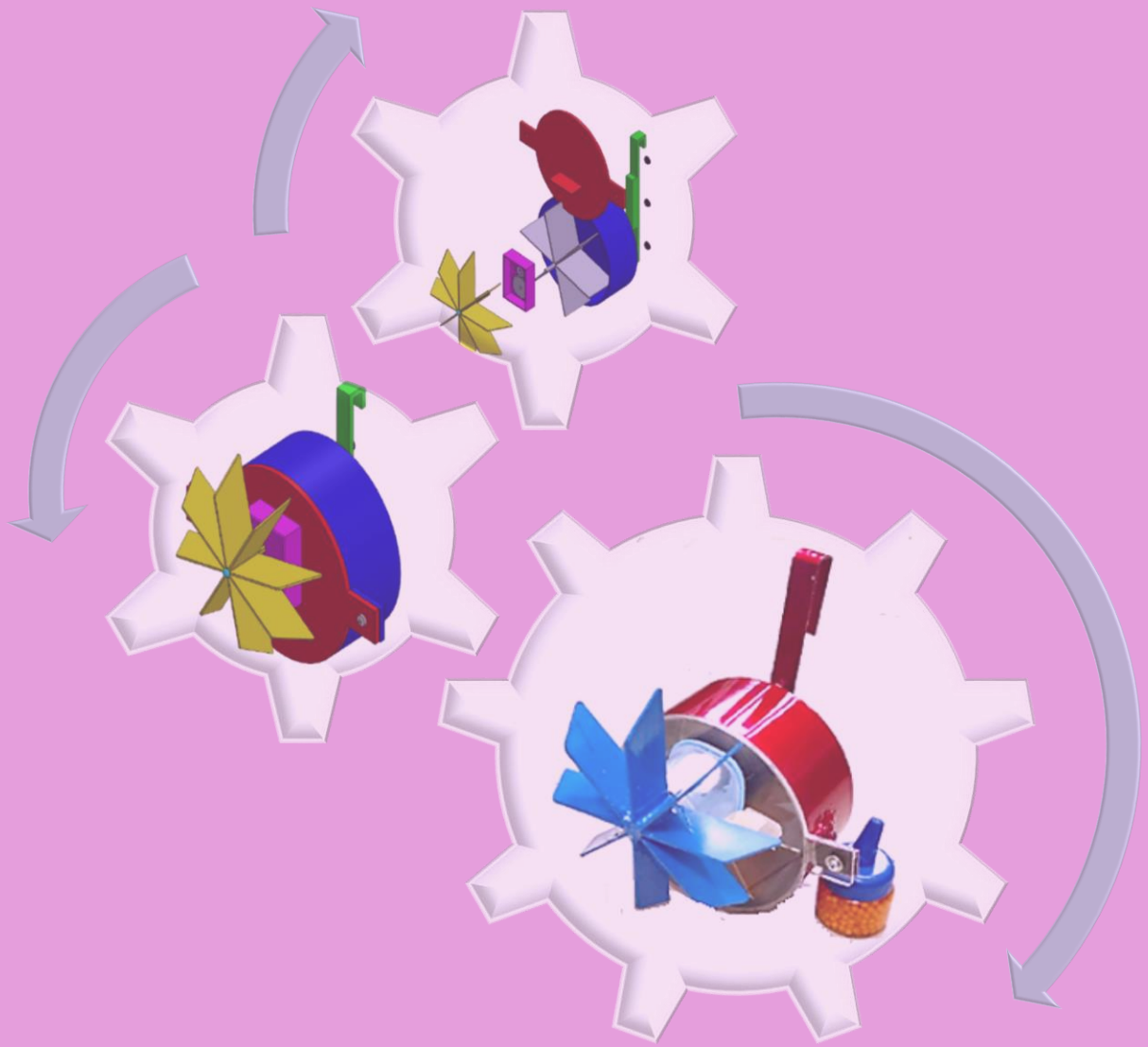
Prototype Design Collection

Series 3



UNIVERSITI TEKNOLOGI MARA CAWANGAN JOHOR
KAMPUS PASIR GUDANG

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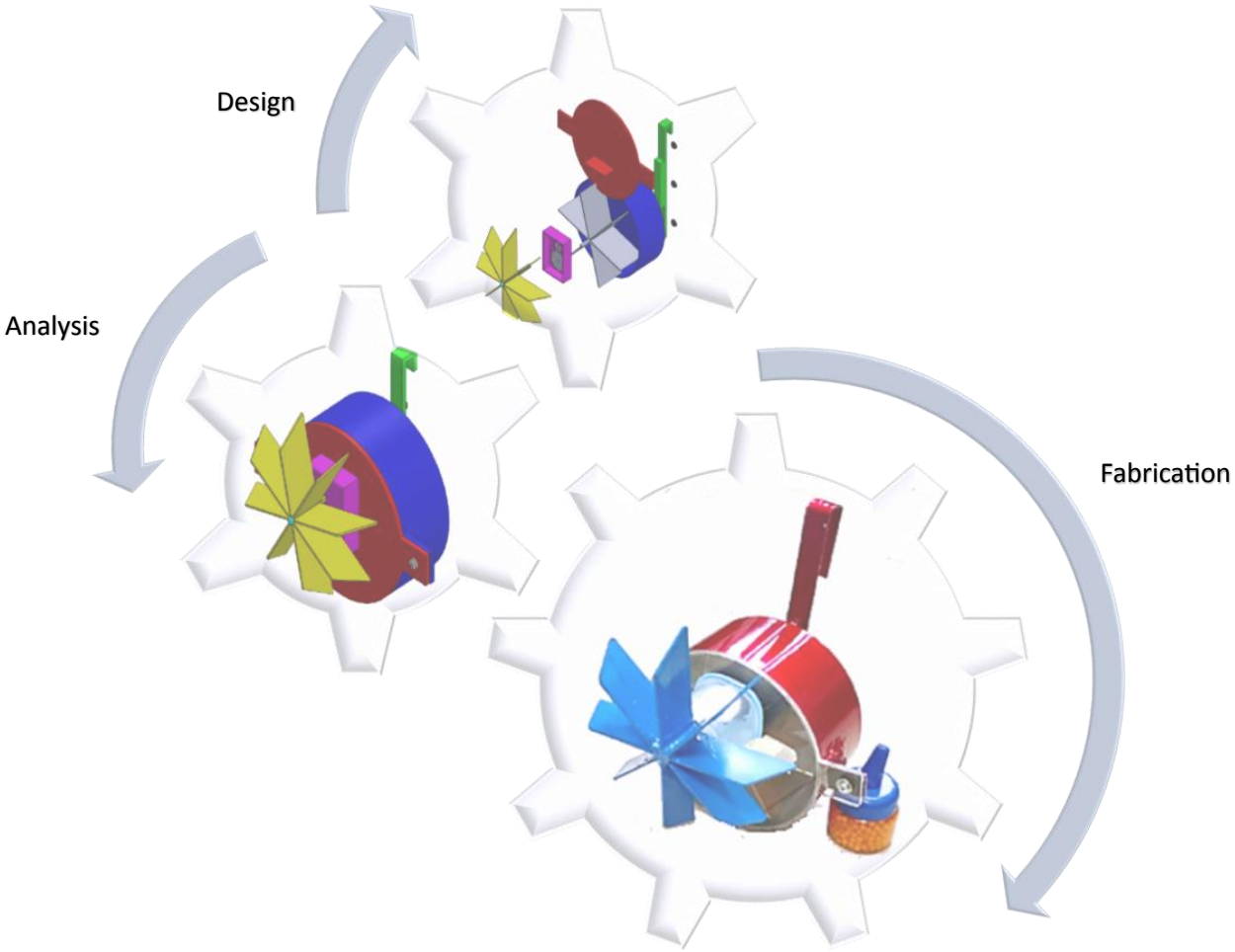

