

THE NEW INVENTION OF ELECTROMECHANICAL DUSTBIN

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DEDICATION

*For my beloved mother, Mahani Binti Ismail and my father,
Mohd Shuhari Bin Sukarman.*

ACKNOWLEDGEMENT

Assalamualaikum Warahmatullahi Wabarakatuh,

Praise to Allah s.w.t the All Mighty that gives me the strength and His blessing to complete my Bachelor Degree Project 2 (PSM2) and my report without any problem. It is difficult to finish this PSM2 without His help.

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ABSTRACT

The objective for this project is to produce and analysis an 'Electromechanical Dustbin' which has the function to easy the waste maintenance collects the garbage. The other alternative of the product is to avoid the air pollution with this product will solve the smelling problem that occur from the old rubbish because it is user friendly and will help user to protect our environmental pollution by using the highly reliable electrical and mechanical actuator. This electromechanical dustbin is a new invention that controlled automatically by using microcontroller (PIC). This dustbin is design with safety characteristic which is has strength product when the load has form to the product. For ensure the product has an achievement, several analysis should be perform. Other than that, case study for the previous product had been finish for search the early information about ability and potential of previous dustbin and result from the research and analysis will be used for guideline to develop new product and to proof for this thesis.

ABSTRAK

Objektif utama untuk projek ini adalah bagi merekacipta dan menganalisis sebuah 'Electromechanical Dustbin' yang mempunyai fungsi untuk memudahkan penyelenggaraan bahan buangan iaitu sampah sarap. Alternatif lain produk ini adalah bagi mengelakkan pencemaran udara dimana produk ini akan menyelesaikan masalah berbau yang berlaku daripada sampah lama kerana produk ini adalah lebih mesra pengguna dan akan membantu pengguna untuk melindungi diri kita dari pencemaran alam sekitar dengan menggunakan komponen elektrik dan mekanikal yang mempunyai kebolehupayaan tinggi. Tong sampah elektromekanikal ini adalah satu rekaan baru yang dikawal secara automatik dengan menggunakan mikropengawal (PIC). Tong sampah ini adalah direka bentuk dengan ciri keselamatan yang tinggi serta mempunyai produk kekuatan apabila muatan telah bentuk untuk produk. Untuk memastikan produk mempunyai satu pencapaian, beberapa analisis telah dijalankan. Selain itu, kajian terhadap produk terdahulu telah dilakukan untuk mengatasi kelemahannya. Maklumat yang diperolehi akan membantu dalam menghasilkan tong sampah yang berpotensi serta daripada penyelidikan dan analisis itu akan digunakan untuk sebagai garis panduan untuk membangunkan produk baru bagi membuktikan tesis ini.

TABLE OF CONTENT

CHAPTER	CONTENT	PAGE
	DECLARATION	ii
	ACKNOWLEDGEMENT	v
	ABSTRACT	vi
	ABSTRAK	vii
	TABLE OF CONTENT	viii
	LIST OF TABLE	xi
	LIST OF FIGURE	xiii
1	INTRODUCTION	
	1.1 Introduction	1
	1.2 Objective	2
	1.3 Scope	2
	1.4 Problem Statement	2
2	LITERITURE REVIEW	
	2.1 Introduction	3
	2.2 First Review: Dustbin	3
	2.2.1 Indoor Bins	4
	2.2.2 Curbside Dustbin	5
	2.2.3 Public Area Dustbin	7
	2.3 Second Review: Dustbin Bag	8
	2.3.1 Biodegradable Plastic Bags	9
	2.4 Third Review: Recent Product Research	10
	2.4.1 Photoelectric Garbage Bin	10
	2.4.2 Device for Collecting and Confining Hospital and Household Waste	15
	2.4.3 Device for Disposing of Garbage	19

