**POLITEKNIK**

**SULTAN SALAHUDDIN ABDUL AZIZ SHAH**

# LED BIKE SAFETY VEST (HIKARI VEST)


| NAME | REGISTRATION NO |
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## JABATAN KEJURUTERAAN ELEKTRIK

**SESI 1:2022/2023**

CONFIRMATION OF THE PROJECT

The project report titled "Design a Fingers Exergame to Improve Fine Motor Skill for Autistic Children Using Arduino" has been submitted, reviewed and verified as a fulfills the conditions and requirements of the Project Writing as stipulated

Checked by:

Supervisor’s name : Nik Rabiahtul Mujahadah bt Abd Rahman

Supervisor’s signature:

Date :

Verified by:

Project Coordinator name :

Signature of Coordinator :

Date :

"I acknowledge this work is my own work except the excerpts I have already explained to our source"

1. Signature : 

Name : **Ahmad Wafri Zuhdi Bin Fahmiddin**

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Date :

DECLARATION OF ORIGINALITY AND OWNERSHIP

**TITLE : LED BIKE SAFETY VEST (HIKARI VEST)**

**SESSION:** SESI 12022/2023

1. I, **1. Ahmad Wafri Zuhdi Bin Fahmiddin (08DEP20F1052)**

   is a final year student of **Diploma in Electrical Engineering, Department of Electrical, Politeknik Sultan Salahuddin Abdul Aziz Shah**, which is located at **Persiaran Usahawan, 40150 Shah Alam, Selangor**. (Hereinafter referred to as 'the Polytechnic').

2. I acknowledge that 'The Project above' and the intellectual property therein is the result of our original creation /creations without taking or impersonating any intellectual property from the other parties.

3. I agree to release the 'Project' intellectual property to 'The Polytechnics' to meet the requirements for awarding the **Diploma in Electrical Engineering** to me.

Made and in truth that is recognized by;

a) **Ahmad Wafri Zuhdi Bin Fahmiddin** ) .
(Identification card No: - 020107020123) ) ....…….
) **Wafri Zuhdi**

In front of me, **Nik Rabiahtul Mujahadah bt Abd Rahman** (820404115378) ) .....……
As a project supervisor, on the date: ) **Nik Rabiahtul**

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I would like to express gratitude to everyone who has simultaneously offered their labour and effort to helping me finish this project, whether voluntarily or involuntarily. First and foremost, I want to thank almighty allah SWT for providing us with guidance, the capacity to think critically and generate brilliant ideas, safety, skills, and a long and healthy life. Next, I want to thank Nik Rabiahtul Mujahadah bt Abd Rahman, my supervisor, for overseeing me and giving me plenty of resources, much-needed guidance and assistance, as well as motivation. She has been on this journey with me from the beginning to the end. Without her thoughtful suggestions and prompt interventions, this study assignment would not have been finished in such a timely and professional manner. She invested a lot of emotional support in this endeavour, which greatly helped me finish my final project. I would also like to take this opportunity to thank Polytechnic Sultan Salahuddin Abdul Aziz Shah, where I currently attend classes, for allowing me to pursue this education and finish my Diploma courses. I had finally learned a lot about how to gather information and analyse it so that it would be useful for our next investigations. For me, it is far more significant than most things because I learned a tonne of things that will be helpful and advantageous in the future. As my supporters in achieving the goal of my project, I would also like to thank Pn Zarina Md Amin, Pn Nur Ilya Binti Ismail, and Pn Hayati Binti Mohd Yasin. All of them are also fellow supervisors for this subject. Additionally, they taught me many things for my project, specifically by giving me ideas that drove my project Last but absolutely not least, many salutations and admiration also goes out to all the friends and other persons who have indirectly provided a hand in helping me accomplish this project.

# ABSTRACT

This study intended to develop a motorcycle safe vest that can be prepared against accidents by mounting a smart module (with Gyroscope accelerometer) on the safe vest in order to emphasize safety among functional aspects of the bike clothing. The research method investigated professional books, prior research, and Internet data to examine the characteristics of bicycle wear and the theoretical examination of smart wear, and analyzed the functional characteristics of the design by reviewing smart jacket and vest design cases for bikes currently on the market. Overall, LED Vest is a light strip controlled by a microcontroller safely applied to a wearable fabric, such as a vest. From this point, we can build on this idea, making it weatherproof, lightweight, portable, and even communicate with other devices.The LED vest works by using an Arduino to control a set of LED strips (WS2812B) based on the User's action. The Arduino can also control individually addressable RGB LED from the LED strip of the rider to either left or right side to obtain data on left or right direction, sudden stop, and so forth and displayed left or right turn signal and sudden stop sign on the backplate (back) through the LED module. As for charging the device to operate LEDs When it comes to the LED Vest, keeping safety in mind is important. As a result, a battery would be required which is small enough to fit in the Bike Vest and durable enough to withstand hard drops and external hits.The Li-Po was an initial choice. It's small and compact. But where it falls is that it doesn't have much protection and can be an issue if it gets damaged or punctured.As an alternative, a Lion RC battery pack was used as the next best alternative. It's sturdy, durable, and can withstand harsher conditions. The only factor we have to compromise is the size. As a result, the LED remote and Suit electronics footprint would be slightly larger.With a limited scope to LED-applied safety vest, this study contemplates on the problems of safety vest on the market and directions for design development with a view to develop its prototype. This is a significant study because it has been conducted concerning a prototype, a cut above the study method of constructing a basic theory. For study method, theoretic considerations on LED and safety vest are followed by case study for LED-applied safety vest currently on the market to draw out problems. Then, solutions for problems with LED safety vest will be found, while planning for a design direction in consideration of safety, functionality and beauty. Scope of study was limited to cases of LED safety vests currently on sale online and offline, excluding cases of common-form luminosity such as HB luminous vest without LED. Accordingly, results of study will help develop the prototype for LED safety vest with an increase of the wearer's safety, and be used as a basic data for developing high-value-added fashion prodcts to meet his aesthetic sense and functionality. This study has limitations. Restricted scope for LED-applied safety vest should be extended to an outdoor wear in follow-up research for the foundation of higher value added.

