AUTOMATIC CAT LITTERCABINET

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This report is submitted in partial fulfillment of the requirements for award of
Bachelorof Electronic Engineering (Industrial Electronics) With Honours.

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UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN
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**BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II**

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Dedicated to my beloved family especially my father and mother, lecture and also to all my friends.

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Praise and very grateful to ALLAH S.W.T, with overflow grace, he gave me a good physical and mental strength to carry on my final year project up to completion.Here I express thousandth infinite gratitude and thanks to my supervisor PnYusmarnitaBintiYusop for her support, guidance, sharing opinion and unfailing patience throughout the project duration and spent a lot of time weekly to for making discussion on the project which I have completed.. I have learned a lot under her guidance, be it practically or theoretically.Other that, a lot of thanks and grateful to my parents and to all my friends that's helps me by giving an opinion along of this project implementation.

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ABSTRACT

Automatic Cat Litter Cabinet is a project that will help cat breeders to solve the main problem of cats that are often encountered by them in terms of work cleaning the cat feces. The focus of this project is focused on all cat breeders, particularly those living in housing areas. Until now the problem is a burden for cat breeders where they are forced to work cleaning the house every day to ensure they are clean and odorless. Therefore, cat breeders have spent a lot of time, energy and money. Automatic Cat Litter Cabinet is kind of automatic cleaning machines that are designed for cat breeders to do the cleaning job without need them to used a lot of energies. This project uses infrared sensor device to detect the presence of cats as an input signal and send the data to the PIC microcontroller. This microcontroller is used in order to give the instructions to do the cleaning process and also use to give notice to the user about the process of being done. With this, all the cleaning work is no longer a burden for cat breeders and it can help the breeders to save time, money, energy and maintain maximum cleaning homes and neighborhoods.

ABSTRAK

Automatic Cat Litter Cabinet merupakan satu projek yang akan membantu para penternak kucing untuk menyelesaika nmasalah utama yang sering dihadapi oleh mereka iaitu kerja-kerja membersihkan hasil buangan kucing. Fokus projekini adalah tertumpu kepada semua penternak kucing terutamanya kepada mereka yang tinggal di kawasan taman perumahan. Sehinggakini masalah ini menjadi beban keapada penternak kucing dimana mereka terpaksa melakukan kerja-kerja pembersihan setiap hari untuk memastikan rumah mereka bersih dan tidak berbau. Olehitu, penternak kucing terpksa banyak menghabiskanmasa, tenaga dan wang. Automatic Cat Litter Cabinet merupakan sejenis mesin pencuci automatik yang dicipta khas untuk para penternak kucing membersihkan hasil buangan binatang kesayangan mereka tanpa mengunakan tenaga yang banyak serta dapat menjimatkan wang. Projek ini menggunakan peranti pengesan infrared untuk mengesan kehadiran kucing sebagai isyarat masukan dan akan menghatar data kepada PIC microcontroller untuk memberikan arahan pembersihan serta memberi notis kepada pengguna berdasarkan proses yang sedang dilakukan. Dengan ini, segala kerja pembersihan tidak lagi menjadi beban kepada penternak kucing serta dapat membantu menjimat kan masa, wang, tenaga dan mengekalkan tahap kebersihan maksima rumah kediaman serta kawasan kejiranan.

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LIST OF ABBREVIATION

ACLC   -   Automatic Cat Litter Cabinet

PIC   -   Programmable Integrated Circuit

RISC   -   Reduced Instruction Set Computer

VI   -   Virtual Instrument

ADC   -   Analog-to-Digital Converter

PIC   -   Programmable Integrated Circuit

ROM   -   Read Only Memory

IR   -   Infrared

LCD   -   Liquid Crystal Display

VSM   -   Virtual System Modelling

LED   -   Light Emitting Diode

FYP   -   Final Year Project

LIST OF APPENDIX

NO   TITLE

A   PIC16F877A DATA SHEET

B   L293D DATA SHEET

C   SPG30 DC GEARED MOTOR SPEC

D   LM555TIMER DATA SHEET

E   HD44780 LCD DATA SHEET

CHAPTER I

INTRODUCTION

This chapter explains the introduction to how the idea of this project is generated. The chapter contains introduction, objective, problem statement, scopes of work and the methodology of the project.

1.1   Introduction

A litter box, sometimes called a sand box, litter tray, litter pan, cat box, or cat box, is an indoor feces and urine disposal box for cats that are permitted free roam of a home but who cannot or do not always go outside to relieve themselves. Many owners of these animals prefer not to let them roam outside for fear that they might succumb to the elements or get hit by a car, so a cat litter box makes it possible to shelter pets from these risks.