3	PROJECT THEORY AND BACKGROUND	
3.1	Introduction	21
3.2	Software Development and Implementation	21
3.2.1	Installing Software	22
3.2.2	Connecting the System	22
3.2.3	Starting the System with Micro-C	23
3.2.4	Bootloader	23
3.2.5	Serial I/O Pin out	27
3.3	Hardware Development and Implementation	28
3.3.1	Power Window Motor	28
3.3.2	Bearing	29
3.3.3	Conveyor Belt	31
3.3.4	DC Power Supply	32
3.4	Micro-C Programming	33
3.4.1	The Simplest Project in Micro-C for PIC	33
3.5	Bootloader	36
3.6	Project Background	38
4	METHODOLOGY	
4.1	Product Development	39
4.2	Design Phase	42
4.2.1	Concept Design	43
4.2.2	Configuration Design	44
4.2.3	Parametric Design	45
4.2.4	Design Detail	46
4.3	Material Selection	47
4.4	Embodiment Product	49
4.5	Project Flow Chart	50
4.6	Project Source Codes	52
4.7	Project Connection Diagram	55

5	RESULTS AND DISCUSSION	
5.1	Results	56
5.1.1	Project Sequent Figure	59
5.2	Analysis	61
5.3	Discussion	63
6	CONCLUSION AND RECOMMENDATION	
6.1	Conclusion	64
6.2	Recommendation	65
8	REFERENCES	66
9	APPENDIX	68

LIST OF FIGURE

NO	TITLE	PAGE
Figure 2.1	Indoor dustbins	5
Figure 2.2	Trash and recycling cans are often separated by type	6
Figure 2.3	A trash can at a park	7
Figure 2.4	Charred trash cans	7
Figure 2.5	An office waste paper bin	8
Figure 2.6	A typical black bin bag	9
Figure 2.7	A perspective fragmentary view of the present invention	12
Figure 2.8	An assembly and partly sectional view	12
Figure 2.9	A longitudinal section view there of; illustrating the motion of the movable cover board when the electric eye detects the approach of a hand	13
Figure 2.10	A longitudinal sectional view of an alternate form of the present invention	13
Figure 2.11	A side cut-away view of the apparatus	15
Figure 2.12	A diagonal view of the feed roller and heat seal assembly	15
Figure 2.13	A cross-section view of the feed roller drive mechanism	16
Figure 2.14	Cross sectional view	18
Figure 3.1	PIC target board connected to the PC	20
Figure 3.2	Micro-C compilers for PIC	21
Figure 3.3	PIC downloader	22
Figure 3.4	PIC board	23
Figure 3.5	PIC circuit diagram	23
Figure 3.6	Motor to be use	28
Figure 3.7	A four-point contact ball bearing	26
Figure 3.8	Animation of ball bearing	26
Figure 3.9	Flat belt	27
Figure 3.10	DC unregulated power supply	28

NO	TITLE	PAGE
Figure 3.11	The system diagram about dustbin operation	33
Figure 4.1	Previous product front views	35
Figure 4.2	Previous project inside view	35
Figure 4.3	Project progress flowchart	36
Figure 4.4	Design phase diagram	37
Figure 4.5	The material selection process for a new product or design	42
Figure 4.6	Previous product	44
Figure 4.7	Currently project and design invention	44
Figure 4.8	Project flow chart	45
Figure 4.9	Project connection diagram	49
Figure 5.1	Project layouts from top, front, side and 3D view	51
Figure 5.2	Project measurement layouts	51
Figure 5.3	Power window motor	54
Figure 5.4	Conveyor belt	54
Figure 5.5	Bearing	54
Figure 5.6	Wheel	55
Figure 5.7	Holder	55
Figure 5.8	Door clip	55

LIST OF TABLE

NO	TITLE	PAGE
Table 3.1	Serial I/O Pin out	24

CHAPTER 1

INTRODUCTION

1.1 Introduction

This project is aim to design and develop the “Electromechanical Dustbin”. This electromechanical dustbin is a new invention that is controlled automatically by using microcontroller (PIC). The advantages of this electromechanical dustbin are user friendly and in addition low maintenance where it can keep a lot of garbage inside it with is compare to the currently dustbin. This project is the combination of electrical and mechanical engineering field to represent the new invention which is regarding the design and development process. The software of the micro-C programming and PIC controller includes the electrical and mechanical actuators will be present as a result to achieve the objective of this project.

1.2 Objective

The project is aimed to meet the following objectives:

- Identify the design specification of previous and current product at the market.
- Design and fabricate the electromechanical dustbin with their function.

