on their sides.
- Turn the eggs 2 or 3 times per day during the first 18 days. Do not turn the eggs after 18 days have elapsed.
- Check the temperature levels in the incubator each time you turn the eggs.
- Keep the temperature as close to 101.5 degrees F (38.6 degrees C^0) as possible in an incubator without a fan. Measure the air temperature at the top of the eggs.
- Aim for temperatures close to 99.5 degrees F (37.5 degrees C^0) in an incubator with a fan.
- This temperature reading can be done anywhere within the incubator.
- Keep checking the temperature during the last 3 days of incubation, even though you won't be turning the eggs.
- Regulate the humidity in your incubator by measuring it with a hygrometer.
- Create an environment for your eggs where the humidity is at 60 to 65 percent during the first 18 days.
- Raise the humidity levels to 80 to 85 percent for the last 3 days (days 18 to 21).
- Add moist surface area to the incubator to increase the humidity level. Add a big pan of water or wet sponges.
- Remove moist surface area to decrease the humidity level. Change a big pan of water out for a smaller dish or remove wet sponges.
- Refrain from opening the incubator door between the 18th and 21st days. Opening the door causes severe fluctuations in the temperature and humidity levels of the incubator, which has a negative impact on the incubated eggs.

1.9 How to Use an Incubator to Hatch Eggs

We can hatch eggs even if you have no hens by using an incubator. Incubators attempt to reproduce the conditions fertile eggs experience under a brooding hen, including appropriate temperature, humidity and ventilation levels. To successfully hatch eggs in an incubator, we will

need to properly calibrate the incubator and be able to keep the settings stable throughout the incubation period.

1.10 Incubating the Eggs

- Warm the fertile eggs to room temperature. Allowing the eggs to warm up will decrease the amount and duration of temperature fluctuation in the incubator after you've added the eggs.
- Mark each side of the eggs with a symbol. Many people use X and O to indicate each side of the egg.
- Use a pencil and lightly draw a symbol of your choice on 1 side of the egg and draw a second symbol on the other side.
- Place the eggs carefully into the incubator. Make sure the eggs are lying on their sides. The larger end of each egg should be slightly higher than the pointy end. This is important as the embryos can become misaligned if the pointy end is higher and may have difficult piping, or breaking through the shell, when it comes time to hatch.
- Allow the temperature to drop after adding the eggs. The temperature will temporarily lower after you've introduced the eggs into the incubator, but it should readjust if we calibrated the incubator correctly.
- Don't increase the temperature to compensate for this fluctuation or we may damage or kill our embryos.
- Record the day and how many eggs you've added to the incubator. we should be able to estimate your hatch date based on average incubation times for the bird species you want to hatch. For example, chicken eggs typically take 21 days to hatch, while many duck varieties and peafowl may take 28 days.

- Turn the eggs daily. Rotating the eggs and changing their position helps mitigate the effects of any temperature differences within the incubator and mimics the behavior of a brooding hen.
- Turn eggs an odd number of times each day. This way, the symbol on the eggs will change every day after you turn the eggs, making it easy to see whether or not you've turned the eggs yet for that day.
- Move eggs around to different positions in the incubator.
- Stop turning the eggs during the last 3 days of incubation, as at this point, the eggs will soon hatch and turning is no longer necessary.
- Adjust the humidity levels in the incubator. Humidity should be around 50 to 55 percent throughout incubation, except during the last 3 days when you will want to raise it to 65 percent. We may need higher or lower humidity levels depending on the type of eggs you wish to hatch. Consult your hatchery or the available literature on hatching your species of bird.
- Replenish the water in the water pan on a regular basis or the humidity levels will drop too low. Always add warm water.
- Add a sponge to the water pan if you need to increase the humidity.
- Measure the humidity level in the incubator using a wet bulb thermometer. Take a reading with the wet bulb thermometer and also record the temperature in the incubator at the time. Consult a chart or psychometric chart online or in a book to find the relative humidity from the relationship between the wet bulb and dry bulb temperature readings.

- Ensure the incubator has adequate ventilation. There should be openings on the sides and top of the incubator to allow air flow-check to make sure these are at least partially opened. You will need to increase the amount of ventilation once the chicks begin to hatch.
- Candle the eggs after 7 to 10 days. Candling the eggs is when you use a light source to view how much space the embryo occupies within an egg. After 7 to 10 days, you should see development of the embryo. Candling allows you to remove eggs with embryos that are not viable.
- Find a tin can or a box that can fit over a light bulb.
- Cut a hole in the can or box that is smaller in diameter than an egg.
- Turn on the light bulb.
- Take 1 of the incubated eggs and hold it over the hole. If the egg appears clear, the embryo has not developed or the egg may never have been fertile. You should see a cloudy mass if the embryo is developing. The embryo will increase in size as you near the hatch date.
- Remove any eggs that do not show a developing embryo from the incubator.
- 10) Prepare for the hatch. Discontinue turning and rotating eggs 3 days prior to the estimated hatch date. Most viable eggs will hatch within a 24 hour period.
- Place cheesecloth under the egg tray prior to hatching. The cheesecloth will help catch bits of eggshell and other matter during and after the hatch.
- Increase the humidity level in the incubator by adding more water or a sponge.

Leave the incubator closed until after the chicks hatch.