UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN AND FABRICATE WHEELCHAIR LIFT CONTROL SYSTEM

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

by

MUHAMMAD IQBAL BIN MOHD SAAD

B071610865

930422055329

FACULTY OF MECHANICAL AND MANUFACTURING ENGINEERING TECHNOLOGY

2019

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

Tajuk: **Design and Fabricate Wheelchair Lift Control System**

Sesi Pengajian: **2019**

Saya **Muhammad Iqbal Bin Mohd Saad** mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **Sila tandakan (X)

☐	SULIT*	Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972.
☐	TERHAD*	Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan.
☒	TIDAK TERHAD	

Yang benar,

.....
MUHAMMAD IQBAL BIN MOHD SAAD

Alamat Tetap:
8212, Lorong Aman 4, Jln Kg Paya,
Batu 2, Jln Seremban, 71000,
Port Dickson, Negeri Sembilan

Tarikh:

Disahkan oleh penyelia:

.....
MOHD SULHAN BIN MOKHTAR

Cop Rasmi Penyelia

Tarikh:

*Jika Laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini perlu dikelaskan sebagai SULIT atau TERHAD.

DECLARATION

I hereby, declared this report entitled Design and Fabricate Wheelchair Lift Control System is the results of my own research except as cited in references.

Signature: .....

Author : MUHAMMAD IQBAL BIN MOHD SAAD

Date: 8 JANUARY 2020

APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Maintenance) with Honours. The member of the supervisory is as follow:

Signature: …….

Supervisor : MOHD SULHAN BIN MOKHTAR

ABSTRAK

Kerusi roda adalah kenderaan utama untuk orang kurang upaya, dan warga emas. Terdapat beberapa orang dari golongan tersebut yang tidak mahu menyusahkan orang di sekelilingnya untuk cuba menyimpan kerusi roda mereka di bonet kereta dengan sendirinya yang agak sukar bagi mereka disebabkan pergerakan mereka yang agak terhad. Di samping itu, golongan orang tua yang tidak mampu membongkok atau mengangkat benda berat akibat kesakitan tulang belakang yang disebabkan usia mereka semakin meningkat. Dengan reka bentuk pengangkat kerusi roda ini, sumber utama kuasa untuk mengerakan adalah sumber elektrik dimana mudah untuk didapati. Keunikan kerusi roda ini adalah mudah dikendalikan. selain itu ia juga direka dengan beban yang tidak terlalu berat untuk memudahkan pemindahan disimpan jika tidak digunakan. Perisian CATIA telah digunakan untuk mengendalikan analisis reka bentuk rangka kerusi roda ini. Dengan reka bentuk ini, dari segi kestabilan, ketinggian akan dianalisis untuk memastikan saiz yang dihasilkan tidak terlalu besar untuk diletakkan di dalam trunk kenderaan. Tujuan utama pengangkat kerusi roda ini adalah untuk membantu warga kurang upaya atau warga emas untuk mengangkat kerusi roda meraka untuk disimpan didalam bonet kenderaan.

ABSTRACT

Wheelchair is the main vehicle for disabled people, and elder's people to move from one place to another. There are some of those who do not want to disturb the people around it trying to keep their wheelchairs in the car bonnet by themselves which is quite difficult because of their limitation in movement. In addition, elderly people who are unable to bend or lift heavy objects due to back pain that cause by increasingly age-old. With the design of the wheelchair lift, the power source is able to facilitate mobility and easy availability. This uniqueness wheelchair lift is easy to control. Besides that it is also designed with a burden that is not too heavy to facilitate the transfer to be stored if not used. The CATIA software has been used to handle the analysis of the frame design of this wheelchair lifter. With this design, point in terms of stability, the height will be analyzed to ensure the size to be produced is not too large to be placed in the trunk of the vehicle. The purpose of this design to help disable and elder's people to lift their wheelchair in to car boot or vehicles trunk. This can help them do such an activity more easily.

DEDICATION

To my beloved parents,
Khairun Binti Ahmad and Saad Bin Hashim,
That always support, patience's and sacrifices shared to me.
To my honoured supervisor,
Mr Mohd Sulhan Bin Mokhtar and all UTeM Lecturers.
Lastly, I would like to thanks all people which contributes to my Bachelor Degree Project for their comments and suggestion, and also to my all friends that help me to.