AHMAD NAJMIE RUSLI

UNIVERSITI TEKNOLOGI MARA CAWANGAN JOHOR
KAMPUS PASIR GUDANG

CHIEF EDITOR:

Ahmad Najmie Rusli

CONTENT EDITORS:

Ahmad Faidzal Khodori

Radzi Abdul Rasih

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FOREWORD

This digital book on Prototype Design Collection Series 3 (PDC Series 3) is published as a reference design for mechanical engineering students. The designs presented experience a few phases of analysis before fabrication of prototype. Each project summarises the project description, prototype, figures, and design parameter. The design products vary in tools or equipment for household, workshop, entrepreneur, etc. Suggested material and detail of prototype dimension are also mentioned in this book.

It is hoped that this book will assist the students to have more ideas on innovation design products in the future.

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e-ISBN: 978-967-0033-32-7

CHAPTER 1

Semi-automated Clothes Folding Machine

Ahmad Zahin bin Razak [1] and Mohd Fadzli Bin Ismail [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): mohdfadzli@uitm.edu.my*

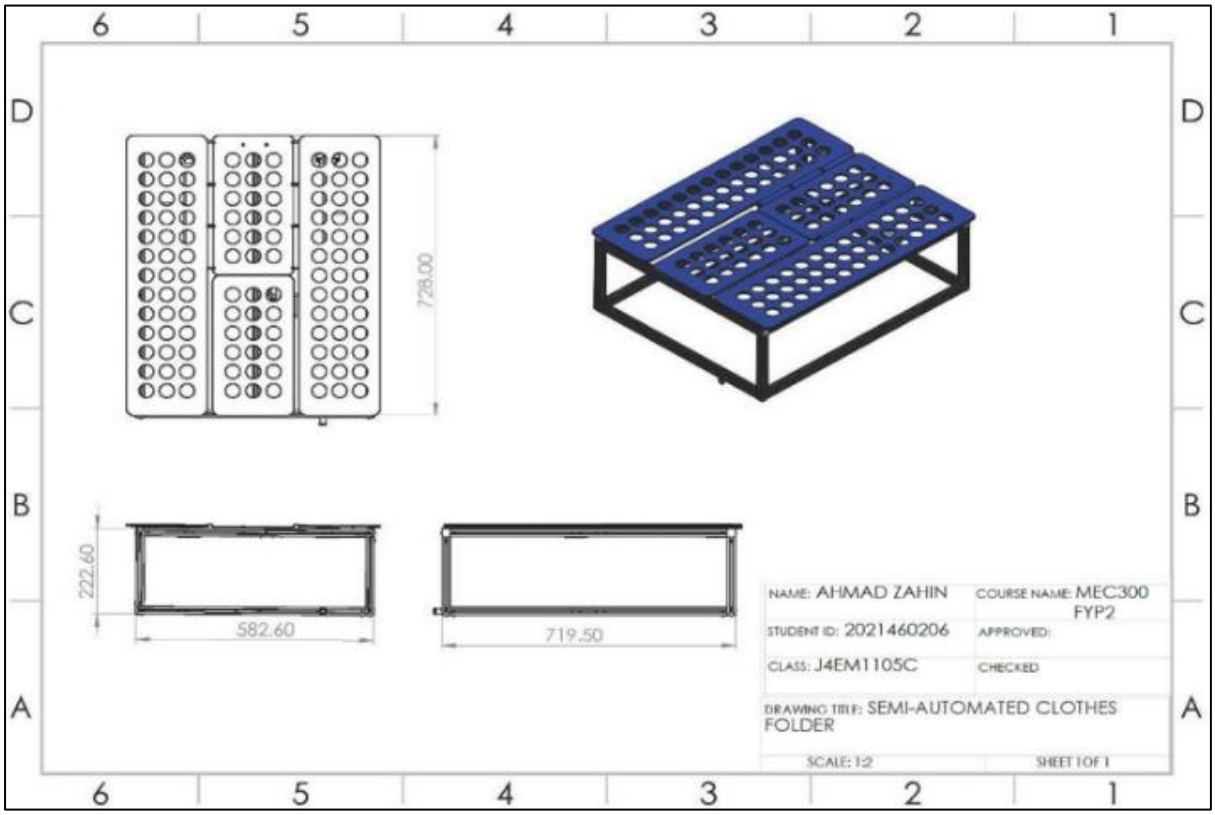
PROJECT DESCRIPTION

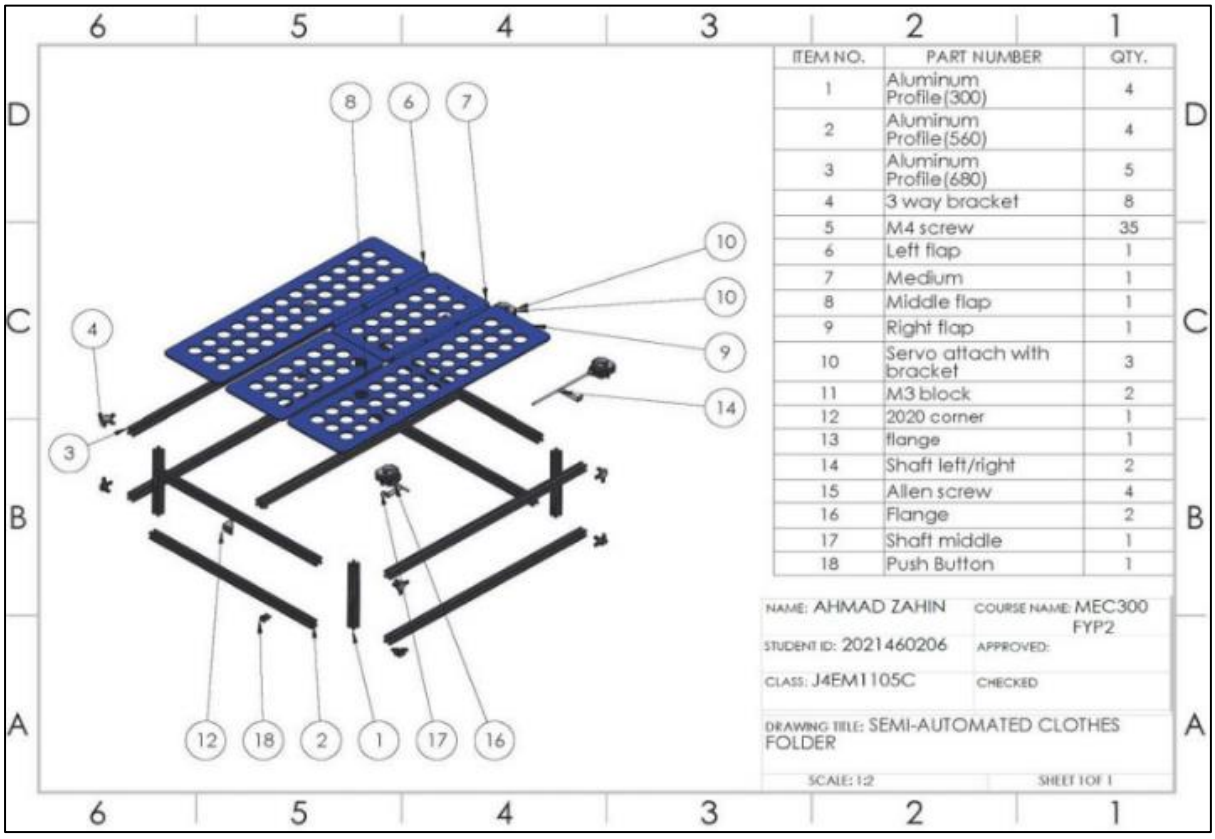