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CHAPTER 1

# 1 INTRODUCTION

## 1.1 Introduction

Riding a bicycle on city streets can often be an intimidating experience. With so many cars around a cyclist has to learn to focus on their ride and block out distractions, but even the safest cyclist who obeys all traffic laws is still at the mercy of the vehicles on the road. As a cyclist, the best way to ensure personal safety is to be seen by motorists. That's where a cycling safety vest comes in handy. Wearing a reflective vest for biking increases a rider's visibility without weighing them down.

While many states have laws protecting cyclists and granting them a buffer of space from passing vehicles, there is no guarantee that a passing motorist is aware of the law. That can make for close calls on the road. By wearing a reflective cycling vest it's possible for drivers to see a cyclist from farther away, giving them more time to react. This reflective vest for cycling can be especially important in inclement weather where visibility may be compromised.

Unlike other reflective sport vests, a bicycle safety vest is designed to be shorter in the front and longer in the back. This allows the reflective areas to be exposed no matter what the rider's position is. Cycling vests are also made from a light weight mesh so they can be word comfortably over any top without causing the rider to overheat.

While there is no definitive way to ensure the safety of cyclists, precautionary measures like wearing a safety helmet, brightly colored clothing, or cycling safety vest can offer some protection against a potential accident. Since most accidents occur when one party involved is not paying attention, brightly colored or reflective garments increase the likelihood of being seen before it's too late.

In addition to a cycling safety vest and protective helmet, a cyclist should also carry a cell phone with them and some form of identification. If an accident does happen, a cyclist needs to be prepared for any scenario. The ability to contact someone in an emergency is always important. Just because a rider is out for a long ride does not mean they should be cut off from communications. Ride smart. Ride safe.

## 1.2 Background Research

Following the introduction of individually addressable RGB LED's to the world, the use of RGB LEDs in general has skyrocketed. Yet, there remains a place in the world where functional RGB lighting has yet to arrive. Cyclists have several options when it comes to providing light during night conditions. The most popular are to place some version of a flashlight on the front handle bars, and a blinking red LED on the seat stem. More expensive options allow for a cyclists to place an LED strip on the wheel hub, and this lights the plane of the wheel as the rider moves. While interesting, and providing a similar feature as the lighting system developed during this project, these hub lights are costly1 , and due to their flashy nature, targets for thieves. Thus, many riders simply opt for the front and rear lighting choice. This provides visibility of the cyclist to oncoming and overtaking motorists. Yet, these conditions are not the biggest threat to a cyclist. Traffic coming towards the cyclist from the sides and in the cyclists' blind spots to the rear present the most dangerous areas, and yet, we have few options as cyclists to shine light in these directions. Thus, we are unable to communicate our position to motorists approaching us from these directions. The LED Bike Safety Lights were designed with this concept in mind. The circuit was created to power RGB LEDs, with the configuration of the LEDs, be it strips or large COB LED packages, left to the end user. The circuit can support LEDs up to a continuous drain current of 5 Amps for each channel, and all transistor, op-amp, and timer packages were chosen to provide a range of input voltages from 5V – 18V DC. The circuit board was designed with mounting holes for optional 18650 Li-Ion battery holders, should the end user desire this configuration over a remote power supply.

## 1.3 Problem Statement

The project idea is to allow bikers to become safer while they are riding espacially at night.I decided that this would benefit many people who ride at night and have trouble being seen in the dark.I can personally relate to this because a car accidentally hit my friend;Arif, when he was biking at night (he was ok) so this is a reason that i was motivated. I'm plan to design a LED bike safety vest which will have turn signal consist of a diamond-like indicator at the back and front light strips on shoulders, the LED arrow in which side they pushed will begin to blink, allowing people in cars to see which way the biker plans on turning. The buttons will be connected to the vest through Bluetooth technology. But i may also be wondering, *"that means you'll need to press the remote every time you require to turn… what if I'm riding a bike?!"* .So I plan to adding gyroscope system for a bike. we can figure out whether the Bike is turning left or right. So, based on the same principles above, we can mount the remote to the Bike handles and do the same.For example, When you turn the handlebar right,The Gyroscope detects the relative change in orientation to the Right. The value 'R' (representing Right) is sent

to the LED Vest microcontroller via Bluetooth.So the result is ,the LED strip would light up the right arrows of the LED strip.

Host Articles and Relation to the Problem Statement

Stewart, Orion, Anne V. Moudon, and Charlotte Claybrooke. "Common Ground: : Eight Factors That Influence Walking and Biking to School." *EBSCO Host*. N.p., n.d. Web.

Our first peer-reviewed article discusses 8 influences on child safety while traveling to school. It looks at the different types of transportation students take to school such as biking, riding the bus, or walking. The 8 factors discussed include, "distance to school, parental fear of traffic and crime, family schedule constraints and values, neighborhood and family resources and culture, weather, and school characteristics." Our shirt would have an impact on these factors for several reasons. Parents would be less fearful that their children would in danger while riding in the dark, so that eliminates the fear factor. During rainy weather, the child would be more likely to be seen with the turn signals than without them. These two reasons are why this article is important to the project.

