UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF AN AUTOMATIC CHICKEN FEEDER

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Power) with Honours.

by

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ABSTRAK

Industri penternakan ayam kini menjadi penting untuk mengekalkan bekalan makanan yang mana telur dan daging segar. Oleh itu, pembangunan pengumpan ayam automatik akan sangat berguna bagi industri penternakan ayam untuk menjadikannya lebih produktif dan cekap. Tujuan mesin ini diciptakan adalah untuk mengurangkan beban kerja dan kos tenaga kerja dengan menggunakan sistem automatik yang lebih cekap dan praktikal. Projek ini dirancang untuk mengesan paras air dan bekas makanan untuk memastikannya mencukupi dan tepat. Komponen utama dalam reka bentuk ini adalah Arduino Uno sebagai pengawal. Dalam projek ini, ia mempunyai dua outlet iaitu keluaran air dan keluaran makanan. Untuk saluran keluar air, injap solenoid akan mengawal aliran air ke bekas air dan suis apungan akan digunakan sebagai petunjuk untuk mengesannya pada tahap maksimum atau minimum. Untuk kedai makanan, motor servo akan mengendalikan makanan untuk memberi makan ayam dari tempat penyimpanan ke bekas makanan dan sel beban telah digunakan pada reka bentuk ini untuk mengukur berat yang diinginkan. Di samping itu, pengguna dapat memilih jumlah makanan yang perlu dikeluarkan. Projek ini akan memberi manfaat kepada penternak ayam untuk mengelakkan pembaziran makanan dan menjadikan sistem pemakanan lebihberkesan.

ABSTRACT

Poultry industry gain important nowadays for sustainable the food supply which egg and fresh meat. Therefore, the development of an automatic chicken feeder will be very useful for poultry industry to make it more productive and efficient. The purpose of this machine was invented is to reduce workload and labor cost by using a more efficient and practical automated system. This project was design to detect the water level and food container to make sure it sufficiently and accurately. The main component on this design is Arduino Uno as a controller. In this project, it has two outlet which is water outlet and food outlet. For the water outlet, solenoid valve will control the water flow to water container and the float switch will used as an indicator to detect it on maximum or minimum level. For the food outlet, servo motor will control the food to feed the chicken from the storage to the food container and the load cell had been applied to this design to measure the desired weight. In addition, it allows the user to select amount of food that need to dispense. This project will benefit the chicken breeders to avoid wasting food and make the feeding system more efficiently.

DEDICATION

I want to thank you to my beloved parent, my families, my lecture, and my fellow friend to support and helping me to completing this thesis.

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TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

FIGURES	TITLE	PAGES
Figure 4.2	Accuracy Amount of Brans Dispensed	28
Figure 4.3	Analysis of weight Sensor (load cell)	30
Figure 4.4	Variance of servo motor angle with PWM values	31
Figure 4.5	Indicator analysis with operation time	32

CHAPTER 1

INTRODUCTION

1.0 Introduction

In this section, it basically explains about the project background on what the function or benefit of the project to the poultry industry. Furthermore, it will explain the problem statement, scope, and objective to describe more details about this project. Basically, designs an automatic chicken feeder among this project by using the controller method is to make the system more intelligent and useful for chicken breeder in poultry industry.

1.1 Project Background

"Poultry" can be described as domestic fowls, including chicken, turkeys, geese and duck, raised for meat production and used as food for the flesh of these birds. In a fact, more than 60 billion chickens get killed every year for consumption. The poultry industry with automatic feeding system gains an important and useful nowadays to raise their domesticated bird such as chicken for the purpose of farming for meat to supply or sold to the people. With advanced technology, formulated feeds are important for good nutrition for chicken growing systems to produce a fresh and high quality of product. From then on, many innovation and inventions have been made for breeder to fulfil the growing demand in the poultry industry and one of the inventions on this project has been produced which is automatic chicken feeder.