T-shirt folding is a universal method for keeping clothes organized and packed. However, the manual folding process for clothes is time-consuming and labor-intensive, resulting in inefficiency and inconsistent folding. The aim of this project is to design and fabricate a semi-automated clothes folding machine that improves efficiency and consistency in clothes folding. The fabrication of the machine involves the cutting and joining processes of the frame and electronic wiring of the Arduino Uno microcontroller. Clothes folding is automated with the aid of the Arduino Uno microcontrollers. Once the cloth is ready on the flipfold, the start button is pushed, and the cloth will be folded in four sequences. As a result, the clothes are folded in an efficient and consistent manner. In conclusion, this project contributes to streamlining the clothing folding process, enhancing productivity, and reducing manual labor.

Keywords: *Arduino Uno, Folding clothes*

PROTOTYPE

DESIGN PARAMETER





ITEM NO.	PART NUMBER	QTY.
1	Aluminum Profile(300)	4
2	Aluminum Profile(560)	4
3	Aluminum Profile(680)	5
4	3 way bracket	8
5	M4 screw	35
6	Left flap	1
7	Medium	1
8	Middle flap	1
9	Right flap	1
10	Servo attach with bracket	3
11	M3 block	2
12	2020 corner	1
13	flange	1
14	Shaft left/right	2
15	Allen screw	4
16	Flange	2
17	Shaft middle	1
18	Push Button	1

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CHAPTER 2

Design and Fabrication of Automatic Waffle Dry Ingredients Mixer

Iskandar Zulkarnain Bin Zamri [1] and Miqdad Bin Khairulmaini [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): miqdadkos@uitm.edu.my*

