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SULTAN SALAHUDDIN ABDUL AZIZ SHAH

ECO BLINKERS

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DECLARATION OF ORIGINALITY

TITLE : ECO BLINKERS

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ACKNOWLEDGEMENT

In this section, we would like to take the opportunity to express our gratitude and appreciation to everyone who have contributed their efforts and times in helping us to complete this project.

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Finally, hear felt appreciation is expressed towards each member of this group as each of us has given all our efforts and times to complete this project as best as we could. This project would not completed and function well without cooperation and coordination from each member. Also, we would to thank students and seniors of Mechanical Engineering Department who also gave us guide and tips on completing our project.

ABSTRACT

This project is an Eco Blinkers which is proposal to solve the problem related the common electronic flag man in the market nowadays. Among the problems are using non rechargeable battery. To solve the problems, an idea was thought and planned to create a device which have criteria of safety and using renewal energy. The Eco Blinker can be best utilized in traffic flow control for long-term or short term. Application for the Eco Blinker to give hazard and alert nearby vehicles of danger ahead which ensure safety of road users on a certain road construction site. The purpose new technologies in Eco Blinkers on construction site could possibly eliminate the usage of a battery power. The Eco Blinkers can reduce costs and increase safety for road users by eliminating the need human flag man. This product is practical for public or privately funded road construction projects that required overnight control as in various weather conditions.

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CHAPTER 1

INTRODUCTION

1.1 PROJECT DEFINITION

Traffic cones, also called pylons, road cones, highway cones, safety cones, or construction cones, are usually cone-shaped markers that are placed on roads or footpaths to temporarily redirect traffic in a safe manner. Traffic cones are often used to create separation or merge lanes during road construction projects or automobile accidents, although heavier, more permanent markers or signs are used if the diversion is to stay in place for a long period of time.

Eco Blinkers are typically used outdoors during road work or other situations requiring traffic redirection or advance warning of hazards or dangers, or the prevention of traffic. During night time use or low-light situations traffic cones are usually fitted with a retroreflective sleeve to increase visibility. On occasion, Eco Blinkers may also be fitted with flash lights for the same reason.

Eco Blinkers are designed to be highly visible and easily movable. Traffic cones come in many different colours, with orange, yellow, pink, and red being the most common colours due to their brightness. Others come in green and blue, and may also have a retroreflective strip (commonly known as "flash tape") at the blade on the head of the cone to increase their visibility. The head on the cone have some blade that move around in two directions. So, this may be a replacement for the lights on the safety cone electronics. There will be two colours at the blade which have red and white.

1.2 PROBLEM STATEMENT

For the observation, motorists will not notice the attendance of safety cones when on the road due to safety cone is less clear at night. This is because, stickers reflected light is limited. That will be less visibility at night and it can caused accident. Next, the electronic safety cone in turn requires high maintenance and high costs to make it. This product also requires electrical energy, and this requires a lot of electricity. The electronic safety cone also has a long shelf life because it is easily damaged.

1.3 OBJECTIVE

The objective of the projects are:

i. Designing and innovative road safety cone.
ii. To increase the safety road cone.
iii. Save the energy by using renewable energy.
iv. Produce project design using 3D printer.

1.4 SCOPE PROJECT

Eco Blinkers designed to increase the safety on the road and to reduce the accident on the road. The scope in designing Eco blinkers are:

I. Help road users to be more aware of the presence of warnings in front of the road.
II. Reduce the use of electricity.
III. Use the concept of renewable energy such as wind energy.
IV. To save on the cost of making this project we use 3D printer.
V. 3D printer is very cheap and easy to produce compared to previous project.

CHAPTER 2

LITERATURE REVIEW

This chapter is about the explanation and description of the studies that have been made by using resources such as writing article, internet, journals and references book. This chapter will elaborate safety cone, safety cone electronic and the advantage and disadvantage of the Eco Blinkers.

2.1 CONCEPT / THEORY

Eco Blinkers is a hazard sign for sending messages, as a warning device, etc, such as a direction indicator on the road. It also providing street lighting at intersection locations to reduce night time crashes by making the intersection features visible to both vehicular and pedestrian traffic. It quite regularly for traffic channelization including concrete barriers, jersey barriers, traffic barrels or drums and vertical panels. Depending on space and need all of these categories are listed as acceptable barricade devices in the MUTCD (Manual on Uniform Traffic Control). Eco Blinkers are often used in areas where there is less horizontal space but they serve the same purpose, to help control the flow of traffic and protect workers.

2.2 Factor of accidents

Road safety issues are an extremely challenging issue that has profound implications. It is an interdisciplinary issue and comes from a variety of causes. Therefore, it does require a holistic or holistic approach, and is integrated in its approach. Among the causes of road accidents:-

- Drive with excessive speed limits including rain and wet roads.
- Drive the vehicle in front of too close.
- Using a cell phone especially reading and sending messages while driving.
- Impartial and considerate of other road users especially when in school and road construction areas.

In addition to the attitude of the driver, preliminary findings also indicate that there are a small number of accident cases involving infrastructure and environmental factors that can be improved. In this regard, a number of steps have been taken, such as the installation

of light blinkers in the corner. This step will be continued to address the issue of overall road accidents as well as involving high-risk users. (Pasukan Polis Diraja Malaysia, 2013).

2.3 Causes of accidents

According to a study by the Malaysian Institute of Road Safety Research (MIROS), 1,849 deaths are those aged 25 and under. The main factor contributing to the cause of road accidents in Malaysia is the road driver factor.

The impact of the accident has led to an increase in accidents by 20,829 in 2019. For the same period, 197 fatalities have been recorded compared to 208 fatalities in 2018 with a decrease of 11 cases. The death toll of 197 road users for the two weeks during the festive season is still high and my hope is that everyone involved including road users will be working to reduce the numbers.

In addition, financial losses also occur in the event of an accident. Every accident will result in damage to the vehicle that needs to be delivered to the car repair shop for a high cost repair. Indeed, consumers will lose money if their car is involved in any road accidents. (Malaysian Institute of Road Safety Research (MIROS), 2018).

2.4 Disadvantages of the conventional blinkers

The disadvantages of the blinkers are the maintenance of the blinkers battery, the small size blinkers. Creation evolution hazard sign electronic security as starting with a smaller size and using electronic light. Where the hazard electronic can easily see by user road because their light bulbs. However, there is still lacking of comments on these cones as lights themselves combustible or running out of batteries and costs maintenance also quite expensive.

Blinker battery life expectancy is short when LED lights are on for a week. When the battery is low the LED light will dim and due to periodic maintenance. Also, in terms of size, it is very small for long distances, so the size of the view from a distance is less noticeable. (Roadtech Manufacturing, 2006).

2.5 EVOLUTION OF THE CREATION OF SAFETY CONE

The important thing of the Eco Blinkers is to help motorists see or know the presence of the cones on the road. Figure 2.1 shows the evolution of hazard sign.

