EASY FLOOR CLEANER

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MECHANICAL ENGINEERING DEPARTMENT

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STATEMENT OF AUTHENTICITY AND PROPRIETARY RIGHTS

EASY FLOOR CLEANER

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As our group supervisor	Mr AMRI

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Thank you

ABSTRACT

The Easy Floor Cleaner is a compact, automatic sweeping machine designed to simplify floor cleaning by utilizing a Motor MY6812 (12VDC 100W) to power a modified broom. This broom is engineered to rotate, allowing it to effectively gather small pieces of trash and various types of dust. The innovative design is housed within a sturdy, custom-welded iron frame, crafted from recycled materials, making it an eco-friendly and sustainable option. Built for efficiency, this device aims to automate the sweeping process, reducing the need for manual labor. Its main goal is to alleviate the physical effort typically required in floor cleaning, making it an ideal solution for environments where constant sweeping is necessary, such as workshops. By minimizing the amount of human energy needed, the Easy Floor Cleaner also reduces cleaning time and boosts productivity, providing a practical cleaning alternative for users. In a workshop setting, dust and debris often accumulate quickly, making it challenging to keep the space clean. Manual sweeping can be time-consuming and strenuous, especially over large areas. With the Easy Floor Cleaner, users can now simply push the machine over the dusty area, allowing it to collect debris efficiently. This automated solution addresses the unique demands of workshop maintenance, offering a convenient and effective way to maintain clean, dust-free floors.

Key word: Easy Floor Cleaner

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Ƒ	Frequency
m	Mass
P	Pressure
r	Radius

LIST OF ABBREVATION

DCV	Direct Current Motor
RM	Ringgit Malaysia
V	Voltage
RPM	Rotation Per Minute
DC	Directing Current
m	Metre
mm	Millimetre
cm	Centimetre
Kg	Kilogram
LBP	Lower Back Pain

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

In the bustling environment of a workshop, maintaining cleanliness can often be a difficult task. Easy Floor Cleaner, an innovative solution designed to revolutionize the way workshops are cleaned. Crafted meticulously from repurposed iron and skillfully welded into a sturdy, measured iron frame, this automatic sweeping machine is engineered to make the process of floor maintenance easier. With its advanced features including a Motor MY6812 (12VDC 100W) and a rotating modified broom, Easy Floor Cleaner effortlessly navigates through workshop debris, efficiently collecting small garbage and dust particles along the way. Easy Floor Cleaner is here to save time and energy, enabling workshop owners and employees to focus on their tasks without the added burden of cleaning chores. Whether it's sawdust, metal shavings, or general workshop debris, this innovative cleaning solution ensures a pristine workspace with minimal human intervention. Say farewell to the frustrations of traditional cleaning methods and welcome the era of effortless floor maintenance with Easy Floor Cleaner.

1.2 BACKGROUND PROJECT

A background project for Easy Floor Cleaner is a device designed to immitate a broom for cleaning a surface of workshop from debris and dirt. This project specifically design for the use of facilitators, craftsmen and student who frequently run a workshop.Easy Floor Cleaner using a pushing mechanism resemblance a trolley combine with rotating modified broom powered by Motor MY6812 (12VDC 100W) for cleaning dirt on the floor and magnetic concept to clean a metal dust. This project will make the workshop more clean and organized.

1.3 PROBLEM STATEMENT

In workshop environments, the persistent challenge of dust, metal powder, and debris accumulation poses significant hygiene and safety risks. Current cleaning tools often fall short in effectively addressing these concerns, leaving floors inadequately cleaned. To mitigate these issues, there arises a pressing need to innovate a straightforward floor cleaner. Operated by a battery-powered motor, such a device would enhance user mobility and comfort, eliminating reliance on external power sources. By providing a convenient and efficient cleaning solution, this development aims to ensure thorough cleanliness, thereby promoting a safer and more hygienic workshop environment.

1.4 PROJECT OBJECTIVES

i. To develop a machine with a mechanism that efficiently isolates and collects dust and metal particles from the workshop floor, saving time and streamlining the cleaning process.
ii. To design a product that is ergonomic and user-friendly, helping to prevent back pain, as adopting ergonomic practices can enhance overall comfort and increase productivity during prolonged use.
iii. To improve air quality in the workshop by designing the product to effectively capture and contain various dust and particles, reducing airborne contaminants for a healthier environment.

1.5 IMPACT OF THE PROJECT

The Easy Floor Cleaner not only reduces the risk of falling in the workshop by maintaining a clean floor surface but also ensures thorough cleaning. This innovative device streamlines the cleaning process, effectively saving significant amounts of time and manpower. By automating tedious cleaning tasks, individuals can allocate their resources more efficiently, focusing on other essential aspects of workshop operations.

1.6 SCOPE OF PROJECT

The primary objective is to create a user-friendly tool for cleaning floors from dust and debris in workshop environments. Its key features include both sweeping and vacuuming capabilities, allowing for the simultaneous removal of dust and dirt from the floor. The tool is designed with a simple and easily understandable construction, using readily available materials. Furthermore, it is highly portable, enabling effortless movement from one location to another within the workshop.

1.7 EXPECTED PROJECT RESULT

The expected outcome of this project is to create a floor cleaner product that is easy to use and effective in cleaning dust and dirt in workshop environments. By using a battery-powered motor, this product is expected to enhance user mobility, allowing them to clean floors more easily and quickly without relying on external power sources. Additionally, it is anticipated that this product will provide high-quality cleaning results, increasing user satisfaction and providing a cleaner and safer working environment in the workshop.

1.8 SUMMARY

The project aims to develop an efficient and user-friendly floor cleaner for workshop environments, capable of effectively removing dust and dirt. Utilizing a battery-powered motor, the cleaner aims to enhance user mobility and comfort, eliminating the need for external power sources. Key features include sweeping and vacuuming capabilities, alongside a simple and easily understandable design. The anticipated outcome is a high-quality cleaning solution that improves user satisfaction and fosters a cleaner and safer workshop environment.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The literature review delves into advancements in floor cleaning, focusing on integrating Motor MY6812 (12VDC 100W) and magnet tech. Traditionally manual, recent innovations promise better precision and efficiency. Motor MY6812 (12VDC 100W) allow precise movement, ideal for tight spaces, while magnets aid in efficient debris collection. The review discusses tech evolution, benefits, and challenges, alongside consumer and environmental factors shaping the adoption of these technologies. By identifying research gaps, this review aims to inform ongoing innovation in this field.

2.2 PREVIOUS STUDIES/JOURNAL/INVESTIGATION

In recent years, cleaning has been identified as an occupational risk because of an increased incidence of reported respiratory effects, such as asthma and asthma-like symptoms among cleaning workers. Due to the lack of systematic occupational hygiene analyses and workplace exposure data, it is not clear which cleaning-related exposures induce or aggravate asthma and other respiratory effects. Currently, there is a need for systematic evaluation of cleaning products ingredients and their exposures in the workplace. The objectives of this work were to:

i. Identify cleaning products' ingredients of concern with respect to respiratory and skin irritation and sensitization.
ii. Assess the potential for inhalation and dermal exposures to these ingredients during common cleaning tasks.

In recent years, conventional floor cleaning machines are most widely used in airports, railway stations, malls, hospitals and in many commercial places, as cleaning is one of the important parameter for the sanitation and government regulations. For maintaining such places, cleaning the floor is the major task which is necessary. There

are conventional floor cleaning machines available to perform floor cleaning operations in above said places. Generally a conventional floor cleaning machines requires electrical energy for its operation. In India, especially in summer there is power crisis, in majority of places. Hence cleaning the floor using the conventional floor cleaning machines is difficult without electricity. In this project an effort has been made to develop a manually operated floor cleaning machine so that it can be an alternative for conventional floor cleaning machines during power crisis.

2.3 SUMMARY

This review critically examines the formulations, performance attributes, and environmental ramifications of floor cleaners. Evaluating both traditional chemical-based variants and emerging eco-friendly alternatives, it assesses their efficacy in soil removal, considering factors like usability and cost-effectiveness. Additionally, it addresses the environmental footprint of these cleaners, highlighting their role in indoor air pollution and water contamination. The review advocates for sustainable practices in floor cleaner development and usage, emphasizing the importance of biodegradable ingredients and reduced packaging waste to mitigate environmental harm.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

The Easy Floor Cleaner project aims to revolutionize floor cleaning with a modern, efficient solution. By leveraging existing technology, it reduces workload, energy consumption, and cleaning time. Designed with user convenience in mind, it prioritizes simplicity, functionality, and sustainability, setting new standards for cleanliness and efficiency.

The principal approach adopted in the construction of the portable floor sweeper involves the utilization of joining or welding techniques to amalgamate preexisting metal components into the framework of the product. This method is selected not only for its simplicity in execution but also for its capacity to yield robust and long-lasting structures. By employing this technique, the project ensures a sturdy and resilient design that withstands the rigors of everyday use, thus enhancing the overall durability and reliability of the floor sweeper. Additionally, the use of joining or welding methods facilitates efficient manufacturing processes, contributing to cost-effectiveness and scalability in production. Moreover, this method allows for customization and adaptation to meet specific design requirements, ensuring versatility and adaptability in catering to diverse user needs and preferences. Ultimately, the adoption of joining or welding techniques underscores the project's commitment to engineering a high-quality and user-friendly solution for floor cleaning tasks.

