UNIVERSITI TEKNIKAL MALAYSIA MELAKA

SMART BICYCLE SAFETY SYSTEM

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Computer Engineering Technology
(Computer Systems) with Honours

by

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TAJUK: **Smart Bicycle Safety System**

SESI PENGAJIAN: **2016/17 Semester 1**

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Date	:	DECEMBER 13, 2016

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's in Computer Engineering Technology (Computer Systems) (Hons.). The members of the supervisory committee are as follow:

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(Principal Supervisor)

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(Co-Supervisor)

ABSTRAK

Berbasikal adalah aktiviti kompleks yang memerlukan motor, deria dan kebolehan kognitif yang berkembang pada kadar yang berbeza daripada zaman kanak-kanak kepada remaja. Sementara anak-anak boleh menunggang basikal beroda dua pada usia lima atau enam, penilaian yang lemah tentang bahaya jalan pada usia itu dan matang perlahan-lahan sehingga penghakiman dewasa seperti dicapai pada awal remaja. Menunggang basikal secara selamat bergantung pada penjagaan, kemahiran dan pertimbangan penunggang basikal dan pemandu. Reka bentuk jalan yang menggalakkan kewujudan bersama selamat basikal dan kenderaan bermotor dan penggunaan alat-alat keselamatan, termasuk topi keledar basikal, lampu dan pita reflektif. Sekarang kegelapan yang kelihatan lebih cepat, dan malam amat berbahaya untuk penunggang basikal kerana jarak penglihatan yang rendah bahawa pemandu mempunyai. Bukan sahaja kegelapan bahaya, tetapi juga kabus, ribut salji, dan hujan lebat mengakibatkan masalah pada penglihatan. Untuk menganinya, penunggang meletakkan reflectors: reflectors depan yang jelas, reflektor belakang merah, pedal reflectors amber, dan reflektor sisi jelas; malah menambah reflektor yang pakaian mereka. Walaupun ini membantu, ia tidak menyelesaikan sepenuhnya masalah ini, jadi penunggang basikal juga menggunakan lampu aktif. Penunggang menambah lampu depan dan lampu berkelip hitam supya boleh dilihat oleh sesiapa sahaja tanpa mempunyai sinar cahaya pada mereka. Dengan menggunakan Arduino membuat projek keselamatan basikal, ia akan membuat pengguna lebih yakin untuk menggunakan basikal sebagai kenderaan untuk pergi ke banyak tempat.

ABSTRACT

Cycling is a complex activity requiring motor, sensory and cognitive skills that develop at different rates from childhood to adolescence. While children can successfully ride a two-wheeled bicycle at age five or six, judgment of road hazards are poor at that age and matures slowly until adult-like judgment is reached in early adolescence. Safe cycling depends on the care, skills and judgment of cyclists and motorists; roadway design that promotes safe coexistence of bicycles and motor vehicles and the use of safety devices, including bicycle helmets, lights and reflective tape. Now that darkness appears quicker, and the night is especially dangerous for cyclists because of the low visibility that drivers have. Not only is darkness a danger, but also fog, blizzards, and heavy rain all wreaking havoc on the vision. To combat this, bikers attach reflectors: clear front reflectors, red rear reflectors, amber pedal reflectors, and clear side reflectors; some even add reflectors to their clothing. While this helps, it doesn't fully resolve the problem, so cyclists also use active lighting. Bikers add front and black flashing lights that can be seen by anyone without having to shine light on them. By using an Arduino to make the cyclist safety bike project, it will make the bicycle user more confident to used the bicycle as a vehicle to went to many places.

DEDICATION

Every challenging work needs self efforts as well as guidance of elders, especially those who were very close to our heart.
My humble effort I dedicate to my sweet and loving

Father & Mother,

Whose affection, love, encouragement and prayers of day and night make me able to get such success and honor,

Along with all hardworking and respected

Lecturers

ACKNOWLEDGEMENT

This project praises to the Almighty God for giving me the grace, courage and strength to complete it. I am very thankful to my parents for their love, support and encouragement and for being with me on each and every step of my life. I am also very thankful to my father Mohd Yusoff Bin Abdullah for being very supporting and motivating.

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A	-	Ampere
AC	-	Alternating Current
AuC	-	Authentication Centre
BSC	-	Base Station Controller
BSS	-	Base Station Subsystem
BTS	-	Base Transceiver Station
CEPT	-	European Conference of Postal and Telecommunications
DC	-	Direct Current
DTMF	-	Dual Tone Multi Frequency
EIR	-	Equipment Identity Register
ETSI	-	European Telecommunications Standards
GMSC	-	Gateway Mobile Switching Centre
GPIO	-	General Purpose Input Output
GPRS	-	General Packet Radio

		Service
GSM	-	Global System for Mobile Communication
HD	-	High Definition
HDMI	-	High Definition Multimedia Interface
HLR	-	Home Location Register
ME	-	Mobile Equipment
MMS	-	Multimedia Messaging Service
MOD	-	Module
MoU	-	Memorandum of Understanding
MS	-	Mobile Station
MSC	-	Mobile Switching Centre
NOOBS	-	New Out Of the Box Software

Chapter 1

INTRODUCTION

This chapter explains the introduction of the project, problem statements, the objectives of the project being done, scope of the project, project significant and also the conclusion of the introduction part.