1.3 Scope of the Project

The scope for this project is tried to design an invention of electromechanical dustbin that can be fully protected. This dustbin will be operated and controlled by using microcontroller (PIC). The most important thing is to study and understand how the PIC controller and micro-C programming can be operated. It also will upgrade the previous project to invent the new dustbin

1.4 Problem Statement

The high waste maintenance of using the current dustbin that to make sure the dustbin is always empty when it full with garbage. So this project will be controlled automatically by using microcontroller (PIC) to be low maintenance because it can keep a lot of garbage inside.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this project, the first process is to build up one model of dustbin with use Solidwork software. This design is covered from the frame work, motor, conveyor and several components. For this project, the material will be use for fabricated process which is different from the previous project. The material can be selected after make the analysis.

2.2 First Review: Dustbin

A dustbin more commonly in the world as a waste container, rubbish bin or simply bin which is usually made out of metal or plastic. Usually, there are many type of dustbin which we can see at our surrounding. They were come out with variable shape and design of dustbin. Other than that, they also common with many functions which related for the situation such as recycle waste management and consumer.

2.2.1 Indoor Bins

Place to leave hobos after you pee on them. Indoor bins are traditionally kept in the kitchen to dispose of culinary excess such as fruit peelings or food packets, although there are also wastepaper baskets or wastebaskets which are used in offices to dispose of waste paper and other office refuse. Sometimes a bin can simply be referred to as "the garbage" or "the trash", in an example of metonymy, such as when one might ask "*Where's the garbage?*" in an unfamiliar kitchen.



Figure 2.1: Indoor dustbin.

(Source: <http://en.wikipedia.org/wiki/Image:Bin.JPG>)

Most bins have lids on the top to seal in the odor that trash tends to emit. Though most have to be opened manually, indoor bins sometimes have pedals which open the lid when stepped on. Indoor bins are traditionally lined with bin bags, which keeps the bin itself clean, facilitates the removal of the garbage and allows disposal with minimal contact to the contents. A common practice is to place multiple bags in each bin once a day so that one can empty the container by removing the bag and not have to replace it, speeding up the process. Rubbish is usually kept in these receptacles until full, at which

point they are transferred via the aforementioned bin bags to an outside receptacle, or simply to the roadside.

2.2.2 Curbside Dustbins

The curbside dustbins usually consist of three types: trash cans (receptacles often made of tin, steel or plastic), Dumpsters (large receptacles similar to skips) and wheelie bins (light, usually plastic bins that are mobile). All of these are emptied by collectors, who will load the contents into a garbage truck and drive it to a landfill, incinerator or waste sorting facility to be disposed of.



Figure 2.2: Trash and recycling cans are often separated by type.

(Source: http://en.wikipedia.org/wiki/Image:Trash_cans_in_row.jpg)

In some areas there is also a recycling service, often with one or more dedicated bins (or in the UK boxes) intended to receive items that can be recycled into new products. These bins are separated into different categories (usually represented by colours) which determine what materials can be inserted into the bin. The most common materials used for recycling are paper, glass, metal, plastics and "green waste" (compostable material, either garden waste or food scraps or both). The contents of the bins are taken to a recycling plant to be processed, and there are various systems for recycling bin collection: single bin combined stream systems, multiple bin systems, and cyclic collections with different materials collected on different days.



Figure 2.3: A trash can at a park

(Source: http://en.wikipedia.org/wiki/Image:Trash_can.jpg)



Figure 2.4: Charred trash can

(Source: http://en.wikipedia.org/wiki/Image:Damaged_trash_can_%28prague%29.JPG)



Figure 2.5: An office waste paper bin

(Source: <http://en.wikipedia.org/wiki/Image:Wastepaperbin.jpg>)

2.2.3 Public Area Dustbin

Certain public areas such as parks have litter bins which are placed alongside paths frequently walked by visitors. This encourages people to avoid littering, which create an unhealthy and aesthetically unpleasant social environment.

Bins in outdoor locations or other busy public areas are usually mounted to the ground or wall. This discourages theft, and also reduces vandalism by making it harder for someone to physically move or maneuver the bins; to spill their contents on the ground for example, or to use the bin as a weapon.