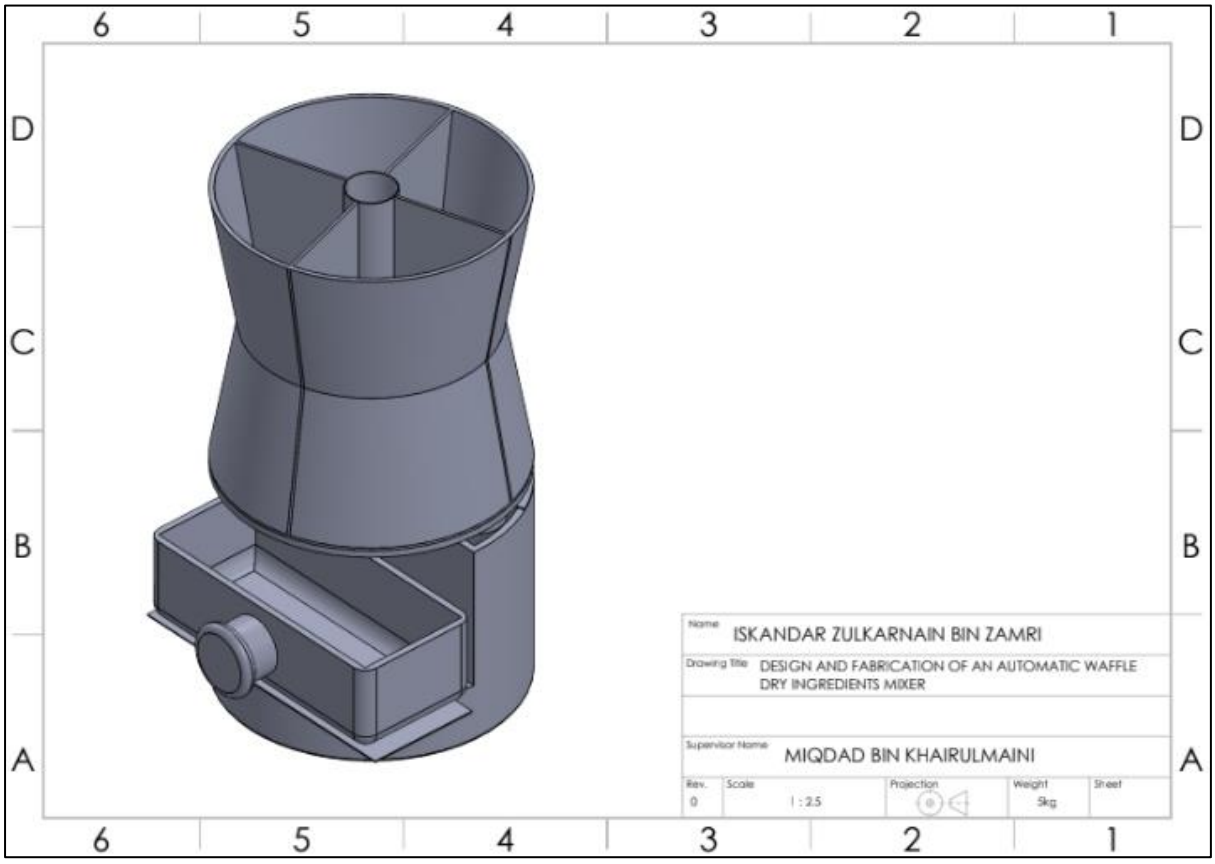
PROJECT DESCRIPTION

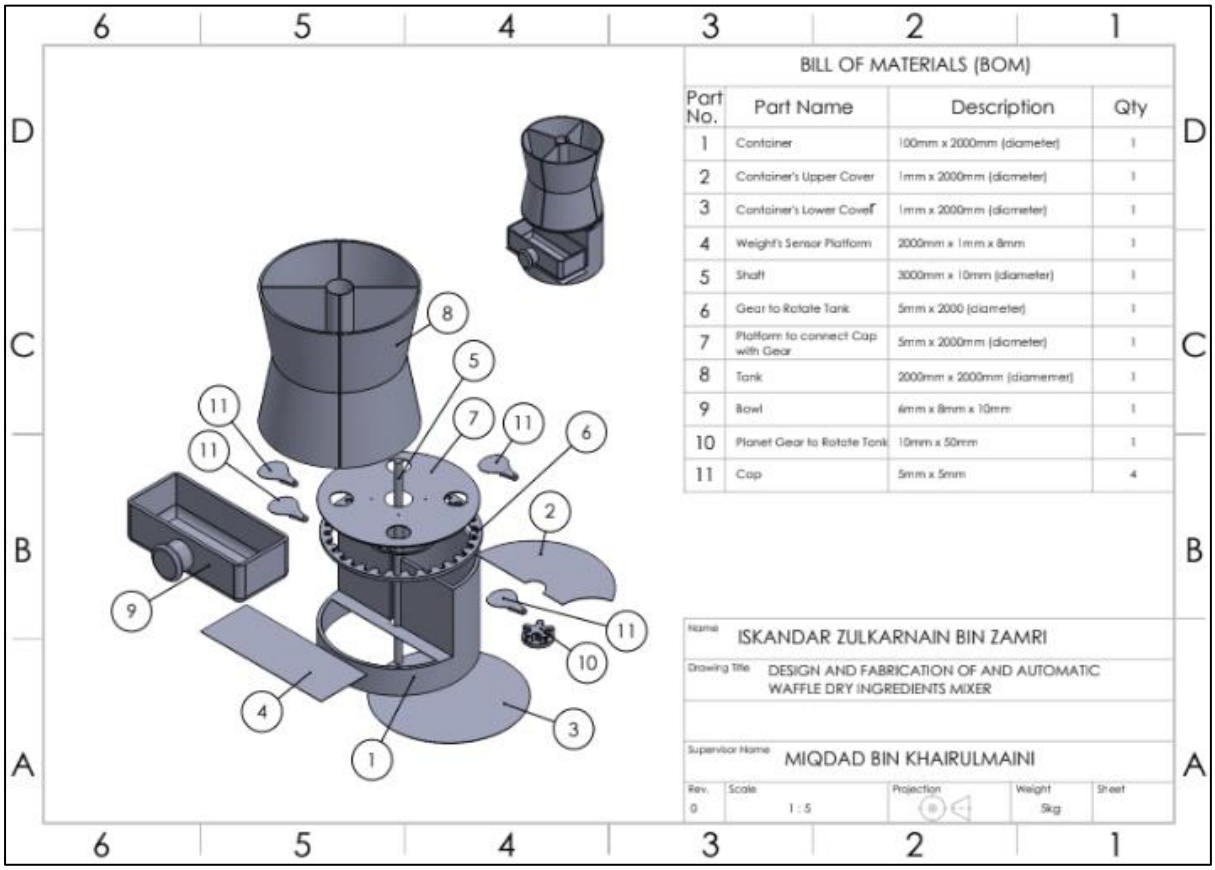
Waffles are among the most sought-after foods, especially during teatime. However, making waffles is time-consuming due to the need to measure and mix ingredients manually. Additionally, many people are unaware of the ingredients required for making waffles. This automatic waffle dry ingredients mixer eliminates the need for manual measurement and mixing, ensuring thorough blending at the push of a button. To achieve the project goals, the product was designed using Solidworks. The fabrication process involved a combination of modern and traditional tools available in the workshop, ensuring efficiency and quality. The end product of the automatic waffle dry ingredient mixer allows the user to measure and mix the required ingredients with only a push of a button. The market for this product extends beyond kitchen use to include restaurants, cafes, hotels, and other foodservice establishments that serve waffles on their menu. Thus, the demand for this product in various marketplaces is expected to be significant.