ACKNOWLEDGEMENTS

First of all, Syukran to ALLAH S.W.T because without health, strength and perseverance that He gave to me, I would not able to complete this Final Year Project report. I have been wisely take an effort for this project to complete this thesis. I want to thank you to all people that has helped me out to accomplish this thesis. Without encourage from them, I won't able to complete this project. I would like to deepest appreciations to my supervisor Mr. Mohd Sulhan Bin Mokhtar for his continuous support of research and his motivation, suggestion and constant supervision as well. Without his guidance and persistent help, this project could not be successfully completed. I also want to thank you to my beloved parents, Khairun Binti Ahmad and Saad Bin Hashim that always give motivation, often pray to me, and positive vibes while carry out this project. Lastly, my big appreciation to my all fellow friends, BMMM,BMMA and BEEE students and to all people who directly or in directly helped me out in developing this project thesis. Once again thank you so much for all that support me.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF SYMBOL

N	-	Newton
Pa	-	Pascal
V	-	Volt

LIST OF ABBREVIATION

BMMM	-	Bachelor Mechanical Manufacturing Maintenance
BMMA	-	Bachelor Mechanical Manufacturing Automotive
BEEE	-	Bachelor Electric Electronic Industrial Electronic
CAD	-	Computer Aided Drawing
MIG	-	Metal Inert Gas
GMAW	-	Gas Metal Arc Welding
PbA	-	Lead Acid
NiMH	-	Nickel Metal Hydride
NiCad	-	Nickel Cadmium
AC	-	Alternate Current
DC	-	Direct Current
FYP	-	Final Year Project
BDP	-	Bachelor Degree Project

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter wrote the background of the problem statement and objectives to be achieved through the project. This chapter also provides a structure of the report that will describe generally about chapter division and related contents.

1.1 Background of study

Crane was created by Ancient Greece used to build big theaters, monuments and temples such as the Parthenon in Athens. The early Greek crane was driven by the power of a male or an animal to be operated like a donkey. Crane is known as a machine designed to lift or lower loads by moving horizontally. Crane priority is used to lift or lower heavy loads for one place to another. (Jeremy Miller, 2018)

Crane use one or more simple machines that create advantages of mechanical that can moves load beyond of capability of normal human. Crane are generally equipped with hoist rope, wire ropes or chains and sheaves. Commonly, crane employed in the transport industry for loading and unloading of freight. In construction, crane mainly use of the movement of material and also use for assembly of heavy equipment in manufacturing. (Jeremy Miller, 2018)

Disabilities is a term that covering impairments, activity limitations, and restriction participate. Problem in body or structure an activity restriction known as an

impairment that difficult encountered by an individual by carry out a project or action while a participation restriction. Those problem are known by an individual in involvement in life situations. Disability is not just about health but its complex phenomenon, reflecting the interaction between features of human body and society in which they live. Term of disability are usually an incapacity for exercise in all the legal right ordinarily possessed by person.

The main purpose of this lifter project to make the disabilities and eldest people to make them easier and convenient to lift their wheelchair in to trunk without any barriers. The disabilities and eldest people are less fortune which their health problem make them too hard to store into the vehicles boot or trunk. This wheelchair lift which design for help an elderly or disable people to lift their wheel chair into car boot or vehicles trunk. In addition, the source of energy that is use to move the lifter is from electrical power. This lifter is fully utilized by electrical power and move of the lifter up and down more easily. By using electric power only, it will not harmful to the environment which this lifter can be categorize as eco-friendly. Besides that, this lifter are low maintenance cost design that help reduce cost for maintenance time.

1.2 Problem Statement

A problem statement is a description of the issues that need to be addressed by a problem solving team and should be presented to them before it try to solve a problem. This project implement for the elderly or disable people to lift and to store wheel chair into car boot. The disable or elderly people have their own weakness which they cannot to lift up or pickup heavy object due to their limitation of capabilities.

In addition the lifter will help them to lift or store their wheel chair in car boot or trunk. Therefore, by using the electrical system, automatically this lifter can be classified as green product. The reason why this project implemented because there is problem that the disable and eldest people often an experience during they need to lift their wheelchair in car boot or vehicle trunk. Therefore the design of the lifter will help them for easy operation to make them easily used time by time. Besides that, the disabled and eldest people have their weaknesses at lower part of their body that make them limit in movement or bend over to lift an item.

