POLITEKNIK BANTING SELANGOR

TOSSING WAVES ROBOT DESIGN STUDY INVOLVING FACTORS & INNOVATION

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JABATAN KEJURUTERAAN MEKANIKAL

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This report was submitted to the Department of Mechanical Engineering as partially fulfilling the award conditions Diploma in Mechanical Engineering In Manufacturing

JABATAN KEJURUTERAAN MEKANIKAL

SESSION JUNE 2023

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TOSSING WAVES ROBOT DESIGN STUDY INVOLVING ROBOTIC FACTORS AND INNOVATION

TITLE : TOSSING WAVES ROBOT

SESSION : JUNE 2023

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SIR ZULKARNAIN BIN JAMAK

IC NUMBER :

As a project supervisor, on the date

30/5/2023

…..……. : ……..……

(DATE) **(ZULKARNAIN BIN JAMAK)**

ACKNOWLEDGEMENTS

First of all, we are grateful to God with His abundant grace that we were able to complete the paperwork for the Final Year Project with success. On this occasion, we would also like to thank the Banting Selangor Polytechnic, especially the Department of Mechanical Engineering, for giving the 4th semester students the opportunity to apply all the knowledge they have received while at PBS.

We have taken efforts in this project which is Tossing Waves Robot. However, it would not have been possible without the support and help of many individuals, to whom we would like to express our deepest gratitude. We are deeply indebted to our supervisor Sir Zulkarnaian Bin Jamak for his continuous guidance and supervisory information and providing the necessary information related to this project and also for his support in completing the project.

In addition, we are grateful to the supervisor who gave us a lot of guidance and guided us to find ideas for the production of new ideas. Many thanks also to the lecturers of the Department of Mechanical Engineering and lecturers from other departments who have taught us directly or indirectly. Our thanks and appreciation also go to our colleagues in developing this project and those who helped us by making it possible.

PENGHARGAAN

Terlebih dahulu syukur ke hadrat Ilahi dengan limpah kurnia-Nya dapat kami menyiapkan kertas kerja untuk Projek Tahun Akhir dengan jayanya kami juga bersyukur proposal ini dalam jangka masa yang ditetapkan. Di kesempatan ini juga, kami ingin mengucapkan terima kasih kepada pihak Politeknik Banting Selangor terutamanya kepada Jabatan Kejuruteraan Mekanikal kerana telah memberikan peluang kepada pelajar semester 4 untuk mengaplikasikan segala ilmu yang telah diterima sepanjang berada di PBS.

Kami telah mengambil usaha dalam projek ini iaitu Robot Fire Fighter. Walau bagaimanapun, ia tidak mungkin berlaku tanpa sokongan dan bantuan daripada ramai individu, kami ingin mengucapkan terima kasih yang tidak terhingga kepada mereka semua. Kami amat terhutang budi kepada penyelia kami Sir Zulkarnaian Bin Jamak atas bimbingan dan penyeliaan yang berterusan serta memberikan maklumat yang diperlukan berkaitan projek ini dan juga atas sokongan beliau dalam menyiapkan projek.

Selain itu juga, kami berterima kasih kepada penyelia yang banyak memberi tunjuk ajar dan membimbing kami untuk mencari idea bagi penghasilan idea baru. Jutaan terima kasih juga kepada pensyarah-pensyarah Jabalan Kejuruteraan Mekanikal dan pensyarah dari jabatan lain yang pernah mengajar kami secara langsung atau tidak langsung. Ucapan terima kasih dan penghargaan kami juga ditujukan kepada rakan-rakan sekerja kami dalam membangunkan projek ini dan mereka yang sudi membantu kami dengan kebolehan mereka.

ABSTRACT

The purpose of this project is to create a robot to help people, especially to help move things without endangering human life and make people's daily work easier to move faster. Tossing Waves robot that uses two switches that move the motor to start the throwing process. Where this machine plays an important role to help human energy and this project produces another alternative in human daily use that is more environmentally friendly because this robot is made of recycled materials. The problem faced nowadays is the use of a lot of human energy in the process of lifting and moving goods.

A robot is a mechanical or virtual device that can perform physical or software tasks under human supervision and control or utilising an artificial intelligence programme. Although the term robot can refer to either, this virtual robot is commonly referred to as an internet Bot. Tossing Waves Robot is intended to assist humans in performing tasks more quickly and thoroughly. With the existence of this Tossing Waves Robot we can reduce the rate of manpower usage and save manpower.

The process of creating this robot there are many mechanical and practical theories used to adjust the needs of the Tossing Waves Robot. This robot creation project provides many opportunities to increase knowledge and experience because it can apply the use of design software such as strong work, creators, basic engineering calculations, reading programming code (Arduino), identifying and solving problems, especially in the manufacturing process of Tossing Waves Robot.

ABSTRAK

Tujuan projek ini adalah untuk mencipta robot untuk membantu orang ramai, terutamanya untuk membantu memindahkan sesuatu tanpa membahayakan nyawa manusia dan memudahkan kerja harian orang bergerak dengan lebih pantas. Robot Tossing Waves yang menggunakan dua suis yang menggerakkan motor bagi mulakan proses melontar. Di mana mesin ini memainkan peranan penting untuk membantu tenaga manusia dan projek ini menghasilkan satu lagi alternatif dalam kegunaan harian manusia yang lebih mesra alam kerana robot ini diperbuat daripada bahan kitar semula. Masalah yang dihadapi pada masa kini ialah penggunaan tenaga manusia yang banyak dalam proses mengangkat dan memindahkan barang.

Robot ialah peranti mekanikal atau maya yang boleh melaksanakan tugas fizikal atau perisian di bawah pengawasan dan kawalan manusia atau menggunakan program kecerdasan buatan. Walaupun istilah robot boleh merujuk kepada sama ada, robot maya ini biasanya dirujuk sebagai Bot internet. Tossing Waves Robot dicipta bertujuan untuk membantu manusia dalam melaksanakan tugas dengan lebih cepat dan teliti. Dengan adanya Robot Tossing Waves ini kita dapat mengurangkan kadar penggunaan tenaga manusia dan menjimatkan tenaga manusia.

Proses penciptaan robot ini terdapat banyak teori mekanikal dan praktikal yang digunakan untuk menyesuaikan keperluan Tossing Waves Robot. Projek penciptaan robot ini memberi banyak peluang untuk meningkatkan pengetahuan dan pengalaman kerana ia boleh mengaplikasikan penggunaan perisian reka bentuk seperti kerja yang kuat, pencipta, pengiraan asas kejuruteraan, membaca kod pengaturcaraan (Arduino), mengenal pasti dan menyelesaikan masalah terutamanya dalam proses pembuatan Tossing Waves Robot.

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SYMBOL			PAGES
f	-	Frequency	19
m	-	Mass	19
P	-	Pressure	19
d	-	Diameter	42
r	-	Radius	42
Vo	-	Initial Speed (m/s)	19
t	-	Times (s)	19
θ	-	Angle Degree (˚)	19

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Our Final Year Project is called "Tossing Waves Robot" it is specially designed for make it easier for workers to carry out the process of moving objects, this tossing wave robot suitable for use in industry. The use of advanced machines and robotic technology can improve quality and productivity and further advance the industrial sector. For centuries, human has dedicated knowledge and effort to the creation of machines that aid in human daily tasks or allow to undertake deeds that are beyond the capabilities of the human body. This technology is used to develop machines that can replace humans and imitate human actions.

Nevertheless, when we think about robots, we think of science fiction, of a machine that looks and acts like a human. In reality, the term "robotics" was coined by Isaac Asimov, a famous story writer on the subject. An industrial robot is now defined as a combination of mechanical and electronic components with integrated subsystems and software programmed to perform specified tasks.

In addition, application in manufacturing Tossing Waves Robot is a different robot because it uses throwing techniques in moving objects from one position to another or certain processing operations where the robot does work at a faster rate of speed than humans. Tossing Waves Robot in the industrial sector helps a lot in the execution of normal work faster and more efficiently. The increased use of robotic technology will open up more job opportunities, increase productivity and further expand the economy of a country.

1.2 BACKGROUND RESEARCH

Tossing operations are considered extremely, most humans aren't gifted enough for the abilities we've developed to toss things for unusual reasons to translate successfully to everyday practical duties. But imagine what we'd be capable of if we could reliably throw arbitrary objects to arbitrary locations. It would make things like cleaning a room or sorting laundry so much easier, and it would completely change work environments like warehouses, where it could potentially eliminate all of that time spent walking.

Tossing is a difficult problem in general, and it's worth noticing right away that humans aggressively simplify throwing by virtually always utilising well-balanced, aerodynamic, and/or symmetrical objects. If you programme a robot, it can throw imbalanced or asymmetrical things accurately, but you normally have to define how to grasp and toss each object separately, working out the ideal motion and then ordering the robot to repeat it.

Tossing Waves Robot is right up there with humans in terms of efficiency, at least for the particular set of items that it has experience with. While humans are likely always going to be better at dealing with novel items, Tossing Waves Robot does pretty well with new types of objects. It only takes it about an hour or two of training on something new for Tossing Waves Robot to achieve performance similar to that with known objects, and it can also quickly learn to throw things to locations that it hasn’t previously trained on.

1.3 PROBLEM STATEMENT

Based on observations and research results, we have identified several the problem at hand is Learning to throw arbitrary objects is more difficult, especially for self taught robots that learn to pick up objects and toss them through trial and error experiments rather than being explicitly trained by humans. Tossing Robot is incapable because it teaches itself to catch and toss with minimal human intervention, and in a relatively short time, it can operate fast enough and accurately enough that this technique has the potential to be used for practical real-world picking systems.

- Human can't work more time than robot.
- Throw in human energy to experience high errors compared to robots.
- Need to pay labour every month.

1.4 OBJECTIVE PROJECT

The objective of the project is throwing, throwing is a great way to exploit dynamics to improve manipulator capabilities. for example, throwing can allow the robot to quickly place objects into a box or throw the object, it can increase the physical accessibility and controlled speed that has been set on this Tossing Waves Robot. However, accurately throwing an arbitrary object in an unstructured setting presents many challenges from obtaining the initial reliable pre-throw state of the object in the manipulator to handling the varying object-oriented properties that can be thrown more easily in this work, we proposed a joint end-to-end formulation to create control for sensors when throwing objects to ensure the safety of Tossing Waves Robot users. In this formulation, we have created a robot that allows for more accurate tossing between simulation and deep learning that is using a via two switch to run the Tossing Waves Robot.

- Save energy resources by using robotic energy resources in industry
- The speed of throwing using robot energy is faster than human energy
- Throwing an object right at the target with a lower risk of error

1.5 SCOPE OF RESEARCH

Our study's scope and delimitations are the sections where we had define the broader parameters and boundaries of our research about Tossing Waves Robot . The scope details what we study will explore, such as the target population, extent, or study duration. Delimitations are factors and variables not included in the study.

- Using inventor to create a Tossing Waves Robot design.
- Tossing Waves Robot can be used in various fields that can help people's daily work. e.g in industry Injection Moulding.
- Using the throwing concept to move an object with the maximum speed.
- Turn on the switch to start the motor.
- Tossing Waves Robot can be used in various fields that can help people's daily work.

1.6 IMPORTANCE OF STUDY

In the era of modernity as we can see our life today has advanced in many ways among the most important current and prospective applications of robots are in medicine, industry, and education. Robotics is an interdisciplinary branch of engineering and science that includes mechanical engineering, electronic engineering, information engineering, computer science, and others. Robotics deals with the design, construction, operation, and use of robots, as well as computer systems for their control, sensory feedback, and information processing. Researching, designing, and creating new robots serve a range of useful functions, whether domestically, commercially, or militarily; robotics is a discipline that is rapidly expanding as technology develops. A lot of robots are designed to perform hazardous human tasks including disarming bombs, looking for survivors in unstable ruins, and investigating mines and shipwrecks. Moreover, robotics is employed as a teaching tool in STEM fields (science, technology, engineering, and mathematics).

1.7 OPERATIONAL DEFINITIONS / TERMS

We define robot operations as the practice of observing, controlling, and performing analytics on active robotic devices. Robot operations guides operators on how to best manage their deployment. Gone are the days of a handful of the exact same robots being piloted on a limited scale. Many of today's robot fleets are large, heterogeneous, and complex to manage. Robot operations is the function that must be optimized to realize the promised return on investment in robotics.

Robot operations is increasingly becoming a larger part of the conversation in the world of robotics. Let's examine what's driving this emergence. Focusing on efficiency and cost is nothing new as companies in mature sectors strive to deliver 10-15% growth year-over-year. While younger firms in emerging sectors still have plenty of inefficiencies to drive out with improved operations and experience, finding new cost savings becomes increasingly difficult for more mature sectors. Players must make increasingly bigger and bolder changes to keep pace with market expectations for growth.

1.8 SUMMARY

From this chapter we have achieved in showcasing each and be able to identify the problem statement and we also be able to clarify the objective of this project clearly. Furthermore, we also well constructed the scope of this project clearly above. The project summary is a brief document that consists of an overview, and discusses the intellectual merits, and broader impacts of the research project. Each of these sections is required to be present and must be clearly defined. The project summary is one of the most important parts of the proposal . What that said we are also going to discuss the article review of each and every component we have been used in our project in the following topic which is Literature Review.

CHAPTER 2

LITERATURE RESEARCH

2.1 INTRODUCTION

A literature review is a comprehensive summary of previous research on a topic. The literature review surveys scholarly articles, books, and other sources relevant to a particular area of research. The review should enumerate, describe, summarize, objectively evaluate and clarify this previous research. It should give a theoretical base for the research and help you (the author) determine the nature of your research. The literature review acknowledges the work of previous researchers, and in so doing, assures the reader that your work has been well conceived. It is assumed that by mentioning a previous work in the field of study, that the author has read, evaluated, and assimilated that work into the work at hand.

Literature means research articles that are referred to understand and study the research issues. The literature review is used to provide contextual studies by looking at the research that has been conducted in the field of research and not just summarizing the research conducted by other researchers. In addition, through the study of the literature the researcher can also identify the weaknesses and strengths of the resulting project. The “literature” in a literature review, however, refers to all the previous research and scholarship on a particular topic, no matter what discipline you are studying; the “review” is your explanation of what the literature says. Therefore, the literature review is important as it can be used from several aspects as a guide and reference for the researcher in completing this study.

2.1 PREVIOUS STUDIES / REVIEW / INVESTIGATIONS

Abu Robocon 2018 has the theme of throwing a blessing ball, the result of a study. Gravitational acceleration affects the movement of objects, one of which is parabolic motion. Movement A parabola is a type of motion of an object that is initially given an initial velocity and then moves a trajectory whose direction is completely influenced by gravity so that the trajectory is parabolic The movement of the parabola can be seen in Fig. Parabolic motion Motion on the y-axis is straight motion that changes regularly in the vertical direction. Move the object in one direction vertical which is affected by the force of gravity, so there is a damping in this direction. Movement on the x-axis i.e. uniform straight motion, i.e. the movement of objects in a horizontal direction that is not affected by the force of gravity,so there is no acceleration or deceleration in this direction .Initial velocity of the object at each value point constants and equations apply

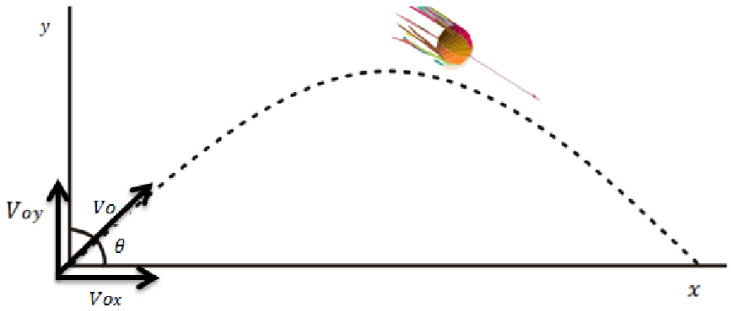


Figure 2.1 Object Movement

The horizontal distance traveled by the position of the object at any time can be determined by the equation:

$$Vox = Vo \cos \theta$$

Description:

$Vo =$ Initial speed (m/s)

$t =$ Time (s)

$\theta =$ Tilt angle (˚)

ROBOT WORK PROCESS

Robot planning covers mechanical design, electronic design, and program design. Robot mechanics are made with materials less base so that the strong robot frame does not break easily. Thrower mechanics are made with 2 thrower levers different length specifications. The electronic system of the robot uses Arduino mega to control LCD 16x2 as a visual of the condition of the robot, Relay to provide DC voltage to the solenoid. The IR sensor will installed on the robot to detect the ball as a trigger to throw the ball. Pneumatic is one of the right substitutes for DC motors. Because pneumatics use air as the actuator, so the pneumatic movement is very fast. IR sensor to detect the blessing ball object that has been received from the manual robot. Arduino mega which becomes the KRAI 2018 robot microcontroller to operate the robot more stably. Microcontroller arduino mega will need a 5 V power supply to supply the microcontroller voltage.