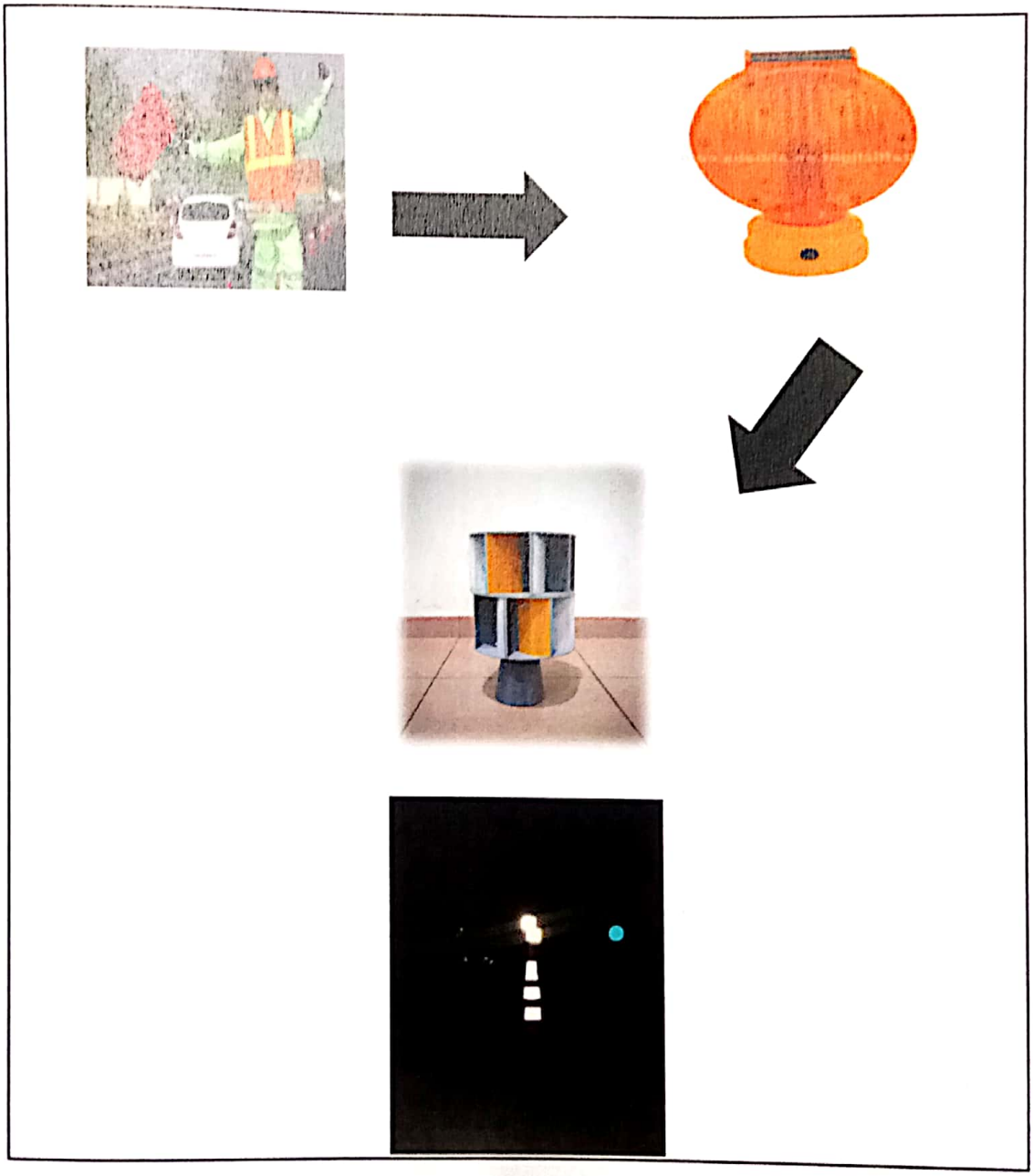


Figure 2.1 Hazard sign Generation

2.6 TYPES OF SAFETY CONES AVAILABLE IN THE MARKET.

There are various types of hazard sign flash that are in the market, each type of hazard sign have their different shape and specification. The chart below shows the types of along with their pros and cons.

The creation of a hazard sign design is more compact and has a little lack (Figure 2.2) in which the hazard sign has a large size and makes it difficult to install. Besides, it does not reflect light more clearly. This can make road users cannot see or notice the presence of the hazard sign.

Figure 2.2 Flag man

Creation evolution hazard sign electronic security as Figure 2.2 starting with a smaller size and using electronic light. Where the hazard electronic can easily see by user road because their light bulbs themselves. However, there is still lacking of comments on these cones as lights inside combustible or running out of batteries and costs maintenance also quite expensive.

Figure 2.3 Hazard Electronic

The creation of Eco Blinkers, began to grow with improvements by using wind to spin the round shape flash flight .This flash light has portable base that allows it to be installed on barrier and safety cone. It is also environmentally friendly because it does not use electrical energy even the wind for moving it. By adding the reflector sticker around the flash light, the appearance and reflected light is brighter than hazard electronic and this causes more road users will see the presence of the flash light. Unfortunately, it requires a relatively high cost compared to ordinary cone reflector because there are additional spin on it.

2.7 COMPARISON OF CRITERIA

The table below shows a comparison of the criteria for safety cones in the market.

Table 2.1 Comparison Criteria

Image	Characteristic	Energy
	✓ Durable (rain or shine) ✓ Large size ✓ Have a division ✓ Heavy weight	Use of electricity
	✓ Not hardy ✓ Has physical size is relatively mild ✓ Foldable and portable ✓ Light weight	Use of electricity
	✓ Durable ✓ Have a physical size which is quite heavy ✓ Has two parts	Using wind energy and renewable energy

CHAPTER 3

Methodology

3.1 INTRODUCTION

This chapter will tell the mechanism of Eco Blinkers work and the component that has been used in order to build it. The design of the project was designed by using Autodesk Inventor Professional 2018. The materials that used were highly capable of extreme weather and heat to withstand the current temperature. The project itself need to be durable as much as it can so that it can spin without problem. Figure 3.0 shows the flowchart of methodology.