3.1.1 Flowchart Process Of The Project

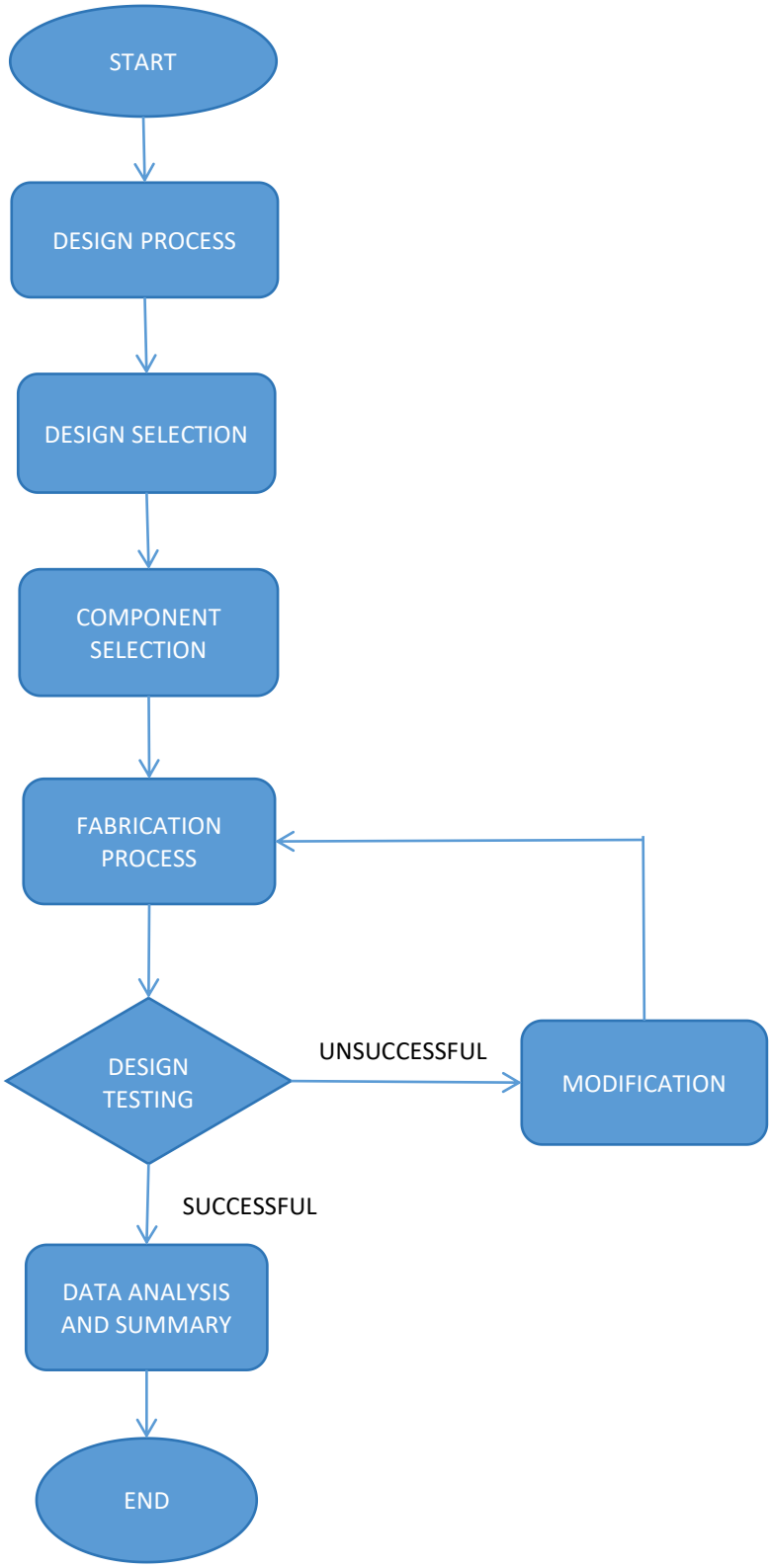


Figure 3.1: shows flowchart process of the project

3.2 PROJECT DESIGN

Our Easy Floor Cleaner project focuses on creating a mobile application to simplify and improve task management. By using an agile development approach, user-centered design, and the React Native framework, we will develop and refine the app through research, prototypes, and user feedback. This ensures the mobile application meets user needs and enhances productivity effectively.

3.2.1 Project Sketch

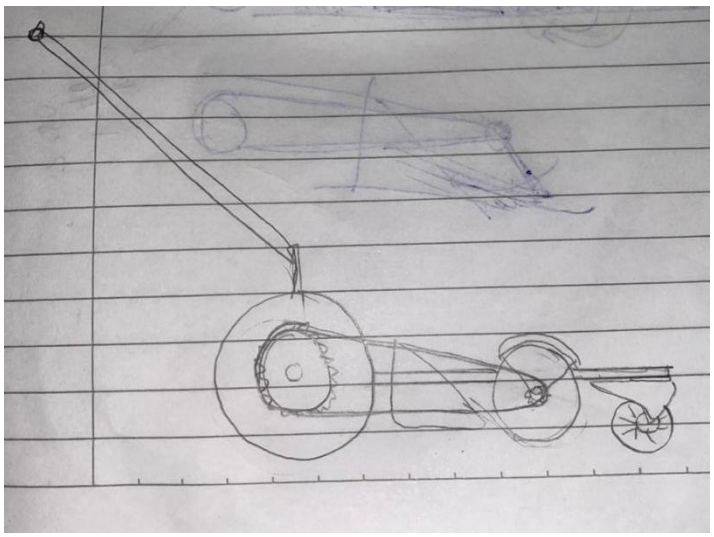


Figure 3.2: **FIRST SKETCH**

ADVANTAGES	DISADVANTAGES
Lightweight	Too big

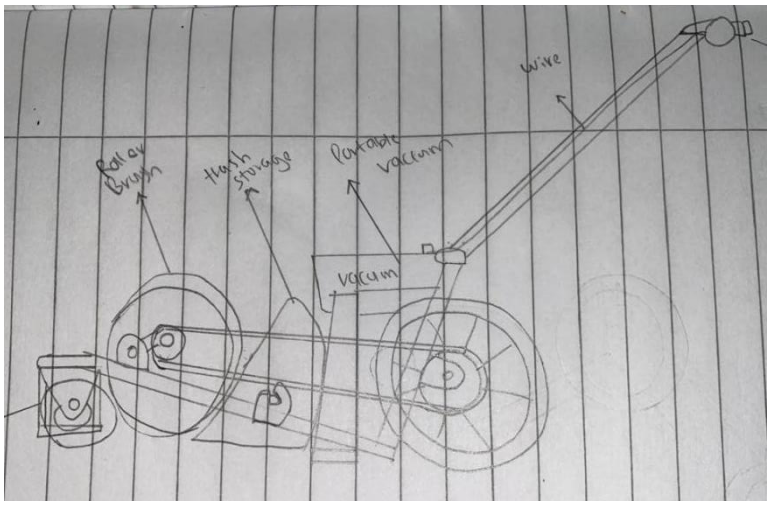


Figure 3.3: **SECOND SKETCH**

ADVANTAGES	DISADVANTAGES
Adding mechanical element	Too complex

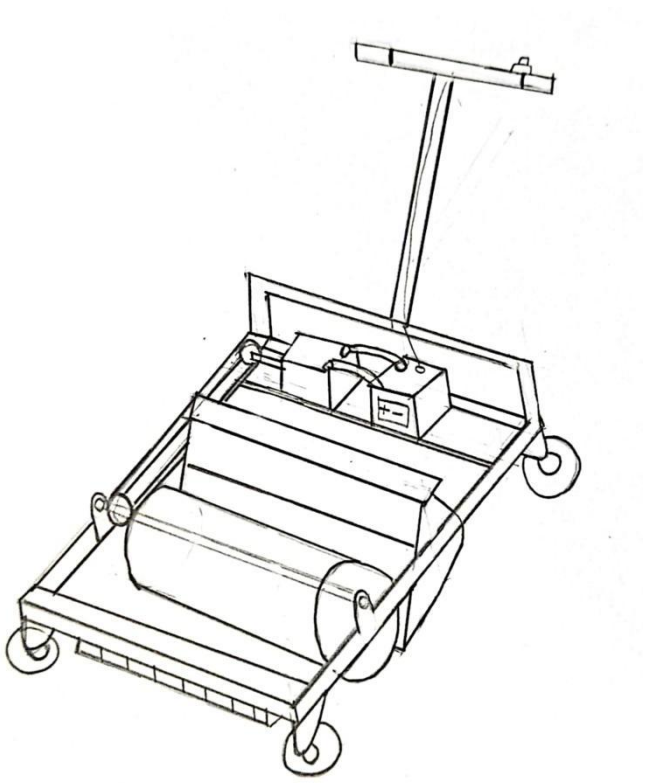


Figure 3.4: **THIRD SKETCH**

ADVANTAGES	**DISADVANTAGES**
Multi cleaning	Cant clean big rubbish
Easy to control	Limited places to be use