Arduino pin input mega IR sensor while the arduino mega relay output pin. The relay works to provide a switch for supply DC voltage to the robot solenoid. The solenoid function on the robot will regulate the wind pressure supply pneumatic as a thrower. Pneumatics on the robot will be made mechanical inclination angle for produce the desired throw. KRAI robot performance by using Arduino mega as microcontroller. Arduino mega has the advantage to make the performance of the robot better and more stable. When the IR sensor does not detect the object of the blessing ball, it gives logic 0, then when the IR sensor is detected detects the object of the blessing ball and is given a logic 1. After the IR sensor gives a logic 1 to the Arduino then the relay is in a closeloop state to provide voltage to the solenoid. Figure 2.2 is a diagram KRAI 2018 robot performance system flow.

Figure 2.2 Robot Performance System Diagram

SPECIFICATIONS OF COMPONENT TOSSING WAVES ROBOT

Basic dc motor specs were covered in the last tutorial. One needs to select a battery with the right characteristics in order to power a motor in a robot. For powering the motors, a variety of batteries are available. The following are the primary characteristics that should be taken into account while choosing a battery :

Voltage Rating

The voltage used to identify the switchgear and to which its operational performance is related is known as the "rated voltage." The rated voltage represents the maximum voltage of the systems for which the switchgear is designed. The maximum terminal voltage that a new battery should be able to supply to the electrical components is this.

Current Rating or Capacity Rating

A battery's capacity rating or current rating refers to how much current it can produce in an hour. This rating relates to how much power the battery can provide. For instance, a battery with a 1 amp-hour capacity will be able to continuously supply a current of 1 amp to a load for exactly 1 hour, or 2 amps for 1/2 hour, or 1/3 amp for 3 hours, etc., before becoming fully depleted. A typical automobile battery, for instance, might have a capacity of 70 amp-hours when measured at 3.5 amps of current. This indicates that the maximum period this battery could deliver 3.5 amps of continuous power to a load would be 20 hours (70 amp-hours / 3.5 amps).

Cross Section (mm^2)	Approximate Overall Diameter (mm)	Current Rating	
		Single Phase (Amps)	Three Phase (Amps)
1.5	2.9	17.5	15.5
2.5	3.53	24	21
2.5	3.4	24	21
4.0	4.4	32	28
6.0	4.68	41	36
10	5.98	57	50
16	6.95	76	68

Figure 2.3 Current Rating

SLA Batteries

The most affordable choice for high capacity continues to be SLA batteries. They can go through 1,000 charge and discharge cycles without needing much maintenance for several years, as long as the discharge doesn't exceed 30% of their capacity. The SLA batteries are very simple to charge and have a huge current output. These batteries are readily available and inexpensive, but they are not chosen for hobby robots because they are like hefty rocks for mobile robots.

Figure 2.4 SLA Batteries

12V Air Cond Cooling Fan Motor

Although products with electrical plugs are intended to be used with cooling fans, we used them in our project for turning wheels. Because outlets and voltage vary from country to country, this device might need an adapter or converter to be used where you are travelling. Before kindly verify compatibility replacement universal 12 volt electric fan engine motor. Powerful CFM performance wattage and reversible polarity.

- Overall motor housing diameter is 4.25" and depth is 2.25".
- Distance between each hole center is a standard 4.5".

Figure 2.5 12V Air Cond Cooling Fan Motor

Servo Motor

Figure 2.6 Servo Motor

A servo motor is a kind of motor that has extremely precise rotational capabilities. This type of motor typically has a control circuit that gives feedback on the motor shaft's present location. This feedback enables the servo motors to rotate very precisely. A servo motor is used to rotate an object at predetermined angles or distances. It consists of a straightforward motor that drives a servo mechanism. There are numerous different servo motor kinds based on the type of gear arrangement and operating characteristics in addition to these primary divisions. A servo motor often has a gear configuration that enables us to produce a very high torque servo motor in tiny and light designs. These characteristics make them useful for a variety of applications, including toy cars, RC helicopters and planes, robotics, etc.

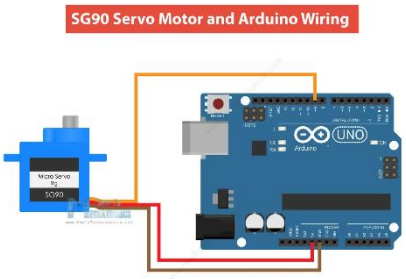


Figure 2.7 Servo Motor and Arduino Wiring

Due to their popularity and widespread use in many Arduino applications, servo motors offer excellent position control and are simple to operate. RC models, automation, robotics projects, and other things all benefit greatly from the use of servos. I've already utilised these in numerous Arduino projects**.**

2.3 COMPARISON OF OUR PRODUCT WITH LATEST TECHNOLOGY

Old Design	Description
	• Heavier • Less Accuracy • Expensive Material • Shoot Slower • Only have one wheel as a shooter.
New Design 	• Lighter • More Accuracy • Less Expensive Material • Shoot Faster • Have two wheel as a shooter.

Table 2.1 Comparison of our product with latest technology

2.4 DATA AND STATISTIC

While the terms ‘data’ and ‘statistics’ are often used interchangeably, in scholarly research there is an important distinction between them. Data are individual pieces of factual information recorded and used for the purpose of analysis. It is the raw information from which statistics are created. Statistics are the results of data analysis - its interpretation and presentation. In other words some computation has taken place that provides some understanding of what the data means. Statistics are often, though they don’t have to be, presented in the form of a table, chart, or graph. Both statistics and data are frequently used in scholarly research. Statistics are often reported by government agencies - for example, unemployment statistics or educational literacy statistics. Often these types of statistics are referred to as 'statistical data'.

2.4.1 SUSTAINABLE DEVELOPMENT GOALS (SDG)

Robotics is an interdisciplinary branch of computer science and engineering. Robotics involves the design, construction, operation, and use of robots. The goal of robotics is to design machines that can help and assist humans. Robotics integrates fields of mechanical engineering, electrical engineering, information engineering, mechatronics engineering, electronics, biomedical engineering, computer engineering, control systems engineering, software engineering, mathematics, etc.

Robotics develops machines that can substitute for humans and replicate human actions. Robots can be used in many situations for many purposes, but today many are used in dangerous environments (including inspection of radioactive materials, bomb detection and deactivation), manufacturing processes, or where humans cannot survive (e.g., in space, underwater, in high heat, and clean up and containment of hazardous materials and radiation). Robots can take any form, but some are made to resemble humans in appearance. This is claimed to help in the acceptance of robots in certain replicative behaviour which are usually performed by people. Such robots attempt to replicate walking, lifting, speech, cognition, or any other tasks mainly performed by a human. Many of today's robots are inspired by nature, contributing to the field of bio-inspired robotics.

2.5 SUMMARY

This is usually the theoretical literature review. A literature review is a survey of academic sources on a particular project topic. It gives an overview of the ebb and flows information, permitting you to distinguish significant hypotheses, strategies, and holes in the current research. As a summary of this topic, we have achieved in explaining each and every subtopic as we mentioned in the introduction. Furthermore we have provided some articles together with our statement to support the information we have stated. Moreover, we also going to discuss about the flow of the project, the organization chart, Gantt chart and the research based on our project in the following topic which is methodology. Today, robotics is a rapidly growing field, as technological advances continue; researching, designing, and building new robots serve various practical purposes, whether domestically, commercially, or militarily. Many robots are built to do jobs that are hazardous to people, such as defusing bombs, finding survivors in unstable ruins, and exploring mines and shipwrecks. Robotics is also used in STEM (science, technology, engineering, and mathematics) as a teaching aid.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter examines the numerous research methodologies and methods that are regularly used. Information system researchers use this term. The research approach and findings the methodology employed in this study is acknowledged and explained. The chapter begins with a broad introduction to research. Following that, the investigation the methodology and research methods utilised in information systems are explained in detail. A great effort has been made to clarify and distinguish various research methodologies and the research approach When conducting this research, we looked through the literature on many researchers were found to be employing the research about Tossing Waves Robot technique and research methodologies interchangeably. As a result, there are sections on research methodology and research methodologies have been handled separately.

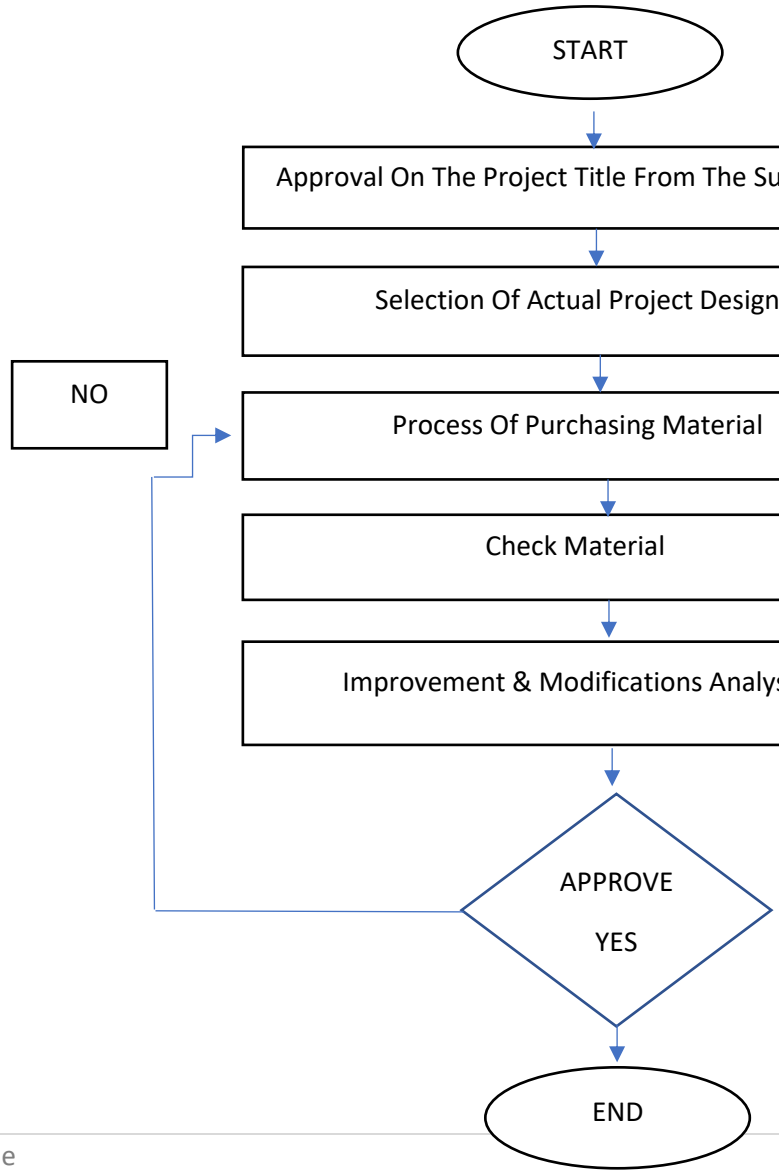
The section on research technique is methodology refers to the theoretical analysis of the methods appropriate to a field of study or to the body of methods and principles particular to a branch of knowledge. The research methodology is a way to systematically solve the research problem. This chapter includes an introduction, project design, Gantt Chart, Flow Chart, Data Analysis, Fabrication Technique, experimental setup with Project Design, Material, Cost and ETC. For the analysis of archival data documents obtained through the Internet, case study research methods are combined with basic theory research approaches. To study the manufacture of Tossing Waves Robots to facilitate the daily work of humans controlled through mobile phones connected via wifi.

3.2 FLOW CHART

Flow Chart Project 1

To make this project a success, several steps need to be done and also need to be followed to ensure that the project to be done is smooth and successful. If there is a problem, this flow chart should be referenced back to help before or during the project. With this flow chart, it encourages the use of time in a more orderly and systematic way because it can follow all the instructions so accurately and perfectly.

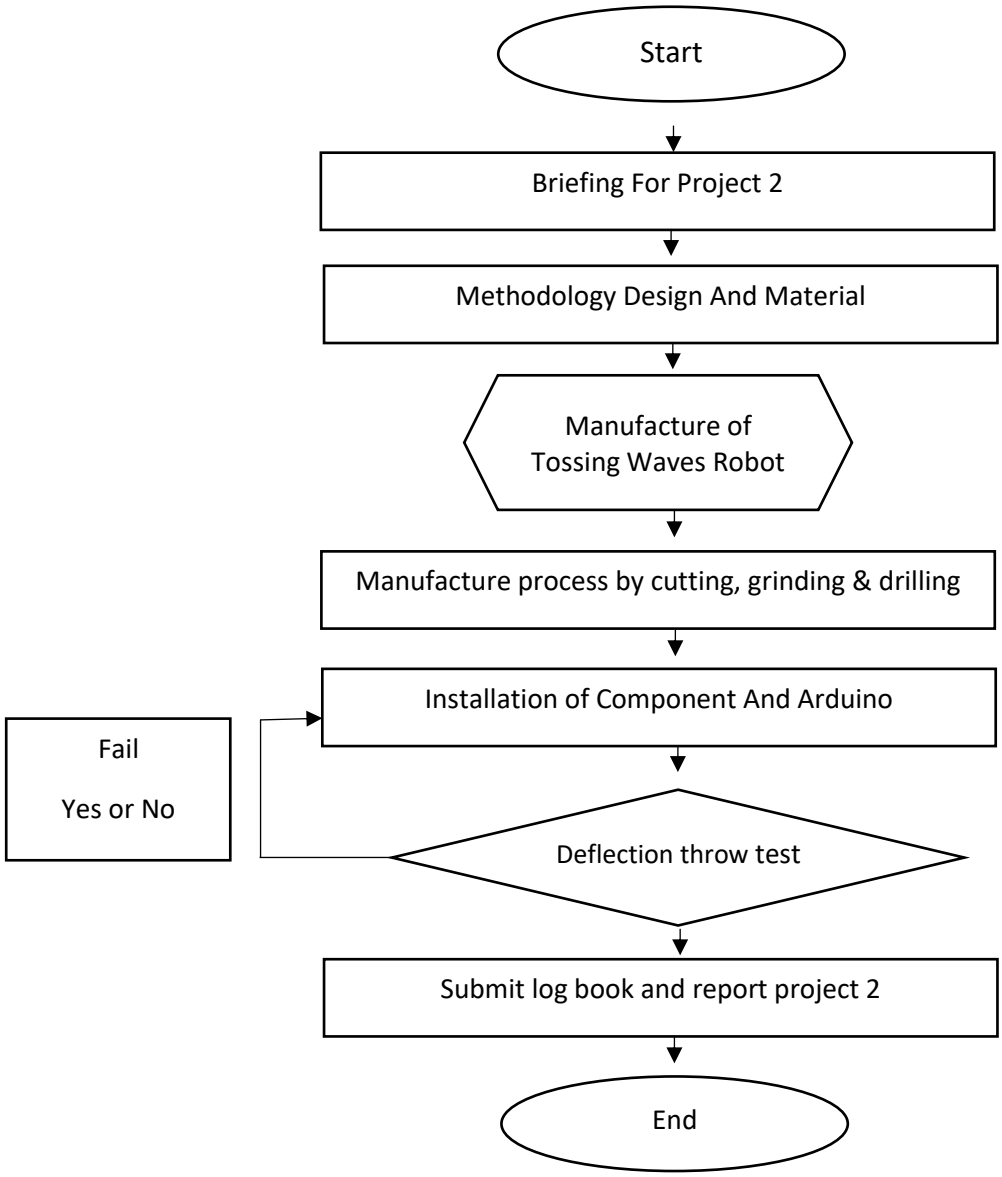
Among the steps that need to be followed are as follows .