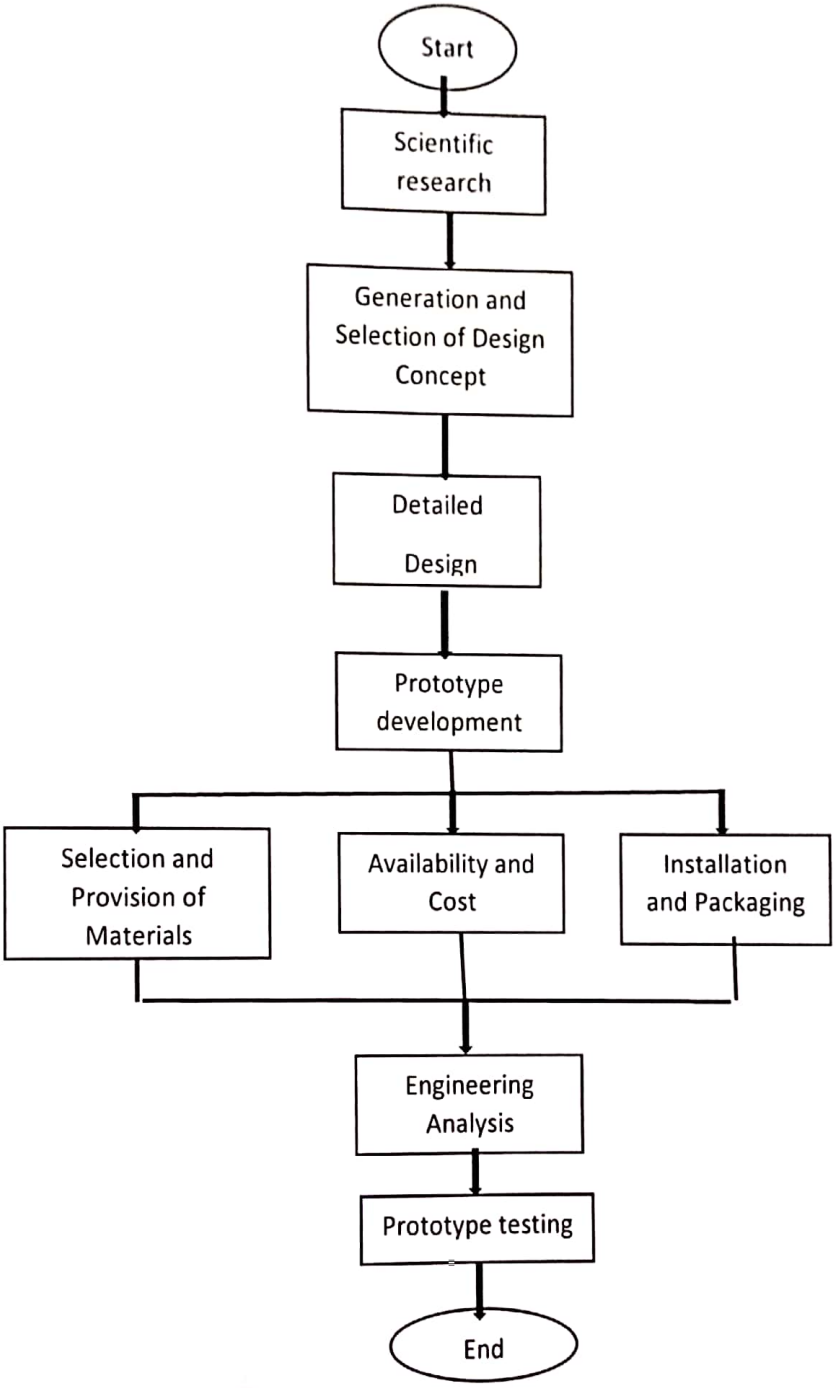


Figure 3.0 Flowchart of Methodology

3.2 PROJECT METHODOLOGY

In each production project, it required some method for the product and development of the project. It depends on the design and specification of core product design (Product Design specification).

i. Market

Products available on the market have a several weaknesses and disadvantages that make us to innovate and created the products.

ii. Specification

Specification of product is important because it affected the design of a product. In addition, it also important when choosing the detailed of design project.

iii. Performance

Assembly work on the project can be completed quickly because the equipment was easy to take.

iv. Environment

The resulting product should be environmentally friendly and do not pollute the environment. In addition, the output of results must be neat and stiff.

v. Security

The resulting product should have characteristic of high security and do not endanger consumer who uses it.

3.3 FUNCTION OF PROJECT

Eco blinkers has been selected to increase the safety for the people that has driving back and forth. Eco Blinkers are designed to be highly visible and easily movable. Eco Blinkers is created to solve the problem related to the common safety cone in the market nowadays. Among the problems are using batteries and LED lights. To solve these problems, an idea was thought and planned to create a device which have the criteria of

safety and can be used for long term. The design of the product that is portable which can be separated to two parts have choose is because it fulfill the criteria of portable devices.

The idea of the Eco blinkers for the driver can be alert at the first encounter at the sharp corner or at the dangerous place. This is so that the driver can prevent for car accident. Eco blinkers can save so much money because it using renewable energy. Renewable energy can be required just from the wind because of the mechanism of the project. It is contain an electric circuits and motor a generators. When blinkers are hit by wind they will turn and rotate the motor generator. The generator generates an electric current to turn on the lights and wans the incoming vehicle.

Eco blinkers can also guide the road even in dark conditions. Eco blinkers light will turn on when in dark conditions and turn on when in day light conditions. This is because there are Light Dependent Resistor (LDR) detectors the electric current. LDR is a component that has a variables resistance that changes with the light intensity that falls upon it. This allows them to be used in light sensing circuits

Eco Blinkers can be as easy to mobile as they can be modified to accommodate where appropriate. This can also ease facilitate the work of repairing eco blinkers in the event of a malfunction.

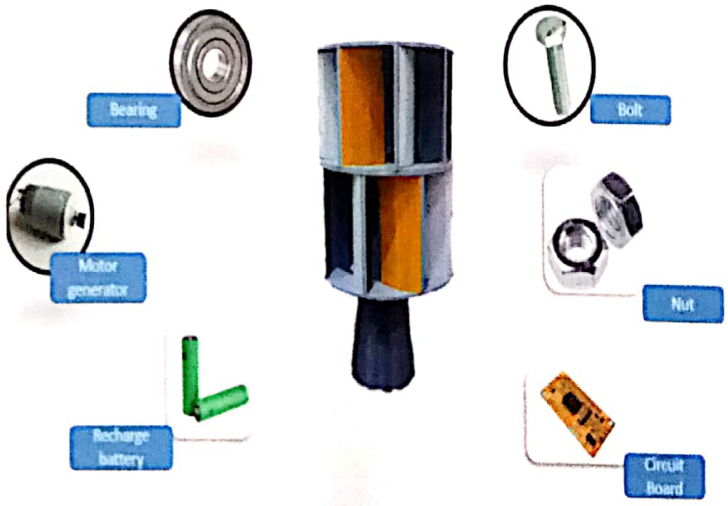


Figure 3.1 Components in the eco blinkers

3.4 COMPONENTS OF ECO BLINKERS

Good design can be generated by studying every part and material used. In order to produce the best design, the main components of the Eco Blinkers made. The purpose of the study was to obtain information and gain insight into the main components of spin reflector safety cone. The components of the Eco Blinkers are as follows:

i. Safety cone
ii. Barrier
iii. PLA
iv. Bearing
v. Bolt and Nut
vi. Glue plastic steel epoxy
vii. Penetrating oil (WD 40)
viii. Reflector sticker
ix. Rechargeable battery
x. Motor generator

3.4.1 Safety Cone

Common safety cones is suitable prevail in the Eco Blinkers for all users will know that the original function of a safety cone is to warn about the hazard ahead. In addition, safety cone is suitable for physical size stable and more durable. We also use part of the cone to become a site placed on the head of the cone.

Figure 3.2 Safety Cone

3.4.2 Traffic Barrier

Traffic barriers used to keep vehicles within their roadway and prevent them from colliding with dangerous obstacles such as boulders, sign support .With the addition of flash light over the barrier can give the driver a clear light of the danger ahead.

Figure 3.3 Traffic barriers

3.4.3 Polylactic acid (PLA)

Polylactic Acid (PLA) is different than most thermoplastic polymers in that it is derived from renewable resources like corn starch or sugar cane. Most plastics, by contrast, are derived from the distillation and polymerization of nonrenewable petroleum reserves. Plastics that are derived from biomass (e.g. PLA) are known as "bioplastics". (Robert Tanguay , February 2018)

3.4.4 Bearing

A bearing is a machine element that constrains relative movement to the desired motion and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Most bearings facilitate the desired motion by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts.

Rotary bearings hold rotating components such as shafts or axles within mechanical systems, and transfer axial and radial loads from the source of the load to the structure supporting it. The simplest form of bearing, the plain bearing, consists of a shaft rotating in a hole. Lubrication is used to reduce friction. In the ball bearing and roller bearing, to reduce sliding friction, rolling elements such as rollers or balls with a circular cross-section are located between the races or journals of the bearing assembly. A wide variety of bearing designs exists to allow the demands of the application to be correctly met for maximum efficiency, reliability, durability and performance. (Stephan Poll, September 1988)

Figure 3.4 Bearing

3.4.5 Bolt and Nut

Bolt and nuts are always used in conjunction with a mating bolt to fasten multiple parts together. The primary function of the nut in any threaded assembly is to act as the instrument through which the tension is induced into the bolt or screw and to continue to retain that tension and thus, the clamp load in the assembly.

In this project, the shape of nut is the material that we select to used is hexagonal which have six sided. Six sides give a good granularity of angles (good in tight spots), but more and smaller corners would be vulnerable to being rounded off.

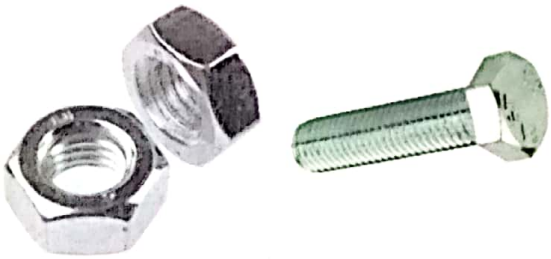


Figure 3.5 Bolt and nuts

3.4.6 Glue plastic steel epoxy

This is best glued with a poly cement (also called plastic cement), or a specialized plastic glue such as Loctite Epoxy Plastic Binder or Super Glue Plastic Fusion. Other adhesives that will work with plastics ranging from really hard to very thin and flexible. It's tough to select a single glue type that will be a good solution to all of these different structures. Glue is used to fasten Eco Blinkers parts that were delaminating.