Keywords: *Waffle, Mixer*

PROTOTYPE

DESIGN PARAMETER





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CHAPTER 3

Design and Fabrication of Smart Cup Sorting System for A Campus Cafeteria

Aifa Binti Mohd Irfan [1] and Miqdad Bin Khairulmaini [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): miqdadkos@uitm.edu.my*

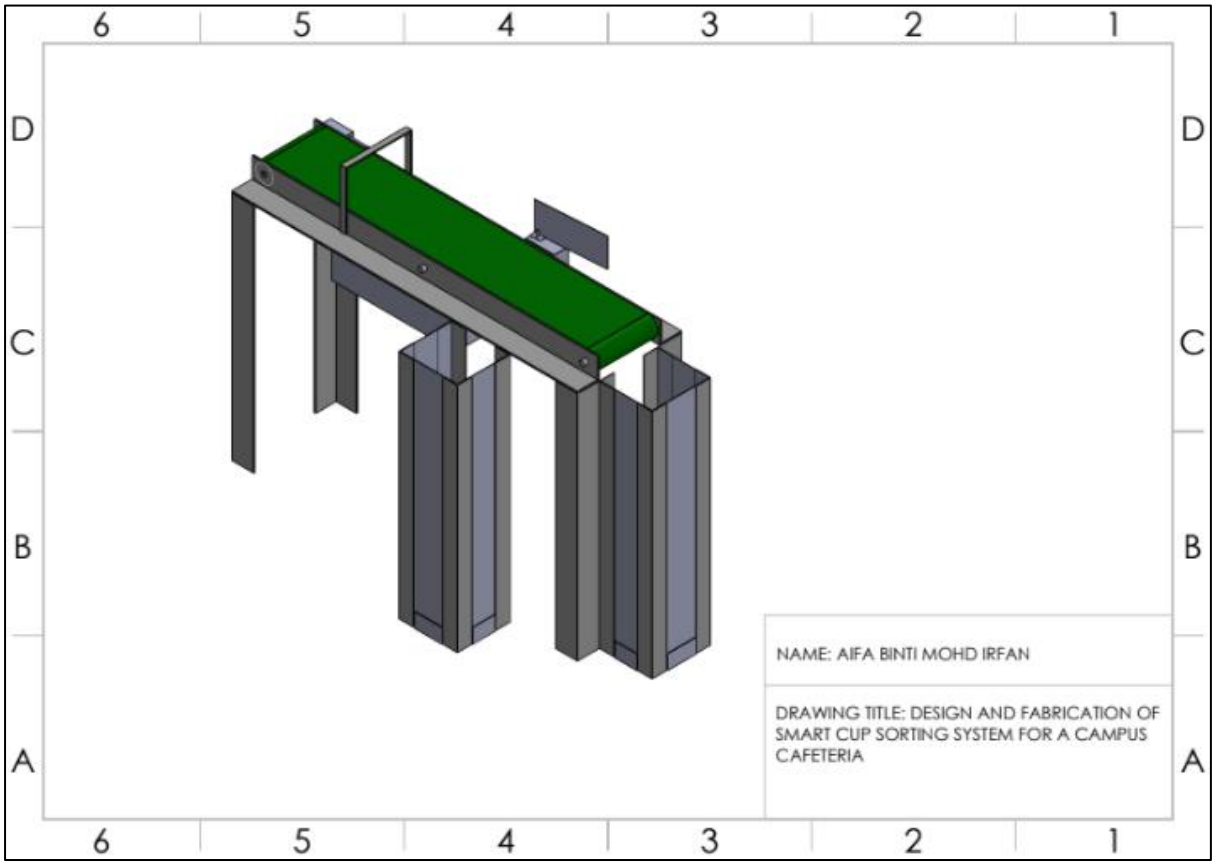
PROJECT DESCRIPTION

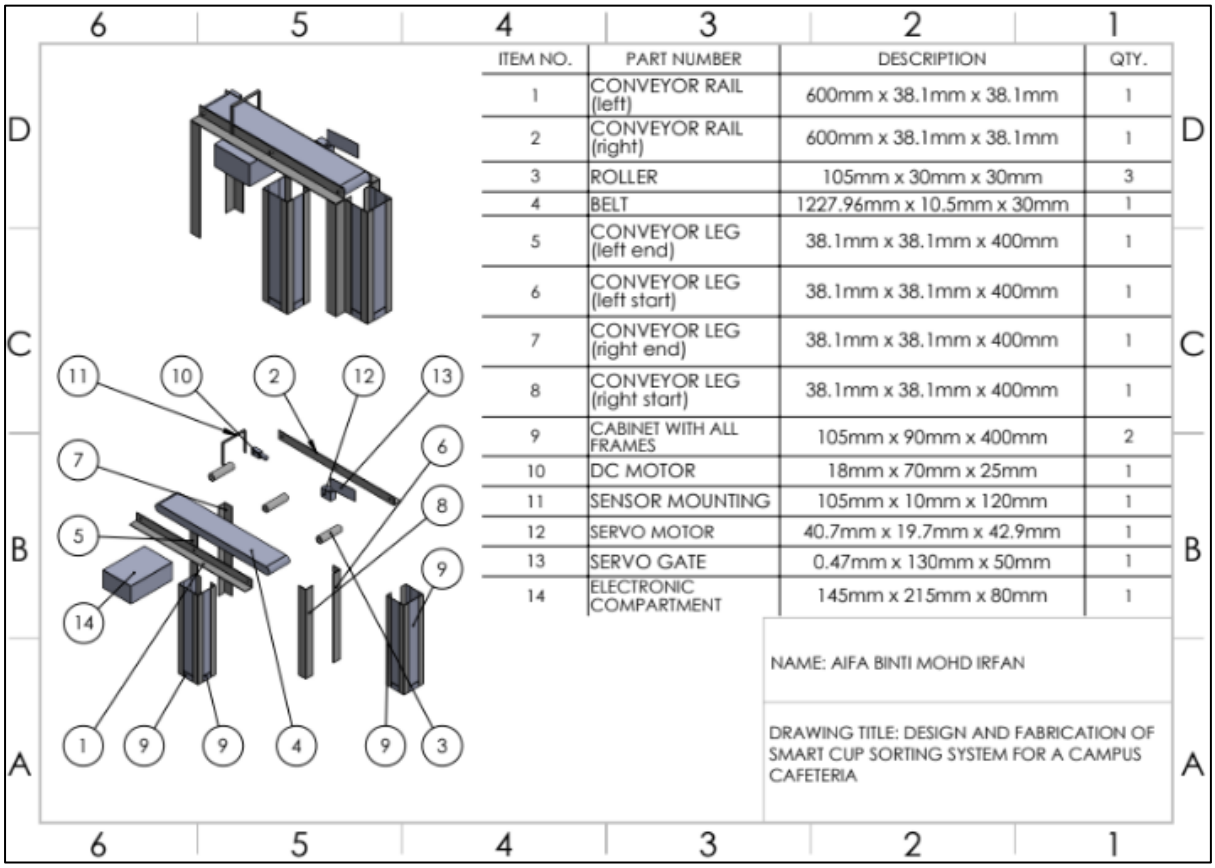
A conveyor belt is a convenient system for transporting heavy loads over long distances, reducing the need for extensive human labor and energy. Using the conveyor system saves significant time and energy. Technological advancements have simplified human life by introducing machines that assist with daily tasks. A common example can be seen in our daily routines, such as in the cafeteria, where customers do not return their used dishes to the proper bins according to their colors. This is inconvenient for the staff since each stall usually has its own kitchen utensils. When customers mix items in the bins, it creates additional work for the staff to sort and collect plates and cups. The main goal of this project is to help ease the burden of the staff by creating a smart sorting system using Arduino that will detect the color of the cups and sort them into their designated cabinets. One methodology involves observing cafeterias at various universities to understand their dishwashing systems. The expected result of this project is to facilitate the collection of neatly stacked cups in the cabinets, alleviating the workload for both customers and staff. Additionally, it is expected that students will learn more about the Arduino system and coding.