The poultry industry with automatic feeding system gains an important nowadays to raise their domesticated bird such as chicken for the purpose of farming for meat to supply or sold to the people. Before the new technology and ICT era, people are used the traditional method of feeding chickens by filling manually or mechanically containers with water and brash. The major problem with this method is to ensure the continuous supply of food, to be alert and conscious the balance food in chicken coop. Thus, the required quantity of the food supplied cannot be reliably calculated to prevent wasting food. Furthermore, this device provides an effective solution for contribute adequate food, set feeding times and trouble free automatic feeding to assist breeders

Nowadays, most breeders still feed their chicken manually which is filling the food container by hand. In this modern era, an automatic feeder for chicken breeders is a good investment to reduce a labour cost, workload and saves time. It is an electrical and electronic device designed to distribute the exact amount of food in the chicken coop at a given time each day. But there are still have a several minor and major challenges that are being researched recently to develop the feeding and management processes. One of the major challenges is it able to reduce a labour cost and workload but it raising the electricity consumption on the feeding system.

This project is a system that has design with two outlet which is for water outlet and food outlet. For the water outlet can it will fill the water container with a certain level using a float switch as a level indicator and a solenoid valve to control the water flow. While for the food outlet, it will detect the level or mass of food on the container using a load cell and has a monitor to make sure it accurately. All of this system is control by using an Arduino Uno to give signal such as to turn on or turn off motor. This project is not also cheap but can have huge impact to any chicken breeder in poultry industry.

1.2 Problem Statement

Some ideas or attempt have been made based on the researches to improve the manual feed of chicken that has a low accuracy and efficiency. The invented an automatic feeding system to make the chicken breeder to feed their chicken more practical using the controller method. Feeding on the accurate amount will be the most important to develop the chicken breeder in the poultry industry. Inaccurate amount of feeding will effect chicken growth in a period of time. This system also feed the chicken on the desired time by automatically. In the event of emergency, there no man power to in take care or feed a chicken, the system will use a timer to feed for 24 hour. This system was design to reduce a workload, saves time and offered to control the feeding time for 24 hours.

1.3 Objectives

The aim of the project is to develop the modelling and control the Automatic Chicken Feeder using an Arduino Uno as a controller. These projects objectives are clarified on the background of project problem statement and project scope.

1. To analyse an automatic chicken feeder in industrial application
2. To design an automatic chicken feeder using Arduino Uno
3. To ensure an accurate amount of feeding chicken.
4. To design an automatic chicken feeder to feeding the chicken at desired time.

1.4 Scope

This project is an upgrade to the conventional method of feeding chicken automatically. Since this project focuses on the device and controller that has been used in the system, there are still some weakness on this project requires enhancing these system capabilities. The development of automated chicken feeder systems can be divided into three part which is software implementation, mechanical part and electrical part. For the software part, Arduino Uno had been use in this project to control the whole system such as to give signal to turn on or turn off motor. For the mechanical part, it more focused to develop the design to fit the electrical part. The model had been design to make two outlets which are for water outlet and food outlet. For the electronic part, the main component on this design is float switch as a level indicator and solenoid valve to control the water flow. Furthermore, load cell had been used to measure the food that needed and servo motor to control food flow.

1.5 Significance of the Study

The research and implementation of this project will be significant and beneficial in many aspects. The importance to implement this project is to automate the feeding chicken system in poultry industry. This project is equipped with technology that capable of providing standard meal times for chickens as well as providing chickens with the required amount of food and water based on the program that being set. Thus, controlled amount of food and water being fed by the system to the chicken saved and minimized waste feeds due to leftover or driven out by the mechanism. Furthermore, the thesis would also enhance the capability of researcher to perform a research analysis which may aid them in the learning process of circuit design, mechanical design, troubleshooting and testing.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

The analysis of past studies is a brief study that was conducted before the project was carried out. It describes studies conducted by other individuals or existing projects related to the projects to be undertaken. Based on the previous research, it focus on existing projects and to make comparisons between existing projects and the projects that will be developed knowing their respective advantages and disadvantages. The purpose of the analysis is to make comparative results a guide to developing a good and effective project. In identifying that needs and functions of a project in the early stages, this information is important because the development of the project is based on its needs. Previous studies covering the above topics were intended to provide knowledge, information and insights on the scope of research related to an automated chicken feeder system to be developed.