Figure 3.6 Glue plastic steel epoxy

3.4.7 Penetrating oil (WD 40)

The bearings need to rotate the head of the project. To smoother the bearing, WD-40 are used to spray on the bearing. After sprayed, bearing can swivel smoothly even better.

Figure 3.7 Penetrating oil (WD 40)

3.4.8 Reflector sticker

Reflectors are actually an array of mirrors. A single mirror reflects light at the same angle that it hits the mirror. Reflective tape uses the same general principle. Reflection stickers are pasted on each blade in eco blinkers. It will reflect back the light when exposed to light.

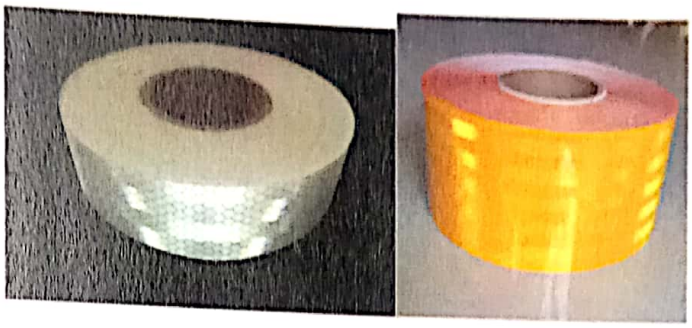


Figure 3.8 Reflector sticker

3.4.9 Rechargeable battery

A rechargeable battery is a type of electrical battery which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discarded after use. It is composed of one or more electrochemical cells. The term "accumulator" is used as it accumulates and stores energy through a reversible electrochemical reaction. Rechargeable batteries are produced in many different shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network.

Rechargeable batteries typically initially cost more than disposable batteries, but have a much lower total cost of ownership and environmental impact, as they can be recharged inexpensively many times before they need replacing. Some rechargeable battery types are available in the same sizes and voltages as disposable types, and can be used interchangeably.

This battery is the power source used in this project to turn on the yellow led. Then, increase brightness of Eco Blinkers.

Figure 3.9 Rechargeable battery

3.4.10 Motor Generator

Motor generator is a device for converting electrical power to another form. Motor–generator sets are used to convert frequency, voltage, or phase of power. They may also be used to isolate electrical loads from the electrical power supply line. When the Eco Blinkers are hit by the wind it will turn the motor generator to produce energy that can turn on the light.

Figure 3.10 Motor generator

3.5 MACHINERY

The 3D printing process builds a three-dimensional object from a Autodesk Inventor Professional 2018 model, usually by successively adding material layer by layer, which is why it is also called additive manufacturing, unlike conventional machining, casting and forging processes, where material is removed from a stock item (subtractive manufacturing) or poured into a mould and shaped by means of dies, presses and hammers.

The term "3D printing" covers a variety of processes in which material is joined or solidified under computer control to create a three-dimensional object, with material being added together (such as liquid molecules or powder grains being fused together), typically layer by layer. As of 2019 the precision, repeatability and material range have increased to the point that some 3D-printing processes are considered viable as an industrial-production technology, whereby the term additive manufacturing can be used synonymously with "3D printing". One of the key advantages of 3D printing is the ability to produce very complex shapes or geometries, and a prerequisite for producing any 3D printed part is a digital 3D model or a STL file. The most-commonly used 3D-printing process (46% as of 2018) is a material extrusion technique called fused deposition modelling (FDM).

A step in the STL generation known as "repair" fixes such problems in the original model. Generally STLs that have been produced from a model obtained through 3D scanning often have more of these errors. This is due to how 3D scanning works-as it is often by point to point acquisition, 3D reconstruction will include errors in most cases. Once completed, the STL file needs to be processed by a piece of software called a "slicer," which converts the model into a series of thin layers and produces a G-code file containing instructions tailored to a specific type of 3D printer (STL printers). This G-code file can then be printed with 3D printing client software (which loads the G-code, and uses it to instruct the 3D printer during the 3D printing process). Printer resolution describes layer thickness and X–Y resolution in dots per inch (dpi) or micrometres (μm). Typical layer thickness is around 100 μm (250 DPI), although some machines can print layers as thin as 16 μm (1,600 DPI).The particles (3D dots) are around 50 to 100 μm (510 to 250 DPI) in diameter. For that printer resolution, specifying a mesh resolution of 0.01–0.03 mm and a chord length ≤ 0.016 mm generate an optimal STL output file for a given model input file. Specifying higher resolution results in larger files without increase in print quality.

Figure 3.11 3D Printer Zortrax

3.5.1 Finishing

Though the printer-produced resolution is sufficient for many applications, greater accuracy can be achieved by printing a slightly oversized version of the desired object in standard resolution and then removing material using a higher-resolution subtractive process.

The layered structure of all Additive Manufacturing processes leads inevitably to a strain-stepping effect on part surfaces which are curved or tilted in respect to the building platform. The effects strongly depend on the orientation of a part surface inside the building process.

Some printable polymers such as ABS and PLA, allow the surface finish to be smoothed and improved using chemical vapour processes based on acetone or similar solvents.

Some additive manufacturing techniques are capable of using multiple materials in the course of constructing parts. These techniques are able to print in multiple colour and colour combinations simultaneously, and would not necessarily require painting.

Some printing techniques require internal supports to be built for overhanging features during construction. These supports must be mechanically removed or dissolved upon completion of the print.

All of the commercialized metal 3D printers involve cutting the metal component off the metal substrate after deposition. A new process for the GMAW 3D printing allows for substrate surface modifications to remove aluminium or steel.

3.5.2 Manufacturing process

The design of the project was inspired from turbine which is why the shape of the project was round. Instead of that, the dimension of the project was calculated precisely to avoid any error during the printing process. The maximum height the printer can print is 200mm and the maximum width is 200mm. The body frame is the biggest part of the project which consume 300g of filament to print. Its angle of blade was calculated perfectly to trap the wind that passes it. (As shown in Figure 3.12)

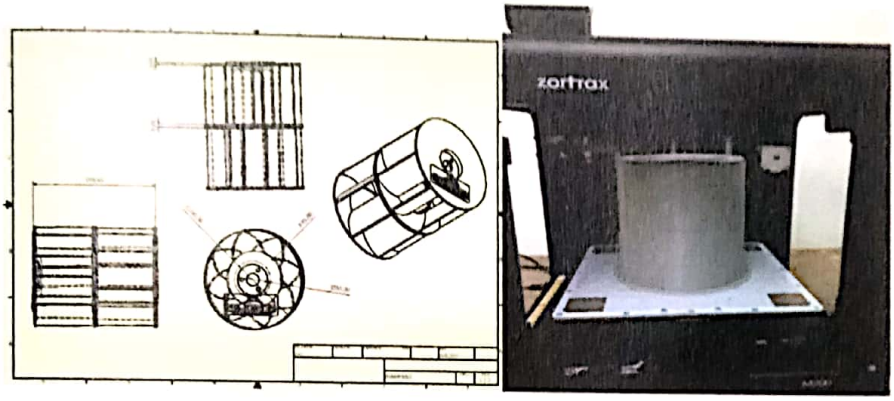


Figure 3.12 Body Frame

The shaft was printed with support because we wanted the support to be tough and strong enough to withstand the load by the project. It was designed so precise so that the bearing can fit easily into the top of the shaft. At the bottom of the shaft was printed with 4 holes so that it can be lock with the base cone (uses screw and nut to lock). The shaft dimension is 206mm and the diameter of the end top is 10mm. (As shown in Figure 3.13)

