DESIGN AND DEVELOPMENT OF SMART POULTRY HOUSE AND EGGS CLEANING SYSTEMS

Ahmad Hafizuddin Bin Zakaria

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A SMART POULTRY HOUSE AND EGGS CLEANING SYSTEM

AHMAD HAFIZUDDIN BIN ZAKARIA

This report is submitted in partial fulfillment of requirement for the degree

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"I hereby declared that I have read through this report entitle "Design And Development of Smart Poultry House and Egg Cleaning Systems" and found that it has comply the partial fulfillment for awarding he degree of Bachelor of Mechatronic Engineering"

Signature : .....

MASLAN BIN ZAINON
Lecturer
Faculty of Electrical Engineering
Universiti Teknikal Malaysia Melaka

Supervisor's Name :

Date : 13/5/2009

I declared that this report entitle *"Design And Development of Smart Poultry House and Egg Cleaning Systems"* is the result of my own research as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature	:	.....
Name	:	AHMAD HAFIZUDDIN B. ZAKARIA
Date	:	13/5/2009

DEDICATION

"For my beloved mother, Noorayah Bte Jais and family"

ACKNOWLEDGEMENT

First of all, I would like to express my grateful to Allah S.W.T. because the goodness that gives me strength in order to complete my project. I have successfully finished my PSM project even though I have to gone though many difficulties during the process to complete the project. I would like to say special thank to my parent because of their support in term of financial and advice.

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ABSTRACT

Nowadays, in conventional livestock farming system, the product from the egg is still process in a manually method. This is the one development system that helps to the small and medium farmer's towards technology and swaps the conventional method to automated method. In this project, there are two automated systems is based on the egg production. Both of the systems is grading system and storing system. The whole systems use the PLC as a controller to move the part in this system smoothly. From the beginning, the egg is entering to the container before roll over to the grading process. The container is angular about two to ten degrees to make sure the egg can rollover. Then, the egg is grade to the size and its weight by the mechanical mechanism into three raise sections, which is small, medium and large. It is used the PLC application as a main controller to make the entire of the system is functioning smoothly. Then the egg is storing to the tray by the storing process. In the storing process, there is a one mechanical arm as function as store the egg. This project will be hope can help the small and medium farmer in developing the egg grading system for their egg production and can expose the student about the automation technology today.

ABSTRAK

Sehingga kini, kebanyakan sistem perladangan ternakan dalam negara yang menghasilkan produk berasaskan telur masih lagi di proses secara kaedah manual. Projek ini adalah satu sistem pembangunan untuk pekebun kecil dan sederhana ke arah teknologi yang dijangka dapat menukarkan kaedah perladangan lazim kepada kaedah perladangan secara automasi. Projek ini mempunyai dua sistem automasi iaitu sistem penggredan dan storan. Aplikasi peranti PLC digunakan sebagai penggerak utama untuk mengoperasikan keseluruhan projek ini dengan lancar. Permulaan proses apabila telur yang berada di dalam bekas yang condong bergolek untuk dihantar ke proses penggredan. Bekas adalah bersudut antara dua ke sepuluh darjah untuk memastikan telur dapat bergolek. Telur kemudiannya di gredkan diproses penggredan. Proses penggredan mempunyai mekanisma mekanikal yang digerakkan oleh motor yang dapat mengasingkan telur mengikut saiz dan grednya. Telur akan digredkan kepada 3 bahagian iaitu kecil, sederhana dan besar. Telur kemudian bergolek ke dalam saluran yang akan menghantar telur ke bahagian untuk proses penyimpanan ke dalam bekas telur. Proses penyimpanan telur mempunyai satu bahagian lengan mekanikal yang menggunakan kaedah secara gelungsuran. Sistem pneumatik digunakan untuk menyedut telur untuk disimpan ke dalam bekas telur. Projek ini diharap dapat membantu menggantikan sistem yang sedia ada untuk proses penggredan telur di Malaysia bagi membantu peladang kecil dan sederhana untuk mengurangkan kos dan dapat mendedahkan pelajar tentang teknologi automasi yang digunakan pada hari ini.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FLOW CHARTS

LIST OF FIGURES

LIST OF APPENDIX

CHAPTER 1

INTRODUCTION

This chapter will explain about the objective, problem statement and scope of the project.

