UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN AND FABRICATION THREE-WHEELS ELECTRICAL BALANCING SCOOTER FOR DISABLE PERSON

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 Honors.

by

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DECLARATION

I declare that this report entitled “Design and Fabricate Three-Wheel Electrical Balancing Scooter for Disable Person” is the result of my own research except as cited in references.

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APPROVAL

This study is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the criteria for the degree of Bachelor of Mechanical Engineering Technology (Maintenance Technology) with honors. The Supervisory member shall be as follows

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Date :

DEDICATION

Dedicated to my beloved parents,

Rogayah Binti Mustafa and Abdul Hamid Bin Abdul Wahab

Thank you for your sacrifice, patience and moral support along with me.

To my honored supervisor,

Mr Mohd Sulhan Bin Mokhtar and all UTeM staff and lecturers.

To my dearest friends

For their encouragement and supports through the research

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ABSTRAK

Ringkasan yang boleh dibuat dari projek ini adalah ianya satu projek skuter elektrik yang mempunyai tiga roda direka khas untuk kegunaan orang kurang upaya dan orang tua. Antara sebab utama projek ini dilakukan adalah untuk memberi kemudahan kepada golongan-golongan orang kurang upaya untuk bergerak dalam jarak yang dekat. Seperti yang sedia maklum, orang kurang upaya ini amat susah untuk bergerak termasuk mereka memerlukan tenaga yang banyak untuk bergerak kerana atas pelbagai faktor salah satunya kesihatan. Oleh itu, skuter ini dicipta untuk mengatasi masalah yang dialami oleh orang-orang seperti ini. Selain itu, skuter ini juga pengangkutan "eco" kerana menggunakan tenaga elektrik. Tambahan pula, penghasilan projek ini juga disebabkan boleh mengurangkan pencemaran alam sekitar. Untuk pengetahuan skuter ini menggunakan sepenuhnya tenaga elektrik kerana ia dapat mengurangkan pencemaran yang berlaku di masa kini. Dalam penghasilan projek ini, skuter ini terlebih dahulu dilukis menggunakan perisan "SolidWORKS". Selepas itu, proses fabrikasi pula dijalankan mengikut masa dan jadual yang telah ditetapkan. Proses pemilihan reka bentuk juga dilakukan untuk memenuhi kriteria-kriteria mengikut objektif yang dipilih. Antara proses-proses yang dilakukan adalah seperti, proses kimpalan, proses pengerudian, proses pemotongan, proses pemasangan brek skuter, proses pemasangan gear dan akhir sekali proses elektrikal.

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ABSTRACT

A summary of this project is a three-wheeled electric scooter project designed specifically for the use of the disabled and the elderly. One of the main reasons for this project is to provide people with disabilities to move within close proximity. As you know, people with disabilities are very difficult to move around including they require a lot of energy to move because of a variety of health factors. Therefore, this scooter was created to deal with the problems experienced by people like this. In addition, this scooter is also an "eco" transport for using electricity. Furthermore, the production of this project is also due to the reduction of environmental pollution. To this knowledge scooters make full use of electricity as it minimizes current pollution. In the production of this project, this scooter was first drawn using the "SolidWORKS" software. Subsequently, the fabrication process is carried out according to the time and schedule set. The design process is also carried out to meet the criteria according to the selected objectives. Among the processes involved are, welding process, drilling process, cutting process, scooter brake installation process, gear installation process and finally electrical process

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LIST OF ABBERVIATION

MTB	Mountain Bike
TTF	Technical Trial Features
US	United States
CHAdeMO	Charger Demonstration
BMS	Battery Management System
AC	Alternate Current
DC	Direct Current
MEMS	Mechanical Micro System
AIEE	American Institute Electrical Engineer
MIG	Metal Inert Gas
BDP	Bachelor Degree Project
PPT	Product Prioritization Technique

LIST OF SYMBOL

KG	Kilogram
N	Newton
%	Percent
Psi	Pound Per Square Inch
kPa	Kilo Pascal
Hz	Hertz
rpm	Revolution Per Minute
˚C	Degree Calcius
V	Voltage
A	Ampere

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CHAPTER 1

INTRODUCTION

1.0 Introduction

In this chapter accommodate the background of the problem statement and introduce the objectives that need to be done as well as the project scope of the study which is clearly describes the limits in this study. In this chapter also contains the groundwork of the report which can generally represent the dissolution of chapters that related to one. Furthermore, it is further an outline of the course of the projects and also illustrates how this project works.

