

UNIVERSITI TEKNOLOGI MARA

**DESIGN AND FABRICATION OF AN
MANUAL MECHANICAL SWEEPER
FOR EFFICIENT FLOOR
CLEANING**

FARIZNIL SYAHMI BIN ESMALIZAM

Dissertation submitted in partial fulfillment
of the requirements for the degree of
Diploma
(Mechanical Engineering)

College of Engineering

Feb 2024

ABSTRACT

Broom is widely known as a cleaning tool that is used to sweep floors. It is frequently utilized along with a dustpan. Brooms were first created in 1797 by Levi Dickenson, a farmer from Hadley, Massachusetts. Brooms are widely used across the world in every household as they are easier to use for a quick clean up without the hassle of bringing out vacuum cleaner. However, despite there are still difficulties that could be faced to keep our place clean from dust or any dirt. The conventional broom requires us to have a dustpan to collect the dirt or debris, the dustpan could take some space to store and sometimes get in our way when we are sweeping. Hence, that is the reason why this project was carried out, which is to design and fabricate an ecofriendly mechanical sweeper. The expected result is a mechanical sweeper that should be easy to operate and maintain, yet capable of removing a wide variety of substances such as dirt, dust, and small debris.

ACKNOWLEDGEMENT

Firstly, I wish to thank God for giving me the opportunity to embark on my diploma and for completing this long and challenging journey successfully. I am appreciative of the support, motivation, and direction I have gotten from a higher force. I sincerely appreciate God for his divine favor, which I believe has been a major factor in leading me through this effort. My gratitude and thanks go to my supervisor, Mr. Zeno Michael, for helping me to succeed in this project, for his great mentoring and advice. His insights and constructive feedback have not only enriched my work but also contributed to my academic growth.

Finally, this dissertation is dedicated to my father and mother for the vision and determination to educate me. Their support throughout this journey has been my driving force behind my accomplishment. This piece of victory is dedicated to both of you. Alhamdulillah.

TABLE OF CONTENTS

	Page
CONFIRMATION BY SUPERVISOR	ii
AUTHOR'S DECLARATION	iii
ABSTRACT	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS	x
CHAPTER ONE: INTRODUCTION	11
1.1 Background of Study	11
1.2 Problem Statement	12
1.3 Objectives	12
1.4 Scope of Study	12
1.5 Significance of Study	13
CHAPTER TWO: LITERATURE REVIEW	14
2.1 Benchmarking/Comparison with Available Products	14
2.2 Review of Related Manufacturing Process	16
2.3 Patent and Intellectual Properties	19
2.4 Summary of Literature	22
CHAPTER THREE: METHODOLOGY	23
3.1 Overall Process Flow	23
3.2 Detail Drawing	25
3.3 Engineering Calculation and Analysis	32
3.4 Bill of Materials and Costing	34

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Broom is widely known as a cleaning tool that is used to sweep floors. It is frequently utilized along with a dustpan. Brooms were first created in 1797 by Levi Dickenson, a farmer from Hadley, Massachusetts, who created one for his wife out of sorghum [1]. Brooms are widely used across the world in every household as they are easier to use for a quick clean up without the hassle of bringing out vacuum cleaner and not to mention sweeping floor did not create loud sounds that may interrupt other people's peace. Brooms also are useful to sweep on a lot of floor surface whether it be a harsh or a smooth surface.

However, despite there are still difficulties that could be faced to keep our place clean from dust or any dirt. The conventional broom requires us to have a dustpan to collect the dirt or debris, the dustpan could take some space to store and sometimes get in our way when we are sweeping. For example, grit or dirt will drag across the floor because the broom just pushes the dirt inside the dustpan. Sweeping is also tiring especially if we are sweeping a large area and sweeping takes a lot of time to remove debris or dirt.

Currently there is an innovation in mechanically sweeper in the market some of the are electronically powered and some of the are mechanically operated. However, the design has a lot of flaws in terms of its reliability and longevity. They are limited to indoor purposes as a lot of them have a soft brush which is not suitable for outdoor cleaning. Some of the mechanically operated manual sweepers are not reliable as they are easy to break down due to low quality material. Some of them are electronically powered thus making them hard to maintain, especially when they break down.

The aim of this project is to enhance the reliability of the current design for broom and mechanical sweeper as a purpose to solve the challenges related to sweeping with a handheld broom on the market. This mechanical hand sweeper is cost effective and easy to operate.