1.3 Project Objective

Based on the introduction and problem statement above, the objective of this study are as below:

- To design wheelchair lift for elder and disable person.
- To fabricate and produce the design into the real product

1.4 Scope

The scope of wheelchair lift project are from the design of crane or hoist wheelchair for disable and eldest people. There are main section that should be reached for ensure the lifter project can works well. Overall, the scope of this project are can be describe as below:

- Specifically design for disable and elders people
- Using electrical power source for main operation.
- The wheelchair lifter only can operated one wheelchair only.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This section will discuss in detail about this project's theories and previous research. The review included from reference books, journals, discourses and assets from internet. This project will finalized based on the data that gain with specific goal to keep running as a manual for completing the project. Besides that, the approach that used in this project are also discussed. The review to be gathered each of the information or data that get from assortment of sources to get the best results for this project. By those information, it could be guarantees that the project are delivered by accomplish the target and working legitimately.

2.1 Fabrication

The fabrication of this project was done with the help of using CAD drawings. The welding process successfully done and carefully rechecked for any error or misleading in angle and straightness.

Metal fabrication are creation of metal structures process such as welding, cutting, bending and assembling process. The process involved of value added of machines, parts and structures from various raw materials. Usually based on design drawing or engineering drawing and awarded the contract, builds the product. The metal fabrication are start withdrawing by using precise dimensions and specification. Typical projects

include loose parts, structural frames for buildings, stairs and heavy equipment. Fabricated product may called a fabrication. Mostly fabrication shops and machine shop have overlapping capabilities but generally fabrication shop focused on metal preparation and assembly.

2.1.1 MIG Welding

MIG welding is an arc welding process which electrode solid wire continuous feed through the welding gun into weld pool by joining the two base material together. In fact, MIG stands for metal inert gas and also known as gas metal arc welding or GMAW in technical term name. A shielding gas are also sent through the welding gun and protect the weld pool from contamination as shown in Figure 2.1.

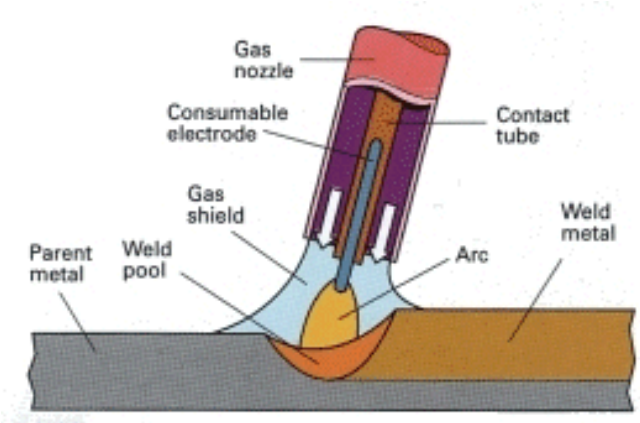

Figure 2.1: Mig welding weld pool process (TWI Global, 2016)

The significant result of MIG welding are adjustment in physical properties of the base material and weld because of the warmth connected to the combination zone. In 1940's the originally for welding aluminum was develop and for other ferrous materials, gas metal arc welding or GMAW was applied soon to steels because it provided more faster of time welding compared to the other welding process. (TWI Global, 2016)

Commonly the uses of semi inert gas in MIG welding are carbon dioxide (CO_2). Now day, GMAW are mostly used as common industrial welding process which preferred for its speed, versatility, and the relative ease of adapting the process to robotic automation. A related process, flux cored arc welding, often does not use a shielding gas, but instead employs an electrode wire that is hollow and filled with flux.

In this project, MIG welding was using to bonding two metals together at the original boundary surfaces. Two section that to be joined are melted together, heat or pressure that applied and with or without added metal in formation of metallic bond. The volume of heat that act as source be generated in or to applied to the workpiece quicker that it was carried away in the surrounding of metal. Consequently it was possible to generate the molten pool which solidified to form the unifying bond between the parts to joint. (TWI Global, 2016)

2.1.2 Cutting Work

Cutting process is the other of process in fabrication that use in this project. Cutting process is a process that physical object that been separated into two or more pieces. For metals, there is variety method can be used to cut the metal element. The method known as chip forming (drilling, milling, turning and sawing), shearing (Stamping, scissoring and punching), abrading (grinding, lapping, and polishing), heat (flame cutting, plasma cutting and laser cutting) electrochemical (etching, electrical discharge machining. Every method has its limitation in accuracy, cost and effect on the material.