In the wild, cats naturally excrete in soft or sandy soil for easy burial. To simulate this instinctive desire, a litter box's bottom is filled typically with an inch or more of cat litter. Litter box filler is a loose, granular material that absorbs moisture and odors such as ammonia. Some litter brands contain baking soda, to absorb such odors.

The litter material also satisfies a cat's instinctive desire to use an easily-dug material. The most common material is clay, although recycled paper "pellets" and

silicon based "crystal" variants are also used. Most of Malaysian's cat breeders today usually use the litter box that is always to ensure the health of their cats in good condition while maintaining the cleanliness of their home. However, the use of litter box is still not so efficient as to remove excrement left by cats where they are required to manually scoop the feces for disposal. This process is a waste of time and increased strain because of this process should be done twice a day at least to ensure their home is free of odor and bacterial infections.So, Automatic Cat Litter Cabinet introduced to facilitate the process of feces disposal where it is a burden to the cat breeders in their daily lives.

The project presents the design of an automatically cat feces disposal system develops with electronics programming applications. The project consist a several general elements which is IR Sensor Object Detection, PIC16f877A Microcontroller, LM7805 Voltage Regulator, L293D Motor Controller, DC Geared Motor and HD44780LCD displays. The block diagram of the system as shown as below:
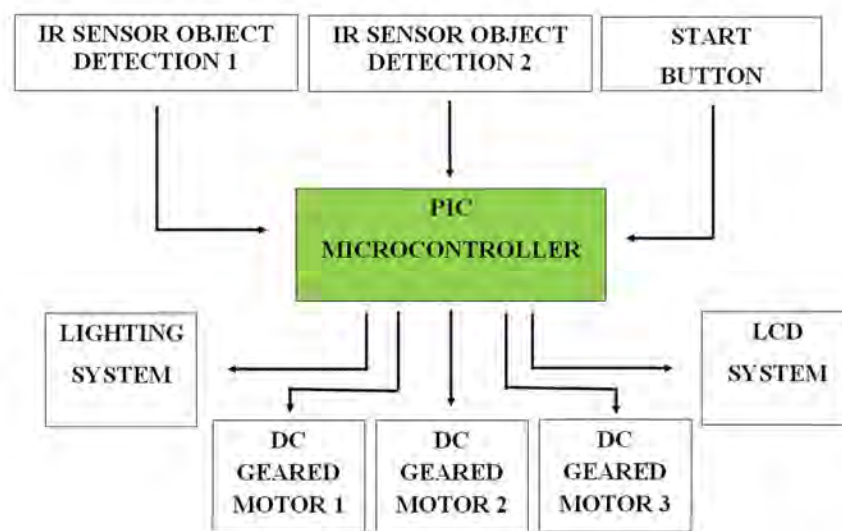
Figure 1.1: System Block Diagram

The use of an IR sensor 1is to detect the presence of a cat as soon as it enters the cabinet. Here, the output signal from the IR Sensor 1 is used as an input signal to the PIC16F877A. By using a program that specifically designed according to application of this system,the output signal from the PIC first of all is used to turn the lights installed in this cabinet and switch on the IR sensor 2 at the same time. The IR

Sensor 2 is use to detect the cat and send the signal to PIC for switch off the lights after it left the cabinet. After a certain time, PIC will switch on all the dc geared a motor which is arm robotic to dispose the feces from the box and placed it into the plastic bag within the cabinet. LCD system is used for user's information notification during the disposing process.

1.2   Project Objective

The main purposed of this project is to design and implement an Automatic Cat Litter Cabinet in real-time. There are several objectives required for bring this project to success which is listed as below:

- To design an automatic cat feces disposing system that used IR sensor applications, PIC programming and LCD system.
- To develop a programming by using CCS compiler according the system requirements.
- To interface with hardware prototype and front panel CCS compiler.
- To develop indicator system with LCD applications.
- To ease the breeders for disposing the feces from litter box. In another work, to create an automatic cleaner machine for cat feces disposing.

1.3   Problem Statement

The veterinarians always recommend for the health of the breeders and the cats, it is necessary for the breeders disposing the feces from the litter box every days. There have a several problems that occur through this disposing process such as:

- It is a waste of time because breeders need to clean the feces two times per days at least.
- As a routine job for breeders every day.
- Waste energies for breeders because the cleaning process is simply not practical.

◈ It use a lot of money to buy the litter incase the breeders leave over the litter box.

1.4   Scope of Project

The scope of work for the project primarily covered on the several parts which are PIC16F877A Microcontroller, Proteus Circuit Designing & Simulation, CCS Compiler, IR Sensor Circuit designingand hardware modeling implementation.

◈ **PIC16F877A Microcontroller**

Basically, microcontroller is a computer system that is fabricated in a single integrated chip. A microcontroller chip consists of Central Processing Unit (CPU) memory modules and several input/output peripherals. The microcontroller is use as a device that can form the basis of an embedded system for electronics applications which is suitable for this Automatic Cat Litter Cabinet project.