1.1 Background of Study

This electric bike is also known as Eco-Friendly Scooter. This electric scooter can also simplify future users regardless of the age factor and are also advisable for use to individuals who have fitness problems or those with infirmity. Such facilities, it can also enhance the health status of nature and also have a high impact on the user to move from place to place.

Deficiency in the legs, impairment in the hands, and impairment in any type of extremity are optimal for using this electric scooter because it is accessible for conducting and does not need to use much strength for movement. Furthermore, people with fitness disputes such as asthma, gout disease are encouraged to use these electric scooters, including

the elderly. This is also suitable for indoor and outdoor activities and also suitable for sport players or scholars who want to move from one place to another in a short distance in period time.

The task is to illustration and produces a product about scooter electricity to people with impairment and retired. As we know, the function of the bicycle is to expedite transport and development from 19th century by Baron Karl Von Drais in 1818 and it is not has a pedal and was modernized by Pierre Lallement in 1866 with no chains. In 1879, Harry John Lawson upgraded the bike by combining a pedal chain with a regular bike to expedite the movement. Overall, the resulting bike can have a very high impact on health as it uses the energy of a person to move the bike. Lastly, the resulting bike is best appropriate for ordinary people, but it will be a deficit of disadvantages individuals such as those with foot pain. Today most bicycle are use by ordinary people as disputed to weakened because the authentic purpose of the bike is to expedite the movement from one place to another.

Electric scooters or electric motorcycles composed are for the comfort of motorcyclist because the design is more flexible and suitable for comfortable users and it refers to a place to put users feet more relaxed. The first electric motorcycle was created by Odgen Bolton Jr. in 1895 whose conception uses a pulley to move the electric motorcycle. In 1915 Ransomes, Sims&Jefferies introduced the first electric scooter prototype and could be registered on the road. Additionally, the predicted travel distance for the electric scooter is able to reach 160km for each charge and also use 3-Step speed control with speed of 6.4km, 24km, 56km per hour. The preferred of this concept is best appropriate to this project with satisfactory criteria.

This Eco-Friendly Scooters is produced with a combination of regular bicycles and electric scooters. The most important part of producing this electric bicycle is a robust frame that is advisable for all types of people, exclusively paralyzed people. Additionally,

satisfaction is very important to encourage consumers to use this electric bicycle. Therefore, the seat illustration can be adjusted according to the suitability of the individual. In addition, it uses electricity to facilitate movement by simply twist the throttle without the cycle requiring more energy.

1.2 Problem Statement

A problem statement is a complication that needs to be listed and resolved with the ambition to accomplish the objectives of the project and need to be further informed about the problem.

Among the reasoning for this project is there is a problem for the elderly and also people with disabilities on the development to move from one place to another. Most regular bicycles are constituted for healthy people and will be a complication for disabled and elderly people. The problem is that it is unavoidable that it is the age factor and it will have a big impact including the lack of energy in the legs. In addition, internal problems such as age similar asthma will be a good example for this project to be achieved. Additionally, the design of this project is reasonable for disabled and elderly people as well as has been altered to suit the user's appropriateness as the seat is adjustable according to the user's accessibility and also use an electric motor to expedite the movement from one place to another conveniently. Accordingly, by using electric motor automatically be confidential as transport that does not cause deterioration. Figure 1 show the example of electric scooter.

Figure 1 : Example of electric scooter.

1.3 Objective Project

The purposes of this study are as follows, based on the introduction and problem statement above;

- To design the advisable electric scooter for disabilities and elderly people.
- To produce and manufacture design drawn into an actual product.