2.1 Poultry Farming

The poultry farming is a major field of world poultry agriculture. In the US, agriculture is one of the most successful sector to growth their economy. This poultry farming, for the most part chickens are farmed in vast numbers and more than 60 billion chickens are slaughtered annually for consumption. There are some names for those chickens that rise for eggs are called layers while chickens raised for meat are called broiler. Based on the World Watch Institute, 74 percent of the world poultry meat and 68 percent of eggs are intensively produced.

Based on the Commercial poultry feeding is a highly perfected science which assure maximum energy intake for growth and fat production. Well balanced and high quality sources of protein achieve optimum development of the muscles, organ and feathers. In poultry farming, a carefully managed environment which avoids crowding, cooling or overheating is very important. Poultry farming is a continuing source of income that is not seasonal and will generate income during the year. This poultry industry can describe in three type poultry farming.

2.1.1 Free Range

Free range is a concept that applies to an animal husbandry system where livestock can wander easily outdoor rather than being restricted to a 24 hours enclosure. Basically, on this free range system the poultry farming encourages chickens to wander freely during the day even though they are normally enclosed in sheds at night to secure them from wild animals or keep them safe when the weather particularly bad. On this system, the free range farmer has less control over cages farmer who need to keep their poultry food carefully. The advantages on this system are the manure from free range chicken can be used in certain farms to support crops.

Figure 2.1: Free Range System

2.1.2 Battery Cages

The poultry farm using battery cages become more popular in many countries. Basically, the structure is using solid metal or mesh and the floor is sloped wire mesh to enabling the feces to drop through and the eggs fall to the conveyor belt. Then, the water is normally provided by overhead nipple devices and food in a trough at the front of the cage is replenished by a mechanical device at regular intervals.

The battery cages are grouped as several thirds in long groups, sometimes with back to back cages. There can be many floors inside a single barn housing battery cages, implying that there can be several tens of thousands of hens in one shelter. The battery cages

advantages involve better maintenance of the chickens removal of floor laid eggs which are costly to collect, washing of the nests, speeding up the collection at the end of the layers. More chicken can be housed in a limited house, facilitating interior management and usually minimal labour cost.

Figure 2.2 : Battery Cages System

2.1.3 Furnished Cages

Furnished cages, also called 'enriched' or 'adjusted' cages are cages for egg laying built to allow the chicken to exercise their normal habits while maintaining their economic and husbandry advantages as well as some of the welfare benefits of non-cage systems. Many architectural elements of furniture cages have been introduced as studies into the field of animal protection have demonstrated that they benefit the chickens. Furnished cages allow the chicken more room than traditional battery cages, so that each bird can stretch its wings without touching each other.

Enrichment such as nesting rooms and dust baths is often offered such that birds may perform their normal habits such as sleeping and roosting as though they were outside. The result showed that enrichment of laying chicken cages makes the better bone quality. While the enriched housing scheme has benefits such as decreased hostility against each other and

healthier eggs, modern egg laying breeds also suffer from osteoporosis, which results in a weakening of the chickens' skeletal system.