1.1 Introduction

In today modern world, all industrial and farming sectors must operate faster, more efficient, and with more flexibility than ever before due to increasing of consumer needs. Industrial automation or numerical control is the use of control system such as computers or PLC to control industrial and farming machinery or process. Currently, all technologies that have been use increase day by day and it is important to fulfill the production needs. There are great benefits in observing a PLC program during the start-up and testing phase.

1.2 Project Overview

This project is about design and construction of an automated system for a smart poultry house and eggs cleaning system. The task starts from research, the development execution and end with the analysis of the project. The main function of this project is to prepare the best place for hen or chicken in order to produce more quality eggs and increase this productivity. It consist of a complete system such as conveyor for eggs movement from section to another section and filthy cleaning system, feeding mechanism, drinking water system, eggs cleaning system, and temperature control system. This system start from temperature controller operation to control the poultry temperature in order to get the ideal temperature range for hen or chicken, the feeding

mechanism and conveyor movement for filthy cleaning process will be move base onset up time and lastly eggs will load into conveyor for cleaning process. Standard parts like PLC, power window motor, various types of switch, DC solenoid valve, various types of sensors, and other part of standard actuator will be used in this project. The whole project will drawn using the Solid Work version 2007. The outcome of this project includes hardware and software program that will fulfill the requirement for PSM.

1.3 Project Objective

There are four objectives that must be archive in this project and that is:

1. To design a prototype of smart poultry house in small scale.
2. To make a low cost smart poultry house that suitable for small scale.
3. To apply PLC as the main controller in the system.
4. To integrate the combination of mechanical and electrical system.

1.4 Project Scope

1. Design a smart poultry house for small scale farm.
2. The use of Programmable Logic Controller (PLC) to control the whole system.
3. The use of conveyor system to handle the product (eggs) movement.

1.5 Problem Statement

In conventional poultry house they just used man power to give the chicken or hen feeding and drinking water, by using too much man power can increase the farm financing that can cause management problem. Other problem is collecting and cleaning eggs usually take a lot of time to do it because human cannot work short in time, and in feeding and supply drinking water system to chicken and hen by using man power can cause a problem if the worker forget to make it in time.

CHAPTER 2

LITERATURE REVIEW

Chapter 2 present the supporting information related to the project.

2.1 Visit at LTK Melaka

LTK (Melaka) Sdn Bhd was incorporated on 16th October 1986. The principal activities of the company are the operation of a fully integrated poultry farm for the production and sales of chicken eggs. Whereas, its wholly owned subsidiary, LTK Bio-fer Sdn Bhd, is involved in manufacturing and marketing of organic fertilizers. LTK (Melaka) Sdn Bhd are one of the leading chicken eggs producer in Malaysia with more than 20 years of track record. Currently, the LTK producing 1 million eggs a day supplying throughout Malaysia. The LTK also export to Singapore. Besides regular farm fresh eggs, the company has entered into a technology licensing agreement with Marditech Corporation Sdn Bhd. With a large land bank located at Durian Tunggal District, Malacca, Malaysia, the farm presently accommodates 1.5 million birds housed in fully automatic cages. In addition, located in the farm includes a 5,000MT (per month) capacity feed mill plant, 2 egg-grading houses (equipped with Modern grading machines), dung house, 10 fertilizer processing plants and an office block.

Introduced to Mr. Nazridatul Faizal Bin Mohd Kasim as the LTK charge man. Visited at the whole farm and introduced to the technologies that had been used in that farm. They used the conveyor system to collect the eggs from 10 connected poultry house that controlled by PLC control system as showed in figure 2.0.

Figure 2.0: The eggs collector section.

