UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN AND FABRICATION THE ELECTRIC BICYCLE FOR DISABLE AND OLDER PERSON

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

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DECLARATION

I hereby, declared this report entitled "DESIGN AND FABRICATION THE ELECTRIC BICYCLE FOR DISABLE AND OLDER PERSON" is the results of my own research except as cited in references.

Signature : …….

Author's Name : MUHAMMAD AZMIR BIN ZAINAL

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor Of Mechanical Engineering Technology (Automotive Technology) with Honours. The member of the supervisory is as follow:

Encik Mohd Sulhan Bin Mokhtar

(Project Supervisor)

ABSTRAK

Ringkasan yang boleh di buat dari projek ini adalah ianya satu projek basikal elektrik tiga roda yang di reka khas untuk kegunaan orang kurang upaya dan orang tua. Sebab utama mengapa projek ini dijalankan adalah untuk memberikan kemudahan kepada golongan-golongan istimewa ini mudah bergerak ke mana sahaja. Kita sering di maklumkan bahawa golongan istimewa ini susah untuk bergerak kerana faktor kesihatan yang tidak mengizinkan. Oleh itu, basikal elektrik ini di cipta untuk mengatasi masalah-masalah mereka. Selain itu juga, di antara faktor-faktor lain ialah dari segi faktor alam sekitar. Masalah alam sekitar yang semakin tercemar adalah salah satu faktor projek ini di hasilkan. Basikal elektrik ini sepenuhnya digerakkan menggunakan sistem elektrik. Oleh itu, sedikit sebanyak dapat mengurangkan masalah alam sekitar yang sering bermasalah kebelakangan ini. Untuk menghasilakn projek ini, basikal elektrik ini terlebih dahulu dilukis dengan menggunakan perisian seperti "*Computer Aided Design (CAD)"*. Selepas itu, proses fabrikasi akan di jalankan. Di antara proses-proses fabrikasi yang akan dilakukan adalah seperti proses pengukuran, proses kimpalan, proses pengerudian, proses pemotongan, proses pendawaian, proses pemasangan brek basikal, proses pemasangan gear dan proses pemasangan.

ABSTRACT

A summary of this project is that it is a project of electric three wheel bike that is designed specifically for use by the disabled and the elderly. The main reason why this project is to provide facilities for special groups is easy to move anywhere. We often informed that this special group is difficult to move because of health factors. Therefore, the custom electric bicycle is the design to solve their problems. In addition, among the other factors is in terms of environmental factors. Environmental problems are increasingly polluted is one of the factors of this project is derived. The fully electric bike powered by an electric system. Thus, to some extent can reduce environmental problems often troubled lately. To produce this project, the first electric bicycle drawn by using software such as "Computer Aided Design (CAD)". After that, the fabrication process will be run. Among fabrication processes to be performed are as measuring process, welding process, the drilling process, the cutting process, the wiring, setup braking system, touch-up process, gearing process and the installation process

DEDICATION

To my beloved parents,

Zubaidah Binti Yahya and Zainal Bin Che Mat

Thank you for all support, sacrifices, patient and willingness to shared with me.

To my honoured supervisor,

Encik Mohd Sulhan Bin Mokhtar and all UTeM lecturers.

To my dearest friends

Muhammad Tarmizi Bin Bahari, Mohammad Husaini Bin Hashim, Muhammad Azad Bin Abu Bakar, Muhammad Safwan Bin Abdul Rahim, Muhammad Hazim Bin Mazlan, Syed Muhammad Naguib Bin Syed Sulaiman, Muhammad Faiz Bin Razali, Muhammad Faidillah Bin Omar, Khairul Anwar Bin Mohd Saib, Muhammad Syafiq Bin Laili, Adi Azri Bin Ngahdiman, Hariz Bin Abu Hanifah, Mohamad Taufiq Bin Md Osman Ani and Nurul Syifaa Binti Zafferi

thank you for always giving me a guidance and persistent help to complete this project thesis.