Horacek, Tanya M., Adrienne A. White, Geoffrey W. Greene, and Melissa M. Reznar. "Sneakers and Spokes: An Assessment of the Walkability and Bikeability of U.S. Postsecondary Institutions."*EBSCO Host*. N.p., n.d. Web.

This article discusses, "the assessment of walkability and bikeability of 15 U.S. postsecondary education campuses. Our shirt would greatly increase the safety for the postsecondary campuses because it is an introduction to a new safety feature for bikers at night.

"Biking Safety." *New York Times*. EBSCO Host, n.d. Web.

Our next article reviews on how New York Cities street changes are making it more difficult for bikers to get around. Despite this be a geographical problem, hand signals used by the bikers are more difficult to spot than the turn signals we are creating. These will 1.) Allow bikers to keep both hands on the steering, which is safer. And 2.) Allow people driving cabs to visibly see the bikers better.

Hardesty, Greg. "Athlete Peddles Some Advice on Bike Safety."*Family Safety and Health*. Interview, n.d. Web.

Our last article is an interview with decathlon and biking athlete Bruce Jenner. He discusses some safety tips in biking such as "using hand signals." Without our technology there is a danger in the biking world by using hand systems. Just like driving a car, it is safer by using two hands on a bike. By eliminating the hand turn signals we will be saving lives.

## 1.4 Research Objectives

The following are the objectives to be applied in the system that being develop:

i. To develop a safety vest that improving the cyclist communication and intent with other motorists and pedestrians on the road.

ii. To construct a vest to indicate left and right signal by using gyroscope accelerometer.

## 1.5 Scope of Research

- This Project is focusing that system can be implemented for all cyclist
- The emphasis is that improving the cyclist communication and intent with other motorists and pedestrians on the road.
- The main controller is using Arduino Nano and Gyroscope Accelerometer to indicate left and right signal

## 1.6 Project Significance

Hikari Vest is an open-source Bike Safety Vest designed to be a wearable technology. The product is a Bike Suit designed to increase a cyclist's visibility, especially during the night. As well as improving cyclist's communication with other motorists and pedestrians.In addition, I need innovation to add more functionality than the competitors: If I add an accelerometer to the Bike remote rather than the LED wearable to reduce the number of electronics. We can then use the handle as the indicator, meaning we can signal left and right without lifting a finger or even being aware of the wearable Led suit.

## 1.7 Chapter Summary

This chapter contains all of the procedures for our project, including the problem statement ,study objectives, and study scope.This concept came to me via the internet and it how evolved into a human need.There's also background research on our topic in there.

CHAPTER 2

# 2 LITERATURE REVIEW

## 2.1 Introduction

The multi-purpose of reflective safety vests are made up of LED electronic light-emitting diode lamp beads. They have many outstanding advantages such as high brightness, energy saving, and waterproofness. Two pairs of LED lights strips are installed on the front and back of the clothes. According to the specific requests, a variety of contents can be designed to remind the flashing mode. At the same time, there are lighting functions. At present, the multi-functional LED reflective vests have been popular promoted in the traffic while walking, running, biking or doing road side repairs or construction.

In order to ensure personal safety during the process of commanding and law enforcement, you can wear a LED vest with reflective material outside the work clothing. When the car light shines on it, it will reflect light. However, due to the increased haze, rain, fog, and other inclement weather, the light source is insufficient at night, the reflective film is passively reflected, the reflection angle is too small, the reflected light effect is poor, and the human eye is less sensitive to the fixed reflective light source. And the original reflective vest can no longer meet the safety warning needs of modern urban traffic management.

## 2.2 Multi-functional design for safety vest (Literature Review Topic 1)

This study was intended to develop a multi-purpose, multi-functional design for safety vest to enhance the safety and user's availability. With a limited scope to LED applied safety vest, this study contemplates on the problems of safety vest on the market and directions for design development with a view to develop its prototype. This is a significant study because it has been conducted concerning a prototype, a cut above the study method of constructing a basic theory.

### 2.2.1 Previous Research (Subtopic Literature Review Topic 1)

For study method, theoretic considerations on LED and safety vest are followed by case study for LED-applied safety vest currently on the market to draw out problems. Then, solutions for problems with LED safety vest will be found, while planning for

a design direction in consideration of safety, functionality and beauty. Scope of study was limited to cases of LED safety vests currently on sale online and offline, excluding cases of common-form luminosity such as HB luminous vest without LED. Accordingly, results of study will help develop the prototype for LED safety vest with an increase of the wearer's safety, and be used as a basic data for developing high-value-added fashion products to meet his aesthetic sense and functionality. This study has limitations. Restricted scope for LED-applied safety vest should be extended to an outdoor wear in follow-up research for the foundation of higher value added.

The Hikari Vest consist of:

- A diamond-like indicator at the back
- Front Light Strips on Shoulders

Table 2.1: The table explains the functionality of each LED segment

| LED Strip | Colour | Function |
|---|---|---|
| Diamond Strip - Half | Yellow | Turn Right or Left |
| Diamond Strip Red | Red | Abrupt Brake Lights |
| Front Shoulder Strip | Yellow | Turn Right or Left |
| All LED on Blinking | Yellow | Hazard / Emergency |

Going into detail, the Bike Remote and the LED Bike Vest have two Arduino (Microcontrollers) which communicate with each other through Bluetooth. The LED vest works by using an Arduino to control a set of LED strips (WS2812B) based on the User’s action. The Arduino can also control individually addressable RGB LED from the LED strip. The Bike Remote has four customizable push buttons. When a button is pressed, a value is sent to the Hikari Vest’s Arduino, triggering the LED strip/ WS2812B to light up a specific way based on the particular value receiver.