In order to get the quality omega 3 eggs they used a mixture ingredients like volcanic ash, special palm oil from Latin America and soy been to produce a hen food. They used a feeding machine to feed their hen base on time that had been set up and for the drinking water system they used the nipple system, figure 2.1 showed that feeding mechanism during its operation and figure 2.2 showed the position of nipple system in poultry house.

Figure 2.1: Feeding machine.

Figure 2.2: Drinking water system.

To get an ideal temperature in their poultry house they used the heater and the ventilation fan as shown in figure 2.3 and 2.4.

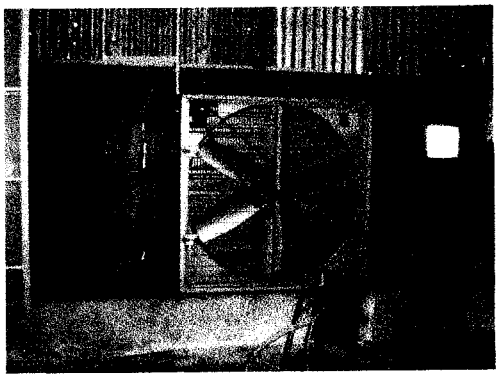

Figure 2.3: Poultry house ventalation fan.

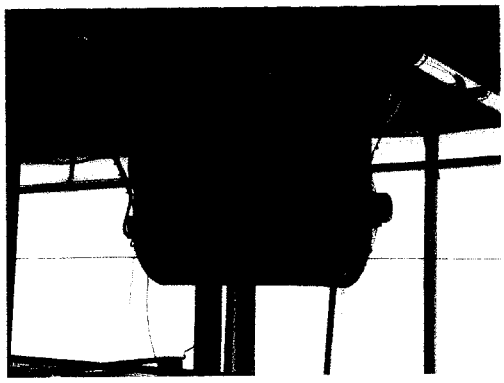

Figure 2.4: Poultry house heater.

2.2 Range Poultry Housing

(By Robert Plamondon, Edited by Anne Fanatico and Richard Earles NCAT Agriculture Specialists June 2003)

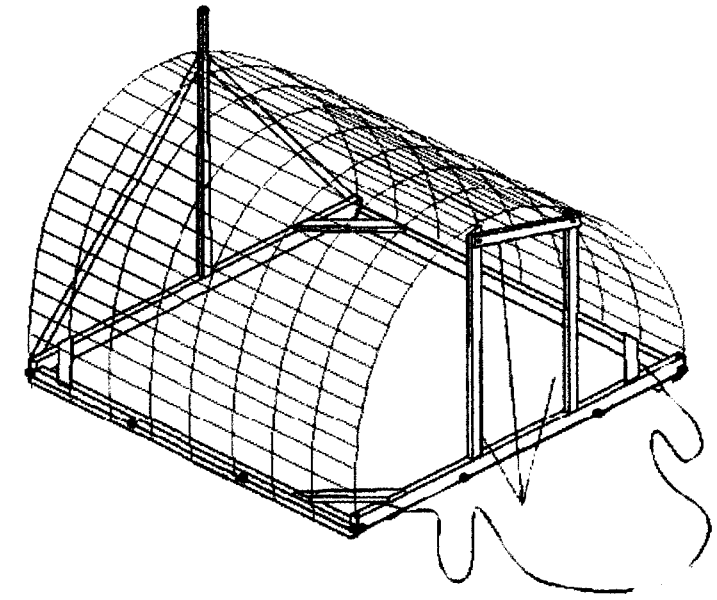

Figure 2.5: Poultry housing.

Houses designed to be moved with a tractor or four-wheel-drive vehicle can be made larger, stronger, heavier, more durable, and with more interior features than a hand-movable pen. A machine-portable house is basically a building on skids. The methods of construction vary. Some people build greenhouses on skids. Some build tents on skids. This house build sheds on skids, with wooden frames, plywood sides, and metal roofs. It is possible to put houses on wheels rather than skids, but this complicates the design if don't have a suitable trailer or wagon already. A wheeled house can roll downhill when don't want it to, while a house on skids stays where you put it. Any tractor can pull quite a large skid-mounted house. Dragging a skid mounted house across a pasture doesn't damage the turf. The Salatin method of pasture pen confinement does not work well with machine-portable housing. Moving a floorless pen with the birds inside must be done carefully and gently, which is hard to do with a tractor. Because of this, machine-portable housing inevitably involves a management system that gives the bird's access to the outdoors. If the house is floorless, the birds must be shooed outside before the house can be moved safely. If it has a floor, the house can be moved with the birds inside, but the