Flow Chart Project 2

To make this project a success, several steps need to be done and also need to be followed to ensure that the project to be done is smooth and successful. If there is a problem, this flow chart should be referenced back to help before or during the project. With this flow chart, it encourages the use of time in a more orderly and systematic way because it can follow all the instructions so accurately and perfectly.

Among the steps that need to be followed are as follows .



3.3 GANTT CHART

Gantt Chart Project 1

Gantt charts are used in our project management to plan and schedule projects. Gantt charts are highly helpful because they enable us to break down complicated projects into an understandable schedule and monitor the status of tasks as work is done. This table shows a gantt chart in our project production process starting from the 1st week until the 14th week.

	Planning
	Actual

Description	**Week**													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Research Studies **- Problem Statement** **- Objective** **- Scope Of Project**														
Development and Test **- Prepare the project equipment** **- Check the performance of the project**														
Project Completion **- Achieve the planned objectives** **- Make improvements** **- Inventor drawing**														
Report Completion **- Finish Chapter 1, 2, 3, and 4** **- Report Checked By Supervisor**														
Presentation And Submission **- Final project presentation** **- Submissi on of FinalProject Report**														

Table 3.1: Gantt Chart

Gantt Chart Project 2

Gantt charts are used in our project management to plan and schedule projects. Gantt charts are highly helpful because they enable us to break down complicated projects into an understandable schedule and monitor the status of tasks as work is done. This table shows a gantt chart in our project production process starting from the 1st week until the 14th week.

	Planning
	Actual

	Week													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Briefing Project 2														
Discussion of Design														
Discussion Material Used														
Actual Cost														
Fabrication Process														
Installation of Component														
Presentation Project 2														
Submit log book & Report Project 2														

Table 3.2: Gantt Chart

3.4 FABRICATION OF PROJECT DESIGN

Fabrication is the process that occurs during the process of building the project. For this project 2 different techniques are required for Tossing Waves Robot. Fabrication covers a broad range of applications, from fabricating Tossing Waves Robot from manufactured parts and fabricating components for a assembly. For fabrication the production Tossing Waves Robot structures is using processes like cutting, drilling, grinding and assembling.

3.4.1 PROCEDURE PROJECT PRODUCTION TECHNIQUES METHOD

Figure 3.1: Cut two board into a size of 55cm x 60cm for base and top.

Figure 3.2: Measure the position of the motor according to the appropriate size of the ring.

Figure 3.3: Make two holes with a diameter of 9cm to insert the motor.

Figure 3.4: Scrape off the excess on the hole that has been made to fit the motor in.

Figure 3.5: This is the process of making ring shooter wheels.

Figure 3.6: Scrape the surface of the wheel rim to make the surface of the wheel rim flat and not bumpy.

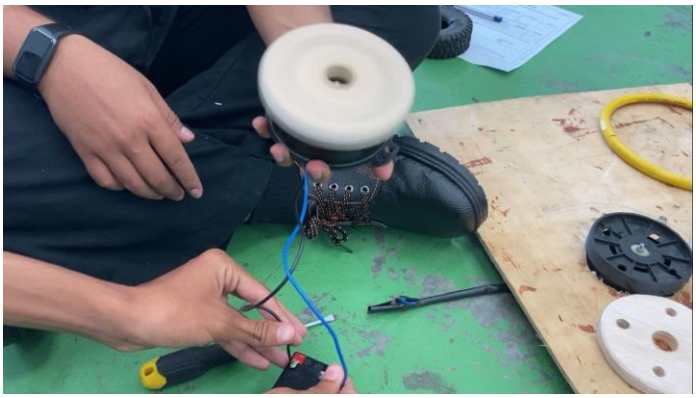


Figure 3.7: Attach the wheel to the motor to test the wheel if the wheel fits the motor.

Figure 3.8: Make screw holes using a drill to fasten the motor so that the motor does not fall.

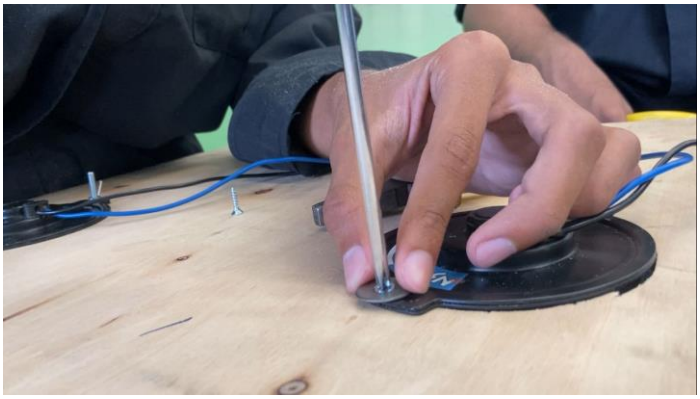


Figure 3.9: Insert the motor into the hole that has been specially made for the motor and tighten it tightly using screws so that it does not fall.

Figure 3.10: Cut the iron plate into a size of 55cmx60cm to be used as a lining for the base board.

Figure 3.11: Scrape the edges of the iron plate so that there are no excess effects from the cutting done on the iron plate.

Figure 3.12: Cut the iron plate that is more than the board to get the same size by using a grinder.

Figure 3.13: Cut the iron plate into a size of 30cm for length and 15cm for width to be used as a ring loader.

Figure 3.14: Knock the iron plate using a rubber coupling so that the iron plate is formed into a cylinder with a diameter of 25cm.

Figure 3.15: Make a hole using a drill on an iron plate that has been shaped into a cylinder to be riveted.

Figure 3.16: The two surfaces of the iron plate are riveted so that the iron plate sticks and becomes a permanent cylinder.

Figure 3.17: Ring loader sprayed using black spray.

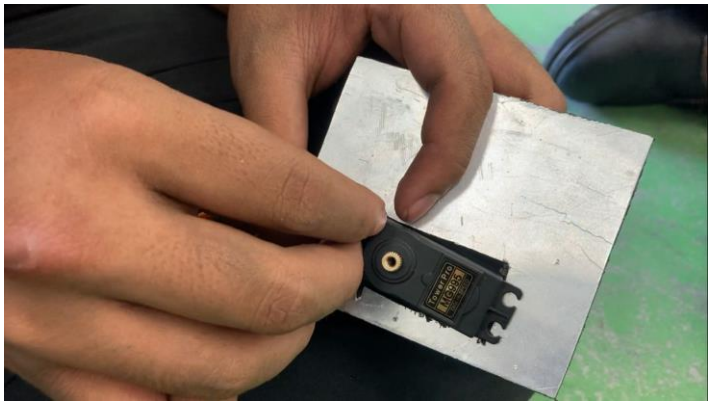


Figure 3.18: A place to hold the servo motor is made and tie the servo motor.

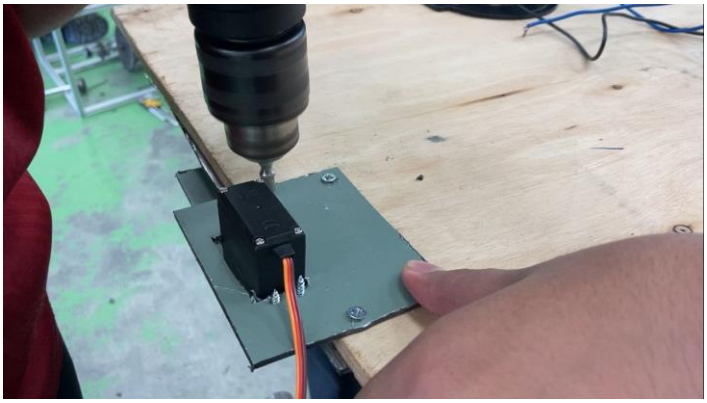


Figure 3.19: The servo motor with its handle is attached to the back of the board so that it can push the ring.

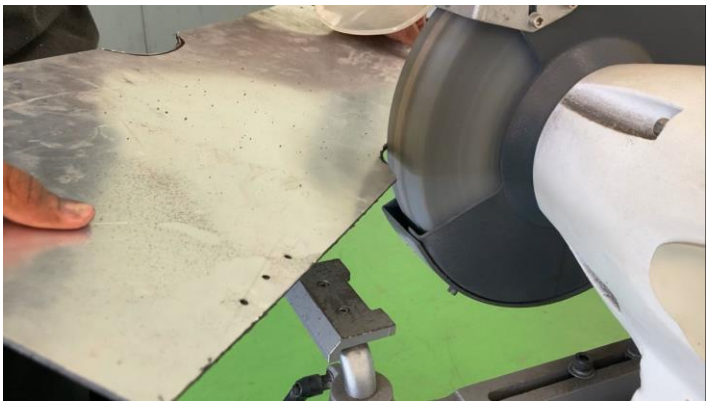


Figure 3.20: The loop board is made using plastic because the surface is smooth.

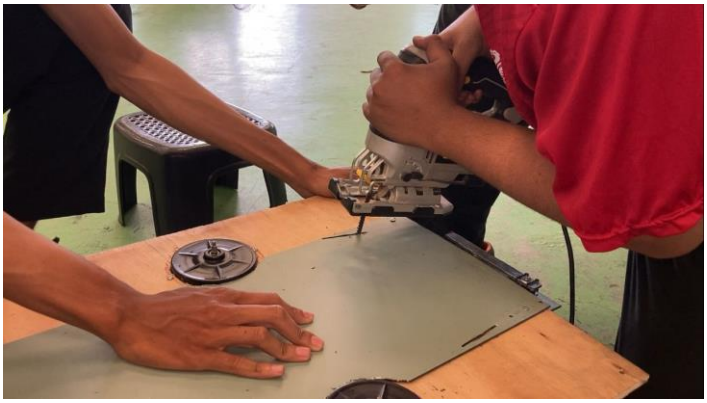


Figure 3.21: Make a passage hole to insert the ring loader.

Figure 3.22: Ring loader inserted into the passage hole.

Figure 3.23: After inserting the ring loader into the passage hole, the ring loader will be fastened with a screw so that it does not come off from the hole.

Figure 3.24: After completing the installation of the ring holder then colour the project on the top using black spray to get a beautiful colour and suitable.

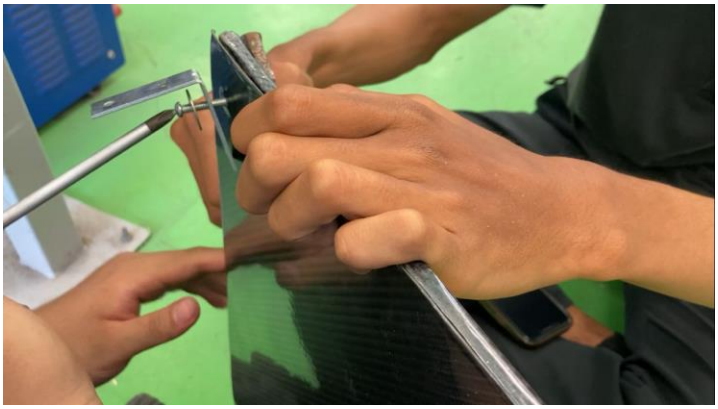


Figure 3.25: The L connector is fastened using screws at each corner of the bottom and top boards.

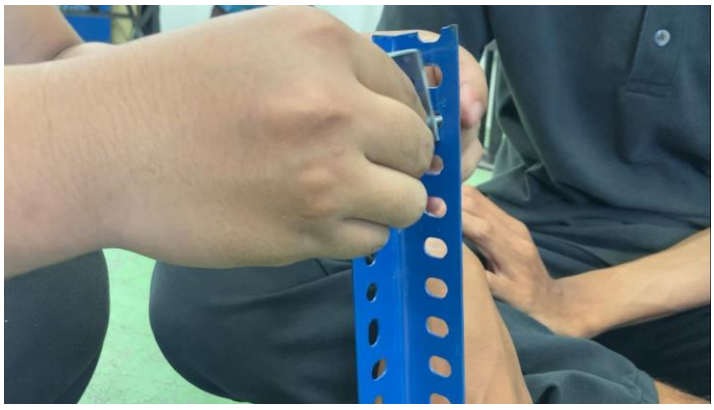


Figure 3.26: The pole is fastened to the L connector to connect the bottom and top boards into one.

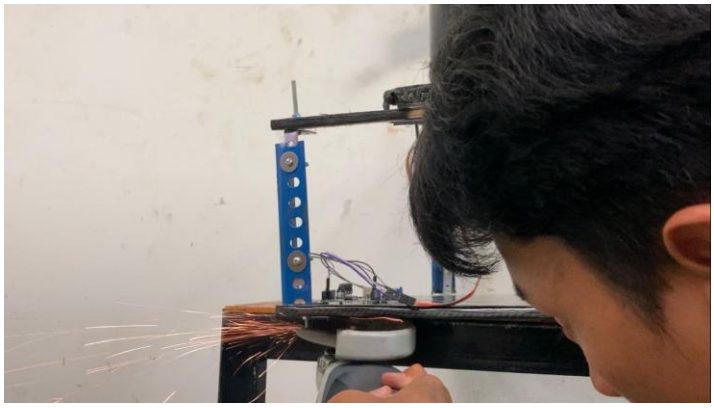


Figure 3.27: Cut off the excess screws that come out.

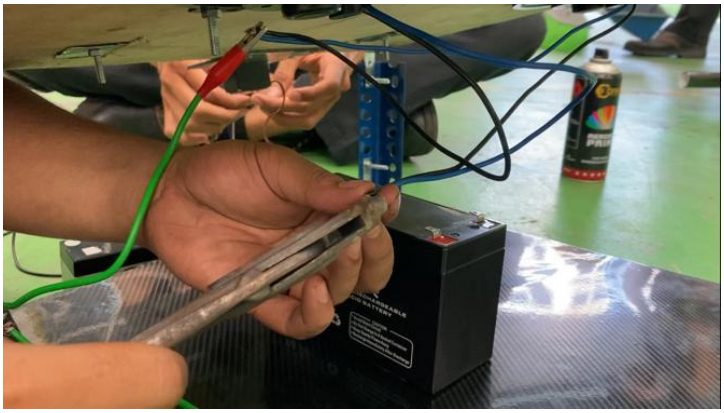


Figure 3.28: Put the battery on the base board and attach it using double tap, wire connection between all electrical components and motor is done.

Figure 3.29: Do the final test on the Tossing Waves Robot.

3.4.2 PROJECT DESIGN

Progress Design	Result Design
	
• Does not have a ring loader • box cut as a ring path • The original color of the board is worn and not beautiful • Rough ring path • Does not have An arduino	• Have a ring loader • Plastic board is used as a ring path • The project is sprayed with black to make it more attractive • Smooth ring path • Have an arduino

Table 3.3 Project Design

3.4.3 PROJECT PART DRAWINGS

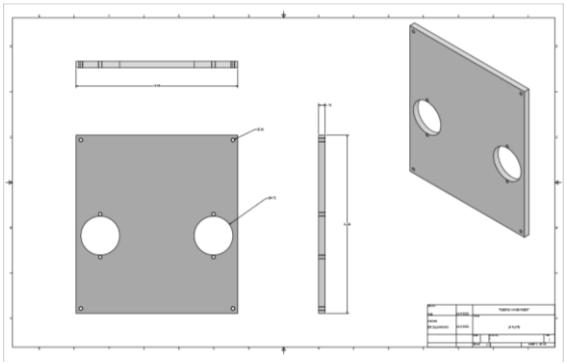


Figure 3.30 : Upper Board - The upper board is where the motor and ring loader are located.