3.3 INVENTOR DESIGN

Figure 3.5: First Inventor Design

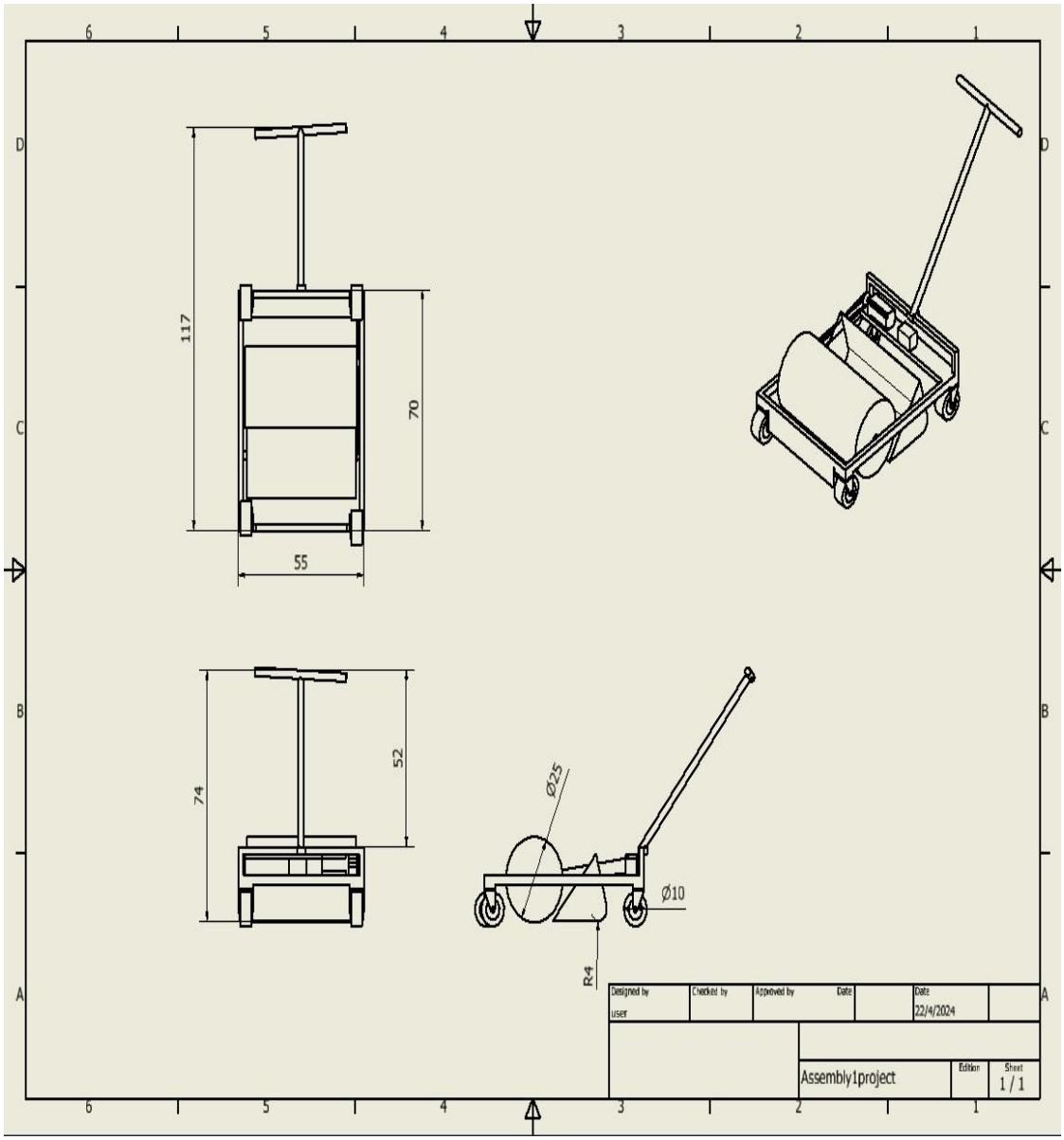


Figure 3.6: First inventor design drawing

3.3.1 Wiring / circuit schematic

12V Lead-Acid Battery: This battery was selected as the primary power source for its reliability and long cycle life. It provides a steady 12V output that is well-suited for prolonged operation, capable of delivering the necessary current without rapid depletion.

Switch: A simple toggle switch is integrated between the battery and the motor, allowing for straightforward on/off control. The switch enables users to control the motor power safely and conveniently, providing immediate cutoff when the device is not in use.

Motor (MY6812): The motor is a 12V DC, 100W model (MY6812) chosen for its high torque and power efficiency. It directly drives the brush rotation mechanism, with the series circuit providing a stable current supply. This motor is connected in a way that ensures consistent operation under load conditions typical of floor cleaning tasks.

The components are connected in a series configuration: the positive terminal of the battery leads to the switch, which then connects to the positive terminal of the motor. The motor's negative terminal is linked back to the negative terminal of the battery, completing the circuit. This simple series arrangement minimizes complexity, keeps wiring manageable, and reduces potential points of failure, aligning with the Easy Floor Cleaner's design objectives for durability and ease of maintenance.

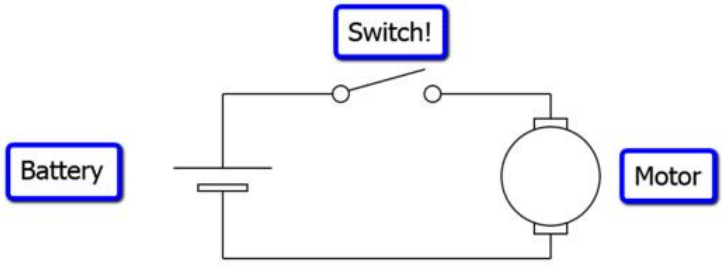


Figure 3.7: Diagram of our circuit

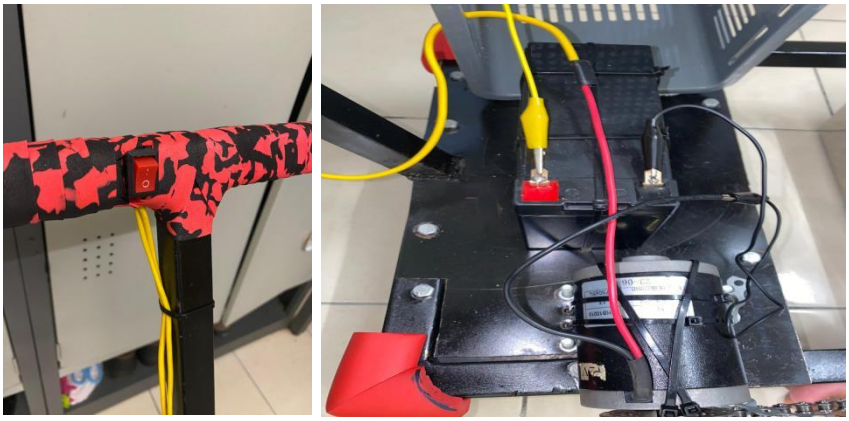


Figure 3.8: Shows our electrical circuit

3.4 MATERIALS AND EQUIPMENT

In selecting items for this project, priority is given to high-quality and eco-friendly materials. The chosen components should exhibit excellent durability and be easily integrated into the production process. The materials are :

3.4.1 Materials

1. Mild steel (pipe,plate,sheet,hollow)

Mild steel is a type of carbon steel that contains a low level of carbon. Otherwise known as low carbon steel, mild steel contains roughly between 0.05% and 0.25% of carbon by weight. This is opposed to high carbon steel, which can be composed of up to 2.5% carbon by weight.

2. Bolt and Nut

Bolt and nut are used to fasten and secure components together in mechanical construction and assembly.We use size 10mm bolt,nut and washer.

3. Motor DC 12V 100W 2750RPM

Easy Floor Cleaner is equipped with a powerful 12V DC motor (100W, 3500 RPM) designed for efficient cleaning in workshop settings. This motor provides robust suction and cleaning power, ideal for quickly removing dust, grease, and debris, ensuring floors stay spotless and safe. Lightweight and easy to maneuver, it's good for workshops with high foot traffic and industrial activity.

4. Wholesale trolley wheel

Wholesale trolley wheels serve to enable smooth movement and transportation of goods or materials on trolleys or carts, enhancing efficiency in logistics operations across various settings.

5. Steel shaft

Steel shaft 500mm.The function of steel shaft is to hold brush in position and to put it in the bearing to rotate.

6. Pillow Block Bearing (8mm)

Pillow block baering size 8mm used to hold the steel shaft that is tied together with the broom to launch the rotation of the shaft movement.

7. Battery 12v 100w

Battery used for the power supply to activate the movement of the motor for turning the motor to the shaft.

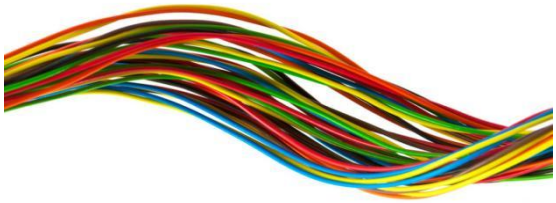
8. Magnetic bar

Magnetic bar for our magnetic system.Placed in front of our Easy Floor Cleaner.The magnet is quite strong ensuring no metal debris get away when operating.

9. Aluminium Garbage Shovel

Aluminium garbage shovel ensuring our garbage shovel full in durability and not easiliy broke.It is suitable for our Easy Floor Cleaner.

10. Wire



Wire is used to connect or flow electricity from the battery to the motor and switch for Easy Floor Cleaner.

11. Chain

The chain works to rotate the movement of the sprocket powered from the motor.

12. Sprocket

Sprocket's function is to transmit power from one rotating shaft to another, or to impart linear motion to a track or tape.This help our shaft rotating smoothly.

13. Broom head

Broom head function is to clean and remove dirt and debris from surfaces on the floor.

14. Container plastic

Container plastic helps to increase our project safety with cover the dust and debris from flying.

15. Stackable basket

This stackable basket helps our Easy Floor Cleaner to cover our battery and motor to prevent from electricity shock and safety.

16. Cable ties

Cable ties, also known as zip ties, are used to bundle and secure cables and wires to keep them organized and prevent damage.

17. Corner guard

Corner guard used to cover all the sharp corner of our project frame to avoid injury.