## 2.3 WS2812B LED Strip (Literature Review Topic 2)

Having a closer look, The WS2812B LED strip is made up of 5050 RGB LED lights which a smaller WS2812B LED driver is integrated.Since it consists of RGB lights, we can control the intensity of the RGB (Red, Green, Blue) hexadecimal value to give us the Color Hue we like and which individual LEDs to light up.The exciting part is that we can control the entire strip with just one Arduino pin from the Data line. Also, the current LED's data output pad is connected to the next LED's input pad.

## 2.4 Arduino for MPU-6050(Accelerometer and Gyroscope Sensor (Literature Review Topic 2)

MPU-6050 theory has played an important role in LED vest. So that's why I earn how to use the MPU-6050 accelerometer and gyroscope module with the Arduino board. The MPU-6050 IMU (Inertial Measurement Unit) is a 3-axis accelerometer and 3-axis gyroscope sensor. The accelerometer measures the gravitational acceleration, and the gyroscope measures the rotational velocity. Additionally, this module also measures temperature. This sensor is ideal for determining the orientation of a moving object. Using the accelerometer's values, it is possible to calculate the roll and pitch angles using trigonometry. However, it is not possible to calculate the yaw. We can combine the information from both sensors to get more accurate information about the sensor orientation.

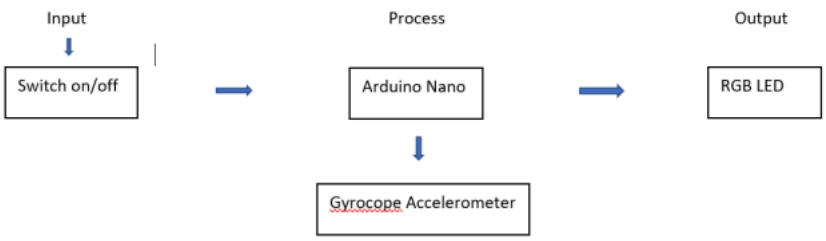



Figure 2.1: Block diagram Hikari Vest

### 2.4.1 Microcontroller

This is where the Microcontroller gyroscope (MPU6050) comes into the my Hikari Vest. Using the relative position/orientation of the MPU6050, we can figure out whether the Bike is turning left or right. So, based on the same principles above, we can mount the remote to the Bike handles and do the same.For example ,When you turn the handlebar right.The Microcontoller Gyroscope detects the relative change in orientation to the Right. The value 'R' (representing Right) is sent to the LED Vest microcontroller via Bluetooth.So The LED strip would light up the right arrows of the LED strip

### 2.4.2 Arduino Uno

Arduino UNO is a microcontroller board based on the **ATmega328P**. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

## 2.5 Chapter Summary

This section focusing on two different section, the first is develop a multi-purpose, multi-functional design for safety vest to enhance the safety and user's availability this study contemplates on the problems of safety vest on the market and directions for design development The second section is discovered about the theoretic considerations on LED and safety vest are followed by case study for LED-applied safety vest currently on the market to draw out problems .Then, going to detail part about the Bike Remote and the LED Bike Vest have two Arduino (Microcontrollers) which communicate with each other through Bluetooth and the last but not least including the selection of the type of Microcontroller which is gyroscope (MPU6050) comes into the my Hikari Vest.

CHAPTER 3

# 3 RESEARCH METHODOLOGY

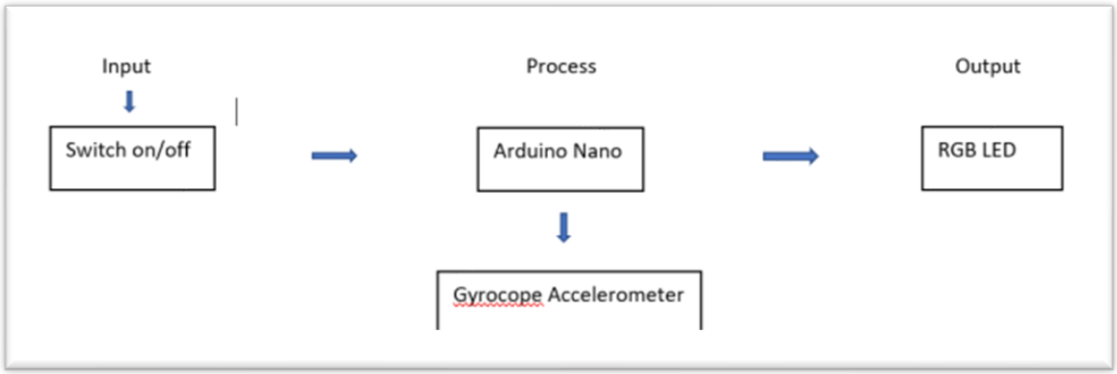
## 3.1 Introduction

To realize this Project as a product that ready to use with safety characteristic, a very comprehensive plan is undertaking. A step by step procedure is done so that the Project can be completed in time. This include collecting data of a lot on preparations and the materials that you have to work, design the mechanical part, circuit design testing, verification and simulation.

## 3.2 Project Design and Overview.

As mention in the previous chapter, the designed controller is using a WS2812B LED strip and MPU6050(Gyroscope) with Arduino Nano as the main controller.The design of the controller circuit using Arduino realizes using Proteus 8 Professional Software and then convert to PCB circuit.