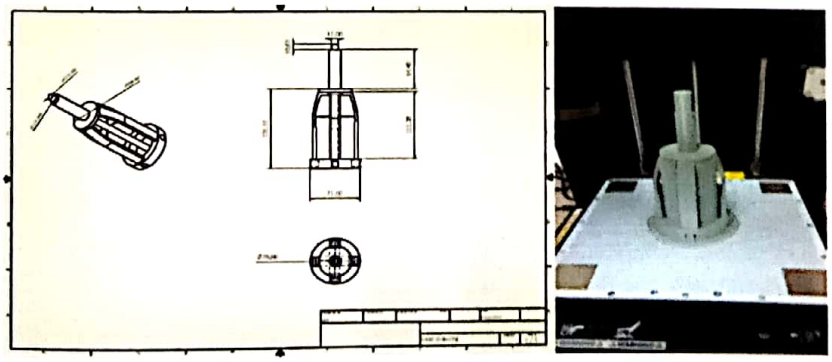


Figure 3.13 Shaft

The housing bearing was designed and printed to hold the bearing and in the same time put some pressure on the bearing. The 3 holes was to hold the bearing and the top cover of the body frame. It was joint by screw and nut. The bearing that has been use on this project was 25mm radius. The size of bearing also plays major part in the project because as we decrease the size of the bearing, the faster and smoother the blade spin with minimum wind surround the project. (As shown in Figure 3.14)

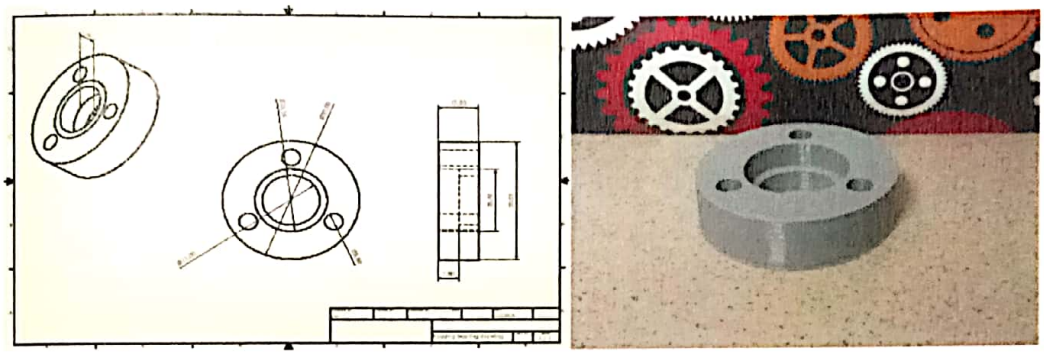


Figure 3.14 Housing bearing

The top cap was designed to cover the bearing from exposed to the outdoor. This is to ensure the bearing can rotate smoothly. The idea to make it thin was because we wanted the project to be lightweight and hence reduce the consumption of filament material during the printing process. Besides, the top cap was printed with built in slot so that the top can be fit perfectly with the blades .Instead of that, it also as a finishes to the project itself. (As shown in Figure 3.15)

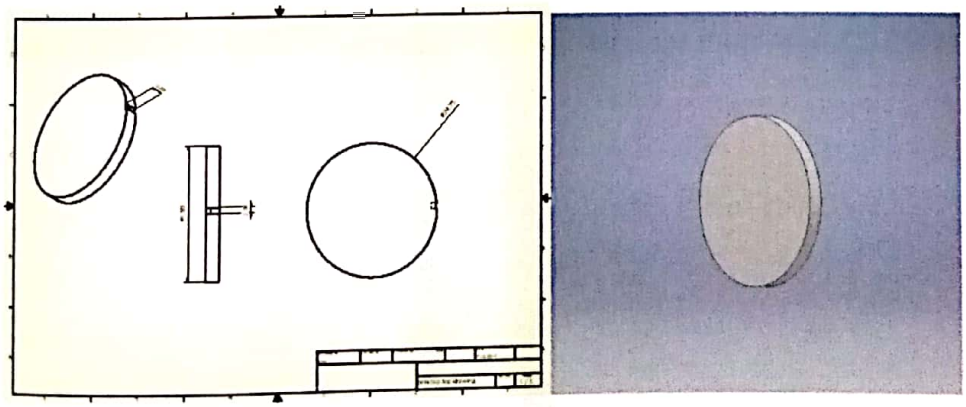


Figure 3.15 Cap top

The base cone was designed to connect the project to safety cone below it. It was printed with holes so that the shaft can be lock with the base. It uses the same joint mechanism, which is screw and nut. (As shown in Figure 3.16)

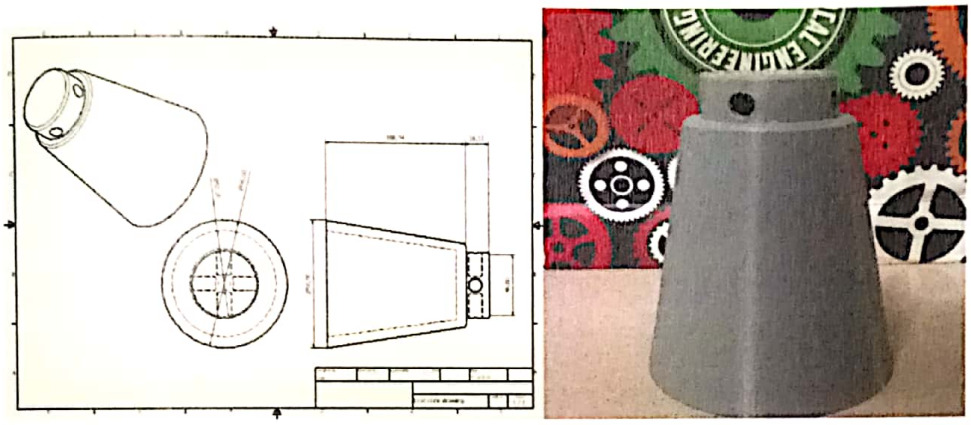


Figure 3.16 Base cone

3.6 CONCEPT OF DESIGN

Design concept was a method which easier to make a selection of the best design for quality production. The idea to design this project is the result of the investigation study on the weaknesses of the existing cone marketed. From there the idea of the project design were came. The design produce has the durability, safety and low cost. The figure 3.17 below is the project drawings using Autodesk Inventor Professional 2019.

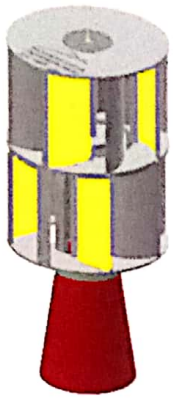


Figure 3.17 Eco Blinkers

3.7 SELECTION OF APPROPRIATE MATERIAL AND COMPONENT

Selection of materials and components made after determining the method and the principles behind it. Selection of materials and components also done by the advantages and disadvantages of the system you want to use. After discussion and get opinions from the lecturers chosen the material in accordance with this project. This project was focused on the materials that used for this project because this project is in dire need of endurance over more resilience than in hot weather and rain. The main materials used are, safety cones, PLA, and bearing. The reason why the material was chose have been explained and described in literature review.

3.7.1 Buy Materials and Components

After determined the materials and components used in the production of this Eco Blinkers, for the next step the materials and components have to buy. Just decided to buy in the store Designex 3D sdn bhd because the place to buy aluminum was cheaper than other stores. Hence, the place is also close with the project area, namely in Kuala Lumpur (110, Jalan 16/11, Pusat Perdagangan phileo Damansara, 46350 Petaling Jaya,Selangor).

In addition, the bearing just purchased on the AMICO BEARINGS (Malaysia) Sdn. because the place has many options and different size. The price is also very reasonable

with the goods offered. Location AMICO BEARING (Malaysia) Sdn. is in (NO 19, Jalan Arfah 1, Medan Niaga Sri Kuching, 51200 Wilayah Persekutuan, Wilayah Persekutuan Kuala Lumpur). Next, for Motor Generator, have bought in the store Aiszzy Electronics Enterprise (No 13A, Jalan Kristal L7/L, Seksyen 7, 40000 Shah Alam, Selangor) because the prices were very reasonable.