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All praise belongs to ALLAH (SWT). Without the health, strength and perseverance He gave, I would not be able to complete this project thesis. I have taken efforts in this project and spend time wisely to complete this thesis. However, it would have not been possible without the kind support and help of many individuals. In particular, I want to thank to anyone that contributed in my project thesis. They have encouraged me and giving full thought during this project. First, I would like to express the deepest appreciations to my supervisor Mr Mohd Sulhan Bin Mokhtar for his patient and endless supports that continually teaching me throughout my project. He gave me a necessary suggestions and constant supervision as well as for providing information regarding the project thesis. Without his guidance and persistent help this project thesis would not complete successfully.I also want to express my gratitude towards my beloved parents Mr Zainal Bin Che Mat and Mrs Zubaidah Binti Yahya also all families for their kind motivation to go through all the hard works and they gave me their supports and positive vibes while carrying out this project. In addition, I am very grateful for those giving me a chance to ask information from basic conceptual idea of the project. Also big appreciations to all my housemate and my friends Tarmizi Bahari, Safwan Abd Rahim, Husaini Hashim, Azad Abu Bakar, Hazim Mazlan, Khairul Anwar, Faidhillah Omar, Syed Naguib, Faiz Razali, Shafiq Laili, Adi Azri, Hariz Abu Hanifah, Taufiq Osman and Syifaa Zafferi because helped me to finished this project. Lastly, my big appreciations also go to the people who are directly or indirectly helped me in developing this project thesis. Once again, thank you so much for all my supporters.

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CHAPTER 1

INTRODUCTION

This chapter contains the background of the problem statement and includes the objectives to be achieved throughout the project and the scope of the study which clearly defined the boundaries or limit of this study. This chapter also provides a structure of the report which generally describes about chapter division and related contents so that particular chapter. In overall, it summarizes the progress of the whole project, describing how the whole project has been done.

1.1 Background of study

An electric bicycle, also known as an e-bike or booster bike, is a bicycle with an integrated electric motor which can be used for propulsion. There are a great variety of electric bicycle available worldwide, from electric bicycle that only have a small motor to assist the rider's pedal-power to somewhat more powerful e-bikes which tend closer to moped-style functionality. The lack of competent physical and mental faculties the absence of legal capability to perform an act.

Disabilities is an umbrella term, covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure an activity restriction is a difficulty encountered by an individual in carrying out a project or action while a participation restriction is a problem known by an individual in involvement in life situations. Disability is thus not just a health problem. It is a complex phenomenon, reflecting the interaction between features of a person’s body

and features of the society in which he or she lives. The term disability usually signifies an incapacity to exercise all the legal rights ordinarily possessed by an average person. Convicts, minors, and incompetents are regarded to be under a disability.

This task is about the design and manufacture of electric bicycle for disable person. Morchin, Oman (2006) state that a traditional bicycle is a two-wheel vehicle that is propelled by the rider who delivers muscle power through pedals that rotate one of the vehicle's two wheels. Generally, bicycle is one of the transportation that has been invented around 1862 by Pierre Lallenent. We can say that bicycle is a highly positive transportation in all aspects for example in terms of health. Basically, the cyclists will look healthier as they use their own energy to move the bicycle. Although the design and fabrication of the bicycle are ergonomic to the environment, but it is not ergonomic to the disabilities, especially those who have lower part paralysis. Therefore, nowadays most of the bicycles can only be ride by normal people rather than disabilities. Originally, bicycle was created to ease people to move from one place to another.

The main purpose of this project is to make it convenient for disabilities and older people to move from one place to another without any barriers. We know that disabilities and older people are those who are less fortunate with their health problem which make them hard to walk, and that is one of the reason this electric bicycle is create.

The electric bicycle is one of the product that has been measures from a combination between a bicycle and trishaw. This electric bicycle is specially design for disabiities and elderly. In the development of the electric bicycle, the design of the chasis is one of the most important thing. The low structure of the bicycle is one of the important aspect to facilitate the disabilities and elderly people to ride an operated the bicycle. Besides that, the seat is adjustable. This shows that any type of body size can handle the bicycle.

In addition, the source of energy that is use to move the bicycle is from an electric power. The bicycle is fully use a motor electric power and this will make the movement of the bicycle easier. Back to the aim on the creation of the bicycle, it is specially create for disabilities and elderly people by using motor electric, it will assist those people to operate the bicycle without having to cycle which need more energy. Only by twisting throttle, the bicycle will move on its own. By using electric power only, it will not be harmful to the air. Automatically, this bicycle can be categorize as eco-friendly transportation.

1.2 Problem statement

A problem statement is a brief description of the issues that need to be addressed by a problem solving team and should be presented to them (or created by them) before they try to solve a problem. (Menz, 2016) state that advancing age can affect the foot pain for at least one in four older people.