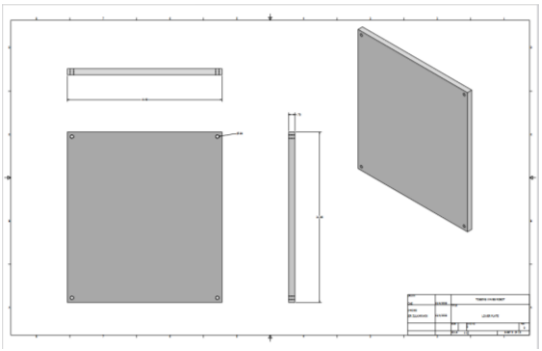


Figure 3.31 : Bottom Board - The bottom board is a board that serves as a place to place electronic materials such as batteries, arduino and other electrical components.

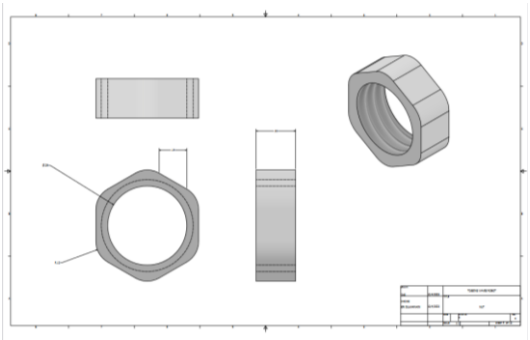


Figure 3.32 : Nut - The nut serves to further tighten the screw bond on the parts that need to be screwed.

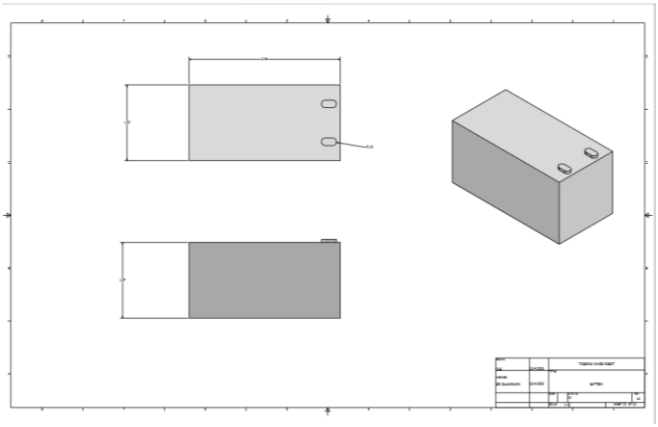


Figure 3.33 : Battery - The battery is the main component that supplies energy to other electrical components such as motors, arduino and servo motors.

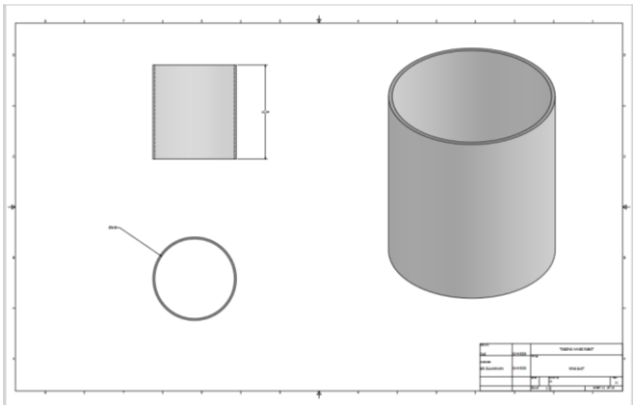


Figure 3.34 : Ring loader - The ring loader is where the ring is stored.

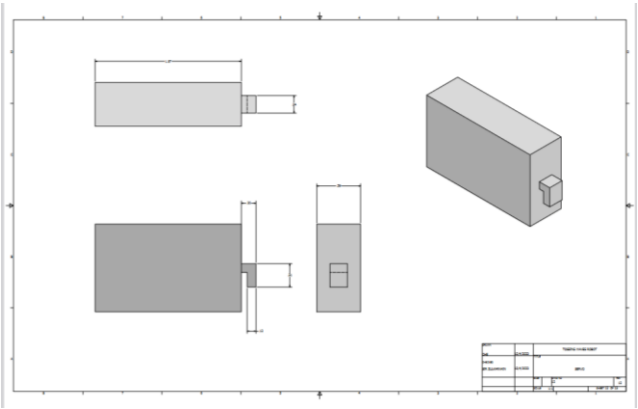


Figure 3.35 : Servo Motor - The servo motor works as a ring pusher so that the ring can be fired by the wheel.

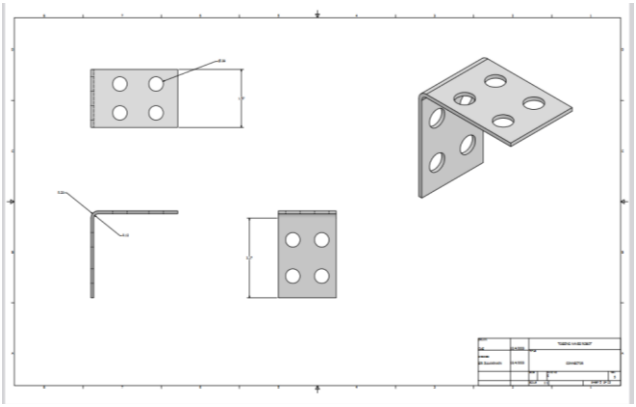


Figure 3.36 : L connector - The L connector functions as where the pole connecting the top and base of the board is fastened.

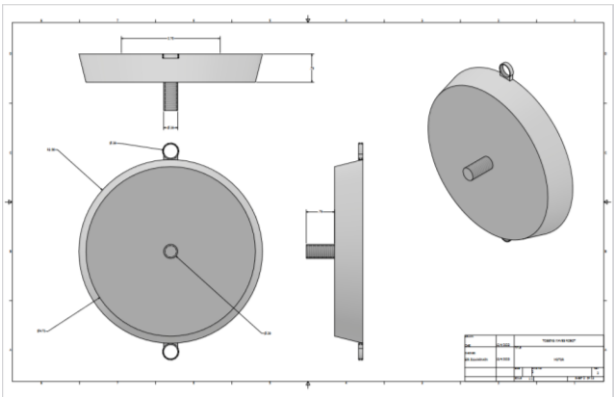


Figure 3.37 : Motor - The motor is used to rotate the wheel at high speed so that it can shoot the ring.

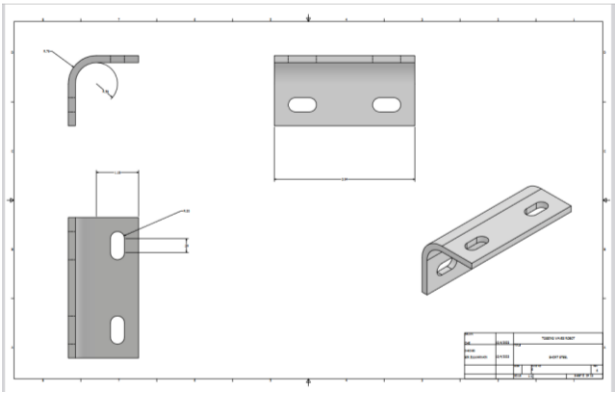


Figure 3.38 : Pole - The pole serves as a link between the top and base boards to create a shape.

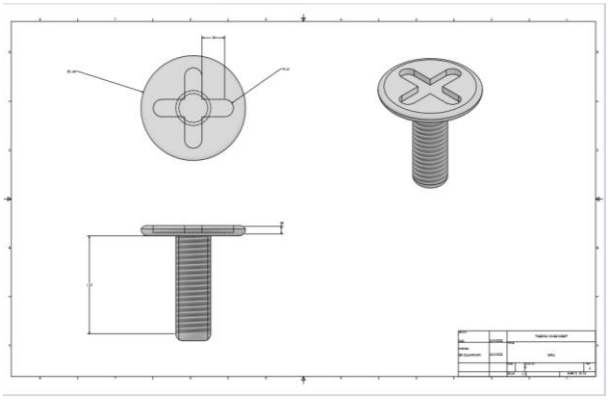


Figure 3.39 : Screw – The screws are used to fasten the two surfaces that need to be fastened together.

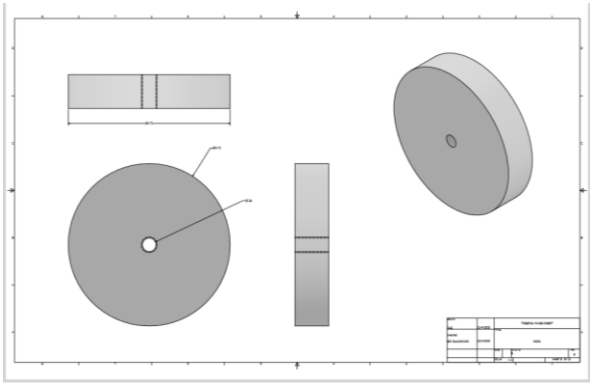


Figure 3.40 : Wheel - The wheel is the reason the ring can move forward with speed like a shot.

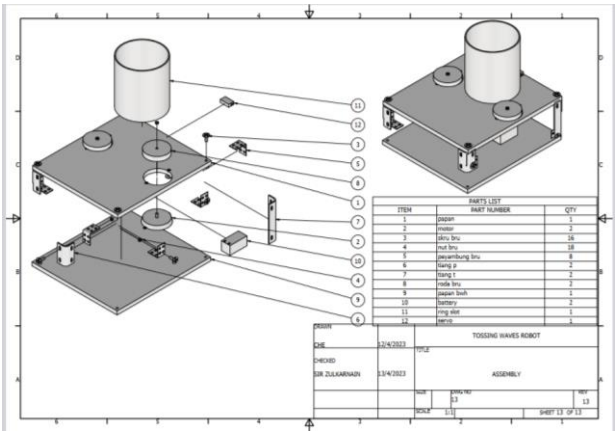


Figure 3.41 : This is the assembly of Tossing Waves Robot and the exploded of Tossing Waves Robot.

3.4.4 DATA COLLECTION MATERIALS AND EQUIPMENT

No.	Diagram	Description
1.		**Battery 12 Voltage** At 12.0 volts battery is considered to be fully discharged or 'flat' and should be recharged as soon as possible**.**
2.		**Motor** A machine powered by electricity that supplies motive power for a vehicle or for another device with moving parts. "these electric motors are highly reliable"
3.		**Servo Motor** A servomotor is a rotary actuator or linear actuator that allows for precise control of angular, velocity, and acceleration.
4.		**Wood** A hard substance that forms the branches and trunks of trees and can be used as a building material.
5.		**Arduino UNO** The Arduino UNO board is used for an electronics project and mostly preferred by the beginners.
6.		**Screw, Nut and Washer** To keep the screw from loosening or to distribute the load from the nut or bolt head over a larger area.

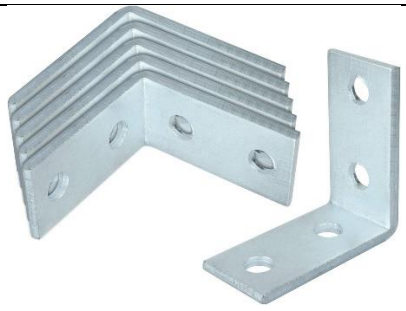
7.		**Electrical Wire** An electrical wire is a type of conductor, which is a material that conducts electricity.
8.		**Switch Button On Off** Type of PROGRESSIVE circuit that is a maintained, double position switch circuit. this circuit function is offered in a two-pole configuration where each pole controls a separate circuit.
9.		**Iron Plate** Iron plates are made by pouring molten iron into a sand-based shaping tool. The shape, of course, is that of a circular plate
10.		**Pole** Poles are installed vertically at each corner at the top and bottom Tossing Waves Robot.
11.		**L – Connector** This connector is for the secondary power circuit used in the office automation equipment.

Table 3.4 Data collection material and equipment

3.4.5 DATA ANALYSIS METHOD

Statistical analysis refers to the process of collecting, reviewing, and interpreting data using statistical methods to gain insights, draw conclusions, and make decisions. This process involves various steps like data collection, organization, analysis, interpretation, and presentation. Statistical analysis helps in detecting patterns, relationships, and trends in data, making predictions, and testing hypotheses. It is widely used in research, business, finance, healthcare, and other fields where data-driven decisions are important.

The results are back from your online surveys. Now it's time to tap the power of survey data analysis to make sense of the results and present them in ways that are easy to understand and act on. After you've collected statistical survey results and have a data analysis plan, it's time to begin the process of calculating survey results you got back. Here's how our survey research scientists make sense of quantitative data (versus qualitative data). They structure their reporting around survey responses that will answer research questions. Even for the experts, it can be hard to parse the insights in raw data.

In order to reach your survey goals, you'll want to start with relying on the survey methodology suggested by our experts. Then once you have results, you can effectively analyze them using all the data analysis tools available to you including statistical analysis, data analytics, and charts and graphs that capture your survey metrics.

3.4.6 COST ESTIMATIONS

No.	Item	Quantity	Price
1	Wheel	2	RM 12.00
2	Battery 12V	1	RM 25.00
3	Servo motor	1	RM 21.00
4	Glue	1	RM 3.00
5	Spring Washer & GI Washier	2	RM 10.00
6	Hexagon Bolt & Nut	1	RM 3.00
7	GI Bolt & Galv. Mild Steel Roofing	1	RM 3.00
8	Arduino Full Set Component	1	RM 350.00
9	Wooden Planks	2	RM 7.00
10	Type 12V Cooling Fan Motor	2	RM 80.00
11.	Sticker Carbon	2	RM 24.00
		Total	**RM 538.00**

Table 3.5 Cost estimations

3.5 SUMMARY

This chapter focuses on the method of data collection as well as the setting in which the data is collected. The research design and method chosen for the study have been mentioned. It also includes the questionnaire instrument and the functions of each section. The chapter three of final year projects usually explains the 'research methodology', as traditionally called, under various categories and research tools. Mentioning tools, I mean the instruments for data collection or gathering, research techniques, research population, instrument for data analysis and the likes.

CHAPTER 4

RESEARCH FINDINGS AND DISCUSSION

4.1 INTRODUCTION

We want to do a research on our product which is tossing wave robot. In recent years, there has been an increasing interest in the development of robots that can throw or toss objects accurately and with specific trajectories. These robots have wide-ranging applications in industries such as logistics, manufacturing, and sports, where precision and efficiency are essential. The development of such robots requires extensive research and experimentation to overcome the technical challenges in designing intelligent and responsive control systems, sophisticated sensors, and manipulators capable of generating sufficient power. This research aims to investigate the current state of the art in the development of tossing wave robots, highlight recent advances in technology and control systems, and evaluate their performance through experimental results. By analyzing the various approaches to building a tossing wave robot, this research aims to contribute to the ongoing efforts towards the development of more efficient, reliable, and adaptable robots that could help to transform numerous industries.

