



UNIVERSITI TEKNOLOGI MARA
CAWANGAN BUKIT BESI

MEC299

**DESIGN AND FABRICATION OF ELECTRIC
SKATEBOARD WITH FRONT LIGHT**

MOHAMAD AFIF JAZIMIN BIN OTHMAN

2020607412

SUPERVISOR:

NORHASHIDAH MANAP

SEM MARCH AUGUST 2022

ABSTRACT

Traveling long distances on foot, such as across campus or from the parking lot to class, can be exhausting and time-consuming. While not physically demanding, the journey takes time out of our hectic college schedule. To improve our time efficiency, this project provides a relatively lightweight, powered solution for travelling long distances quickly and effectively while maintaining full control and safety, a current limitation of traditional skateboards.

With a compact and flexible skateboard design that provides extended range without sacrificing rider comfort, this electric skateboard has the battery capacity to travel all around campus on a single charge. It has regenerative braking for on-demand stopping and safe travel through the use of a wireless controller.

The purpose of this project was to fill the room for improvement of the electric skateboard by adding safety measures which is front light and reflective strip to let other road users notice the presence of the skateboard rider and to see the road more clearly.

The skateboard will be controlled by a single handheld remote control that will be able to manipulate speed and direction of the motor to minimize the time needed and physical energy used to reach a destination.

Table Of Contents

CHAPTER 1: INTRODUCTION	7
1.0 Background of study	7
1.1 Problem statement	8
1.2 Objectives	8
1.3 Scope of work	8
CHAPTER 2: LITERATURE REVIEW	10
2.0.1 Bluetooth	12
2.0.2 Microprocessor and micro controllers	13
2.0.3 DC motor	13
2.0.4 Serial communication	13
2.0.5 Controller	14
2.0.6 Battery	15
2.1 Product design specification based on literature review	16
2.1.1 Flashlight and reflective strip	16
2.1.2 Handheld remote controller	17
2.2 Software and Application	18
2.2.1 SolidWork	18
CHAPTER 3: METHODOLOGY	19
3.1 Introduction	19
3.2.1 Flow chart	19
.....	19
3.2.1.1 Design process	20
Figure 3.1.1	20
3.2.2 Gantt Chart	21
3.3.1.1 House of quality	23
3.3.1.2 Product Design Specifications (PDS)	24
3.3.2.1 Morphological Table	25
3.3.2.2 Sketches of design	26
Design 1	27

CHAPTER 1

INTRODUCTION

INTRODUCTION

An upgraded version of a normal skateboard. The skateboard will be powered by an electric motor and comes with a built-in front light and reflective strip at the back for night time use. This skateboard will be convenient for students or anyone to transport around the campus or anywhere as it requires minimal physical energy to accelerate it.

1.0 Background of study

Since around the 1950's, skateboard has been a popular mean of transportation among the younger generation. The simplicity of the device has always been the key to its success. By pushing with your leg, you create the mechanical force needed to gain speed. As the technology has advanced a lot since the 1950s, it was an appropriate step in the right direction to implement a modern take of the skateboard. Making an electronic skateboard controlled without wires, is a step in that direction. The purpose of an electrical skateboard is to enable a fast way to transport a single person the last bit of a commute as a complementary device to other public transportation [1].

A common issue most people in this era are facing is transportation. As much as walking is healthy for an individual, strolling can make you sweaty and it is a problem if the student is walking to class. It can also introduce injury to some people such as knee and heel pain from having to walk a long distance. Sometimes we all need a deserving rest and this electric skateboard might be the solution.

Other than the benefit of being useful and pragmatic, it is also a fun piece of transportation. Furthermore, it is also cheaper than, for instance, a bicycle and affordable for students making it the best gadget a person can own.

Louis J. Finkle patented the first electric skateboard in 1999 with his first boards inefficient and expensive which made them hard to sell. Therefore, electric skateboards slowly made their way into the market. The electric skateboard industry skyrocketed in recent years partly attributed to the increase in battery energy density. This allows for longer range and more power with a smaller battery. The energy density of commercial batteries increased about 3Wh/kg annually between 1950 and 2010. Between 1990 and 2010, this figure jumps to 5.5Wh/kg due to the invention of the lithium-ion battery. John B. Goodenough, M. Stanley Whittingham, and Akira Yoshino received the 2019 Nobel prize due to their contributions in the field. This proves how much technology goes into the developing lithium-ion batteries [2].

Many electric skateboard companies popped up during the 2010's including Boosted in 2012 [3], Evolve in 2012, and Meepo in 2017. All three of these companies had promising

beginnings, but Boosted went out of business in 2020 due to increased tariffs from the trade war with China [3]. Evolve and Meepo both continue to produce and sell electric skateboards.

Electric skateboards pose many dangers which can lead to fatal wounds. California put several laws in place to minimize motorized skateboard injuries while still allowing the freedom to own one. California defines limitations on electric skateboards in the California Vehicle Code [4].

Neither Meepo, nor Evolve sell an electric skateboard that meets these requirements out of the box. They all either fail the 1,000-watt requirement, or the 20mph requirement. This means that skateboards from these two major companies need modifications for legality in California.

1.1 Problem statement

There is no doubt that there are already a bunch of different models of electric skateboard in the market however, they all inaugurate few similar problems.

The first problem is the user control accessibility. Almost all of electric skateboards for sale are controlled without a handheld remote and instead uses a weight sensor to control the speed which means it requires higher skill to control it as it needs stability. This problem can be overcome by using a handheld remote to control the speed and motor. It will also mean that we can control it without being on top of the skateboard.

The second problem that will be discussed is the fact that it is inconvenient to use at night. An electric skateboard is a small piece of vehicle making it less visible and unsafe for the user to ride it especially at night. Putting a front light and a reflective strip on the back of the skateboard will let other people notice the presence of the rider.

1.2 Objectives

- 1) To design a skateboard that can be controlled using a handheld remote control.
- 2) To fabricate a skateboard with front light and reflective strip.

1.3 Scope of work

As for the material that will be used, the first key material is a battery. Next is a pair of wheels with a single built-in hub motor, riser pads and an electronic controller along with a remote as well as micro USB to charge the remote. Then, a skateboard deck, grip tape for the deck surface, foams and skateboard hardware.