1.1 Project Background

The common motorist views bicyclists as unpredictable on city streets and often lack experience sharing the road with motorists. The key to integrating bicyclists and motor vehicles on the same road with both parties feeling comfortable around one another lies in a common means of communication. Now that darkness appears quicker, and the night is especially dangerous for cyclists because of the low visibility that drivers have. Bicycles lack a signaling system based on lights, like that of a motor vehicle, which other motorists easily read and interpret. Not only is darkness a danger, but also fog, blizzards, and heavy rain all wreaking havoc on the vision. To combat this, bikers attach reflectors: clear front reflectors, red rear reflectors, amber pedal reflectors, and clear side reflectors; some even add reflectors to their clothing.

While this helps, it doesn't fully resolve the problem, so cyclists also use active lighting. Bikers add front and black flashing lights that can be seen by anyone without having to shine light on them. By using an Arduino to make the bikers safety project, it will make user feel confident to ride a bicycle.

1.2 Project Problem Statements

According to the League of American Bicyclists, in 2007, 698 cyclists sustained fatal injuries, and 43,000 cyclists received injuries in accidents involving motor vehicles . The Bureau of Transportation Statistics held a survey asking cyclists how safe they felt. Only 50% of the cyclists felt safe, while less than a quarter of the overall responses felt completely safe while bicycling . Misunderstandings between cyclists and motorists, as well as an unawareness of cyclists by motorists, account for the largest causes of accidents. This project aims to increase the safety of both cyclists and motor vehicles and lower the number of bicyclists injured or killed while riding. To accomplish this, the project implements turn signal indicators and brake lights on bicycles, similar to those found on motor vehicles.

The average driver has become accustomed to recognizing turn indicators and brake lights from other vehicles; by adding these same indicators to bicycles, they become easier to recognize and understand. Though the law dictates that drivers must recognize the arm movements cyclists use for turning, some drivers do not. Or, due to adverse weather or light conditions, drivers cannot perceive cyclists. Moreover, often times road conditions make it unsafe and/or impossible for bicyclists to remove their hand from the handlebars in order to make an appropriate arm signal. By using the same turn signals found on vehicles, cyclists communicate more efficiently with motor vehicles when turning and braking.

1.3 Project Objectives

The main objectives of this project are:

I. To study Arduino system and motor that will be used in this system
II. To develop and estimated current that been produce when bicycle wheel are moving
III. To design a new safety in bicycle to enhances the functionality of Arduino system

1.4 Project Scope and Limitations

The work scope of this project is to estimated current that been produce when bicycle wheel are moving. A small dynamo (generator) mounted on the rear wheel produces a tiny current of electricity that keeps your back safety lamp lit in the dark. Now suppose it could run this process backward. What if the lamp is removed and be replaced with a large battery. The battery would kick out a steady electric current, driving the dynamo in reverse so that it spin around like an electric motor. As the dynamo/motor turned, it would rotate the tire and make the bike go along without any help from your pedaling.

Bikers will also increase their safeties when they ride their bicycle. This project can be divided into several part which is firstly, identify the software and hardware that will be used in this project.

When the software and hardware has been identified, the work will much more efficiency. Then second is identifying the type of motor that will be using in this project and it can produce current. After that combine both of the software and hardware to produce the output that have been working on it. Lastly put the project at the bicycle and modified to make it simplified.