18. Steel plate

Steel plate's function helps to align tire surfaces and be a magnet holder for a magnetic bar.

19. Handlebar tape

This handlebar tape cover our Easy Floor Cleaner handle to prevent from injury and make it more comfortable.

20. Chain guard

Chain guard protects the chain from dirt, mud, water, and the spinning. It also helps the chain to avoid slipping and breaking.

3.4.2 Equipment

1. Grinding machine

The function of a grinding machine is to remove material from a workpiece through abrasion, typically using a rotating wheel with abrasive particles. This process helps to achieve a desired surface finish or shape on the workpiece. Grinding machines are commonly used in manufacturing and metalworking industries for tasks such as sharpening tools, shaping metal parts, and achieving precision dimensions on workpieces.

2. Drill machine

The function of a drill machine is to create holes in various materials by rotating a drill bit against the material's surface. This process, known as drilling, involves applying downward pressure while the drill bit spins, removing material and forming a hole. Drill machines are essential tools used in woodworking, metalworking, construction, and various other industries for tasks such as fastening, assembling, and creating openings for screws, bolts, and other fixtures.

3. TIG machine welding

A TIG (Tungsten Inert Gas) welding machine functions by producing an electric arc between a tungsten electrode and the workpiece. The arc generates intense heat, melting the base metals and a filler material (if used), creating a strong and precise weld joint. TIG welding is known for its versatility and ability to produce high-quality welds in various materials, including stainless steel, aluminum, and copper alloys. It is commonly used in industries such as aerospace, automotive, and manufacturing for applications requiring superior weld quality and aesthetic appearance.

4. MIG machine welding

The function of a MIG (Metal Inert Gas) welding machine is to create welds by feeding a consumable wire electrode through a welding gun, where it melts and fuses with the base metal. Simultaneously, an inert gas, typically argon or a mixture of gases, is emitted from the welding gun to shield the molten weld pool from atmospheric contamination. This process produces strong and efficient welds suitable for a wide range of materials, including steel, aluminum, and stainless steel. MIG welding is commonly used in industries such as automotive, construction, and fabrication due to its versatility, speed, and ease of use.

3.5 FABRICATION PROCESS

The fabrication process for the Easy Floor Cleaner machine was carried out at the Project Workshop, Department of Mechanical Engineering, Politeknik Banting Selangor. To ensure a smooth process, each group member was assigned specific tasks. This chapter will provide a detailed description of the task assignments and the fabrication steps that were implemented.

3.5.1 Measurement, Marking and Cutting process

The very first step in starting the project was marking and measuring. The Easy Floor Cleaner began with a recycled steel body. We measured the project body to have a length of 1000mm, a width of 400mm, and a height of 750mm, including the handle.The body also marked for the hole to be drill at certain part.We then marked the body of the Easy Floor Cleaner accordingly and cut out unnecessary parts.Next, we marked four steel plates, each measuring 105mm in length and 80mm in width, for the trolley wheels. These plates were also marked for holes to be drilled. Additionally, we marked another steel plate, measuring 400mm in width and 200mm in length, for the base of the motor and battery, which also needed holes drilled. After marking, we proceeded to cut all the plates and drill the necessary holes.

Figure 3.9: Shows the marking and cutting process

3.5.2 Connecting and Building Process

In connection and building process,we started by connecting the handle into the body of Easy Floor Cleaner using TIG Welding machine.The process of welding the handle is proceeding smoothly.We also MIG Welding the freewheel on motor then MIG Welding the freewheel on shaft.After that,the building process started by connecting the steel plate for the wheel then connect it to the body using bolt and nut.After that,we connect the steel plate for the base of motor and battery using bolt and nut.Then we started wiring of battery to switch to motor,as the switch is been placed at the handle.We then make the connector for the DIY aluminium garbage shovel,then connect it together with DIY garbage shovel using bolt and nut.Next for the middle part,We connect pillow block bearing at its places where we have already mark and drill it,then enter the shaft that has been connected by freewheel into hole of pillow block bearing.This is where we install the brush from broom into the shaft to make it into roller brush.After the roller brush were successfully install,we then install chain guard and chain.The chain is connected from freewheel of the motor to the freewheel connected to the shaft .We then goes to the front where we install holder for the magnetic bar thus installing the magnetic bar to its places.

Figure 3.10: Shows the welding process

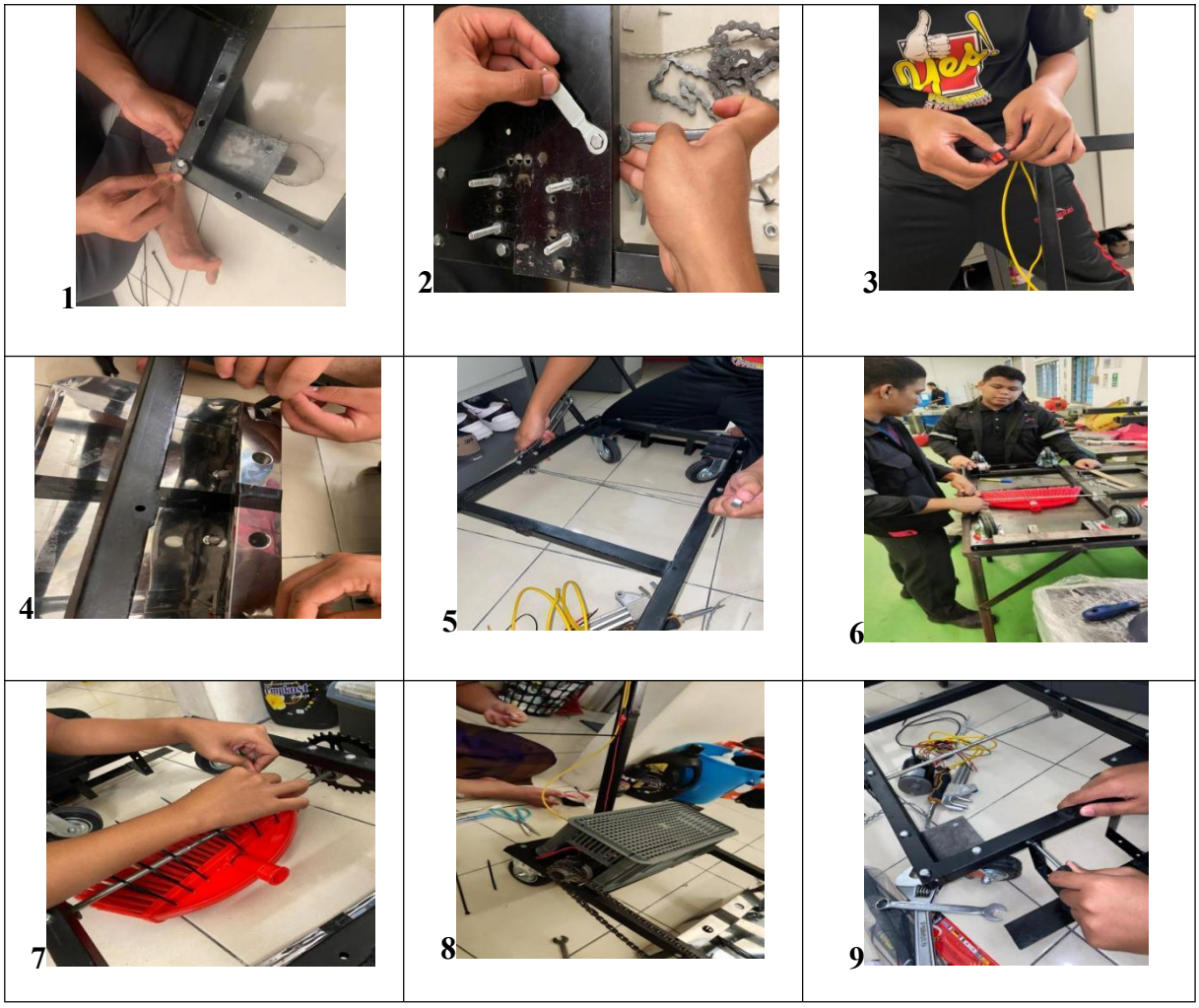


Figure 3.11: Shows building process from left to right in order

3.5.3 Grinding Process

The grinding process used in our project, Easy Floor Cleaner, involves grinding the welding areas, particularly on the handle. It is also applied to some parts of the body. The purpose of the grinding process is to ensure that the project does not have any sharp surfaces or edges.

Figure 3.12: Shows grinding process

3.5.4 Completion Process

The completion process usually is for the project to look good and well pleasent looking. We use Black paint spray for completion of the body,the finished body looking good in black. Handle cover for Easy Floor Cleaner by using handle bar tape. Corner guard in each corner to prevent sharp edges. Stackable basket to cover the motor,battery and wiring. Container plastic to cover the rotating brush because when it been used its dangerous for people.

Figure 3.13: Shows the completion process

3.6 OPERATION TESTING

The process begins by turning on the device by turning the switch to the ON position. If the motor does not start to move, the wiring should be checked for any problems. Once the motor is successfully turned on, it turns the front sprocket, which then drives the sweeper to rotate. The rotating broom facilitates the collection of dust and debris into the attached garbage shovel. If the shovel becomes full, it must be unplugged, and the accumulated dust must be removed into the trash. Meanwhile, magnetic bars are used to attract iron dust. If the magnet bar becomes full, it should be unplugged, and the accumulated iron dust should be removed. The process can then be repeated as needed, ensuring efficient system operation.