Keywords: *Conveyor, sorting*

PROTOTYPE

DESIGN PARAMETER





ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	CONVEYOR RAIL (left)	600mm x 38.1mm x 38.1mm	1
2	CONVEYOR RAIL (right)	600mm x 38.1mm x 38.1mm	1
3	ROLLER	105mm x 30mm x 30mm	3
4	BELT	1227.96mm x 10.5mm x 30mm	1
5	CONVEYOR LEG (left end)	38.1mm x 38.1mm x 400mm	1
6	CONVEYOR LEG (left start)	38.1mm x 38.1mm x 400mm	1
7	CONVEYOR LEG (right end)	38.1mm x 38.1mm x 400mm	1
8	CONVEYOR LEG (right start)	38.1mm x 38.1mm x 400mm	1
9	CABINET WITH ALL FRAMES	105mm x 90mm x 400mm	2
10	DC MOTOR	18mm x 70mm x 25mm	1
11	SENSOR MOUNTING	105mm x 10mm x 120mm	1
12	SERVO MOTOR	40.7mm x 19.7mm x 42.9mm	1
13	SERVO GATE	0.47mm x 130mm x 50mm	1
14	ELECTRONIC COMPARTMENT	145mm x 215mm x 80mm	1

NAME: AIFA BINTI MOHD IRFAN
DRAWING TITLE: DESIGN AND FABRICATION OF SMART CUP SORTING SYSTEM FOR A CAMPUS CAFETERIA

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CHAPTER 4

Electric Belt Sanding Machine

Puteri Nor Azwina binti Arifin [1] and Mohd Fadzli Bin Ismail [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): mohdfadzli@uitm.edu.my*