### 3.2.1 Block Diagram of the Project



### 3.2.2 Flowchart of the Project

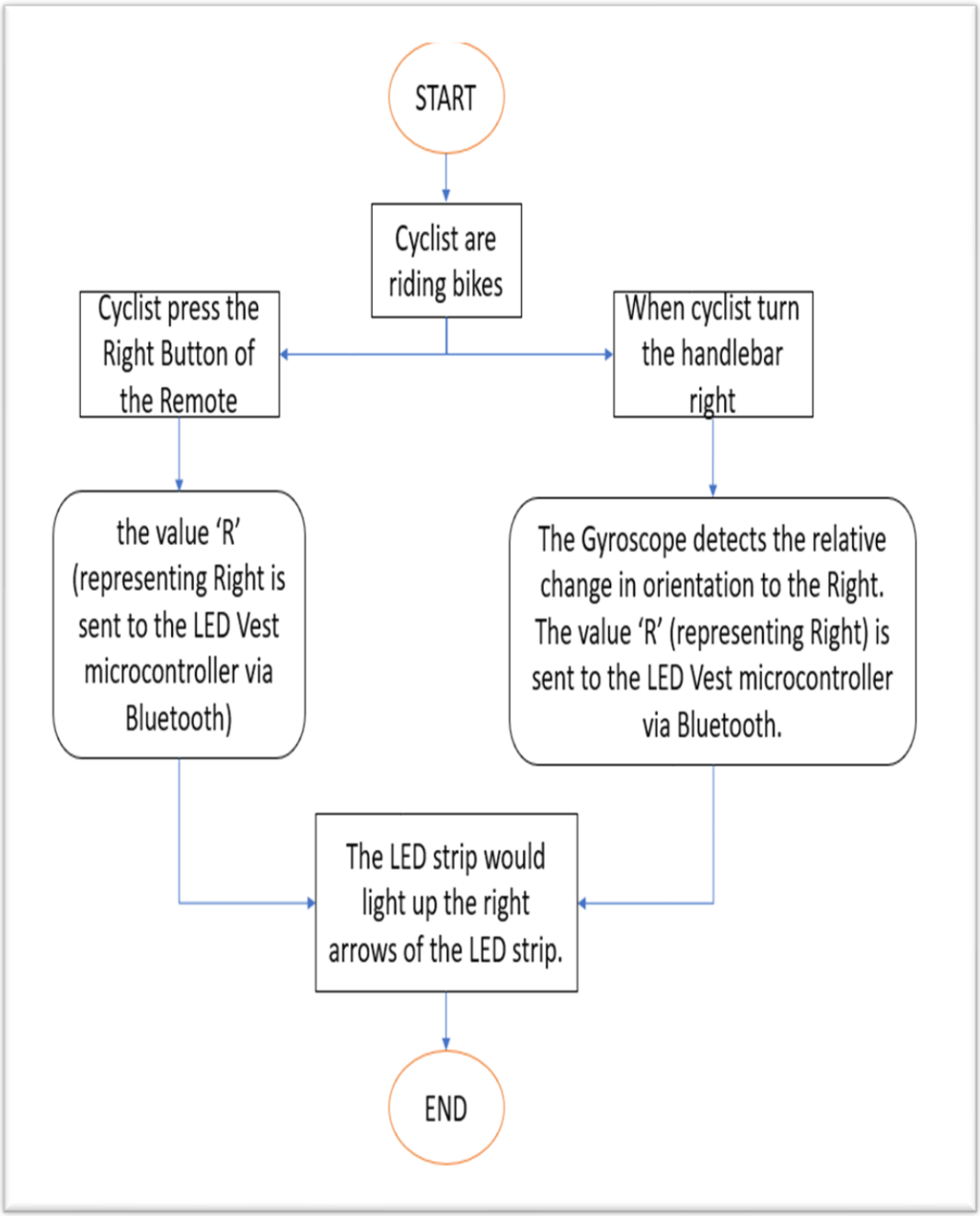



Figure 3.1: Flow chart of operation of the system

## 3.3 Project Hardware

As mention in the previous chapter, the designed controller is using an Arduino Nano (Microcontrollers) which communicate with each other through Bluetooth. The LED vest works by using an Arduino to control a set of LED strips (WS2812B) based on the User's action. The Arduino can also control individually addressable RGB LED from the LED strip. The Bike Remote has four customizable push buttons. When a button is pressed, a value is sent to the Hikari Vest's Arduino, triggering the LED strip/ WS2812B to light up a specific way based on the particular value receiver.