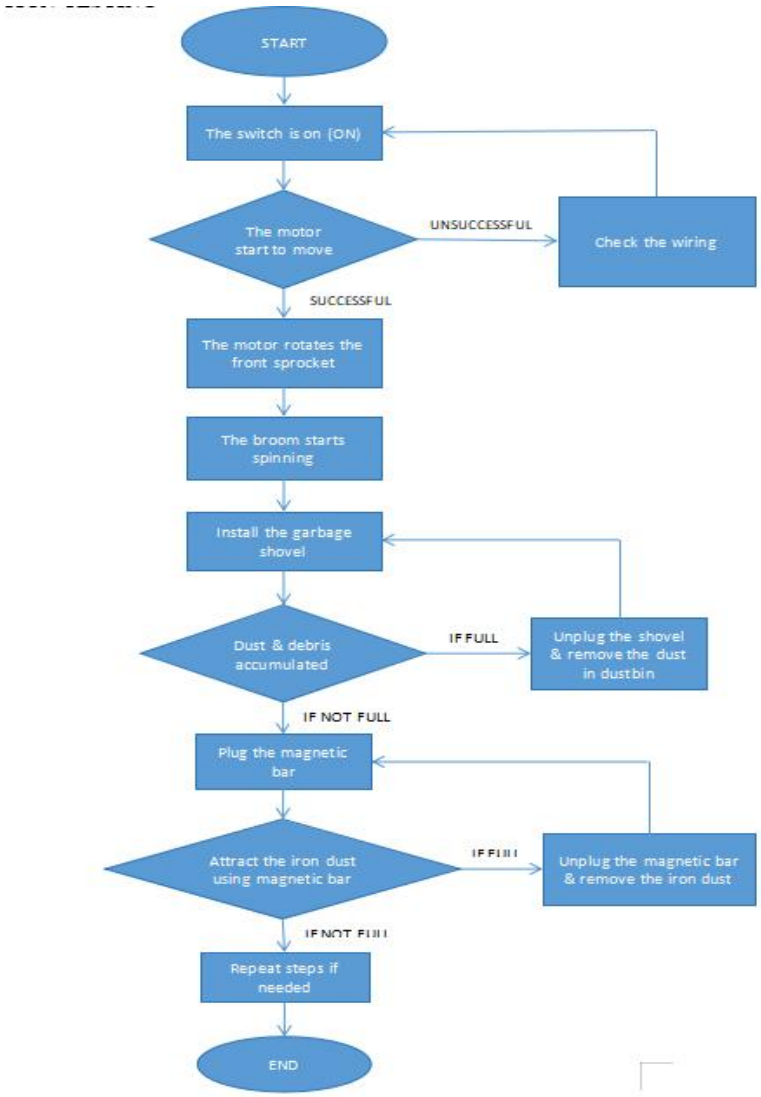


Figure 3.14: Shows flowchart above shows the steps and procedures of how to operate Easy Floor Cleaner

3.7 GANTT CHART

Figure 3.15: Gantt Chart for Project 1

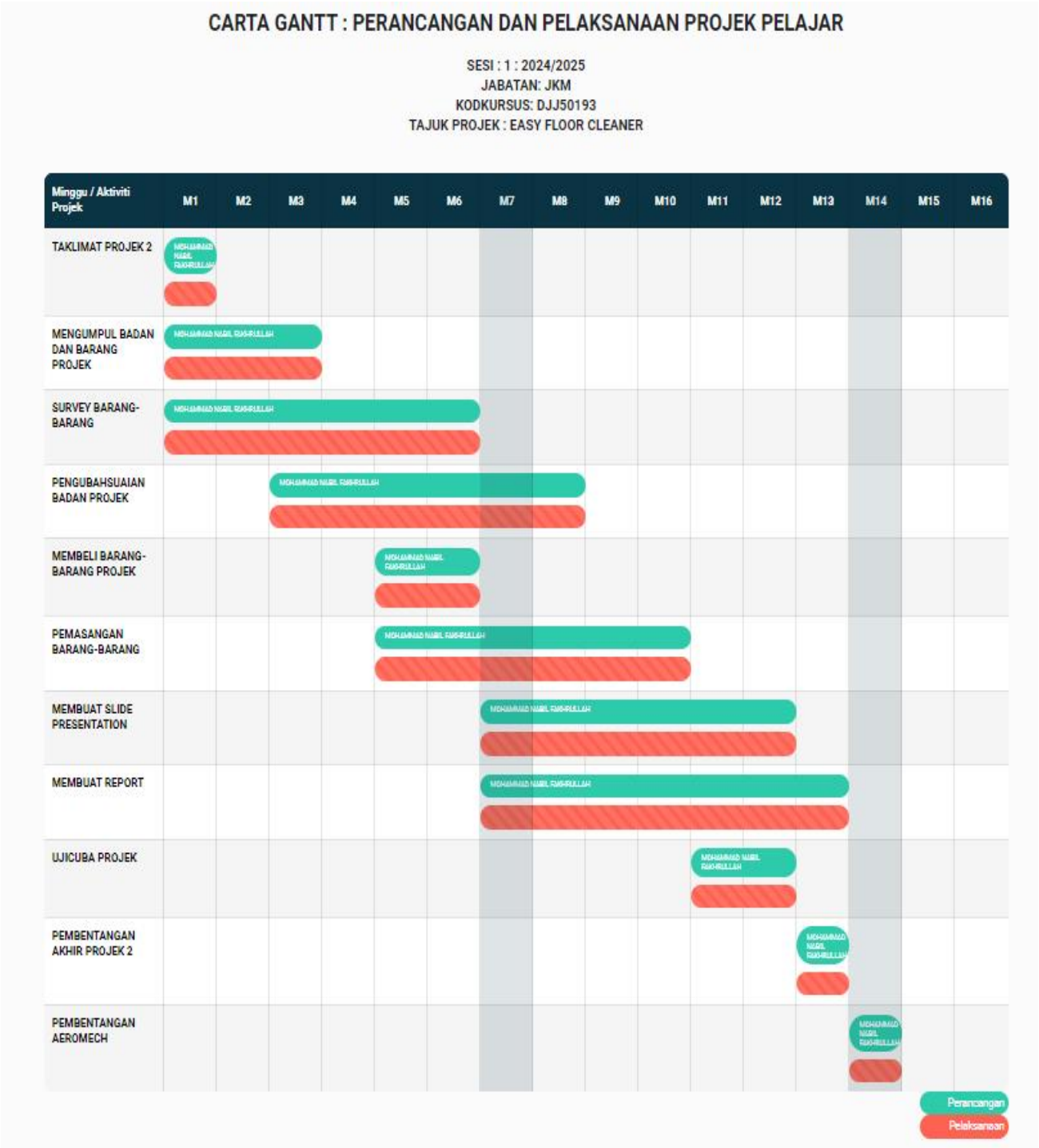


Figure 3.16: Gantt Chart for Project 2

3.8 METHOD DATA ANALYSIS

Our project focuses on developing an Easy Floor Cleaner equipped with a Motor MY6812 (12VDC 100W) and modified broom mechanism. The Motor MY6812 (12VDC 100W) will serve as the driving force, providing precise control over the movement of the cleaner. Coupled with a rotating modified broom, the cleaner will efficiently sweep and clean various floor surfaces with minimal effort required from the user. This innovative design aims to streamline the floor cleaning process, reducing the time and energy typically spent on manual cleaning tasks. Additionally, by incorporating advanced technology, such as the Motor MY6812 (12VDC 100W), our project seeks to enhance the overall effectiveness and user experience of floor cleaning appliances.

3.9 SUMMARY

Our project methodology involves comprehensive research, meticulous design, prototyping, testing, manufacturing, and continuous improvement. We aimed to develop an Easy Floor Cleaner equipped with a Motor MY6812 (12VDC 100W) and rotating modified broom. Our process emphasized collaboration, attention to detail, and iterative refinement to ensure the creation of a reliable and efficient floor cleaning solution that meets user needs and expectations. After all the data has been created, we hope our project will run smoothly.

CHAPTER 4

DATA & DISCUSSION

4.1 INTRODUCTION

This chapter presents the data collected and the analysis conducted for our project, the Easy Floor Cleaner. The data was obtained through surveys carried out at various locations, allowing us to gather valuable feedback and insights from potential users. In addition to the field survey, we also supplemented our findings with online research, which provided broader context and additional perspectives on cleaning efficiency, user preferences, and potential areas for improvement. Together, these sources of data have allowed us to conduct a comprehensive analysis, ensuring that our design aligns with user needs and industry standards. The following sections provide a detailed breakdown of the data gathered and the insights derived from our analysis.

4.2 PROJECT FINDINGS

Based on the survey THE EFFECTIVENESS OF EASY FLOOR CLEANER USAGE AT WORKHSOP IN POLITEKNIK BANTING SELANGOR conducted at Politeknik Banting Selangor.Various chat below shows our finding of effectiveness Easy Floor Cleaner in workshop.

4.2.1 Survey Finding

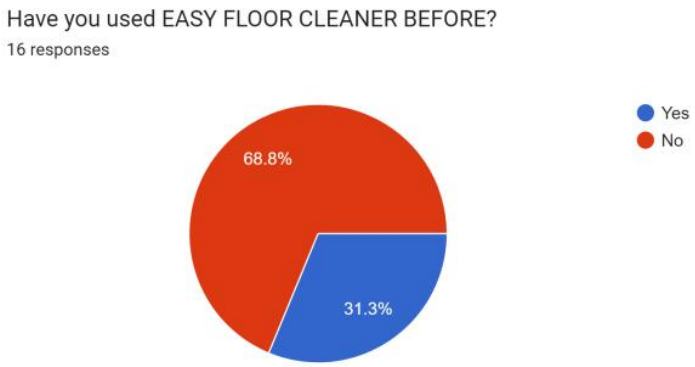


Figure 4.1: Shows Pie Chart of the survey Question 1

The pie chart above indicates that citizens of Politeknik Banting have never used or heard of our project. This highlights the need for advanced cleaning solutions, like the Easy Floor Cleaner, which offers enhanced cleaning capabilities.