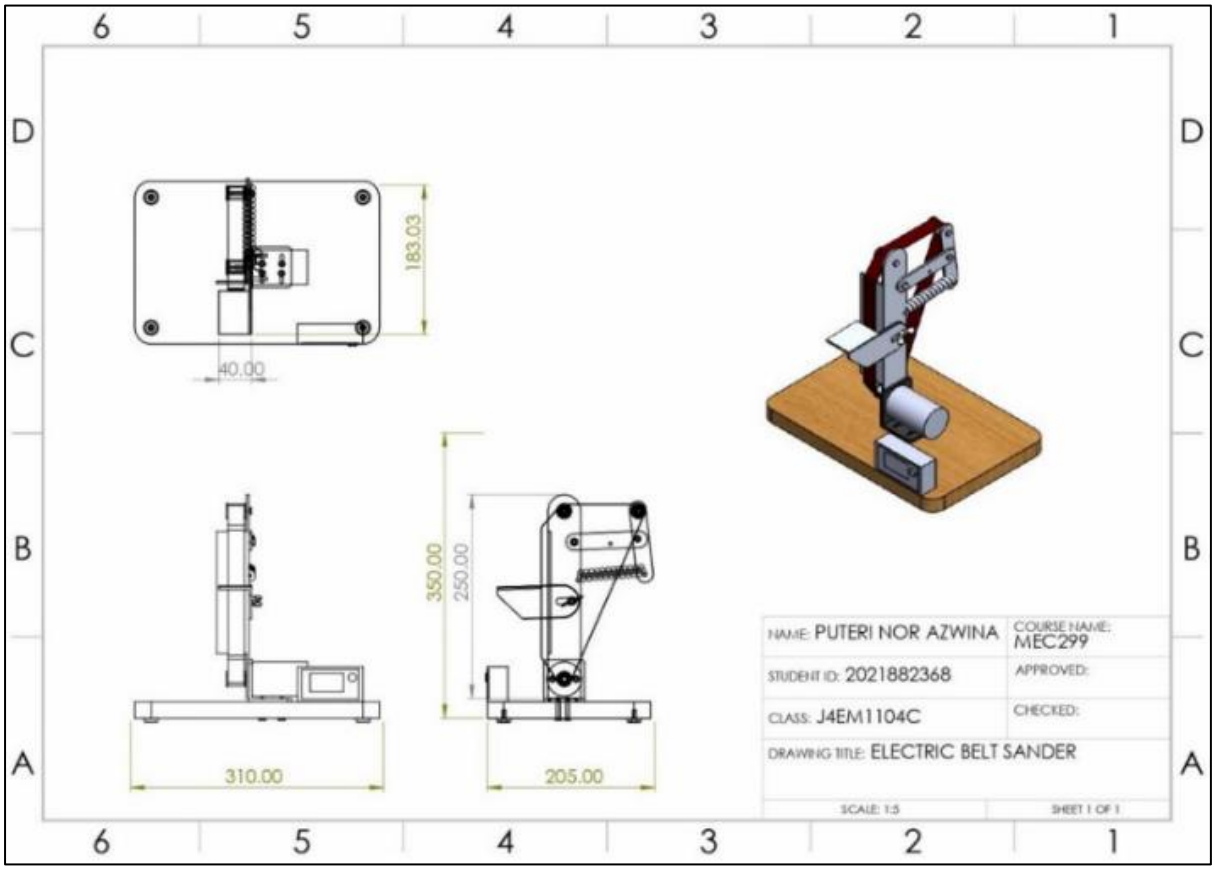
PROJECT DESCRIPTION

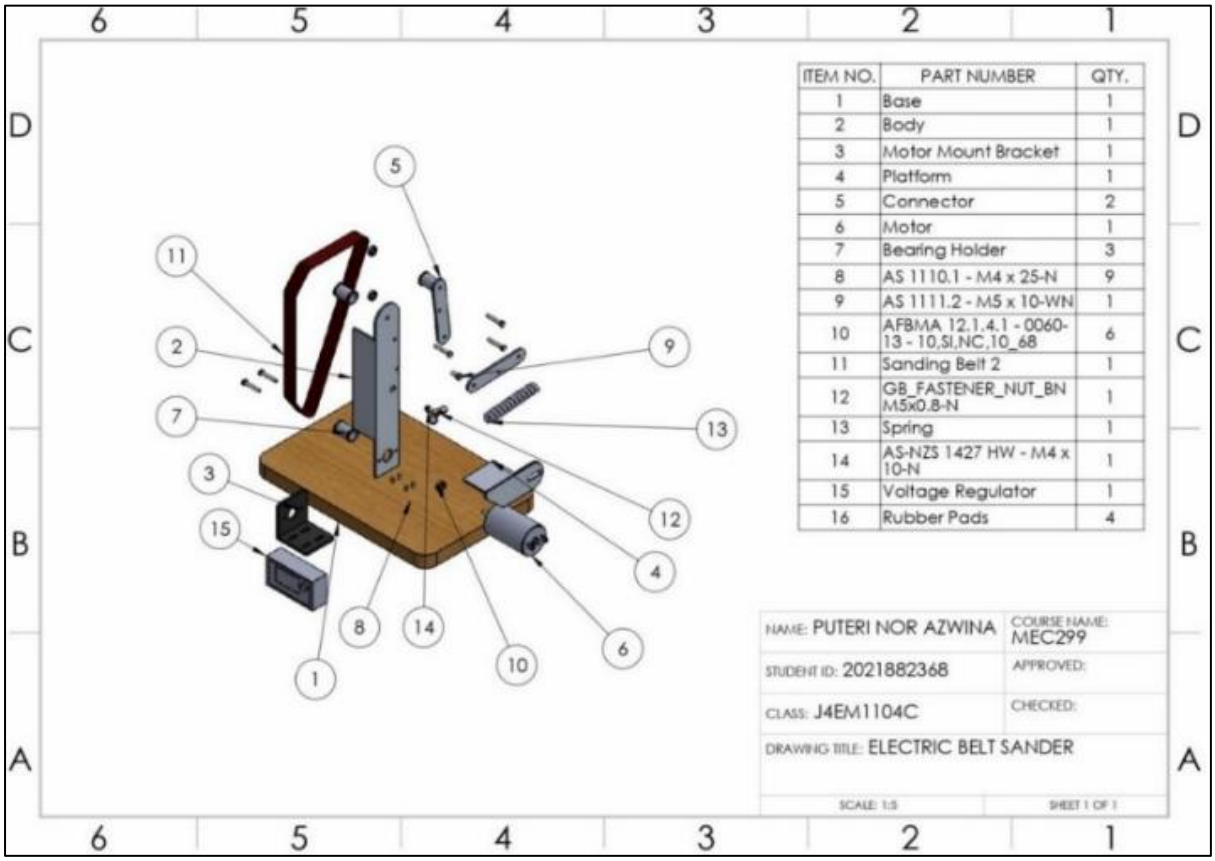
An electric belt sanding machine is a mini power tool using a motorized belt to sharpens and smooths the surface of the workpiece. This machine allows people to finish their work faster without being physically tired. In addition, the use of manual sandpaper requires a lot of time and energy. The aim of this project is to design and fabricate an electric belt sanding machine which assist users, particularly for mechanical engineering students to surface finish their engineering works. The machine is powered using a direct current motor. Meanwhile, the speed controller is used to regulate the speed of the belt sanding depending on their workpiece type. As results, this electric belt sanding machine saves time and energy of the user. Furthermore, it is a low cost machine with a low maintenance cost because the only part that needs to be maintained regularly is the sanding belt once it is worn out. As conclusion, this machine will be of great benefit to people who are interested in buying an affordable and effective belt sanding machine.

Keywords: *Electric belt sanding machine, Sandpaper*

PROTOTYPE

DESIGN PARAMETER





ITEM NO.	PART NUMBER	QTY.
1	Base	1
2	Body	1
3	Motor Mount Bracket	1
4	Platform	1
5	Connector	2
6	Motor	1
7	Bearing Holder	3
8	AS 1110.1 - M4 x 25-N	9
9	AS 1111.2 - M5 x 10-WN	1
10	AFBMA 12.1.4.1 - 0060-13 - 10,SI,NC,10_68	6
11	Sanding Belt 2	1
12	GB_FASTENER_NUT_BN M5x0.8-N	1
13	Spring	1
14	AS-NZS 1427 HW - M4 x 10-N	1
15	Voltage Regulator	1
16	Rubber Pads	4

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CHAPTER 5

Plastic Shredding Machine

Raja Nazrin Shah bin Raja Azlan Shah [1] and Mohd Fadzli Bin Ismail [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): mohdfadzli@uitm.edu.my*