4.2 PROJECT TESTING AND PERFORMANCE ANALYSIS

	Weight Ring	**Time**	**Distance**
Take 1	145gram	3 seconds	2.6 meter
Take 2	148gram	2 seconds	2.3 meter
Take 3	150gram	2 seconds	2.1 meter

Table 4.1 : Testing and performance analysis

4.3 DATA ANALYSIS AND STATISTIC

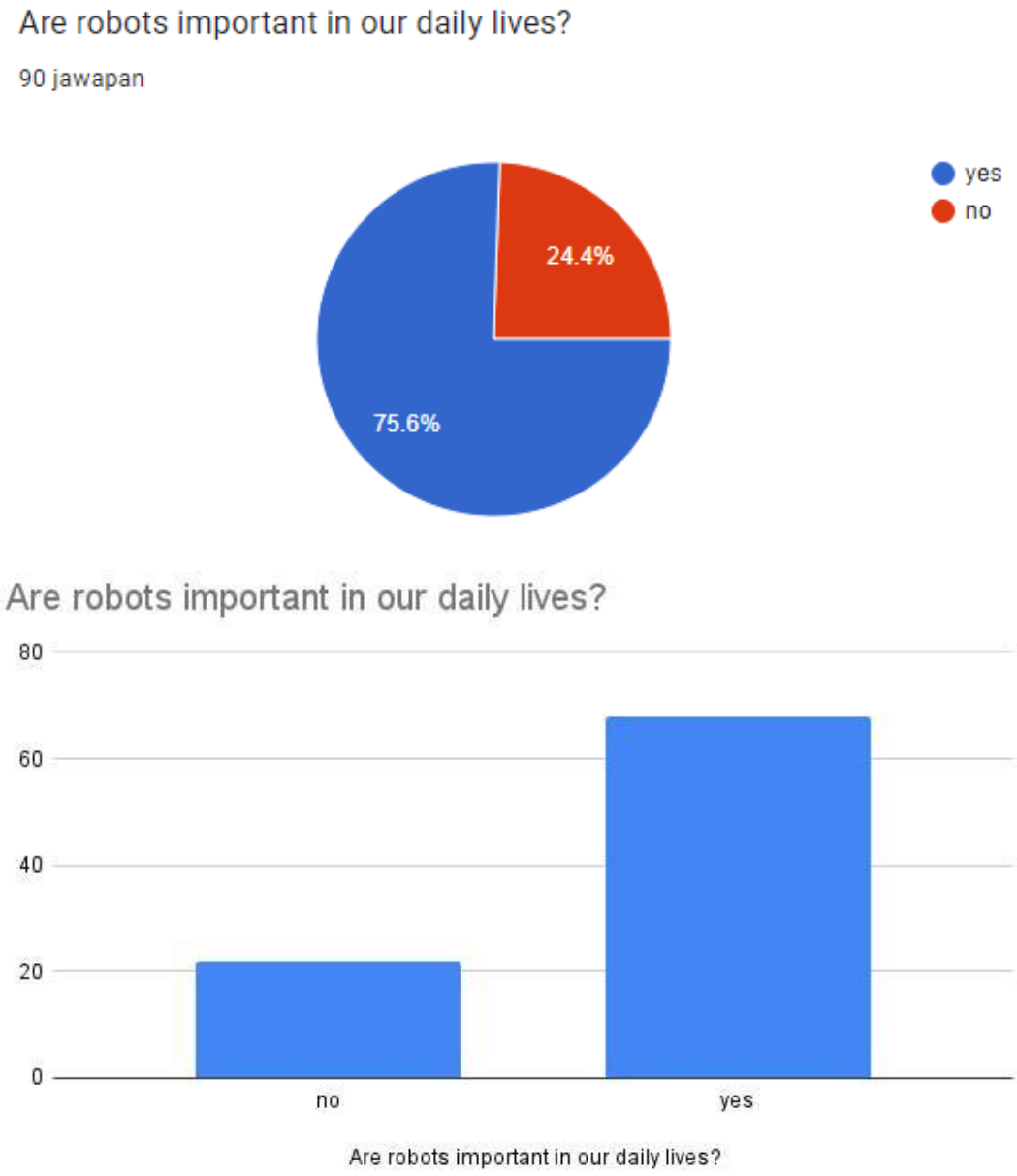


Figure 4.1 : Are robots important in our daily lives?

For question 1 which is are robots important in our daily lives, we can see that the percentage for those who voted yes was 75.6% while the percentage for those who voted no was 24.4%. This shows that for them, robot is important too in our lives.

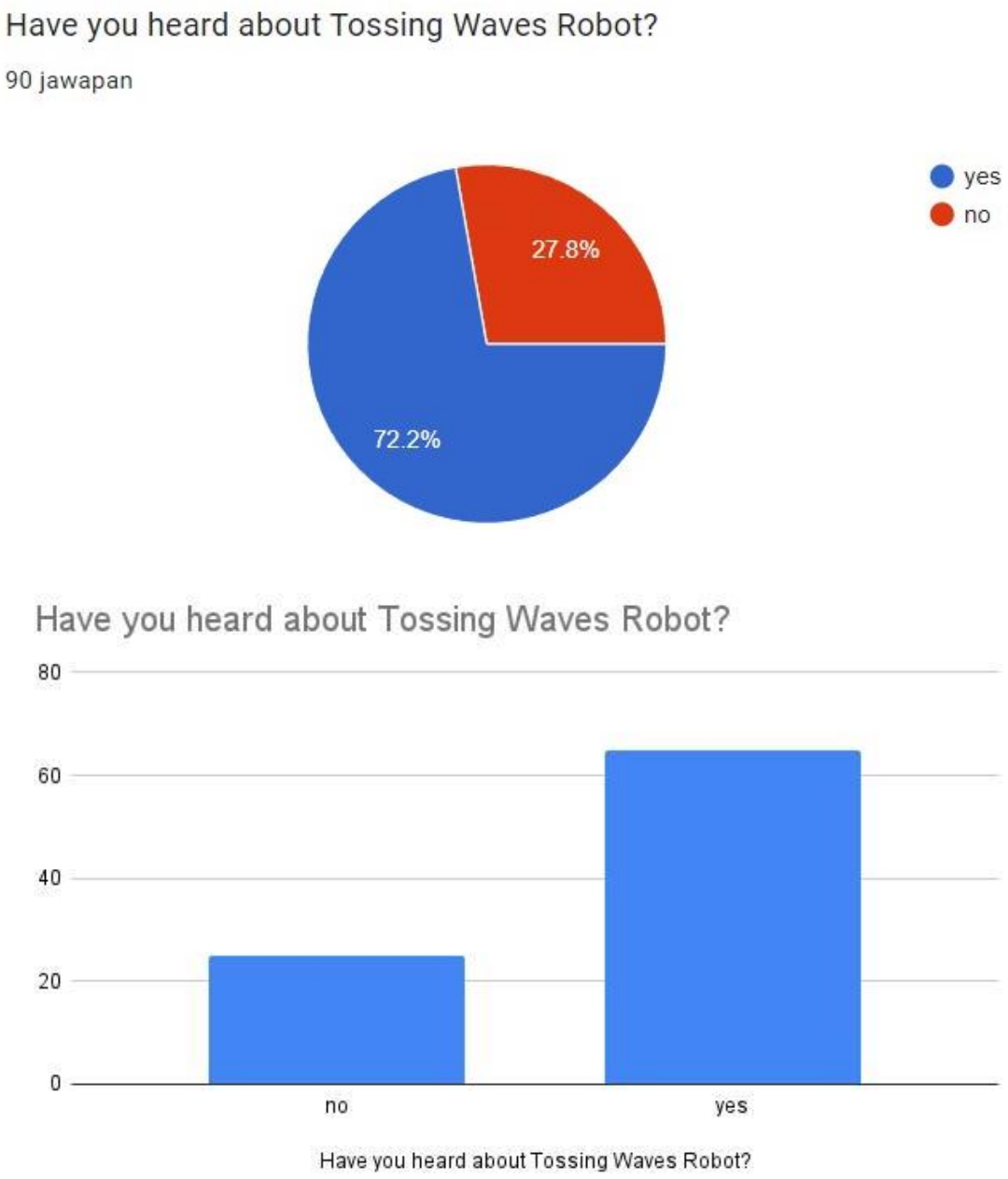


Figure 4.2 : Have you heard about Tossing Waves Robot?

For question 2 which is it have you heard about tossing wave robot, we can see that the percentage for those who voted yes was 72.2% while the percentage for those who voted no was 27.8%. This shows that many people had heard about Tossing Waves Robot.

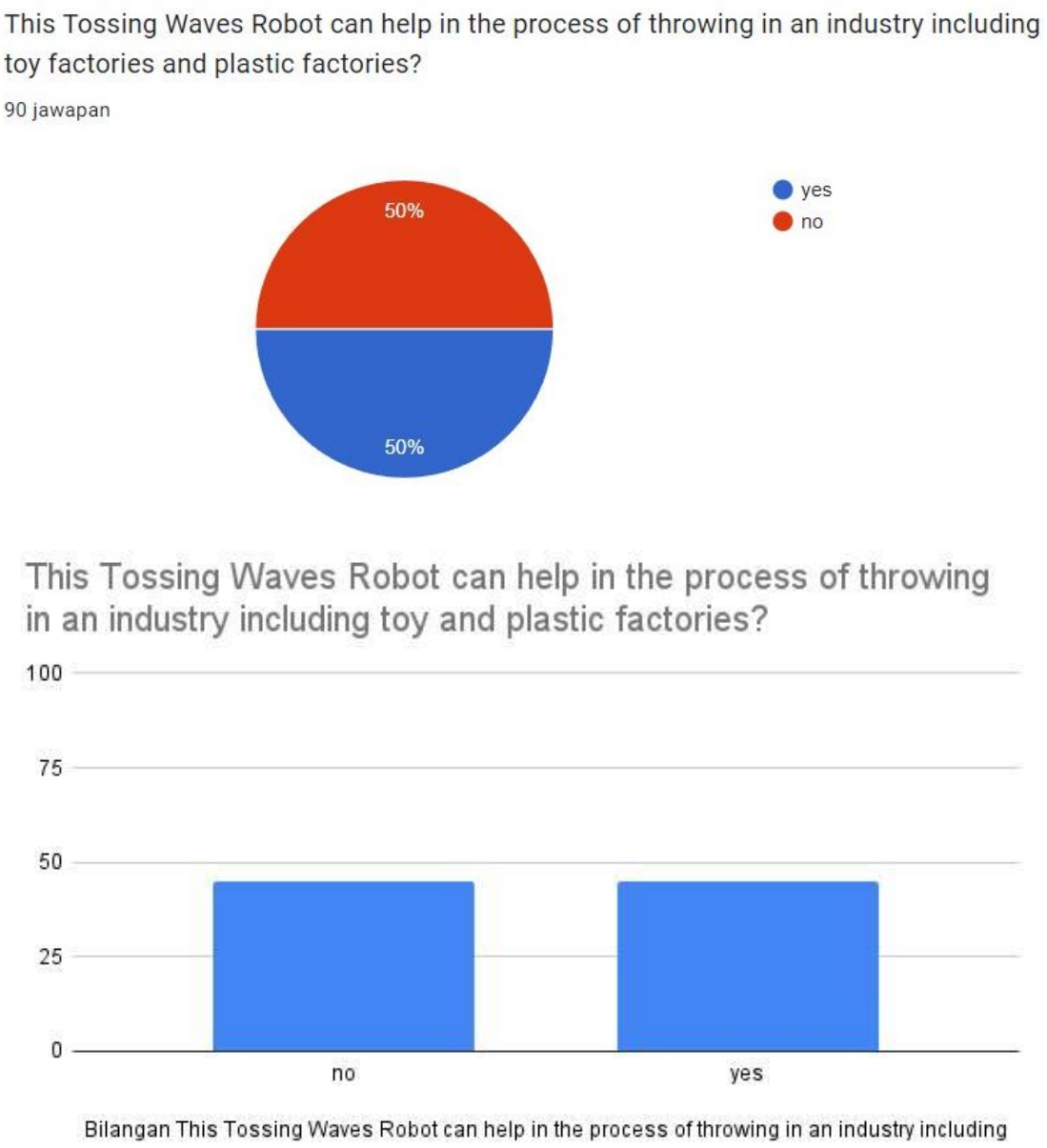


Figure 4.3 : Throwing in an industry including toy factories and plastic factories

For question 3 which is this Tossing Waves Robot can help in the process of throwing in an industry including toy factories and plastic factories, we can see that the percentage for those who voted yes and no is same which is 50%.This show that people still not to sure about this Tossing waves robot can help in the process of throwing in an industry including toy factories and plastic factories.

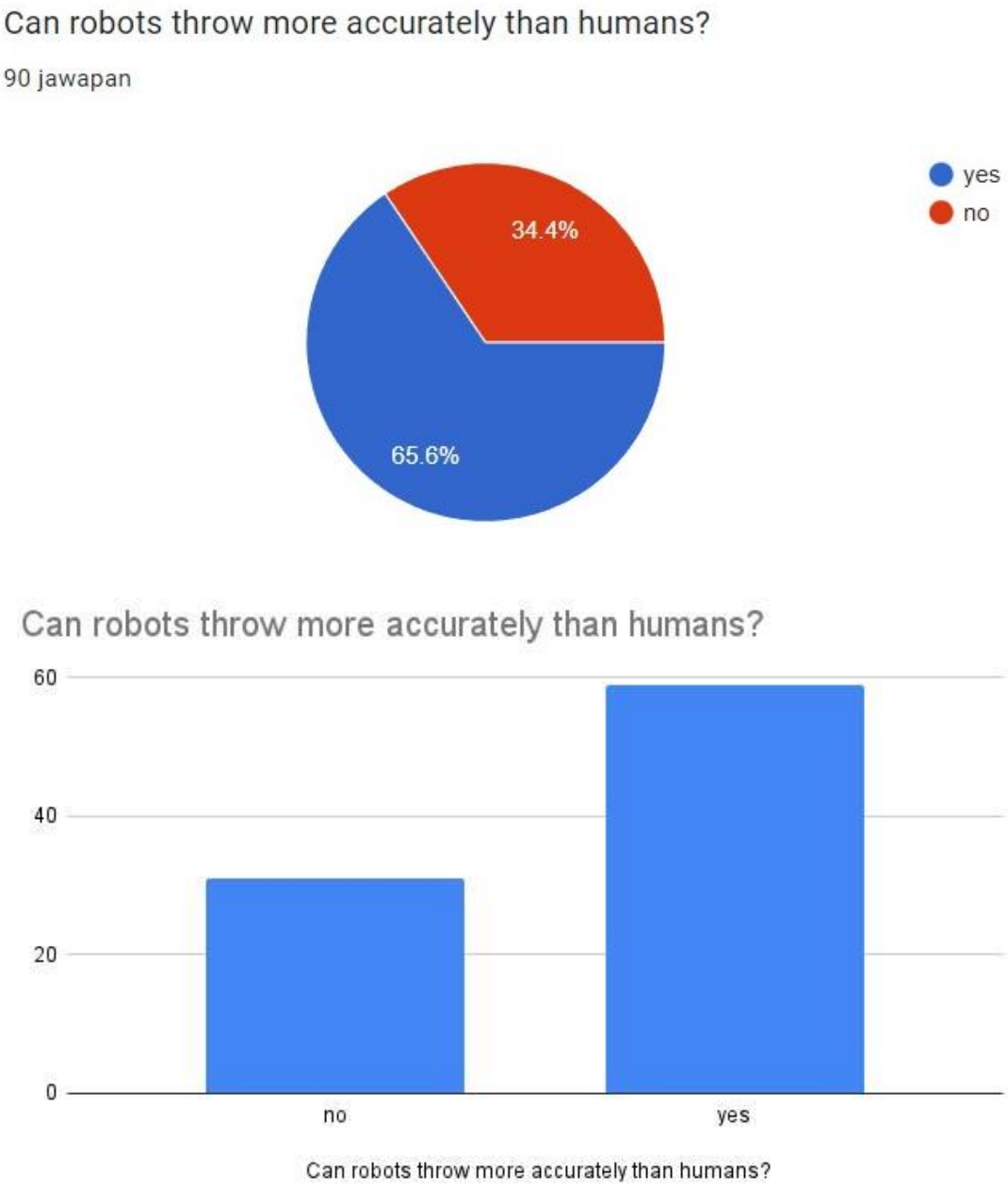


Figure 4.4 : Can robots throw more accurately than humans?

For question 2 which is can robot throw more accurately than human. We can see that the percentage for those who voted yes was 65.6% while the percentage for those who voted no was 34.4%. This shows that for them, people is more accurate than human.