The reason why this project is implemented because there are problems that the disabled and elderly person often experienced during they move from one place to another place where most of the bicycles that has been invent are for normal and healthy people. Electric bicycle providing to these special peoples an opportunity to travel from one place to another place easily (Patel, Patel, & Chheladiya, 2015). Therefore, the design of the bicycle has been modified to make it fit for ride by the disabled and elderly. Besides that, the disabled and elderly people have weakness at their lower part of the body which cause limitation for the movement. Here, the design of the seat and driver packaging is very important. In addition, this bicycle have an electric system which make them to move easily. Environmental problems is also one of the problems that has been happening. Therefore, by using the electrical system, automatically this bicycle can be classified as green transportation as for example green to the environment. In figure 1 shown that the example of tricycle bicycle.

Figure 1: Example of tricycle bicycle

1.3 Project Objective

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

- To design the electric bicycle suitable for disable and older person.
- To produce and fabricate design that has been drawn into a real product.

1.4 Scope

The scope of this project from the design of electric bicycle for disable and older person develop it. There are four main section that must be reached to ensure electric bicycle for disable and older person can work well. The overall scope of this project are described below:

- This bicycle is design specifically for people who have lower limb disabilities.
- An electrical system will be apply inside the bicycle to make the movement of the disabled become much easier.
- The electric bicycle has designed to be ride by one passenger only.
- The electric bicycle must needs its own effort to stand.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Before beginning a project, there are numerous angles that should be considered and assessed deliberately to guarantee that a project is running easily. The review included from reference books, perceptions, discourses, and assets from web. The project will be actualized based on the data gotten with a specific end goal to keep running as a manual for completing the project. The review ought to be gathered each of the information or data gotten from an assortment of sources to get the best results of the project. This is to guarantee that the project will be delivered to accomplish the target and working legitimately.

2.1 Bicycles

A bicycle, is a human fueled, pedal driven, single track vehicle, having two wheels connected to a casing, one behind the other. A bicycle rider is known as a cyclist, or bicyclist. They are the foremost methods for transportation in numerous districts. They likewise give a well known type of amusement, and have been adjusted for use as kid toys, general wellness, military and police applications, dispatch administrations, and bike dashing. The essential shape and setup of a regular upright or "wellbeing bike", has changed little since the main chain-driven model was produced around 1885. In any case, many points of interest have been enhanced,

particularly since the coming of current materials and PC helped outline. These have took into account an expansion of particular plans for some sorts of cycling.

2.1.1 History of Bicycles

The "Dandy horse", additionally called Draisienne or Laufmaschine, was the primary human methods for transport to utilize just two wheels pair and was concocted by the German Noble Karl von Drais. It is viewed as the current bike's precursor; Drais acquainted it with the general population in Mannheim in summer 1817 and in Paris in 1818. Its rider sat on the back of a wooden edge bolstered by two in-line haggles the vehicle alongside his or her feet while controlling the front wheel.

(Morchin, Oman 2006) state that, in 1862 Pierre Lallenent had construct the principal considered two-wheel pedal-fueled bike at France. At that point, in 1870 wire spokes had been created and at 1874 areolas for fixing spokes had been recreate. In 1871 James Starley, a 67 years of age foreman at Coventry Sewing Machines, protected the Ariel bike, which as an alternative offered levers that multiplied the separation voyaged per pedal stroke. In 1880, when the Alliance of American Wheelman was shaped, the "normal" bike had little back haggle front wheel that had a measurement of up to 5 ft. Pedals were decidedly coupled to the front wheel. Bikes were presented in the nineteenth century in Europe and starting at 2003, more than 1 billion have been created around the world, twice the same number of as the quantity of vehicles that have been delivered. They are the central methods for transportation in numerous districts. They likewise give a prominent type of diversion, and have been adjusted for use as youngsters' toys, general wellness, military and police applications, messenger administrations, and bike racing. The essential shape and arrangement of a regular upright or "wellbeing bike", has changed little since the primary chain-driven model was created around 1885. In any case, many subtle elements have been enhanced, particularly since the coming of

current materials and PC supported outline. These have took into account an expansion of specific plans for some sorts of cycling.

2.1.2 Types of bicyles

Bicycles can be categorized in many different ways as by function, by number of riders, by general construction, by gearing or by means of propulsion. The more common types include utility bicycles, mountain bicycles, racing bicycles, touring bicycles, hybrid bicycles, cruiser bicycles, and BMX bikes. Less common are tandems, low riders, tall bikes, fixed gear, folding models, amphibious bicycles, recumbent and electric bicycles. Unicycles, tricycles and quadricycles are not strictly bicycles, as they have respectively one, three and four wheels, but are often referred to informally as "bikes".