◈ **Proteus Circuit Designing & Simulation**

Simulation software that allows the designer to design and simulate the designing circuit base on project requirements applications.

◈ **CCS Compiler**

The CCS compiler was developing exclusively for the PIC microcontroller and provide with generouslibrary of built-in functions; preprocessor commands and ready to run the example programs to quickly jump start any project. This software application will be use together with Proteus Circuit Designing software in order to develop the requirement of the electronics circuits.

◈ **IR Sensor Circuit Designing**

The infrared beam from IR sensor is use to monitor the cat entrance area. When the beam is blocked by the cat, the IR sensor will send the signal to 5V Relays switching circuit. Because the signal from IR sensor only

1.7V to 1.9V approximately, the 5v relays switching circuit is used to produce the 5v output signal as an input for PIC microcontroller. The IR beam is very strong and it use 12VDC supply to power the system. For powering the both unit, one power supply is needs to be used. The relays in this system are rated to switch mains voltages. The circuit is constructed on single-sided printed circuit board.

◈ **Hardware Modeling Implementation**
The idea is to design the automatic disposing system by modified the manual cat litter into the cabinet. All suitable requirements will be attached and implements to create a simple shape of this project.

1.5   Report Structure

This section describes the overall structure of the report contains a summary of each chapter contained in this report. It consists of five chapters. The following is a description of each chapter that has been described.

◈ Chapter I : Introduction
This first chapter is more on the general overview of the project. In this chapter, the background of the problem and the emergence of the project are stated first. Besides, the project objectives, scope of project and the methods used are also included.

◈ Chapter II : Literature Review
The second chapter discusses the background of study related to the project. The chapter consists of the evidence with the broad (e.g. books, internet, lecture notes etc) and focus areas of the study. In this chapter, the trend, direction and research issues are also identified.

◈ Chapter III : Project Methodology
In project methodology, the materials, subjects, and equipment or apparatus used are identified. Besides, the methods or procedures during the project

implementation are also stated. Insufficient, the justification for choosing the method or approach is also stated.

◆ Chapter IV : Results and Discussion

In this chapter, the observation and result obtained from the data analysis are presented. The project discovery is arranged tidily using the aid of figures and tables. The result is discussed and all problems that occur during the implementation are explained.

◆ Chapter V : Conclusion and Recommendation

The conclusion part is about the summarization of main findings of the projects. A brief recommendation for future study is stated at the recommendation part.

◆ References

Listed all the sources cited list of sources cited (referred to) during the implementation of this project.

◆ Appendices

Maps, charts, tables, lists, diagrams, and/or other explanatory sections regarding to the project.

CHAPTER II

LITERATURE REVIEW

The chapter explains all the specification areas use to generate the result regarding project background study along with the literature review and documented about the theoretical concept applied. Literature reviews are based in information obtained from valid sources such as books, articles of relevance, published paper or any other source deemed appropriate.

2.1   Introduction

A literature review is use to discuss the published information in a particular subject area, and sometimes information in a particular subject area within a certain time period.A literature review can be just a simple summary of the sources, but it usually has an organizational pattern and combines both summary and synthesis according the research. A summary is a recap of the important information of the source, but a synthesis is a re-organization of that information. It might give a new interpretation of old material and depending on the situation; the literature review may evaluate the sources and advise the reader on the most pertinent or relevant.

2.2   Cat Litter Box

Cat litter is the material that uses by the breeders as a place for cats to disposes their feces. Within Malaysia, it has been estimate that the use of cat litter is very well received among cat breeders, especially those living in cities neighborhood areas. The process is simple; users need to fill the litter in the box or basin for cat to use and leave it. At a specific time, the breeders need to dispose the feces by scooping the feces manually. A litter box, sometimes called a sandbox, sand box, litter tray, litter pan, cat box, or cat box, is an indoor feces and urine disposal box for cats that are permitted free roam of a home but who cannot or do not always go outside to relieve themselves [1]. Many owners of these animals prefer not to let them roam outside for fear that they might succumb to the elements or get hit by a car, so a cat litter box makes it possible to shelter pets from these risks [1].

The litter material also satisfies a cat's instinctive desire to use an easily-dug material. The most common material is clay, although recycled paper "pellets" and silicon based "crystal" variants are also used.Originally the cat box today is typically plastic tray with outwardly-sloped sides at several inches high. More elaborate models are covered, similar to pet carrying cages with open doorways, providing some allegedly-desired privacy to the pet, as well as keeping the litter out of sight [1]. To facilitate emptying and cleaning a litter box, plastic liners are be used and some have a handle so they can be moved easily.

Figure 2.1: A Basic Litter Box and a Bag of Litter