The options are selected after passing above the store then surveyed of several shops nearby and these stores have been chose because of its own advantages offered to us. Table 3.1 shows the price and quantity of materials purchased.

Table 3.1 Costing of material

MATERIAL	QUANTITY	COST(RM)
Fabbxible 1.75 mm ASA Filament 500g	1	40.00
Amico Bearing 600z	1	9.00
Motor Generator	1	20.00
Circuit board	1	15.00
Reflector Sticker 1m	2	20.00
Glue Plastic Steel Epoxy	1	12.00
Total	7	116.00

3.8 INSTALLING PROJECT OUTLINE

Parts are designed in AutoCAD Inventor and the format was export to STL. This is due 3D Printer only read and print with the size given in the STL file. The assembly was all done in AutoCAD Inventor. The plate's joint with 8 blades with an angle of 45 degrees, each blade was connected using glue. Similarly, the bottom bar with a combined inverted blade on the middle and bottom of the plate. Bearing placed in the centre of the hole on top and included plat bearing housing and cover his head and fastened with a screw. Shaft bearing is placed in the whole and inserted in the middle of the product and are driven on

small plates and fastened with screws. The end plate is portable to 2 base, one is safety road cone and the other one is roadside barrier.

3.9 IDENTIFYING AND RESOLVING ISSUES PROJECT

There are some problems that existed when the projects was in progress. The Eco Blinkers can`t rotate smoothly. This is because the angle between blades is too small that it does not catch a lot of wind to allow it to rotate.

Figure 3.18 Design 1

After identifying the problem, we made some modifications to the old project by increasing the angle distance between blades and test project in the road site. As a result of the test, we found a slight problem, size of blade very small and the project can rotate but not smoothly.

Figure 3.19 Design 2

After testing the first and second design, we created new design to solve all the problems by improving the angles and magnitudes of the blades. Next, the bearings need to rotate the head of the project. To smoother the bearing, WD-40 are used to spray on the bearing. After sprayed, bearing can swivel smoothly even better. The cover was made by using ABS rod to cover the bearing. Indirectly the cover can close the whole plate from extreme weather and rain.

In addition, a yellow led lamp was add on to increase the brightness to warning the road users. Led lamps use batteries as their main source of energy. To maintain the battery power, motor generator has been added to generate electricity to charge the battery.

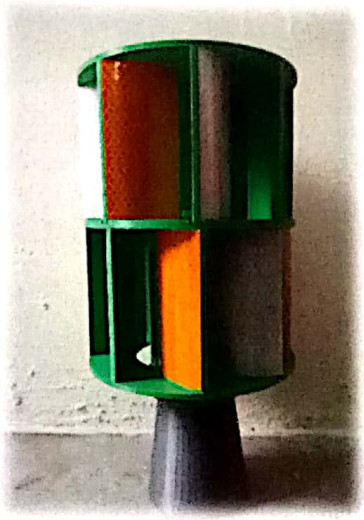


Figure 3.20 Design 3

3.10 REFINING DIVISION AND INTERNAL PROJECT (TOUCH-UP)

After assembled the project, the project undergoes a touch-up process. This is done so that the project will be more neat and attractive.

First, the project was touch up by paste the reflective stickers on the blades. The blades were added to increase visibility on blinkers. There are two colour stickers that are often used on the road side which it red and yellow. Red indicates there are dangerous situations that can lead to death or serious injury .The yellow colour indicates caution and

used to indicate a dangerous situation Yellow stickers was chosen because the colour indicates a dangerous situation on the road site.

After complete the project, there was a problem on the blinkers. The bearing was expose to surrounding and made the bearing easily rusted if there were no cover on it. The cover was created to cover the head. ABS rod material was used as the cover. The AutoCAD Inventor was used to design and was created by using 3D Printer.

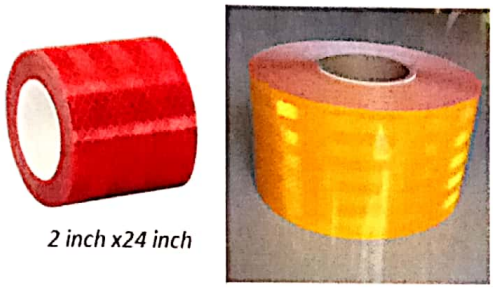


Figure 3.21 Reflective sticker red and yellow

3.10.1 Gantt Chart

Table below shown a planning schedule and implementation of project production activities.

Table 3.2 planning schedule and implementation of project production activities

TASK / ACTIVITIES	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15
PROJECT PLANING															
PROJECT DESIGNING															
PROJECT MATERIAL COLLECTION															
FRAMEWORK COACHING															
IMPLEMENT PROJECT															
PROJECT NEADNESS															
TESTING															
END															

Allocation period to complete | Implementation of project

CHAPTER 4

RESULT

4.1 INTRODUCTIONS

In this chapter, the model that have been described in Chapter 3 are to explain and give description of the result.

4.2 RESULT ACHIEVE

The project has achieved its objective of 90%. The aim of this project is to increase safety level of road cone and thereby save energy by using natural and renewable energy. Mission to achieve in producing Eco Blinkers is to produce accessories for safety cone so it will improve the awareness of surrounding.

While in terms of system maintenance, it is very easy and does not require any special skills. In terms of cost, the project is very affordable and the cost can be reduced if production and income are generated in a smaller number.

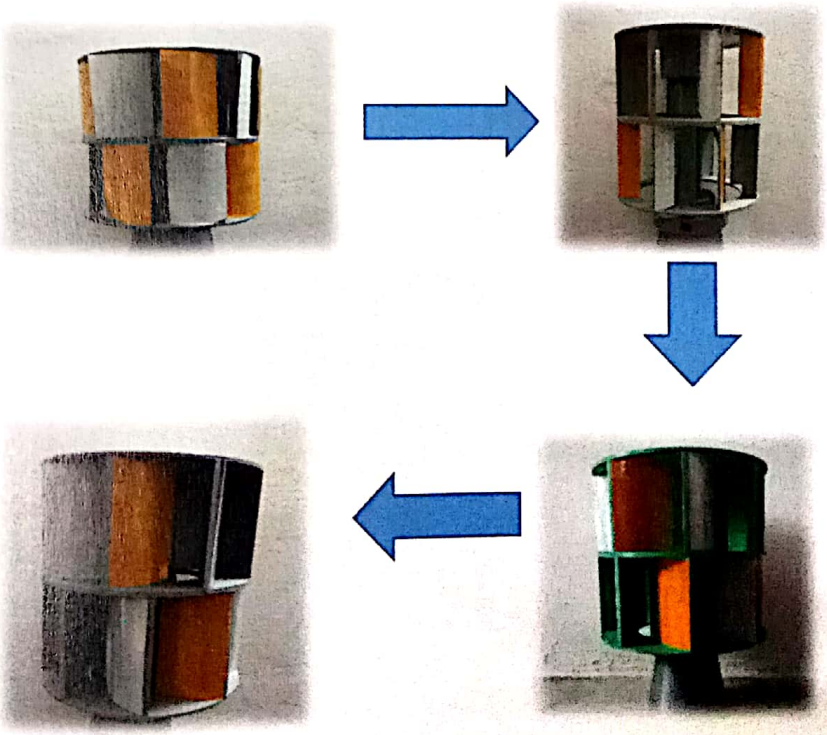


Figure 4.0 Step Eco Blinkers

4.3 RESULT DISTANCE

As the Figure 4.1 shown, the Eco Blinkers is brighter compared to the standard safety cone. This was improved the visibility of the reflection during night. Moreover, this was reduced the usage of safety cone as the visibility of one Eco Blinkers is equivalent to five standard safety cone.