Figure 4.2: Shows Pie Chart of the survey Question 2

Another pie chart shows that, out of 16 respondents from our survey, 56.3% clean the workshop daily. This suggests that an automated cleaning product like the Easy Floor Cleaner could simplify the daily cleaning routine in the workshop, making the process more efficient and manageable.

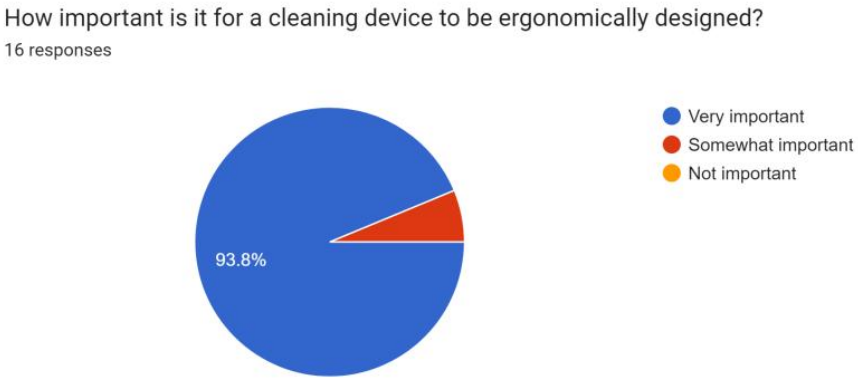


Figure 4.3: Shows Pie Chart of the survey Question 3

The following chart illustrates the demand for ergonomically designed cleaning tools. Ergonomic design has become essential in product development, as it enhances user comfort and efficiency. The Easy Floor Cleaner addresses this need by providing an ergonomic design that helps solve common cleaning challenges faced by Politeknik Banting citizens.

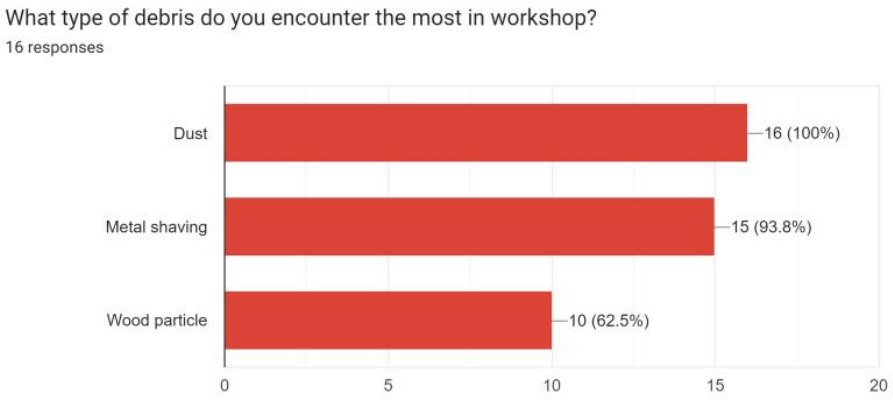


Figure 3.4: Shows Graf Bar of the survey of Question 4

Additionally, the chart above identifies the types of debris commonly found in the Politeknik Banting workshop. This underscores the need for the Easy Floor Cleaner, which is specifically designed to handle metal dust and debris, meeting the workshop's cleaning requirements effectively.

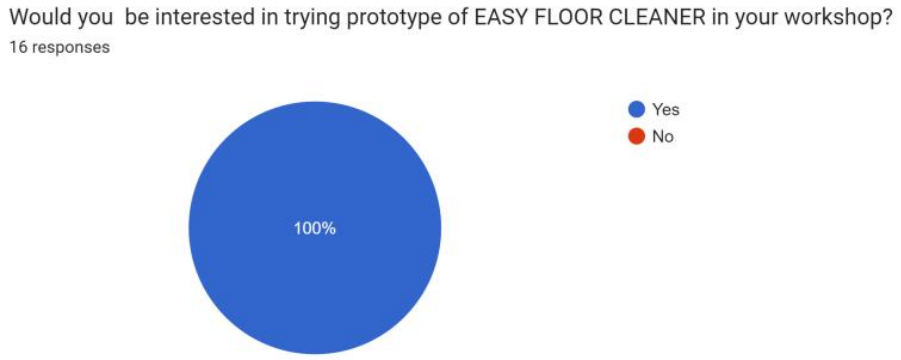


Figure 4.5: Shows Pie Chart of the survey Question 5

Finally, the percentage of respondents expressing interest in having the Easy Floor Cleaner at Politeknik Banting reached 100%. This strong demand validates the project and demonstrates that there is a clear need for innovation in cleaning solutions at the institution.

4.2.2 Survey Conclusion

In conclusion, the data and analysis gathered throughout the development of the Easy Floor Cleaner project reveal a significant need for an advanced, ergonomic cleaning solution within Politeknik Banting. The lack of awareness and availability of such products, coupled with the high frequency of daily workshop cleaning, supports the introduction of the Easy Floor Cleaner as a valuable tool to improve cleaning efficiency. The ergonomic design of our product not only meets user comfort requirements but also addresses the specific challenges of collecting metal dust and debris prevalent in the workshop environment.

The overwhelmingly positive response, with 100% of survey respondents expressing interest in using the Easy Floor Cleaner, further justifies its development and potential impact. This project not only addresses current cleaning needs but also sets a precedent for the implementation of innovative, user-friendly cleaning tools in institutional and industrial settings. Through this project, we hope to contribute a practical solution that enhances cleanliness, reduces manual effort, and aligns with modern ergonomic standards.

4.3 MATHEMATICAL CALCULATIONS IN PRODUCT DESIGN

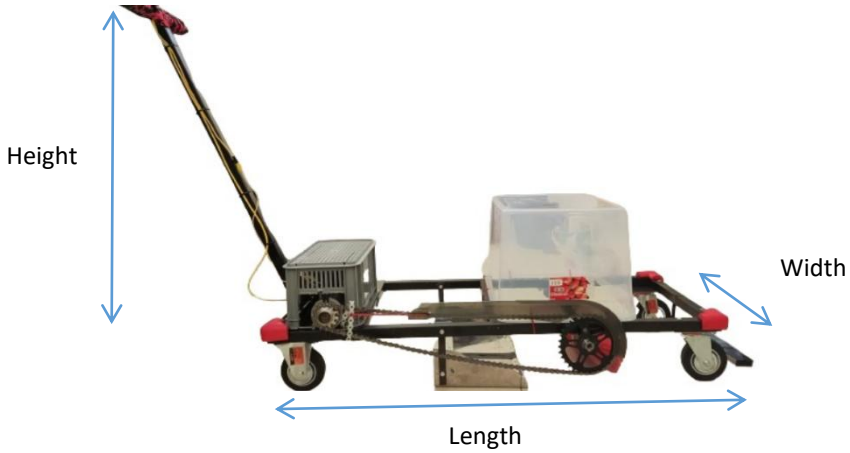


Figure 4.6: Above shows Easy Floor Cleaner measurements

4.3.1 Analysis Data

Below shows the analysis and measurements requirement exists in Easy Floor Cleaner :

i. Height : 750mm
ii. Length : 1000mm
iii. Width : 400mm
iv. Diameter of small sprocket : 55mm
v. Diameter of big sprocket : 130mm
vi. Driving pulley 1 (N1) : 2750 rpm
vii. Driving pulley 2 (N2) : 1165.5 rpm
viii. Distance between rear sprocket and front sprocket, x: 560mm

4.3.2 Calculations

The following section provides an analysis of the torque measurements in the chain between two sprockets. This analysis aims to determine the rotational speed (RPM) between the motor and the rotating brush in the Easy Floor Cleaner. Understanding the torque within the chain drive system is crucial, as it directly influences the efficiency and performance of the brush rotation.By measuring the torque, we can ensure that the motor delivers adequate power to maintain an optimal RPM for the rotating brush, allowing it to effectively clean the floor surface. This analysis not only verifies the alignment between the motor and brush but also ensures that the power transfer through the chain is sufficient to meet the operational requirements of the cleaner. The data gathered from these measurements will help us fine-tune the machine's performance and validate its design specifications.