2.1.3 Electrical Work

Wiring are most important in electrical work. Wiring process done by connecting the motor to battery control by remote control. Wiring process in installed, attached or connecting wires to product that using or provide electrical power for functioning. As in this project the component that used for wiring process is battery, motor and remote control as shown in Figure 2.2.

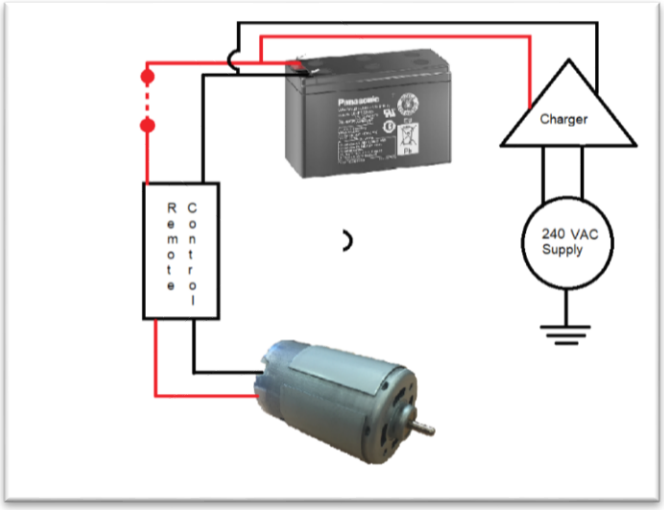

Figure 2.2: Schematic Electrical System

2.2 Wheelchair Lift

Disable and eldest person wheelchair lifts the important in disabled mobility since wheelchair has been introduced to disable and eldest person usage. The lift are plays important role which these help the disable person to lift their wheelchair in vehicles trunk. Wheelchair lift are specially designed to lift the wheelchair for disabled and elders person. There is variety type of wheelchair lift which used in building, public transportation and at private place. (Lisa Lighthall Haubert, 2015). Usually these wheelchair lift consists a motor that lift the platform up and down of the vehicles. Most

of the wheelchair lift move in vertical position direction just like elevator direction. (Robbins, 2008)

Figure 2.3: Public transport with wheelchair lift (Steve Morgan, 2010)

When the wheelchair lift were invented and firstly implemented, these were found in private property which use for personal only to accommodate the disable and eldest persons. Generally the use manual lift are hard to practice for disable or eldest people. There is great benefit of this project wheelchair lift which it takes very less space and the major disadvantages of this lift is that the misuse of the lift. (White, 2016) These handicap wheelchair lifts are very important for the disabled Americans because of these lifts the handicapped Americans are better able to make important contributions in the American society (Jutt, 2011).

Figure 2.4: Wheelchair Lift for trunk vehicles (James, 2012)

2.3 Part of Wheelchair Lift

Part of electric bicycle that consist of motor, winch, battery and console or remote control. In figure show that the part in wheelchair lift.

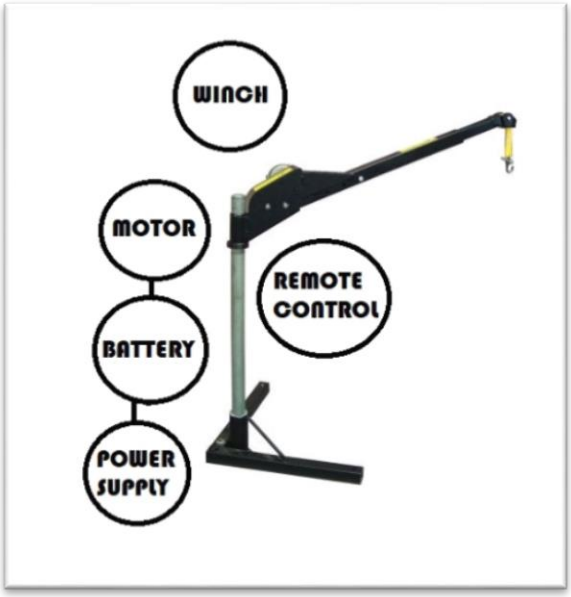

Figure 2.5: Main Part in wheelchair lift