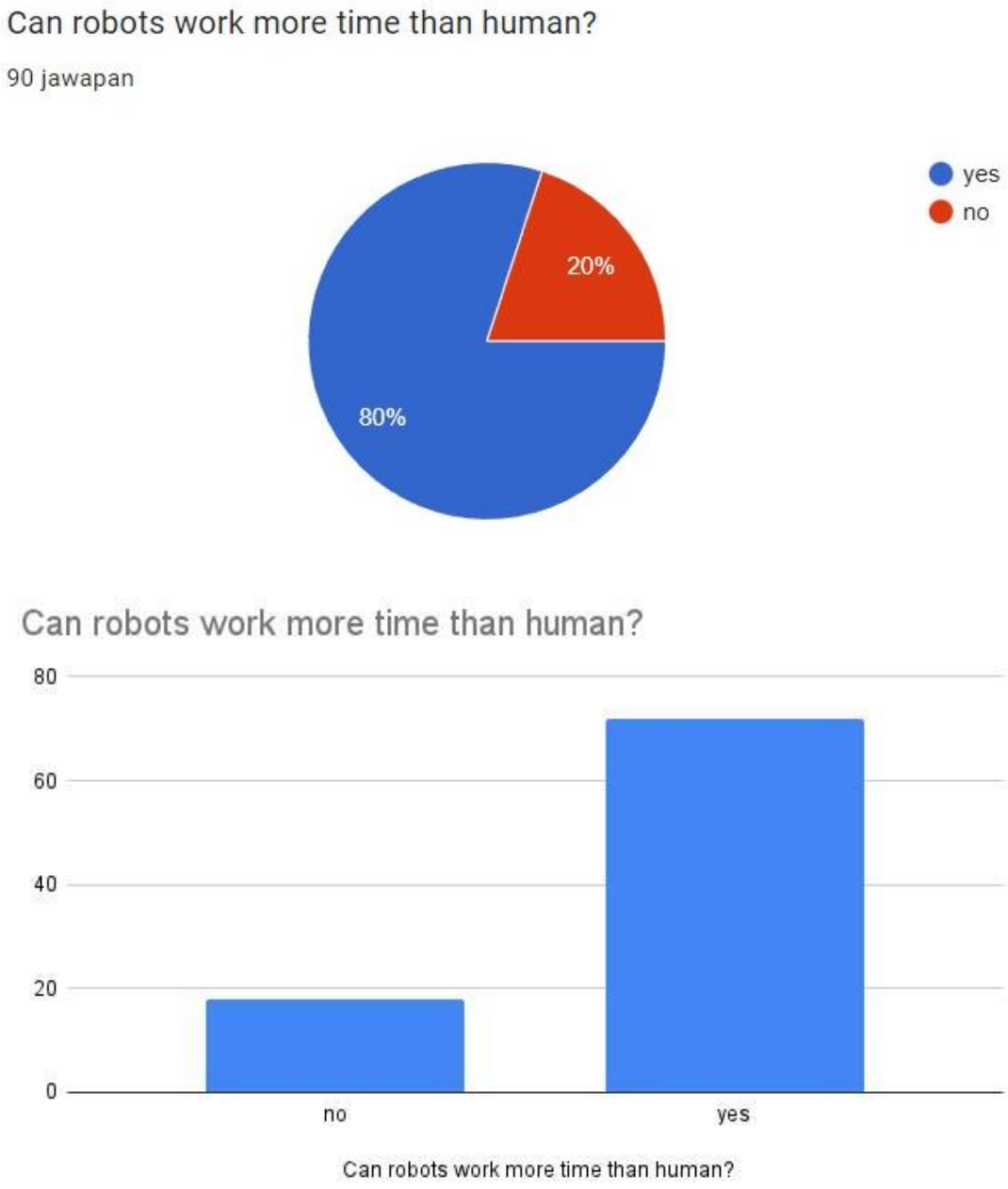


Figure 4.5 : Can robots work more time than human?

For question 5 which is can robots work more time than human, we can see that the percentage for those who voted yes was 80% while the percentage for those who voted no was 20%. This shows that many people think that robot can work more time than human

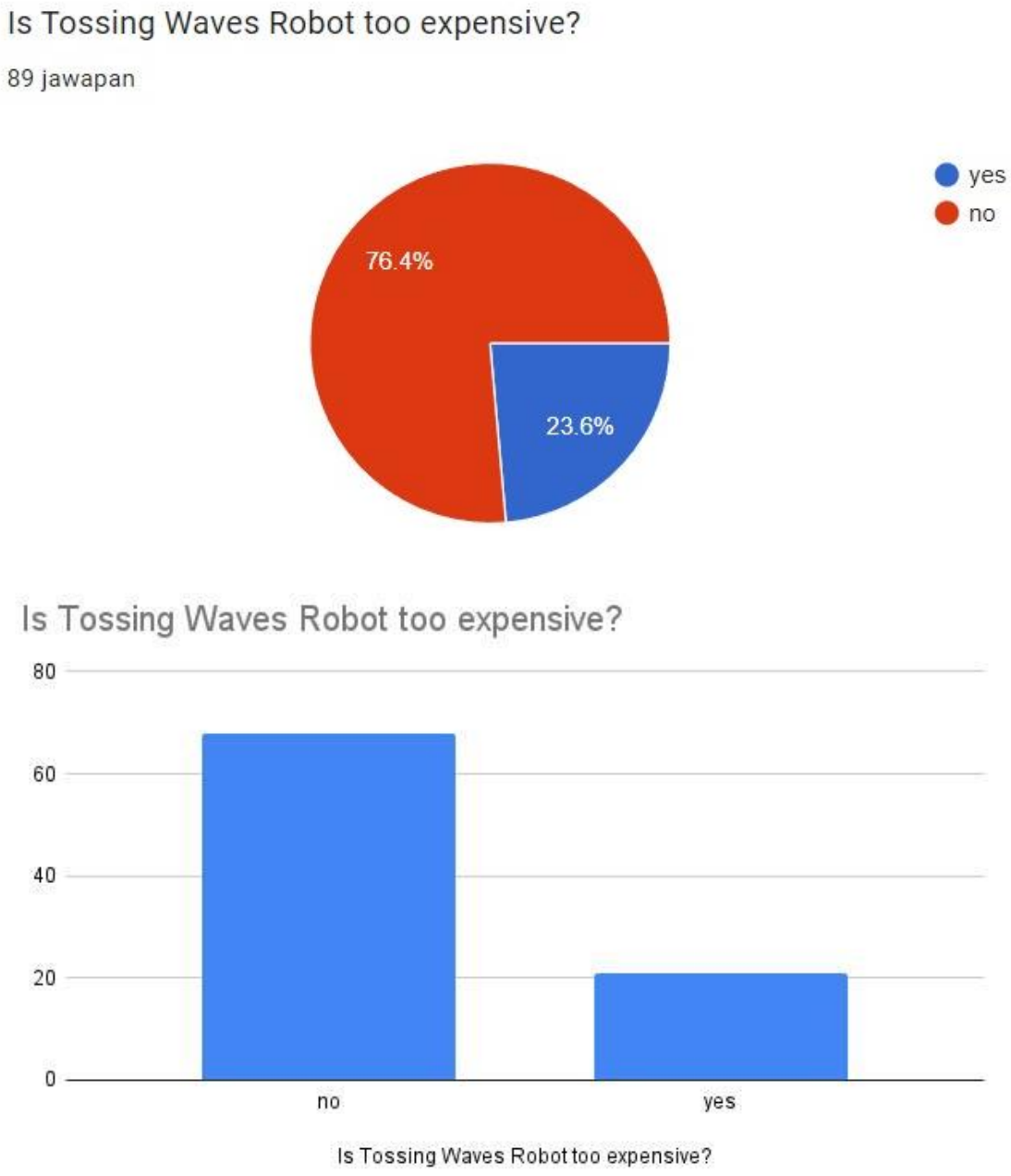


Figure 4.6 : Is Tossing Waves Robot too expensive?

Which is Tossing Waves Robot too expensive, we can see that the percentage for those who voted yes was 23.6% while the percentage for those who voted no was 76.4%. This shows that this Tossing Waves Robot is not expensive and affordable.

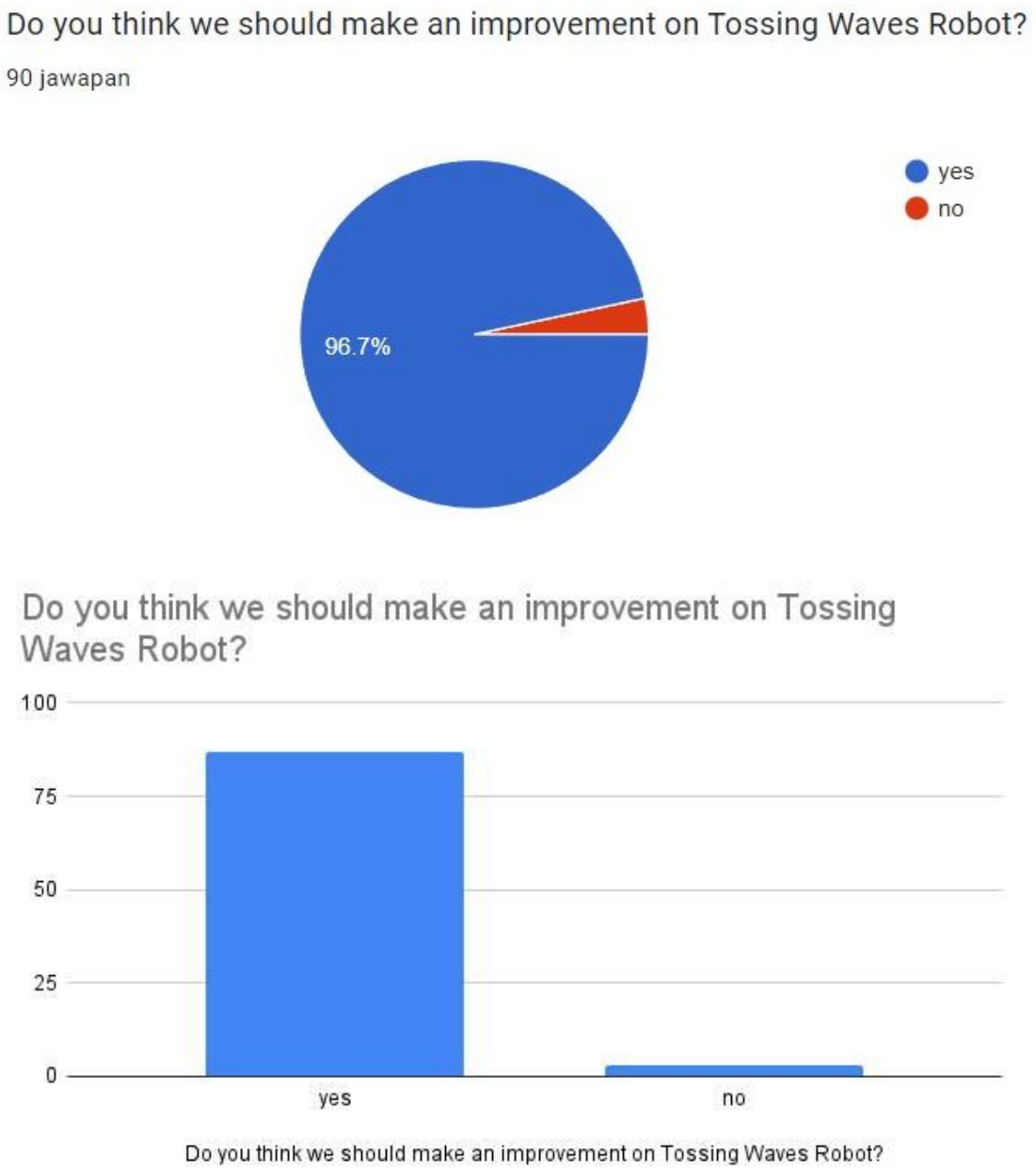


Figure 4.7 : Do you think we should make an improvement on TWR

For question 7 which is do you think we should make an improvement on tossing waves robot, we can see that the percentage for those who voted yes was 96.7% while the percentage for those who voted no was 3.3%. This shows that almost all the voters think that we should make an improvement on Tossing Waves Robot.

4.4 Findings of Analysis and Calculations

We can see that the process of analysis and calculation are essentially the same thing. The difference is that the calculation investigates a single move and the analysis question investigates several moves. And the evaluation process is at the end and at the beginning of each calculated move. The glue that links the analysis and the calculation is the evaluation, when we solve a study of finding project statement, we are more likely to analyze what we are calculating.

No.	Question	Yes	No
1.	Are robots important in our daily lives?	75.6%	24.4%
2.	Have you heard about Tossing Waves Robot?	72.2%	27.8%
3.	This Tossing Waves Robot can help in the process of throwing in an industry including toy factories and plastic factories?	50%	50%
4.	Can robots throw more accurately than humans?	65.6%	34.4%
5.	Can robots work more time than human?	80%	20%
6.	Is Tossing Waves Robot too expensive?	23.6%	76.4%
7.	Do you think we should make an improvement on Tossing Waves Robot?	96.7%	3.3%

Table 4.2 Analysis and Calculation

4.5 Discussion

We have done research on our project which is tossing wave robots. We have made data and research on this tossing wave robot to further investigate this robot. We found that this tossing wave robot has quite accurate throwing accuracy. We also found that the throwing speed of this tossing wave robot is very suitable for use in many places such as factories, industries and also used by others. The durability of this tossing wave robot has also been tested and studied carefully so that we get accurate data. We found this tossing wave robot to be very durable so it's not a problem to throw a quite heavy object or hold a quite heavy object.

4.6 Summary

This chapter reviews the results and analysis of the qualitative data, the compilation of the questionnaire and the results and analysis of the quantitative findings of the study. The findings are also discussed in the light of previous research findings and available literature, where applicable, in order to identify similarities and differences between this study and previous studies and literature. A comprehensive description of the research methodology was given in Chapter 3. The culmination of our study and represents our best thinking and how we answered the research question that had formulated and stated in chapter one of the research project.

CHAPTER 5

CONCLUSION AND SUGGESTION

5.1 Introduction

In this chapter, we will describe the achievement of goals and objectives of the study "Tossing Waves Robot" and then suggestions and recommendations from us to further improve the efficiency of this product in order to attract many consumers to buy it. Conclusion is the final part of an argument or discourse, in which the main points or results of the discussion are summarized and presented to the reader or listener. It is an overall judgment or decision that is reached after considering all available information. Recommendations, on the other hand, are specific actions or suggestions that are made to address the issues or concerns identified in the conclusion.

They are actionable steps that can help improve a situation or solve a problem. Recommendations are often based on the analysis, research or evaluation conducted in a particular study or report. So we will make a conclusion and recommendation about our project which is tossing wave robot based on the previous chapters that we have made. Conclusion and recommendations are the closing of the explanation and research about our project that is tossing wave robot. Conclusion and recommendations that contain compact and easy-to-understand content are our main focus for the convenience of readers who want to examine and understand our project named Tossing Waves Robot.

5.2 Achievement of Aims and Objective of Research

Robotics is a sub-domain of engineering and science that includes mechanical engineering, electrical engineering, computer science, and others. Robotics deals with the design, construction, operation, and use of robots and computer systems for their control, sensory feedback, and information processing. A robot is a unit that implements this interaction with the physical world based on sensors, actuators, and information processing. Industry is a key application of robots, or to be precise Industry 4.0, where industrial robots are used. A machine which is capable of performing complex series of tasks as per predefined programs is known as robot. It is possible to change the program if required in certain cases by qualified software engineers. The branch of technology which deals with design, development and manufacturing of robots is known as Robotics.

Benefits or advantages of Robotics

- Robots have more productivity compare to humans in the same time period. Robots can produce 25% to 40% more parts annually.
- Robots can perform routine and repetitive tasks easily. This will free up human resources to perform more value addition jobs. This way both robots and humans can work together for the development of an organization effectively and efficiently. The robots which work in collaboration with humans are known as robots, refer Robot for more information.
- In certain situations, robots can help in saving huge amount of labour costs.
- Business can achieve Return on Investment (ROI) quickly and in less time period due to high productivity.

5.3 Limitations of the Study

This study was conducted under strict controlled conditions, however, the limited number of subjects used in this study does not represent the entire population of polytechnic students in Malaysia. Therefore, the findings are unique to a particular polytechnic and limited in the context in which the study was conducted. It is assumed that the subjects involved in this study are intellectually mature enough to understand the concepts being taught. It should be noted that the interviewees cooperated fully during the study. In addition, the content covered in this study is limited to the basics of robotics, including :

- Experiencing time constraints because we have a relatively tight time to complete this project.
- Since the questionnaire has been condensed; certain factors cannot be studied in depth.
- Nevertheless, the questionnaire has provided relevant information to complete this robot project.
- Most of the information provided in the project report is collected from the finished robot.
- The conclusion was made after conducting a random poll that programming a robot is a costly process.

5.4 Suggestions and Recommendations

Purpose : Determine the purpose of the tossing wave robot. Knowing the purpose of the robot will help narrow down the options for functionality and features.

Size and Weight: Consider the size and weight of the objects the tossing wave robot will be tossing. The robot should be designed to handle the weight and size of the objects without compromising its efficiency.