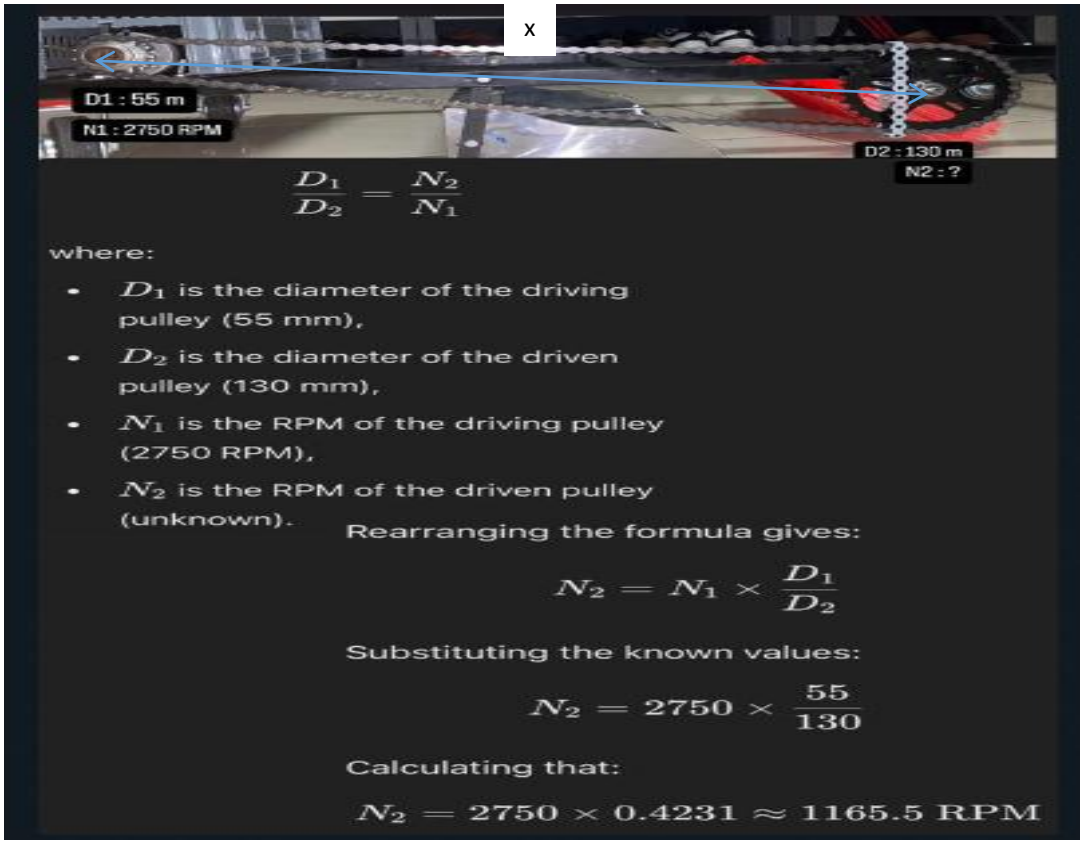


Figure 4.7: Shows the calculation of chain in Easy Floor Cleaner

4.4 COST ANALYSIS

The cost analysis is divided into three categories which is material/component costs, manufacturing costs, and service costs. However, our project incurred costs only in the material/component category. This is because there were no manufacturing or service costs, as these were provided by our institution.

4.4.1 Material/Component Cost

BIL.	MATERIAL	QUANTITY	PER UNIT(RM)	TOTAL(RM)
1	Bolt & Nut	3	2.5-0	7.50
2	Shaft	1	20.00	20.00
3	Big Sprocket	1	10.00	10.00
4	Small Sprocket	1	10.00	10.00
5	Chain	2	16.00	32.00
6	Metal Plat	1	8.00	8.00
7	Magnet	1	22.00	22.00
8	On/Off Switch	1	6.00	6.00
9	Bearing	2	8.50	17.00
10	Motor 12v 100w	1	76.00	76.00
11	Battery	1	41.00	41.00
12	Broom	1	2.40	2.40
13	Cable Tie	1	2.00	2.00
14	Crocodile Clip Wire	4	3.00	12.00
15	Wire	2	3.50	7.00
16	Bracket	1	1.00	1.00
17	Spray	1	10.00	10.00
18	Super Glue	1	4.00	4.00
19	Garbage Shovel	2	7.50	15.00
20	Tape	1	3.00	3.00
21	L Shape	2	2.00	4.00
22	Stackable Basket	1	3.00	3.00
23	Handle Grip	1	7.00	7.00
24	Chain Guard	1	10.00	10.00
25	Corner Guard	1	3.00	3.00
26	Container Plastic	1	18.50	18.50
			TOTAL	**351.40**

Table 4.1: Shows the costing

4.5 SAFETY ANALYSIS

The Easy Floor Cleaner has been carefully designed with safety in mind, addressing potential risks associated with its operation. To prevent injuries from sharp corners on the frame, corner guards are installed on all edges. Electric shock hazards are mitigated by securely covering the motor and battery. The installation of handle grips eliminates risks from sharp surfaces and corners on the handle. Disorganized wires, which could cause tripping or electrical issues, are tied neatly to the handle using cable ties. To protect users from the rotating broom, a cover is installed, and the chain and sprocket system is enclosed with a chain cover to prevent accidental contact. These measures ensure the device is safe and user-friendly, prioritizing the well-being of its operators in workshop environments.

NO	RISK	PREVENTIVE MEASURES
1	SHARP CORNER ON THE FRAME	INSTALL CORNER GUARDS ON EACH CORNER OF THE FRAME
2	ELECTRIC SHOCK	INSTALLING THE COVER FOR THE MOTOR AND BATTERY
3	SHARP HANDLE SURFACES AND CORNERS	INSTALLING THE HANDLE GRIP
4	DISORGANIZED WIRES	TYING THE WIRE TO THE HANDLE USING CABLE TIE
5	ROTATING BROOM	INSTALLING COVER FOR BROOM
6	ROTATING CHAIN AND SPROCKET	INSTALL CHAIN COVER

Table 4.2: Shows risks and preventive measures

4.6 SUMMARY

In this chapter 4 provides a thorough analysis of the data collected, findings, design calculations, cost, and safety aspects of the Easy Floor Cleaner project. Survey data revealed a strong demand for an ergonomic, efficient cleaning tool at Politeknik Banting, with 100% of respondents interested in using the product. Key measurements and torque calculations were detailed to ensure optimal motor-to-brush performance, enhancing cleaning efficiency. The cost analysis focused on material expenses, totaling RM351.40, as institutional resources covered other costs. Safety analysis identified and addressed potential operational risks, including sharp edges, electrical hazards, and rotating components, implementing safeguards such as corner guards, handle grips, and protective covers. This chapter validates the Easy Floor Cleaner as a practical, safe, and affordable solution that meets user needs effectively.

CHAPTER 5

CONCLUSION & RECOMMENDATION

5.1 CONCLUSION

In conclusion, the Easy Floor Cleaner project offers an innovative response to the persistent challenge of maintaining cleanliness in workshop environments. This project aimed to develop a practical and efficient cleaning device that significantly reduces the manual effort and time required for daily workshop cleaning tasks. By integrating key features like a battery-powered motor and a rotating roller brush, the Easy Floor Cleaner efficiently collects various types of debris, including dust, small particles, and metal shavings, commonly found in industrial and workshop settings.

The development of this product addressed several critical needs identified in the project's initial problem statement. In workshop environments, traditional cleaning methods often fall short, as dust, metal particles, and general debris accumulate rapidly and pose both safety and hygiene risks. The Easy Floor Cleaner not only automates the cleaning process but also enhances mobility by eliminating the need for external power sources. This feature, combined with a magnet that attracts metal particles, makes the product especially useful in environments where metalworking and machinery are in use. The ergonomic design further supports prolonged usage, reducing strain on the operator and making it accessible for users with varying levels of physical strength.

The methodology of the project was meticulously planned and executed, ensuring the final product met high standards of durability, reliability, and ease of use. This involved selecting durable materials such as mild steel, crafting a solid frame through welding techniques, and choosing components like a high-torque DC motor that could handle continuous operation. The use of simple wiring and circuit arrangements ensures safety and easy maintenance, while additional safety features such as corner guards, handle grips, and chain covers protect the user from sharp edges and moving parts.

Survey data gathered at Politeknik Banting Selangor reinforced the need for such a product, with 100% of respondents expressing interest in using the Easy Floor Cleaner. The data also showed a daily cleaning frequency among 56.3% of respondents, highlighting the potential time savings this product can offer. Respondents recognized the value of ergonomic features and a device capable of handling specific workshop debris types, affirming the project's relevance and design approach.Financially, the project achieved cost-effectiveness by utilizing affordable yet high-quality components, resulting in a material cost of RM351.40, with institutional support offsetting manufacturing expenses. This budget-conscious design approach makes the Easy Floor Cleaner accessible to workshops and institutions that might lack substantial funding for cleaning equipment. The safety analysis further validates the product as user-friendly and secure, with built-in protections against electric shocks, accidental contact with moving parts, and injury from sharp edges.

This project demonstrates a well-rounded approach to product design, from initial conception through prototype development, testing, and safety optimization. The overwhelmingly positive response from survey participants suggests that this product can make a meaningful impact in institutional and industrial settings, providing a cleaner, safer workspace that also allows personnel to allocate more time to core activities rather than maintenance tasks. As a result, the Easy Floor Cleaner aligns with both user comfort and modern cleaning standards, offering a valuable tool for workshops looking to streamline their operations and maintain high hygiene standards.

Overall, the Easy Floor Cleaner project embodies an effective, ergonomic, and sustainable solution for workshop maintenance, setting a precedent for the future design of automated cleaning tools. By combining technological innovation, user-focused design, and cost-efficiency, this project not only meets existing needs but also paves the way for continuous improvements in cleaning technology and user safety in workshop environments.

5.2 RECOMMENDATION

While the Easy Floor Cleaner effectively meets the hygiene requirements of a workshop, there is room for further enhancements to increase its efficiency and usability. Here are some suggested improvements for Easy Floor Cleaner:

i. Developing Easy-to-Install and Removable Shovels

Incorporating shovels that are simple to attach and detach would significantly enhance the user experience. This feature would save time during maintenance, such as cleaning or replacing parts, and allow operators to quickly remove accumulated debris. This improvement aligns with the goal of minimizing downtime and ensuring that the cleaner remains practical and convenient for everyday use in a workshop setting.

ii. Adding a Vacuum for Enhanced Cleaning Efficiency

Integrating a vacuum system into the Easy Floor Cleaner would elevate its cleaning performance by capturing fine dust particles and debris that might otherwise remain on the floor. The vacuum could be powered by the same motor or an auxiliary system, making it a complementary feature to the rotating broom. This addition would improve air quality, further reducing the risk of respiratory issues for workers while creating a cleaner and safer environment.

iii. Installing Dust Barriers on Both Sides

To prevent dust and debris from scattering during operation, adding barriers on both the left and right sides of the cleaner would be highly beneficial. These barriers could be made of lightweight yet durable materials, such as rubber or plastic, and would help contain the debris within the sweeping area. This feature would not only improve the effectiveness of the cleaning process but also reduce the time spent cleaning adjacent areas where dust might settle.