This list gives an overview of different types of bicycles, categorized by function, number of riders, by construction or frame type, by gearing, by sport, by means of propulsion, and by rider position. The list also includes miscellaneous types such as pedicabs, rickshaws, and clown bikes.

2.1.2.1 Road bicycle

The term road bicycle is utilized to portray bikes worked for going at speed on cleared streets. A few sources utilize the term to mean racing bicycle. Different sources particularly reject dashing bikes from the definition, using the term to mean a bicycle of a parallel style yet constructed more for perseverance and less the quick blasts of speed sought in a racing bicycle as example, they more often than not have more apparatus blends and less howdy tech dashing elements. Sure of these bikes have been suggested to as "sportive" bicycle to recognize

them from racing bicycles. In figure 2 shown the example of road bicycle.

Figure 2: Road Bicycle

2.1.2.2 Tricycle bicycle

A tricycle, regularly contracted to trike, is a human fuelled three wheeled vehicle. Some tricycles, for example, cycle rickshaws and cargo trikes, are utilized for business purposes, particularly in the creating scene, especially Africa and Asia. In the West, grown-up measured tricycles are utilized principally for vacation, shopping, and exercise. Tricycles are supported by youngsters and senior grown-ups alike for their obvious dependability versus a bicycle. However a regular trike has poor dynamic parallel security, and the rider must take mind when cornering to abstain from tipping the trike over. Flighty outlines, for example, recumbent have a lower focus of gravity so require less care.

Tricycle transformation sets or units change over a bike to an upright tricycle. Tricycle unit can take out the front haggle two wheels under the handlebars for a fast and simple transformation. The benefits of a trike transformation set incorporate lower cost contrasted and new hand constructed tricycles and the opportunity to pick any benefactor bicycle frame. Tricycle change sets have a tendency to be heavier than

an astounding, hand fabricated, wears, visiting or dashing tricycle. Change sets can give the future genuine tricyclist an essence of triking before settling on an official choice to buy a total tricycle. Transformation sets can likewise provide prepared to be brazed onto a lightweight, steel bike edge to shape an entire trike. Some trike change sets can likewise be utilized with prostrate bikes to frame supine trikes.

(Hassan, 2012) express that, the tricycle was particularly invented to suit wheelchair inhabitants of solid Upper middle with pelvic to foot restriction. It is additionally intended to suit an ordinarily accessible Wheelchair. The level of connection between the disabled people in the general public has profoundly being risked; along these lines this venture was intended to correct the troubles in portability of the wheelchair users. The fundamental point of the venture configuration is to simplicity versatility for the physically tested and furthermore give sufficient solace they covet. Existing tricycles for the cripples requires the handicapped individual to get off from the wheelchair onto the tricycle. The mechanized tricycle in this venture is intended to beat this issue by enabling the impaired individual to wheel up or down his wheelchair onto or down the tricycle. This is accomplished utilizing an exceptionally composed stage that permits the wheel seat to be wheeled up or down. The model of this tricycle has been created. The anthropometrics information that should be considered in the plan of the stage and edge of the tricycle have been thought about at the outline phase of the tricycle. In figure 3 shown the example tricycle bicycle.

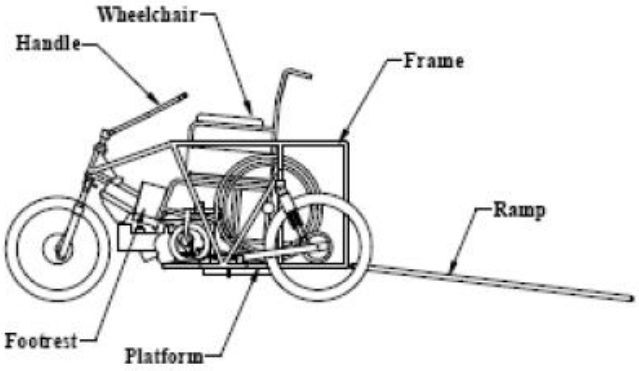

Figure 3: Example of tricycle bicycle

2.1.2.3 Quadracycle

A quadracycle is a four-wheeled human fueled land vehicle. It is likewise alluded to as a quadricycle, quadcycle, pedal auto, four-wheeled bike or quike among different terms. Human controlled quadracycle have been being used since 1853 and have developed into a few groups of vehicles for an assortment of purposes, including visitor rentals, pedal cabs, private visiting, mountain and modern utilize. In figure 4 shown that the sample for the quadracycle bicycle

Figure 4: Quadracycle bicycle