Accuracy: The tossing wave robot should be fitted with precision speed to ensure accuracy and consistency during the tossing process.

Angle Adjustment: The ability to adjust the angle of the toss is a crucial feature for tossing wave robot. It allows the robot to aim accurately and toss the objects at different heights and distances.

Durability: The tossing wave robot should be designed to withstand the constant wear and tear of industrial use or repeated use in recreational activities.

Ease of maintenance: Build a tossing wave robot that is easy to maintain and repair in case of breakdowns.

Cost : The cost of the tossing wave robot should be factored in when making a decision. Consider your budget and compare prices before making a final decision.

5.5 Conclusion

In conclusion, we already give a suggestion about our project and we also have a main target for our project which is Tossing Waves Robot how it is must work. From all the suggestion and recommendation, we already achieve all of our target and recommendation on our project which is Tossing Waves Robot like purpose of Tossing Waves Robot, Size and Weight of our project, accuracy, durability and cost estimate for Tossing Waves Robot. Our project also successfully work and achieve our target on how this Tossing waves Robot must work likes how it shoot, how much it can shoot in one time and how long this Tossing Waves Robot can works.

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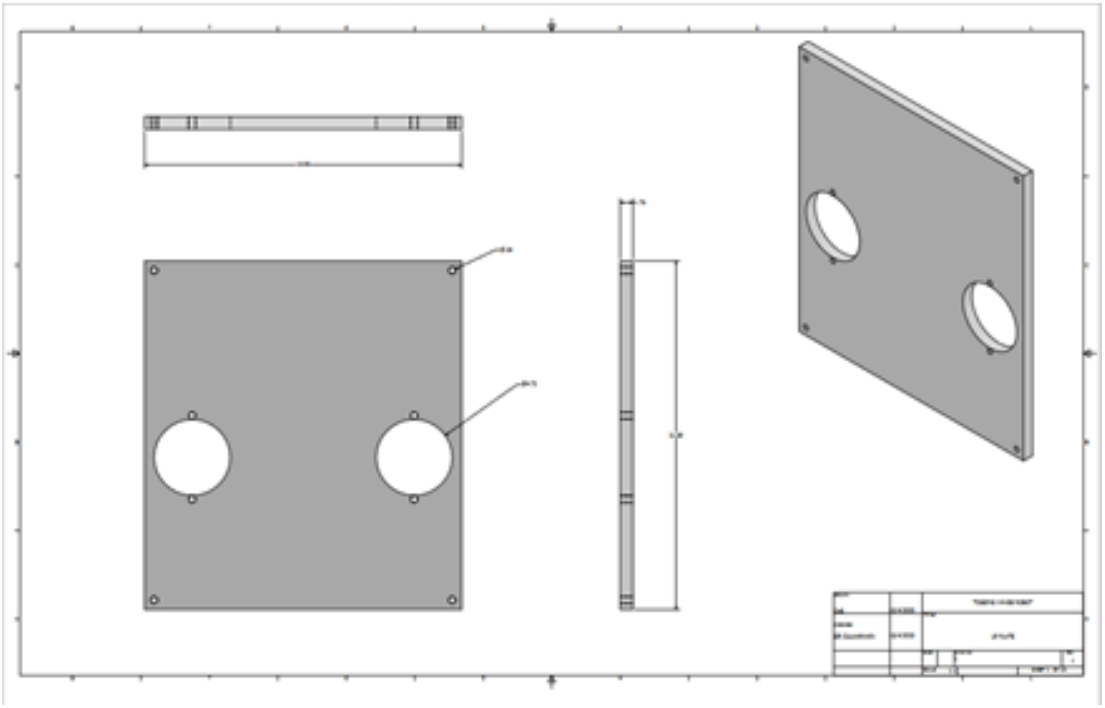
7.0 APPENDIX



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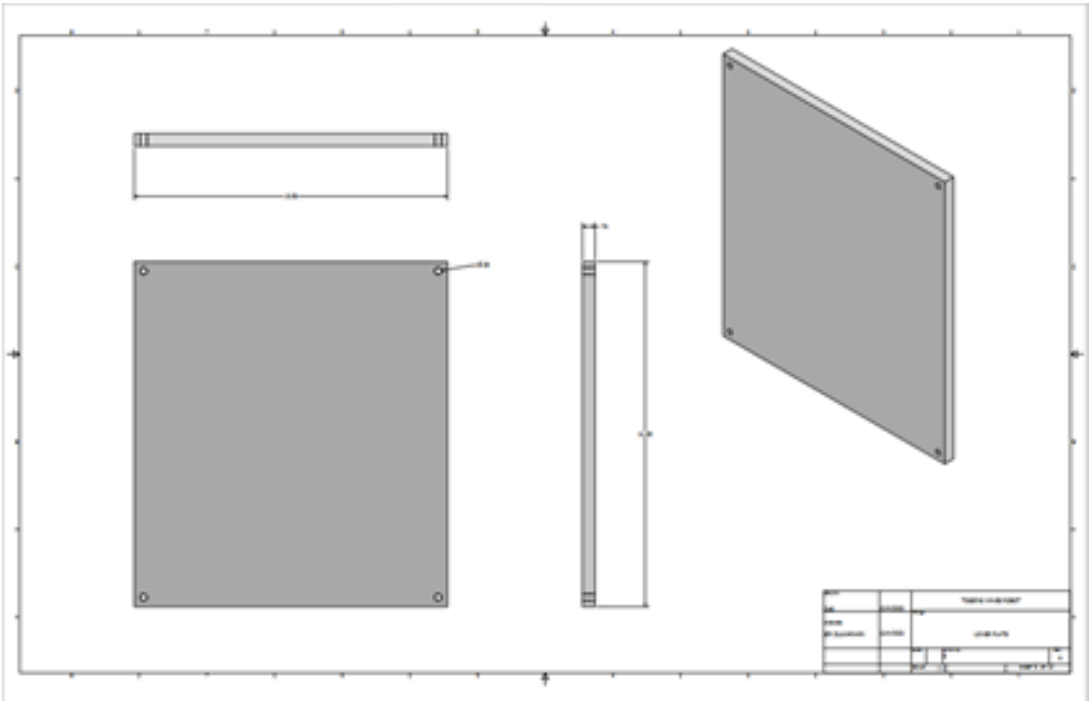

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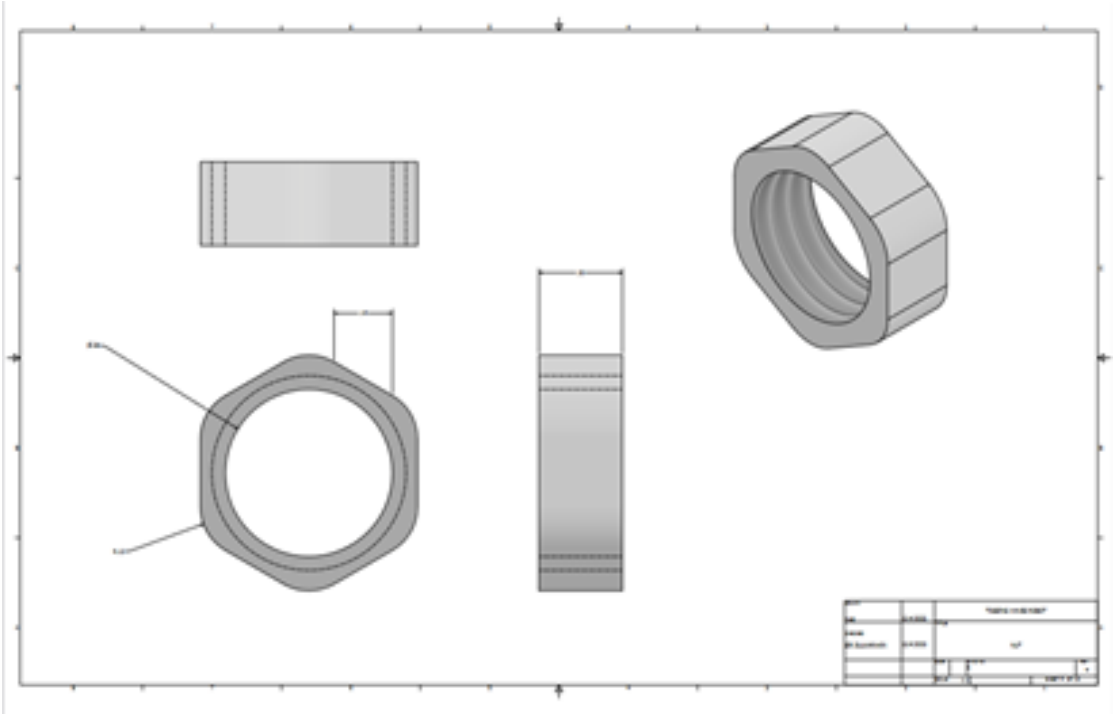

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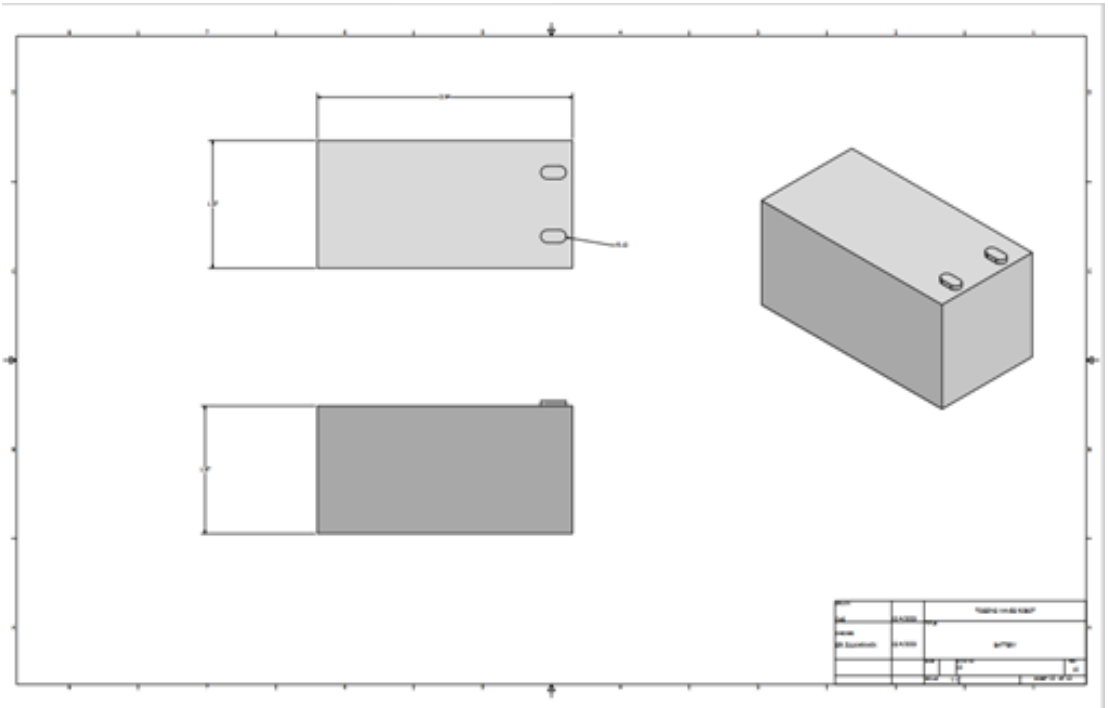

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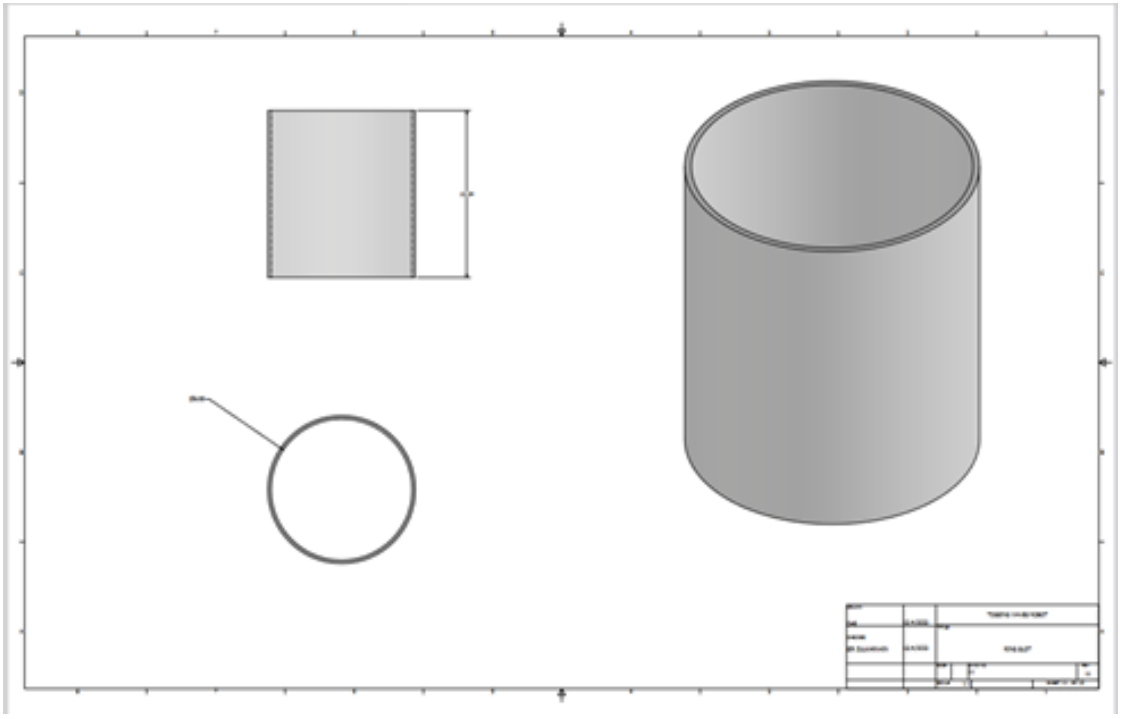
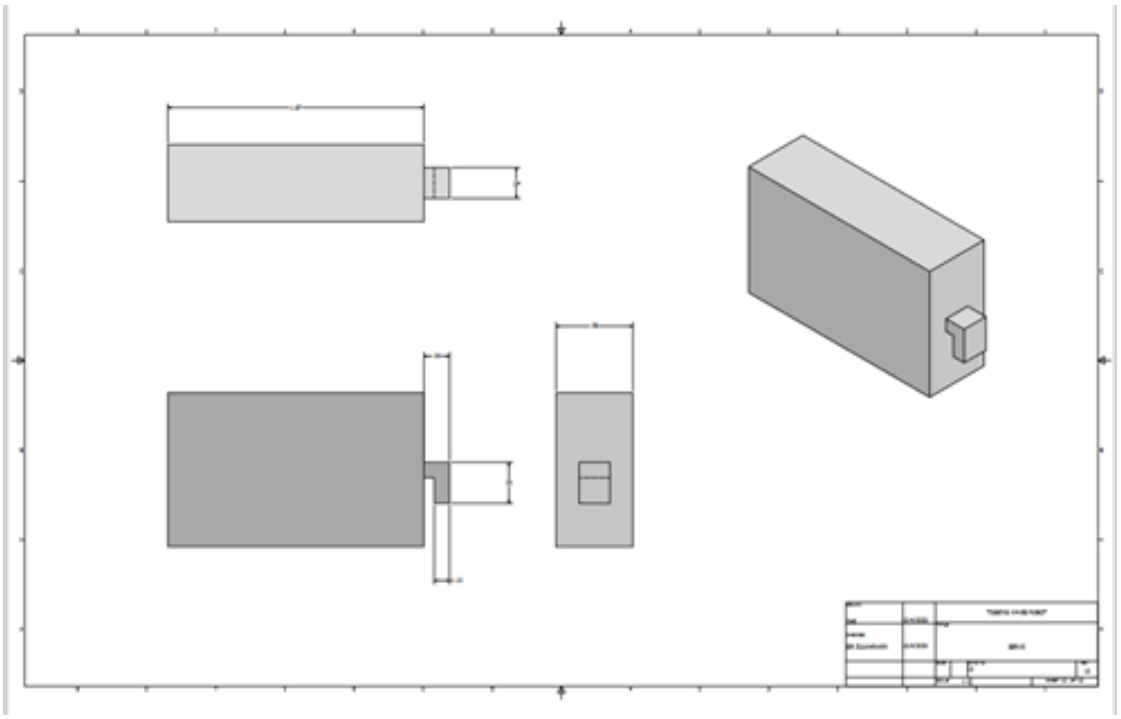
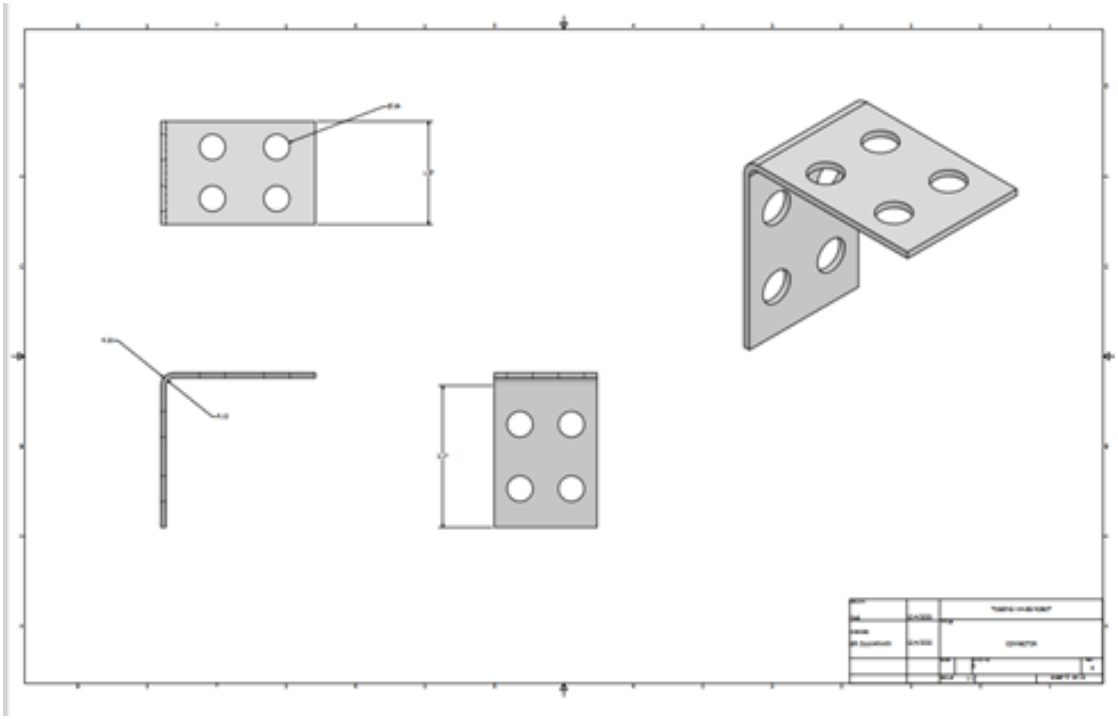