presence of the floor means that their only access to forage is outdoors. Either way, outdoor access becomes necessary. Once the chickens have access to the outdoors, the advantage of the daily move is reduced, since the chickens do not run out of forage so quickly. Joel Salatin keeps a flock of 1,000 hens in a single large hoop house, which he moves every three days. I keep 700 hens in 14 small colony houses, which will be move every three months. To give the chicken's outdoor access, the house needs pop-holes (chicken-sized doorways) in general, the more, the better. If the pop-holes are too narrow or too few in number, chickens who want to go in and out will be blocked by others lounging around in the doorway. Also, high-traffic areas lead to unnecessary mud and manure build-up. These machine-portable houses are open for at least half their full width four feet of doorway for fifty chickens like showed in figure 2.5.

2.3 Manure Belt Cage.

(By Mike Krehl, Product Manager, Egg Production Systems)

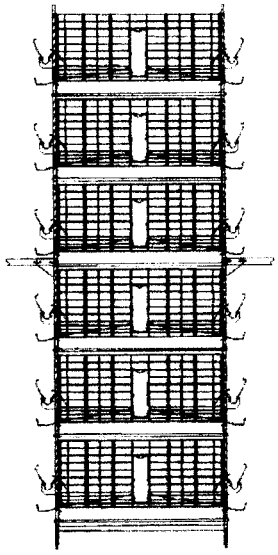

Figure 2.6: Manure belt cage.

The manure belt system as showed in figure 2.6 was also simplified by using roll-formed technology to eliminate left-hand and right-hand manure belt rails. The load side of the manure belt rests on round metal supports that are strong and easy to manufacture and install. The return side rides on the partitions and serves as the top of each cage. The manure belt drive system uses a single motor drive for each tier that allows customers to pull each belt separately or to move multiple tiers at once. The drive unit uses the Chore-Time gearbox, which is the same gearbox used on ULTRA-LIFT XL egg collector. This requires less service and inventory, and allows for greater versatility in case of emergency. For those customers requiring dryer manure, a new air tube was designed with 10 percent more volume than any on the market. By using a unique manufacturing technique, the air tubes are shipped flat, saving over 30 percent in shipping costs, then, as the cages are built, the air tube is expanded and installed through each partition. The cage partition supports the air tube at the correct height above the manure belt to give the best air drying of the manure possible. Another feature of the air tube is that a drip trough was designed into the air tube to catch any stray water from the nipple drinkers. Again, this saves on cost and assembly.

2.4 Eggs-rolling cage bottom wire mesh

(Willis R. Voran Zeeland, Mich)

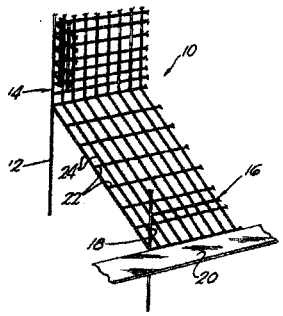

Figure 2.7: Rolling cage buttom wire mesh.

This invention provide a wire mesh for an eggs rolling cage bottom which will not only not trap an egg but will also allow the dropping to pass to the floor. This is accomplishing by constructing the mesh so that it is approximately 3 to 4 inches × 2 inches. Accordingly, it is an object of this invention to provide an egg rolling cage bottom mesh which does not trap an egg rolling thereon regardless of the orientation of the eggs in figure 2.7 showed that the rolling cage bottom wire mesh has design a little bit tilt, it is a further object of the invention to provide a mesh of the above character which also allows droppings to pass freely to the floor. It is still another object to provide a mesh of the above character which will allow the egg to roll down at a slower speed.