1.4 Scope Project

This research project will focus on the most appropriate well designed scooter for users. This electric scooter is suitable for paralyzed people. Additionally, an electrical system will be applied to make movement much accessible. Moreover, it can also save more time and energy to conduct. In addition, only one or two passengers can rides within weight (25kg-70kg) for this electric scooter. There are several reasons for objectives to be successful;

- This electric scooter is categorically designed for paralyzed people.
- There will be an electrical system inside the scooter to make movement much easier for people with disabilities.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

There are several things to clarify before starting this research to expedite this research. In addition, information obtained through journals, books, and websites had a major impact on this research's accomplishment. This also makes exhaustive and precise the equipment intended for this research.

2.1 Bicycles

Bicycles are also known as bicycles or cycles that needs personal energy to move the bike with the pedal concept and have two front and rear tires. The bicycle rider is also known as a cyclist or bicyclist. There are various types of bike designs that are specific to the situation appropriateness and will be further explained.

According to Koepple, Dan (2007), the first bike was launched in the 19th and 21st centuries in Europe. In addition, Koepple response is also very encouraging and almost reached 1 billion people wearing it. Furthermore, it also exceeds the figure of car uses at the time and it is also classified as the most frequent individual transportation because, at this

time many parties who use it include, general fitness, police and militaries, courier services, bicycles racing and lastly bicycles stunts.

2.1.1 History of Bicycle

The first human transport device was invented by Baron Karl Von Drais who used only two wheels and was named "Dandy Horse". In the summer of 1817, Baron Karl Von Drais introduced to the public and was regarded as a modern bicycle founder. The design is a two-wheeled wood, and its feet forward to complete the transport.

The first mechanical movement was made by Kirkpatrick Mcmillan was a blacksmith who came from Scotland in 1893. In early 1860, Pierre Michaux and Pierre Lallement from France had taken the design of the bike and raise such as adding a pedal on the front rim to facilitate the movement of the bike and he was named “Velocipede”. The “Velocipede” is made of iron and wood and is applied to “penny-farthing” according to Norcliffe in 2001. Thereafter, modifications to tire were also made to reinforce the design of the bike among them was combine wire spoke with solid rubber tires. In addition, the bike is also hard to ride due to its high seating and lack of weight.

In 1881, there were some problems identified among them the pedal cannot move the rear wheels and it can only move the front wheels alone. According to Norcliffe in 2001, J.K Starley, J.H Lawson, and Shergold solved the problem by introducing the “Chain Drive” which is connecting the pedal to the rear wheels by using the chain.

2.1.2 Types of Bicycle

There are several types of bike that can be classified including Mountain Bike, Road Bike, Time Trial Bike, BMX/Trick Bike, Recumbent, Beach Cruiser, and Folding Bike. All these types of bicycles are recorded according to their respective appropriateness and function.

The list of bike will be described in intensity as the riders' suitability, the design of each bike, and the methods to use it.

2.1.2.1 Mountain Bike

Mountain Bike or shortened as MTB is a bicycle that bikes off the road such as land and mountain. These bikes are designed according to abrasive landscape and high durability but the design features share the connection with other bikes. This demonstrates its features such as large tire tires, durable wheels, braking brakes, and even multi-gear gear options for steep hill climbing.

The Mountain Bike is usually used on mountain passes, single tracks, fire roads and uneven road surfaces. There are various types of surfaces on this earth such as rocks, roots, puddles, and steep mountains. Additionally, Technical Trial Features (TTFs) apply to these bikes, such as timber, rocks, leaps and brackets. The Mountain Bike is designed to operate in areas and features that are available. In addition, these bicycles are combined with a wide tire feature and stronger rims for heavy duty and also make this bike style more popular for off-road riders through perforated roads.

When the Mountain Bike became popular in the 1970s sporting events such as free travel, endurance, downhill, as well as various tracks. In accelerating mountain climbing and steep decline, the Mountain Bike has led to increased development in transit. For each type of bike it displays different applications like designs and for every optimum performance.