Figure 4.1 Safety cone with Eco Blinkers

At 10 meter distance away, the Eco Blinkers shine brightly as its stickers reflected the light. In the meantime, the Light-emitting diode (LED) also makes it even brighter than the standard blinkers that were being used nowadays. (As shown in Figure 4.2)

Figure 4.2 10 meter distance away

As for 50 meter distance away, the Eco Blinkers shine brighter than the safety cone beneath it. This shows that the Eco Blinkers is more reliable than the safety cone and therefore it is more visible during night-time. (As shown in Figure 4.3)

Figure 4.3 50 meter distance away

As for 100 meter distance away, the Eco Blinkers still work perfectly and shine quite bright. From the Figure 4.4, as the safety cone and Eco Blinkers were placed at 100 meter, the visibility of the Eco Blinkers can still be seen. (As shown in Figure 4.4)

Figure 4.4 100 meter distance away

As for 150 meter distance away, the visibility start to fade for safety cone but not for Eco Blinkers. This is due to the spinning reflective stickers and the LED within the Eco Blinkers that makes it more visible than the safety cone. (As shown in Figure 4.5)

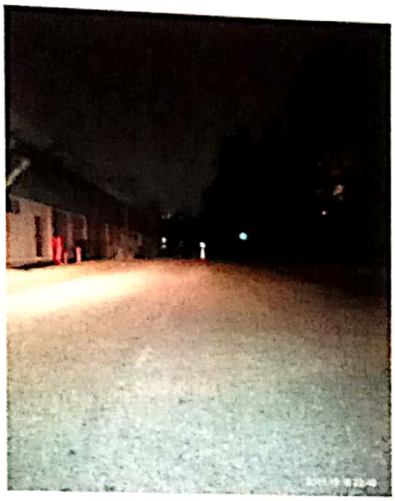


Figure 4.5 150 meter distance away

As for 200 meter distance away, with the help of the light emitted and the darkness of the night, the Eco Blinkers still visible and spin smoothly without any problem. The result of 200 meter was unexpected because the Eco Blinkers again defeated safety cone as its light emitted brighter than the safety cone. (As shown in Figure 4.6)

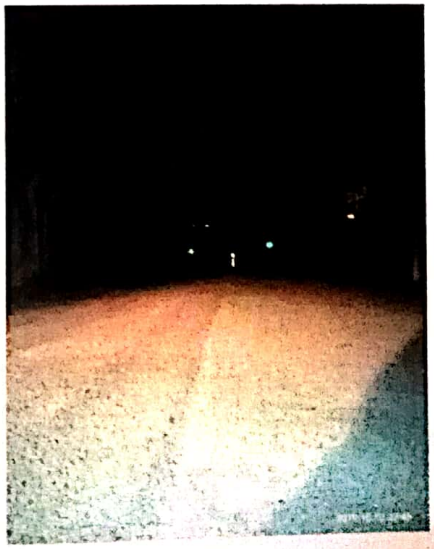


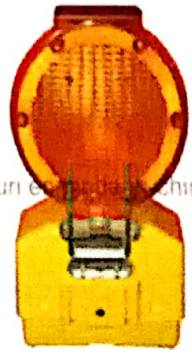
Figure 4.6 200 meter distance away

4.4 THE MINIMUM WIND SPEED REQUIRED TO ROTATE ECO BLINKERS

The equipment used to measure wind speed is called anemometer, the most commonly people used cup anemometer as a tools to measure the wind speed. It is formed from three cups in hemispheric. The different pressure of the wind will cause the cup rotated. The rate of rotating depends by the air speed. The air speed measured in meter per second or knot. The calm situation reported when the speed of the air is below than 0.5 meter per second (1.8 kilometer per hour) or below than a knot.

4.5 COMPARISON BETWEEN ECO BLINKERS AND YELLOW BLINKERS

The table below shown the comparison between Eco Blinkers and the Yellow Blinkers.

Eco Blinkers	Yellow Blinkers
	
• Using renewal energy (wind)	• Using electrical energy (battery)
• Have no maintenance	• Maintenance for 2 batteries holder (6V batteries)
• The brightness of reflection (60-200 meter)	• The brightness of reflection (80-100 meter)

• The brightness depends on vehicle's light and led light	• The brightness depends on the battery life
• The price is RM 70.00 per unit	• The price is RM 60.00 per unit
• The weight is 1.5kg	• The weight is 1.1kg
• Low cost preparation	• High cost preparation
• Using blade for rotate the reflector and charging battery	• Using battery for light up the bulb

Table 4.1: Comparison between Eco Blinkers Light and Yellow Blinkers

CHAPTER 5

CONCLUSION

The Eco Blinkers was designed to innovate the accessories of safety cone. This project will help to reduce the usage of electricity and more focus on renewable energy. This can be achieve with Eco Blinkers because it uses the power of wind to turn the blade which in turn also turn the motor generator that was linked to the body frame of Eco Blinkers. As the blade spin, the shaft of the motor also spin and as a result produces electric energy. The all new design has been added battery cells to store the electric energy that has been produced by the motor. Next, this product also offer an affordable price while being free maintenance. This in turn can save cost and the clients would not need to worry. Overall this project already got the positive feedback from our survey, despite that we also got some negative comment.

SUMMARY

After the completion of the report and this project, the project implemented are very grateful and satisfied with the result. Through this project, it can develop creativity in creating a project and modify existing project to be more attractive and useful. Furthermore, the project was designed with the help of Autodesk Inventor 2019. It undergoes many steps to accomplish a perfect design. That is why, the project was drawn and assembled part by part. Besides, the safety road cone can also be increase. With the upgrade of Eco Blinkers add on top of the safety road cone, it makes the safety road cone more visible during night-time. Apart of that, the Eco Blinkers also saves energy by using renewable energy. The Eco Blinkers uses the power of kinetic energy that was produce by the wind to spin the blades and as for result also spin the motor generator shaft that was connected beneath between the bearing holder and the base shaft. The energy produced then stored in the battery cells that was tied at the bottom of the shaft. Nevertheless, the project is mostly plastic base material. The Eco Blinkers was printed with Zortrax M200 by using ASA as its filament material. The Acrylate Styrene Acrylonitrile (ASA) is a thermoplastic that combines

mechanical strength and resistance to ultra-violet (UV) rays which is a perfect type of material to be use for Eco Blinkers. (Pawel Slusarczyk, December 2015)

Finally, this project can be concluded that the stated objectives have been achieved and implemented effectively.

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APPENDIX

APPENDIX A	PHAMPLET DESIGN
APPENDIX B	BUNTING DESIGN
APPENDIX C	ABSTRACT PITEX
APPENDIX D	RELEVENT PROJECT PICTURES

PHAMPLET DESIGN

WHAT'S NEW?

The current conventional safety cones are great, but it were not enough.

- UPGRADE

The new eco blinkers can make the safety cone more visible during the night as it reflect more light than the cone itself.

Besides, it also uses only the power of wind to work instead of batteries. Moreover, it doesn't need to undergo any type of maintenance.