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### 3.3.1 Schematic Circuit

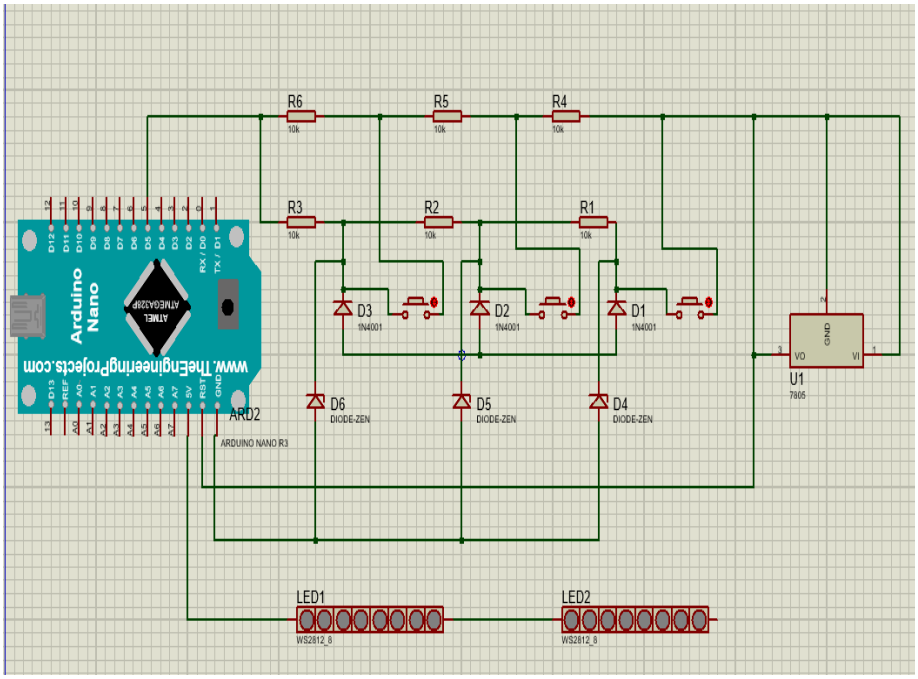



Figure 3.3.1: Circuit Diagram

### 3.3.2 Description of Main Component (Arduino Uno,MPU6050 Gyroscope)

Main component for Hikari Vest is a light strip controlled by a microcontroller Arduino Uno and MPU6050(Gyroscope) that's are safely applied to a wearable fabric, such as a vest. The LED vest works by using an Arduino Nano to control a set of LED strips (WS2812B) based on the User's action. The Arduino can also control individually addressable RGB LED from the LED strip. The Bike Remote has four customizable push buttons. When a button is pressed, a value is sent to the Hikari Vest's Arduino, triggering the LED strip/ WS2812B to light up a specific way based on the particular value received.

#### 3.3.2.1 Component 1 (WS2812B LED strip)

The WS2812B LED strip is made up of 5050 RGB LED lights which a smaller WS2812B LED driver is integrated. Since it consists of RGB lights, we can control the intensity of the RGB (Red, Green, Blue) hexadecimal value to give us the Color Hue we like and which individual LEDs to light up. The exciting part is that we can control the entire strip with just one Arduino pin from the Data line. Also, the current LED's data output pad is connected to the next LED's input pad.

#### 3.3.2.2 Component 2 (Batteries)

Second component is the batteries. When it comes to the Hikari Vest, keeping safety in mind is important. As a result, a battery would be required which is small enough to fit in the Bike Vest and durable enough to withstand hard drops and external hits. The Li-Po was an initial choice. It's small and compact. But where it falls is that it doesn't have much protection and can be an issue if it gets damaged or punctured. As an alternative, a Lion RC battery pack was used as the next best alternative. It's sturdy, durable, and can withstand harsher conditions. The only factor we have to compromise is the size. As a result, the LED remote and Suit electronics footprint would be slightly larger. However, this is worth it to maintain a level of safety. If you have any other alternatives, do leave this in the comments.

#### 3.3.2.3 Component 3 (Resistor,Diode,Push Button)

For other component, I choose the 10K resistor is one of the most common resistors in electronics. Its popularity makes it perfect for learning the resistor color code. It's useful to be able to readily recognize them in projects, along with other common resistors. It's important to realize that not all four bands correspond to the amount of resistance in Ohms. The first three bands tell us that the resistor's nominal value is 10,000 Ohms, and the 4th band gives us the tolerance of the resistor.

Next, Zener diode is a special type of P-N junction diode. It is a silicon semiconductor device in which both P and N junctions are heavily doped due to which it forms a very thin depletion layer which results in the high electric field across the junction. It can work in both forward bias and backward bias, i.e., it can allow the current to flow in both forward or backward directions if enough voltage is passed across the junction, but it is mainly designed to work in the reverse direction. Zener diode solves a vast number of problems that may occur in circuit designing. Hence, it is a widely used component in electrical circuits. It is designed in such a way that it can handle the breakdown caused by the reverse breakdown voltage without failure, which is why it is also known as the breakdown diode.

Last but not least, I use Push Buttons are normally-open tactile switches. Push buttons allow us to power the circuit or make any particular connection only when we press the button. Simply, it makes the circuit connected when pressed and breaks when released. A push button is also used for triggering of the SCR by gate terminal. These are the most common buttons which we see in our daily life electronic equipment's. Some of the applications of the Push button are mentioned at the end of the article.

## 3.4 Mechanical Design/Product Layout


### 3.4.1 Sustainability Element in The Design Concept

Students should elaborate on the design criteria for their project in this subtopic, whether they be economic, social, or environmental design criteria that make use of sustainable design practises. Additionally, describe how the proposed Project will contribute to society.

## 3.5 Chapter Summary

This chapter describes how the project will operate and what components will be used. The project shopping cart with barcode scanner process is explained using a block diagram and a flowchart. The schematic illustration illustrates the task at hand.