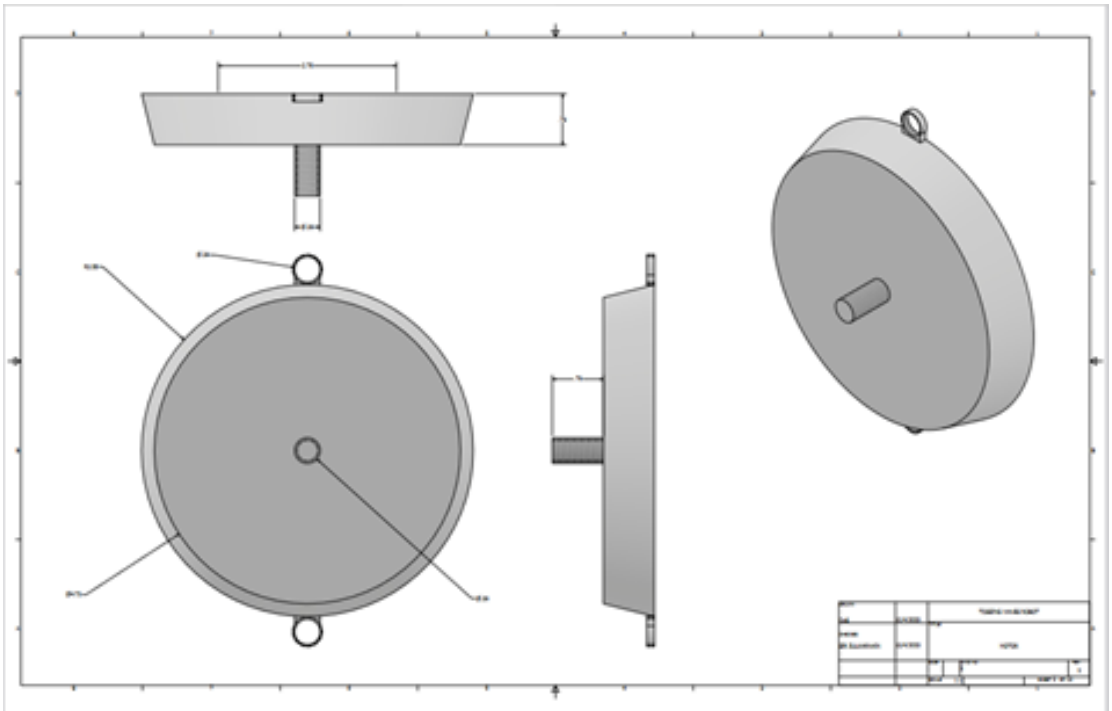
Ring loader



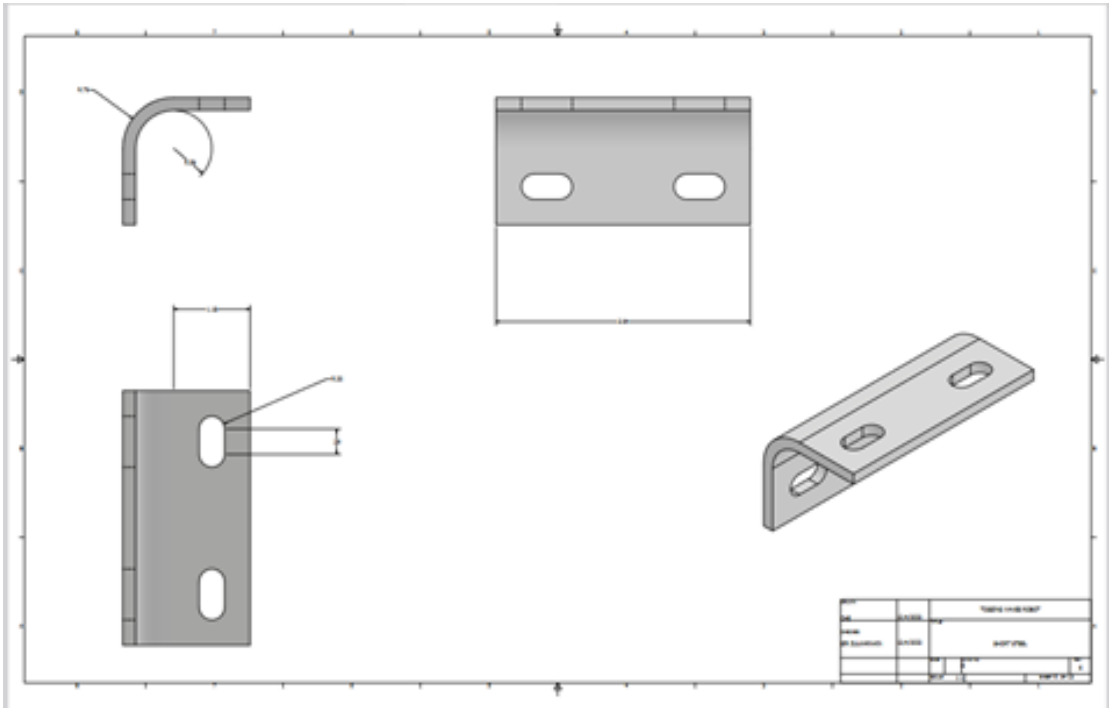
Servo Motor



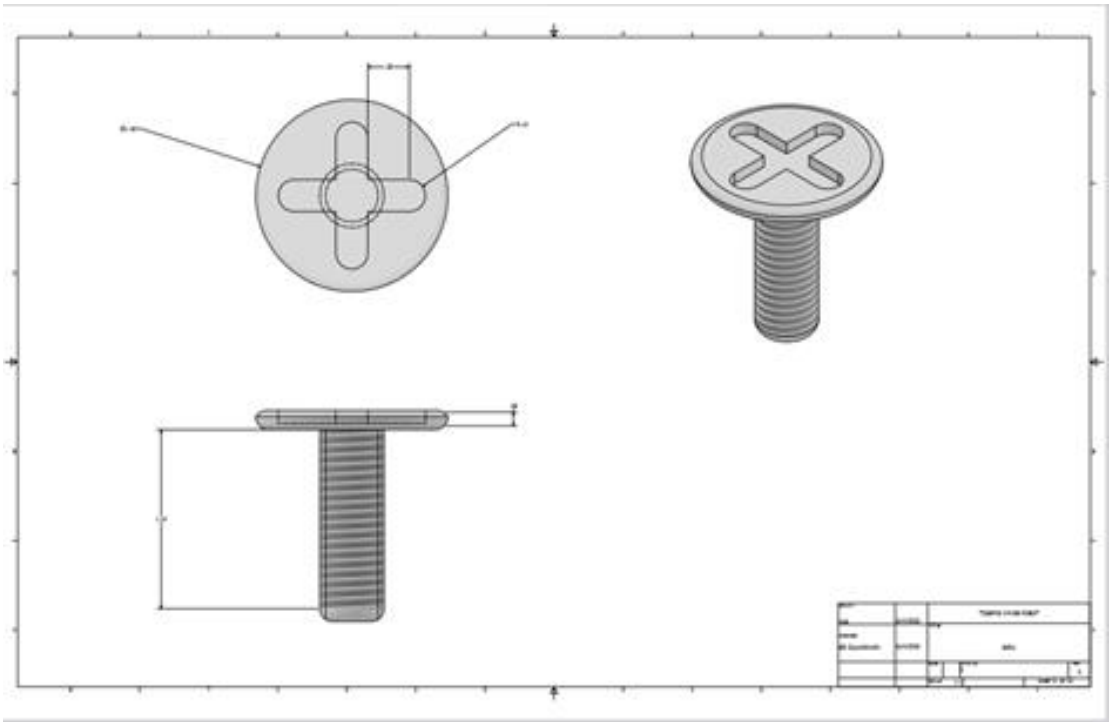
L - Connector



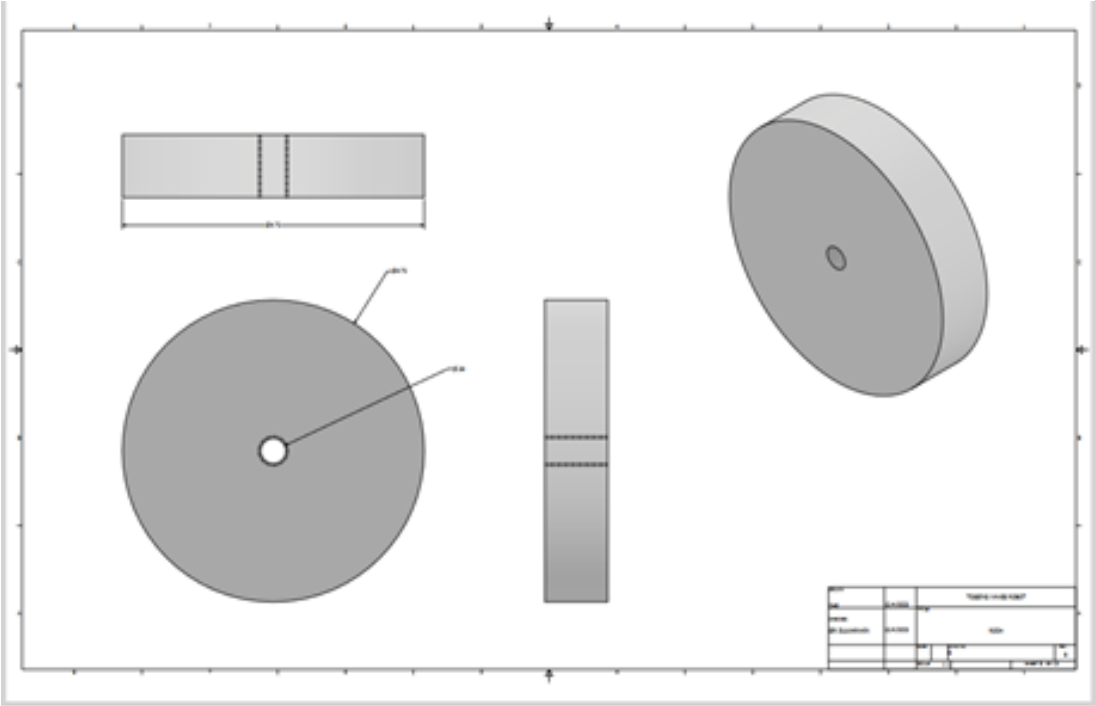
Motor



Poles



Screw



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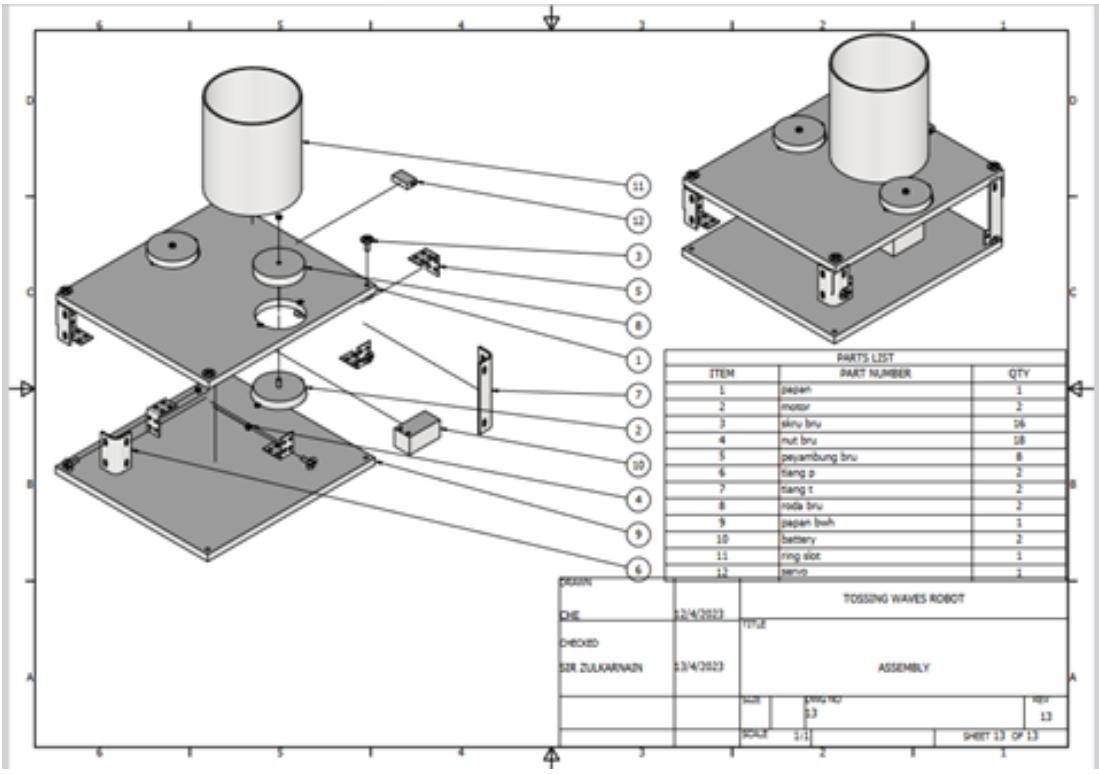

Assembly and Exploded Tossing Waves Robot

Tossing Waves Robot

by Fitriani Rahman

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Tossing Waves Robot

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