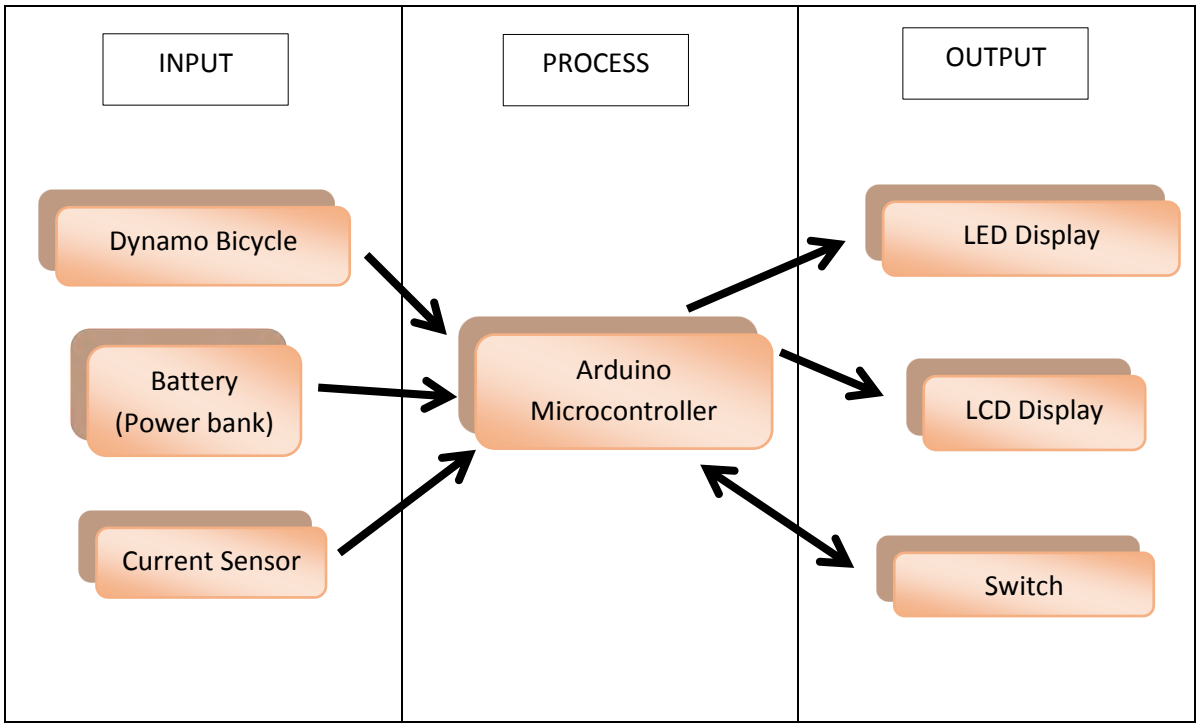

Figure 1.1 Operation system with Arduino Microcontroller.

1.5 Project Significance

Everyone has to share the road whether people biking or driving, The goal for everyone is to get where people going in one piece. This project brings a little technology to your two-wheeler and adds brake lights and turn signals to each handlebar so drivers or other bikers always know when cyclist slowing or about to turn.

This project is a bit like some other similar projects, especially in that the turn signals and brake lights are powered by an Arduino. The best thing about this though is that the signals and the controls are built right into the handlebars and are completely waterproofed, so user don't have to worry about them failing on when user need them.

1.6 Summary Chapter 1

By completing this project, it will make people that used a bicycle as its vehicle to go to some place or sightseeing will be more confident because of its safeties. Its because other's user road will know the direction that the bicycle user will go whether its brake, turn left or turn right. Then, it will indirectly reduce the accident rate cyclists. From this project also, it will enhance people to use bicycles as vehicles for daily life and live a healthy life. Cycling is one of the easiest ways to fit exercise into your daily routine because it's also a form of transport. Cycling also saves money, gets fit and helps the environment It's a low-impact type of exercise, so it's easier on people joints than running or other high-impact aerobic activities. But it still helps people get into shape.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

In this chapter, in order to make this project successful, some studies and researching has been done. The information and studies for this project was collected from many sources such as books, articles, journals and internet. All this information was used in this project as a guide to make sure this project can be done in the time given. All the studies and information collected was based on major component and topic that related to this project.

2.1 System Hardware

System Hardware is the physical components that make up a computer system. Group class category of computer hardware systems together represent objects associated with the hardware. The control unit is divided into a microcontroller and Arduino Kit.

2.1.1 Arduino Uno

Arduino is a software company, project, and user community that designs and manufactures computer open-source hardware, open-source software, and microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices. The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog I/O pins that can interface to various expansion boards (termed *shields*) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers.

For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named *Processing*, which also supports the languages C and C++.The first Arduino was introduced in 2005, aiming to provide a low cost, easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors. The Arduino UNO is show in Figure 2.1 (Aaron, 2013)

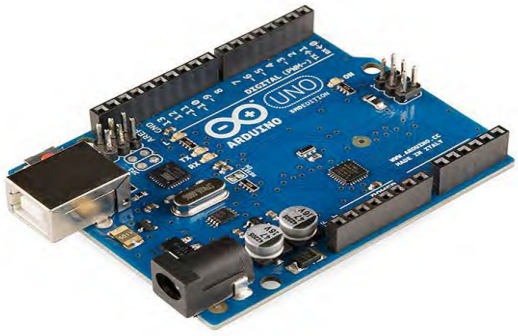

Figure 2.1 Arduino Uno (Aaron, 2013)

The Arduino UNO is a microcontroller board based on the ATmega328. It has 14 digital pin input and output of which 6 can be used as PWM outputs, 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, ICSP header and a reset button. It contains everything needed to support the microcontroller.

How to use the Arduino is easy to use where it is only necessary to connect to a computer using a USB cable or AC power adapter to DC or battery to power it. Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from AC to DC adapter or battery. Indicator of battery that can be included in the GND and Vin pin header connector POWER (Harun, 2013). The meaning of each pin has been described in table 2.1.(Aaron, 2013).