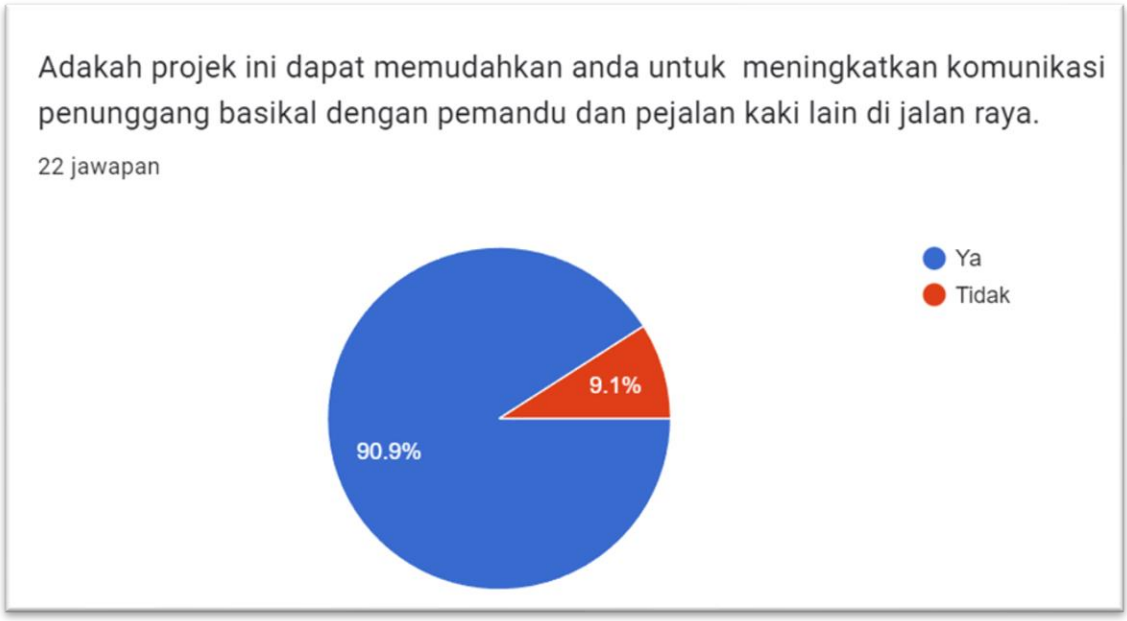
CHAPTER 4

# 4 PROJECT MANAGEMENT AND COSTING

## 4.1 Introduction

In this chapter, the result and analysis will show in table and graph. The analysis shown the percent of component function week by week and percentage of the project every week.

## 4.2 Project Result and Analysis Project analysis


According to the bar chart, 22 people were able to respond to the survey or question.63.6% of 100% is frequent for cycling and 27.3% don't cycling. Other than that, 72.7% of the 22 respondents prefer to give hand signals than to use a signal indicator light during cycling. Lastly, 90.9% of them agree that this project can make it easier to improve the communication of cyclists with drivers and other pedestrians on the road.

### 4.3 Project Result

The result in this project is 100% successful although I feel that this project is fundamental for traffic indicator lights. The project's coding-related issue has been resolved. Due to frequent short circuits on the project circuit, the project has also undergone a number of soldering processes, however this issue can also be resolved. The component gyroscope accelerometer was previously removed from this project since it interferes with the project circuit and is the major issue with it. I had to take it out.

The Led bike safety vest was successfully designed as a result of our effort. The signal indicator light can be easily turned on by the vest. Through the LED lights that are linked to Arduino UNO, it will be able to read the uploaded code. As a result, the cyclist will be able to interact with both the driver and other road users.

## 4.4 Disscussion

The communication between cyclists, vehicles, and other people on the road could be improved to this idea. Cycling enthusiasts will have more courage to this vest's gorgeous and secure design.Therefore when they wear this vest, they appear more assured.

## 4.5 Chapter Summary

This chapter might be summed up by saying that every project has unique issues since, as the phrase goes, "every ailment has a remedy." To come up with a solution, it's crucial to brainstorm with your project supervisor and partners. Finding a solution will therefore be simpler, and the job will be finished by the deadline.

# 5 CONCLUSION AND RECOMMENDATIONS

## 5.1 Introduction

The project is completed entirely in this chapter. Thus, this chapter's ultimate plot conclusion. In addition to suggestions, there are additional projects that can help the function.

## 5.2 Conclusion

This project was successful since I was able to design and make the led safety vest, to sum up. Despite some modifications, I think that the led bike safety vest can make it simpler for everyone to enhance pedestrian and bicycle communication on the road.

## 5.3 Suggestion for Future Work

The recommendation for future work are:

- In order to increase connection with everyone on the road, prepare to add a new component, the microcontroller gyroscope accelerometer.
- to design a remote control with a Bluetooth network as well

## 5.4 Chapter Summary

This chapter might be summed up by saying that every project has unique issues since, as the phrase goes, "every ailment has a remedy." To come up with a solution, it's crucial to brainstorm with your project supervisor and partners. Finding a solution will therefore be simpler, and the job will be finished by the deadline.

# 6 PROJECT MANAGEMENT AND COSTING

## 6.1 Introduction

The table below illustrates the project's costing in this chapter. In order to complete the project, materials and component purchases must be made. Table 6.2 displays the component list and price.