REFERENCE

UTAMA. (n.d.). https://sites.google.com/view/projek-jkm-pbs/utama?authuser=0

Final Year Project. How to start? A Guide for Mechanical Students. (n.d.). https://online.anyflip.com/lsexs/guux/mobile/index.html

Nevon Projects. (2020, November 10). *Manually operated Eco-friendly Road and Floor Dust Cleaning Machine*. https://nevonprojects.com/manually-operated-eco-friendly-road-and-floor-dust-cleaning-machine/

Meganburroughs. (2022, June 22). *Tips for Powering Motors with Batteries*. Precision Microdrives. https://www.precisionmicrodrives.com/tips-powering-motors-batteries

THE EFFECTIVENESS OF EASY FLOOR CLEANER USAGE AT WORKHSOP IN POLITEKNIK BANTING SELANGOR. (n.d.). Google Docs. https://docs.google.com/forms/d/17yczNTnhqcxwTMRzXd7vDulZAzHsHSRbiXKe76pwLZY/edit#responses

Brush Rolls (Industrial Cleaning Brushes) – BURSTEN. (n.d.). http://www.shblsd.com/product/brush-rolls-industrial-cleaning-brushes?gad_source=1&gclid=CjwKCAjw5v2wBhBrEiwAXDDoJa2tft2diq_yUS3KOueqM9co_wbI8vHmsiKvD3B0nzjxQOGADShZ9xoCe2MQAvD_BwE

Stepper Motor Basics. (n.d.). Oriental Motor U.S.A. Corp. http://www.orientalmotor.com/stepper-motors/technology/stepper-motor-basics.html#:~:text=Stepper%20motors%20convert%20electricity%20into,turns%20the%20motor%20one%20step

Stepper Motor Basics. (n.d.-b). Oriental Motor U.S.A. Corp. http://www.orientalmotor.com/stepper-motors/technology/stepper-motor-basics.html#:~:text=Stepper%20motors%20convert%20electricity%20into,turns%20the%20motor%20one%20step

Dashboard. (2023, August 8). The Benefits Of Using Heavy Duty Plastic Shovels For Your Business. . . *IFP Group*. https://www.ifpgroup.co.nz/heavy-duty-plastic-shovels/?srsltid=AfmBOorDbOYcOP3VawzzU-MdKj57L_y20sIGNcL6EQMb5DD_4KkUTklL

Roller Chain - Chain and Sprockets - Mechanical. (n.d.). https://shop.slsbearings.com/my/east-malaysia/mechanical/chain-and-sprockets/roller-chain.html

Ijraset. (n.d.). *Design and Development of Road Cleaner Machine*. IJRASET. https://www.ijraset.com/research-paper/design-and-development-of-road-cleaner-machine

APPENDIX

LAMPIRAN A JADUAL AGIHAN TUGASAN INDIVIDU KUMPULAN PROJEK

LAMPIRAN B EASY FLOOR CLEANER GOOGLE FORM

LAMPIRAN C TURNITIN REPORT CHECK

POLITEKNIK MALAYSIA BANTING

JABATAN KEJURUTERAAN MEKANIKAL

JADUAL AGIHAN TUGASAN INDIVIDU KUMPULAN PROJEK

TAJUK PROJEK : EASY FLOOR CLEANER

SUB-CHAPTERS	DESCRIPTION
NAME OF STUDENT : MOHAMMAD ANUAR BIN MOHD JAMAL (24DKM22F1012)	
CHAPTER 1	1.1 INTRODUCTION 1.2 BACKGROUND PROJECT 1.3 PROBLEM STATEMENT
CHAPTER 2	2.1 INTRODUCTION 2.2 PREVIOUS STUDY/JOURNAL/INVESTIGATION
CHAPTER 3	3.1 INTRODUCTION 3.1.1 FLOWCHART OF THEPROJECT 3.4 MATERIALS & EQUIPMENT 3.4.1 MATERIALS
CHAPTER 4	4.1INTRODUCTION 4.3 MATHEMATICAL CALCULATION IN PROODUCT DESIGN 4.3.1 ANALYSIS DATA 4.3.2 CALCULATIONS
CHAPTER 5	5.1 CONCLUSION
NAME OF STUDENT : MOHAMMAD NABIL FAKHRULLAH (24DKM22F1092)	
CHAPTER 1	1.4 PROJECT OBJECTIVE 1.5 IMPACT OF THE PROJECT
CHAPTER 2	2.3 SUMMARY
CHAPTER 3	3.2 PROJECT DESIGN 3.2.1 PROJECT SKETCH 3.3 INVENTOR DESIGN 3.5 FABRICATION PROCESS 3.5.1 MEASUREMENT/MARKING & CUTTING PROCESS 3.5.2 CONNECTING & BUILDING PROCESS
CHAPTER 4	4.2 PROJECT FINDING 4.2.1 SURVEY FINDING
CHAPTER 5	5.1 CONCLUSION
NAME OF STUDENT : MUHAMMAD MUQRI AZFAR BIN SHAHREN (24DKM22F1017)	
CHAPTER 1	1.6 SCOPE OF THE PROJECT 1.7 EXPECTED PROJECT RESULT 1.8 SUMMARY

CHAPTER 2	**2.2 PREVIOUS STUDY/JOURNAL/INVESTIGATION**
CHAPTER 3	**3.3.1 WIRING/SCHEMATIC** **3.4.2 EQUIPMENT** **3.5 FABRICATION PROCESS** **3.5.3 GRINDING PROCESS** **3.5.4 COMPLETION PROCESS**
CHAPTER 4	**4.2.2 SURVEY CONCLUSION** **4.4 COST ANALYSIS** **4.4.1 MATERIAL/COMPONENT COSTING**
CHAPTER 5	**5.2 RECOMMENDATION**

Pengesahan Penyelia Projek :

…….
Nama :

THE EFFECTIVENESS OF EASY FLOOR CLEANER USAGE AT WORKHSOP IN POLITEKNIK BANTING SELANGOR

Our Easy Floor Cleaner is designed to simplify and enhance cleaning routines in busy workshop environments. This powerful, user-friendly tool quickly tackles dust, grease, and debris, leaving floors spotless and safe for students and staff. Equipped with an efficient motor and durable cleaning pads, the Easy Floor Cleaner is ideal for workshops with high foot traffic and heavy-duty equipment. It's easy to maneuver, and perfect for maintaining a clean, professional workspace at Politeknik Banting Selangor.

* Indicates required question

EASY FLOOR CLEANER

1. What department are you from? *

Mark only one oval.

- ◯ DKM
- ◯ DTP
- ◯ DAM

2. What is your gender? *

Mark only one oval.

- ◯ Male
- ◯ Female

3. What is your age? *

Mark only one oval.

- ◯ 18 Years
- ◯ 19 Years
- ◯ 20 Years
- ◯ 21 Years

4. Have you used EASY FLOOR CLEANER BEFORE? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Other: _____

5. How often do you clean workshop or workspace? *

Mark only one oval.

- ◯ Daily
- ◯ Weekly
- ◯ Monthly
- ◯ Rarely

6. What type of debris do you encounter the most in workshop? *

Tick all that apply.

- ☐ Dust
- ☐ Metal shaving
- ☐ Wood particle
- ☐ Other: _____

7. How effective do you find current cleaning tools in removing dust and metal debris in workshop? *

Mark only one oval.

- ◯ Very effectivve
- ◯ Moderately effective
- ◯ Not effective
- ◯ Other: _____

8. Do you experience dificulty cleaning hard to reach areas in workshop? *

Mark only one oval.

- ◯ Yes
- ◯ No _____
- ◯ Other:

9. How important is it for a cleaning device to be ergonomically designed? *

Mark only one oval.

- ◯ Very important
- ◯ Somewhat important
- ◯ Not important
- ◯ Other: _____

10. What features would you like to see in a floor cleaning machine design for workshop use? *

Tick all that apply.

- ☐ Easy maneuvarability
- ☐ Dust and Metal debris collection
- ☐ Battery powered
- ☐ Automatic brush

11. How much would you be willing to spend on an automated workshop floor cleaner? *

Mark only one oval.

- ◯ Below RM200
- ◯ RM200-500
- ◯ Above RM500

12. How concerned are you about hygiene and safety risks from dust and debris in workshop *

Mark only one oval.

- ◯ Very concerned
- ◯ Somewhat concerned
- ◯ Not concerned

13. Would you be interested in trying prototype of EASY FLOOR CLEANER in your workshop? *

Mark only one oval.

- ◯ Yes
- ◯ No

14. Based on this EASY FLOOR CLEANER Survey please provide us with your recommendation for us to improving this project

EASY FLOOR CLEANER

by Muqri Azfar

Submission date: 15-Nov-2024 10:23PM (UTC+0800)
Submission ID: 2520520677
File name: REPORT_PROJECT_EASY_FLOOR_CLEANER_DONE_1_.pdf (2.74M)
Word count: 7792
Character count: 41793

EASY FLOOR CLEANER

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