In the past terrorists, they have left improvised explosive device in bins. The bomb is much less likely to be spotted than an unattended bag and the metal bins provide extra shrapnel that injures people nearby when it detonates. For this reason there are no bins in most railway stations, most airports, and many shopping centres in the United Kingdom, or if they are provided they are just a bin bag hanging from a metal

loop. Apartment buildings often have Dust chutes in which residents can dispose of their trash. These chutes usually lead to some large receptacle in the basement.

2.3 Second Review: Dustbin Bag



Figure 2.6: A typical black bin bag

(Source: http://en.wikipedia.org/wiki/Image:Garbage_bag.jpg)

A bin bag or bin liner or garbage bag, trash bag, or also can liner is a bag used to line the insides of waste containers to prevent the insides of the receptacle from becoming coated in waste material. Most bags nowadays are made out of plastic.

Plastic bags are a convenient and sanitary way of handling rubbish, and are widely used. Plastic rubbish bags are fairly lightweight and are particularly useful for messy or wet rubbish, as is commonly the case with food waste, and are also useful for wrapping up rubbish to minimize odor. Plastic bags are often used for lining litter or waste containers or bins. This serves to keep the container sanitary by avoiding container contact with the rubbish. After the bag in the container is filled with litter, the bag can be pulled out by its edges, closed, and tied with minimal contact with the waste matter.

Plastic bags for rubbish or litter are sold in a number of sizes at many other stores in packets or rolls of a few tens of bags. Wire twist ties are sometimes supplied for closing the bag once full. In the mid-1990s rubbish bags with draw strings for closure were introduced. Some bags have handles which may be tied, or holes through which the neck of the bag can be pulled. Most commonly, the rather soft, flexible plastic used to make rubbish bags is LDPE (Low Density Polyethylene) or, for strength, LLDPE (Linear Low Density Polyethylene). HDPE (High Density Polyethylene) is sometimes used.

Created in 1950, this invention can be attributed to Canadians Harry Wasylyk, Larry Hansen and Frank Plomp. In a recent special on CBC television, the green garbage bag ranked 36th among the top 50 Canadian inventions. Plastic bags can be incinerated with their contents in appropriate facilities for waste-to-energy conversion. They are stable and benign in sanitary landfills.

2.3.1 Biodegradable plastic bags

Some bags are made of biodegradable polythene film. These will decompose when exposed to air, sun, and moisture or submitted for composting. They do not readily decompose in a sealed landfill. They are also considered a possible contaminant to plastic recycling operations.

Oxo-biodegradable and other degradable plastic bags have certain useful applications when used as rubbish bags. Organic waste can be put into oxo-biodegradable plastic sacks and put straight into the composting plant, unopened, thus reducing smells, disease transmission by insects, and handling hazards. The resulting compost may be used by farmers and growers. Since oxo-biodegradable plastic (unlike

the starch-based alternative) releases its carbon slowly, it produces high quality compost. Oxo-biodegradable plastic does not degrade quickly in low temperature "windrow" composting, but it is suitable for "in-vessel" composting at the higher temperatures required by new animal by-products regulations. Oxo-biodegradable plastics become peroxidised and embrittled, and behave like natural waste. It is bio-assimilated by the same bacteria and fungi, which transform the degraded plastic products to cell biomass, like lignocellulosic materials. Oxo-biodegradable plastic is designed to fragment by a process which includes both photo-oxidation and thermo-oxidation, so it can degrade in the dark.

2.4 Third Review: Recent Product Research

U.S Patent mostly has made many products for the waste management. The products they produce are having variable function for many applications. Usually the application is for house, hospital, government building and public area. The product is depends to customer demand. This research is important to develop the new product. For this project, it only upgrades the old product to the high end look product. It also has to make the research to another invention for get the new idea for the movement and motion in the system and new design for the product. From the several journal and information which are in research, it has variable function for several applications. Other than word, dustbin also has their technology like other machine or component.

2.4.1 Photoelectric Garbage Bin

A photoelectric garbage bin, which includes a rectangular housing having an opening on its beveling upper portion covered by a pivotal cover board and defining there in a space for the setting there in of a dustbin. Through the detection of an electric

eye on the housing, a motor is driven to carry a rope pulley to take up or let off a rope, which extends from the rope pulley thorough an idle wheel to secured to the back side of the cover board, so as to drive the cover board to open the opening of the housing or permit two torsion spring to automatically turn the cover board back to original position to completely close up the opening of the housing.