## 6.2 Gant Chart and Activities of the Project

| | TASK NAME | IMPLEMENTATION | DURATION (DAYS) | COST (RM) | WEEK 1 (20.08.2022 – 26.08.2022) | WEEK 2 (27.08.2022 – 02.09.2022) | WEEK 3 (03.09.2022 – 09.09.2022) | WEEK 4 (10.09.2022 – 16.09.2022) | WEEK 5 (17.09.2022 – 23.09.2022) | WEEK 6 (24.09.2022 – 30.09.2022) | WEEK 7 (01.10.2022 – 07.10.2022) | WEEK 8 (08.10.2022 – 14.10.2022) | MID TERM BREAK (03.05.2022 – 09.05.2022) | WEEK 10 (29.10.2022 – 04.11.2022) | WEEK 11 (05.11.2022 – 11.11.2022) | WEEK 12 (12.11.2022 – 18.11.2022) | WEEK 13 (19.11.2022 – 25.11.2022) | WEEK 14 (26.11.2022 – 02.12.2022) | WEEK 10 (29.10.2022 – 04.11.2022) | FINAL EXAM ( ) | SEMESTER BREAK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PROJECT BRIEFING | PLAN | 1 | 0 | | | | | | | | | | | | | | | | | |
| | | ACTUAL | 1 | 0 | | | | | | | | | | | | | | | | | |
| 2 | MEETING WITH SUPERVISOR | PLAN | 14 | 0 | | | | | | | | | | | | | | | | | |
| | | ACTUAL | 8 | 0 | | | | | | | | | | | | | | | | | |
| 3 | PROJECT DESIGN | PLAN | 10 | | | | | | | | | | | | | | | | | | |
| | | ACTUAL | 3 | 0 | | | | | | | | | | | | | | | | | |
| 4 | PROJECT CODING | PLAN | 117 | 00 | | | | | | | | | | | | | | | | | |
| | | ACTUAL | | | | | | | | | | | | | | | | | | | |
| 5 | SOLDERING | PLAN | 3 | 0 | | | | | | | | | | | | | | | | | |
| | | ACTUAL | 2 | 0 | | | | | | | | | | | | | | | | | |
| 6 | LOGBOOK | PLAN | 14 | 0 | | | | | | | | | | | | | | | | | |
| | | ACTUAL | 14 | 0 | | | | | | | | | | | | | | | | | |
| 7 | ISOLMS | PLAN | 14 | 0 | | | | | | | | | | | | | | | | | |
| | | ACTUAL | 14 | 0 | | | | | | | | | | | | | | | | | |
| 8 | HARDWARE PROJECT | PLAN | 6 | 0 | | | | | | | | | | | | | | | | | |
| | | ACTUAL | 3 | 0 | | | | | | | | | | | | | | | | | |
| 9 | SOFTWARE PROJECT | PLAN | 2 | 0 | | | | | | | | | | | | | | | | | |
| | | ACTUAL | 7 | 0 | | | | | | | | | | | | | | | | | |
| 10 | QUESTION AND ANSWER PROJECT | PLAN | 5 | 0 | | | | | | | | | | | | | | | | | |
| | | ACTUAL | 1 | 0 | | | | | | | | | | | | | | | | | |
| 11 | GOOGLE FORM | PLAN | 5 | 0 | | | | | | | | | | | | | | | | | |
| | | ACTUAL | 1 | 0 | | | | | | | | | | | | | | | | | |
| 12 | FINAL PROPOSAL | PLAN | 6 | 0 | | | | | | | | | | | | | | | | | |
| | | ACTUAL | 2 | 0 | | | | | | | | | | | | | | | | | |
| 13 | PRESENTATION PROJECT | PLAN | 2 | 0 | | | | | | | | | | | | | | | | | |
| | | ACTUAL | 1 | 0 | | | | | | | | | | | | | | | | | |

## 6.3 Cost anf Budgeting

| No. | Component and materials | The unit price | Quantity | Total |
|---|---|---|---|---|
| 1 | Arduino Uno | RM 18.50 | 2 | RM 37.00 |
| 2 | MPU6050 (Accelerometer) | RM 8.50 | 1 | RM 8.50 |
| 3 | LED Strip (WS2812B) | RM 17.43 | 1 | RM 17.43 |
| 4 | Jumper Wires | RM 3.70 | 1 | RM 3.70 |
| 5 | Bluetooth HC-05 | RM 13.90 | 2 | RM 27.80 |
| 6 | Slider Switch | RM 3.31 | 2 | RM 6.62 |
| 7 | Capacitors | RM 0.50 | 1 | RM 0.50 |
| 8 | Other materials | RM | 13 | RM 91.20 |
| | | | **Total :** | **RM 192.25** |
| | List of other costing | | | |
| 1 | Transportation | | - | - |
| 2 | Postage | | 7 | RM 32.90 |
| 3 | Craft Work | | - | - |
| 4 | Internet | | - | - |
| 5 | Application | | - | - |
| | | | **Total :** | **RM 32.95** |
| | | | **Overall total** | **RM 225.15** |

## 6.4 Chapter Summary

Based on the estimated costs, the total cost to execute the project is RM172.15. The research indicates that it is doable to execute and achieve. The project took almost a month to finish. The creation of this project is challenging and time-consuming.

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# APPENDIES

pushButton_KiriKanan | Arduino 1.8.19

File Edit Sketch Tools Help

pushButton_KiriKanan

```
int led1=2;
int led2=5;
int button1=4;
int button2=7;

void setup(){

  pinMode(led1,OUTPUT);
  pinMode(led2,OUTPUT);

  pinMode(button1,INPUT);
  pinMode(button2,INPUT);

}

void loop(){

  if(digitalRead(button1)==HIGH){

    digitalWrite(led1,HIGH);

}

  if(digitalRead(button2)==HIGH){

    digitalWrite(led2,HIGH);



  }

  else{

   digitalWrite(led1,LOW);
   digitalWrite(led2,LOW);

  }

}
```

Done compiling.

```
Sketch uses 966 bytes (2%) of program storage space. Maximum is 32256 bytes.
Global variables use 9 bytes (0%) of dynamic memory, leaving 2039 bytes for local variables. Maximum is 2048 bytes.
```

## APPENDIX B-PROJECTMANUAL/PRODUCT CATALOGUE


1. Switch ON the power supply.

2. To turn on the left and right signal indication lights, press the push button.

3. LED lights boost cycling communication with automobiles and other road users by lighting up the signal indicator and making it easy for everyon