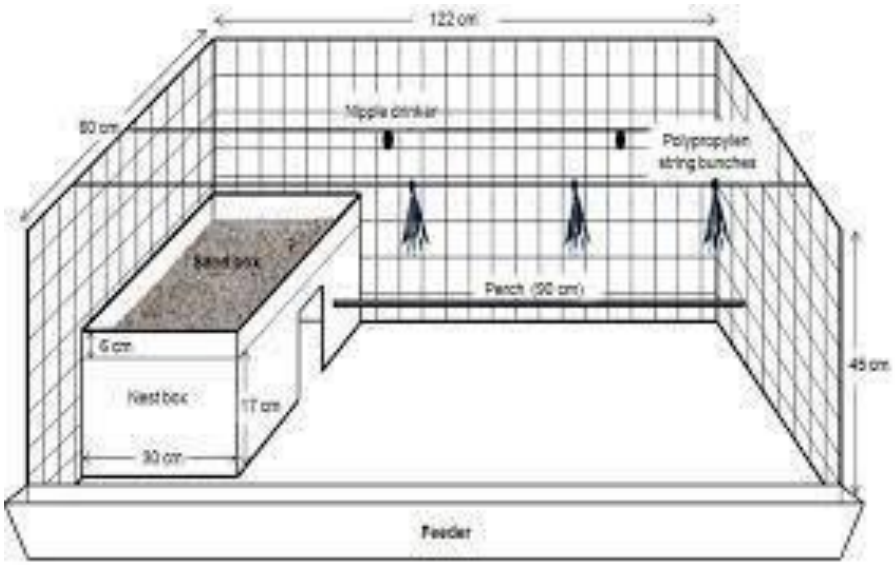

Figure 2.3: Furnished Cages System

2.2 Automatic Chicken Feeder

To develop or design this project it is very important for this project to accomplish it objectives to be able to understand the chicken feeding system in the industry. Based on the previous research on automatic chicken feeder, the main reason this system was invented for the purpose of helping poultry farmers to minimize their energy and reduce a labour cost. Automatic chicken feeder system is an electronic tool or machine that was created to contributed the accurate or right amount of food container at the same time. This project also showed the capability to fill the food or water container in repeating the task daily and accurately. Going at the general components of most automated chicken feeder system, the main components that need to study are the controller, feeder mechanism and servo motor. While some an automatic chicken feeders also implement sensor as feedback system and user interface as display unit, keypad as additional functions and enhancements to the basic automatic chicken feeder system.

Nowadays, this automatic chicken feeder would give it owner money under a variety conditions. The advantages of automated feeding are numerous when performing the food. Any feeder can manage all of these feeds and run them efficiently with the help of used material. This project will contributed the amount of feed supplied by the system to a flock

can be adjustable or regulated. Another control is it provides a timer which may turn the machine on or off while no man power in the chicken coop. the most common error committed by the chicken breeder is to overfeed the chicken and vice versa where the chicken breeder is too frightened to overfeed the chicken which has contributed to starvation and bad health. Therefore, the amount of chicken food is important and this element in the feeder system is highly emphasized for this project.

According to (Soh *et al.*, 2018), people used the traditional way of feeding chicken before this Automatic Feeder system was invented which is by filling containers with grains and feeds manually. In this method, business owner need to be careful about the food left in the cage and feed the chickens in a timely manner to prevent chicken growth disrupted. Therefore, this is difficult for poultry farmers to run their business efficiently as they need to be around the cages now and then monitoring the poultry. Timing and precision are the keys to make the chicken growth more productive. The benefit of an automatic chicken feeder is in terms of costs to the poultry business owner who will have a more accurate and reliable of feeding system.

2.2.1 MCU Based Solar Powered Chicken Feeder

According to (Reyes *et al.*, 2015), poultry industry became a high potential industry particularly in Batangas Province. The system of feeding chicken must be taken into account, as chicken must be fed frequently to be more competitive. In addition, aspects of energy consumption in the industry also need to be emphasized. Elenor also reported that electricity consumption is the most commonly energy used in the industry nowadays. There are numerous energy sources that can be transformed to electrical energy, such as water turbine for hydro, piezoelectric sensor for piezo energy and solar panel for solar energy. This entire device can convert to electric energy. Based on