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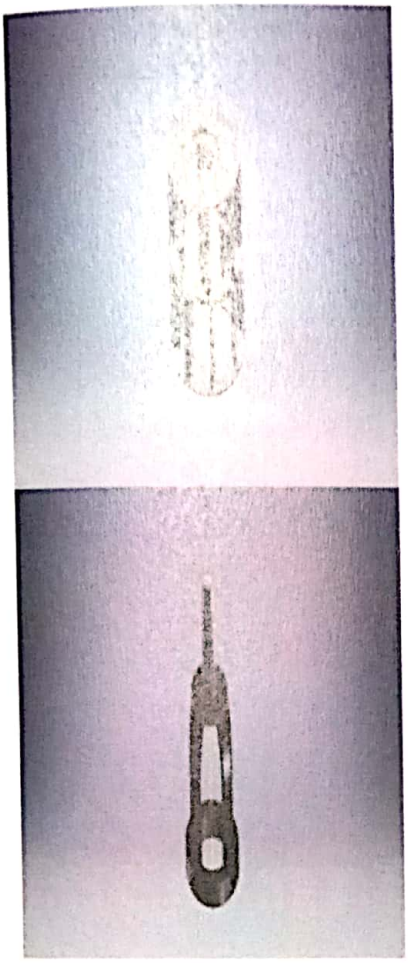
Eco-Blinkers

FINAL YEAR PROJECT

Front page of pamphlet



OBJECTIVE

- Uses only free natural energy in order to work the mechanism
- Increase the awareness level of the current safety road cone
- To reduce the cost of maintenance

HOW IT'S MADE?

AUTODESK DESIGN

With the help of Autodesk Inventor Professional 2019, it was designed

3D PRINTER

Was printed using ASA material within Zortrax M200

RESEARCH AND DEVELOPMENT

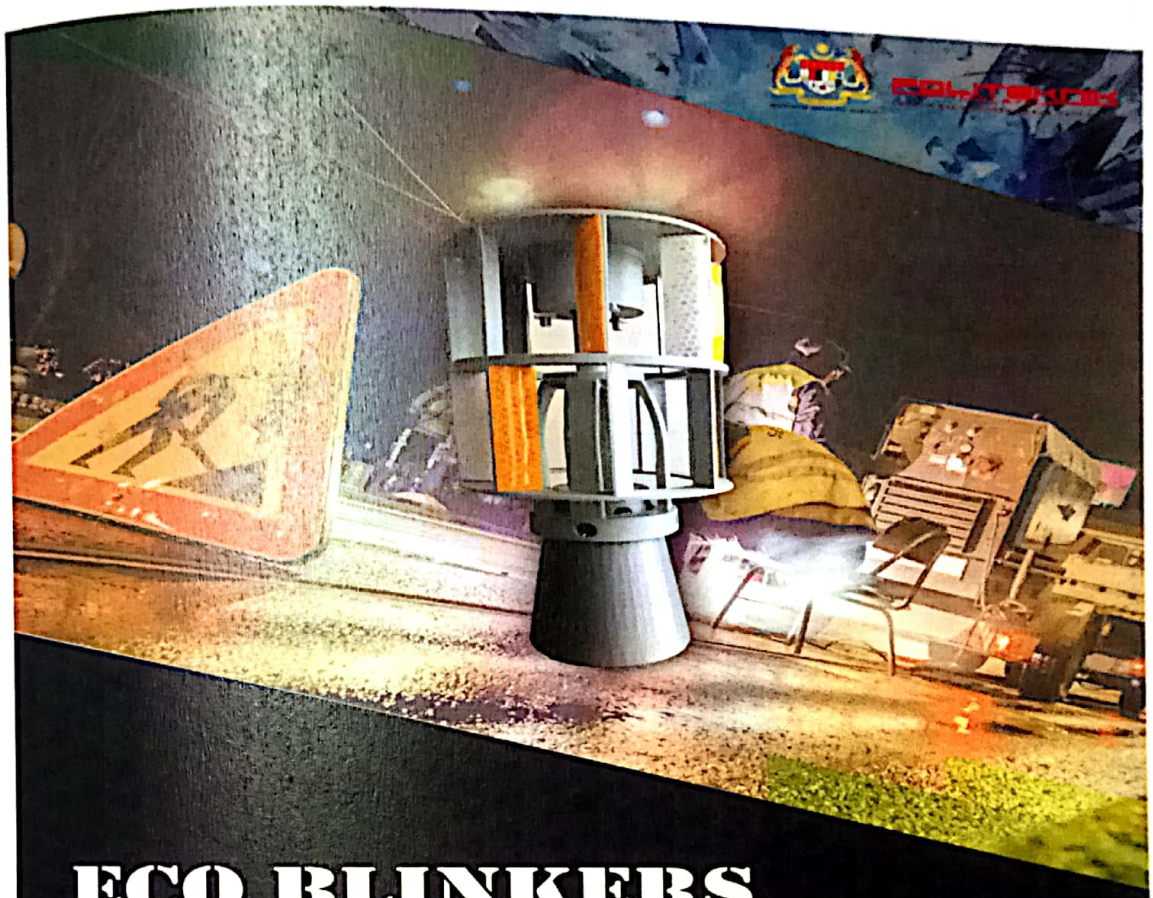
Try and errors were countless in order to achieve a great product

10 METER

200 METER

Back page of pamphlet

BUNTING DESIGN



ECO BLINKERS

The whole new revolutionary of safety cone. It uses only natural energy to work hence reduce the cost of maitenance. Its not only more visible during night but also easy to carry and install.

PROJECT ADVANTAGES

FREE ENERGY
Uses only the power of wind to do the job

FREE MAINTENANCE
Lite version of electric blinkers but need not to change any batteries

PORTABLE
Easy to install and only simple tools needed in order to assemble it

3D PRINTED
Printed with Zortrax M200 and was designed by using Autodesk

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SUPERVISOR: DR. NORASIAH MUHAMMAD

MEMBERS: AHMAD ANWAR ZULKIFLI
AMMAR FAUZAN AL-FATTAH
FIRDAUS MUSTHAPA

Abstract PITEX

KEMENTERIAN PENDIDIKAN MALAYSIA

POLITEKNIK PITEX

PSA INVENTION & INNOVATION TECHNOLOGY EXPOSITION

Tajuk

ECO-BLINKERS

Ketua Penyelidik / Pencipta
(Main Researcher / Inventor)

DR. Norasiah Binti Muhammad

Nama Kumpulan Penyelidik / Pencipta Bersama
(Researchers/Inventors Groups)

1. Firdaus Bin Mustnapa
2. Ahmad Anwar Bin Zulkifli
3. Ammar Fauzan Bin Al Fattan

E-Mel
(E-mail)

firdaus5023@gmail.com
ammarfauzan99@gmail.com
anuarzulkifli98@gmail.com

Info Grafik
(Graphical Information)

Deskripsi Produk Abstrak
(Product Description/ Abstract)

Eco Blinkers was created to solve the problem related to the common safety cone in the market nowadays. Among the problems are using batteries and LED lights. To solve these problems, an idea was thought and planned to create a device which have the criteria of safety and can be used for long term. The design of the product that is portable which can be separated to two parts fulfils the criteria of portable device.

Pernyataan Masalah
(Problem Statement)

I. Safety cone less visibility at night.
II. The safety cone electronic in market is using battery and electric energy to function.
III. The road users undergo emergency at the road like car breakdown and accident.

Objektif
(Objectives)

- Designing and innovative an accessories for safety cone
- Save of energy by using natural energy
- Two direction spin reflector

Carta alir Sistem
(System Flowchart)

Potensi Market
(Market Potentials)

- *JKR*
- *MiROS*

Harta Intelek (IP)
(Intelectual Property)

Industrial Design :

Copyright :
LY2017001551

Kolaborasi Industri / Institusi
(Industrial / Institution Collaboration)

Hubungi
(Contact)

DR. Noordin Abdullah
Ketua Pusat Penyelidikan & Inovasi
Politeknik Sultan Salahuddin Abdul Aziz Shah
Tel : 03-51634000

Nama Pemilik IP / Alamat
(Owner IP Name / Address)

Pengarah
Politeknik
Sultan Salahuddin Abdul Aziz Shah
40150 Shah Alam
Selangor

RELEVENT PROJECT PICTURES

Presentation with Jabatan Kerja Raya (JKR)

Discussion with Supervisor

National-engineering and Architectural Innovation Design Competition

Silver Medal (National-engineering and Architectural Innovation Design Competition)

Present for PITEX 2019 Competition

Got Gold Medal on PITEX 2019