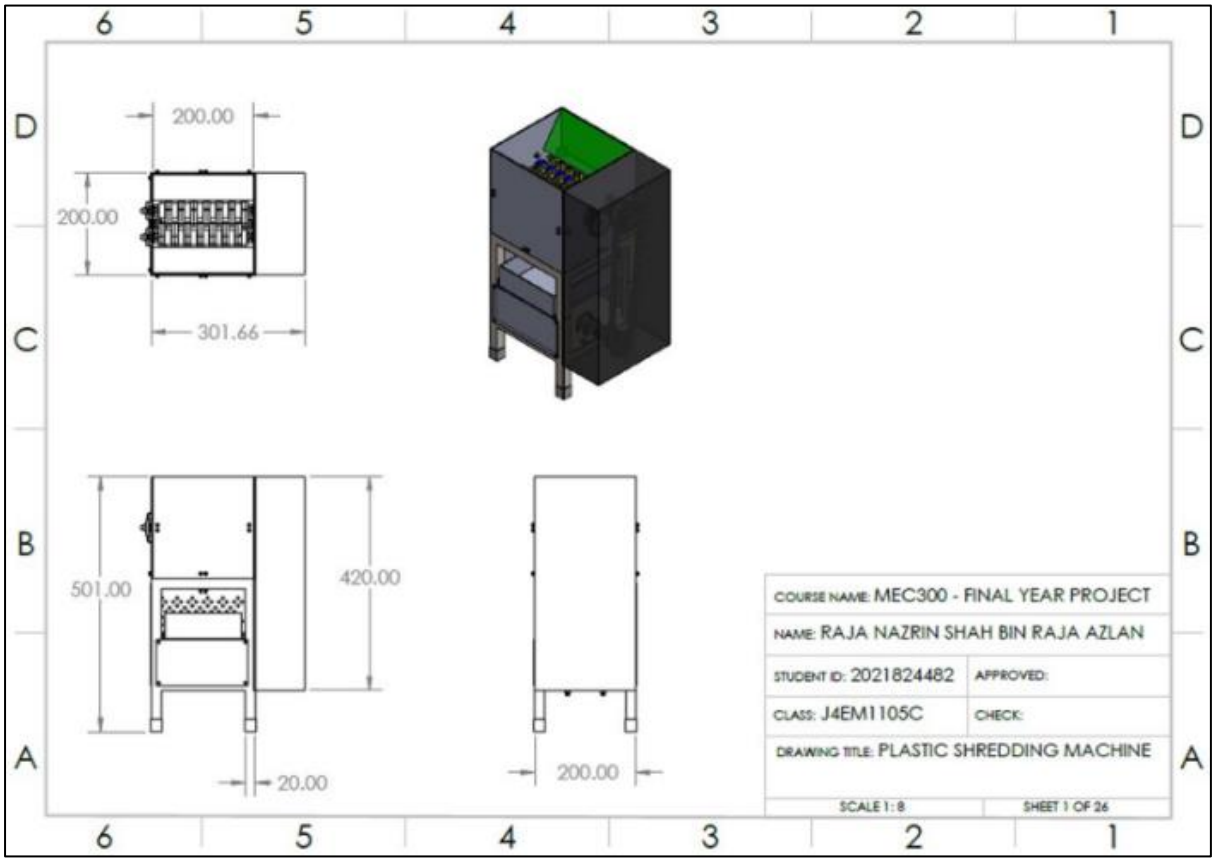
PROJECT DESCRIPTION

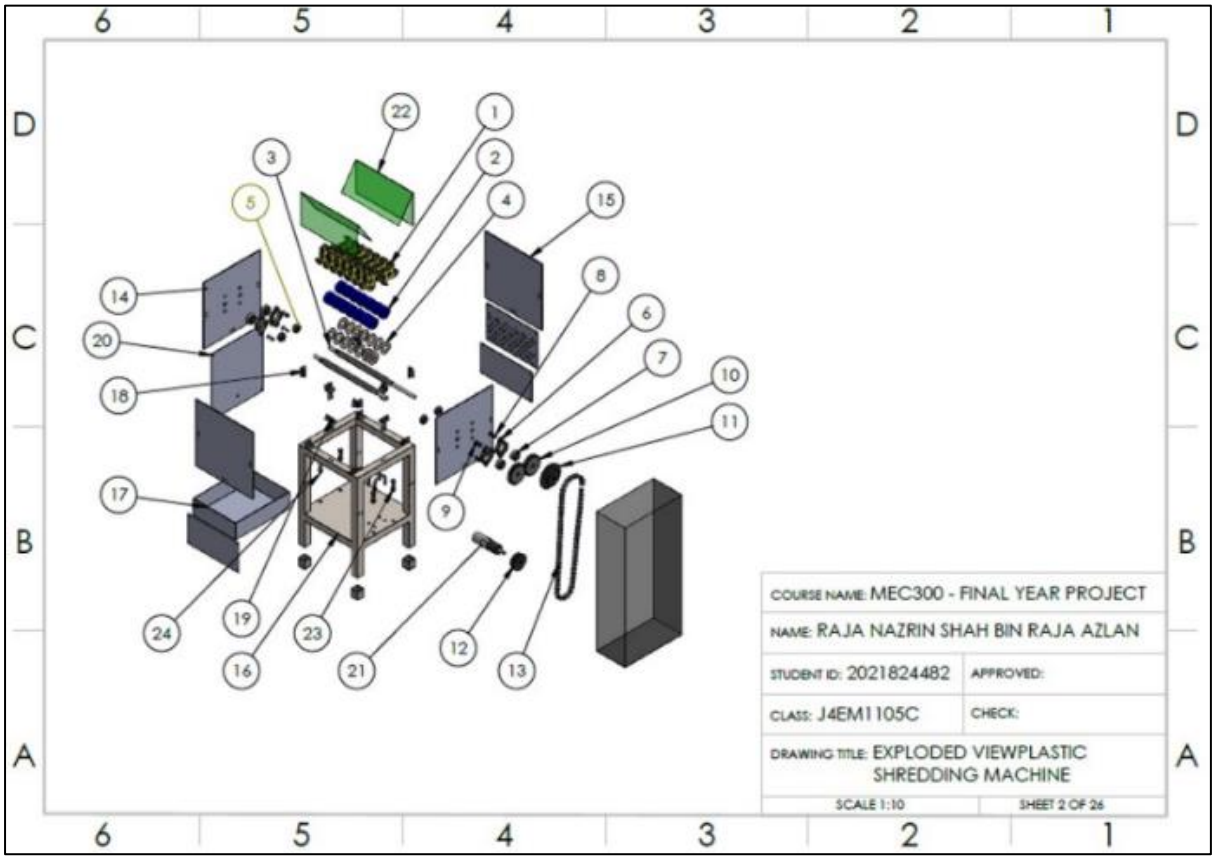
This project focuses on recycling plastic waste, which plays an important role in the betterment of humans and the environment. Recycling plastic waste helps to promote sustainability, reduce environmental pollution, and create a more sustainable future for all. Plastic pollution is well known among the public as it leads to a lot of problems, such as difficult to decompose, consuming a lot of space in garbage bins and dumps, and endangering life species. The aim of this project is to design and fabricate a plastic shredding machine capable of reducing large plastic waste, particularly plastic bottles and cups, into small fragments suitable for subsequent reuse in the manufacturing of other products. This machine utilizes a gear and chain system to connect the AC motor to the shredding blades. The two shredding blades rotate in opposite directions, effectively drawing the inserted plastic into the shredding mechanism. Consequently, the plastic waste is shredded into smaller pieces, which can be reused in the manufacturing of other products. In summary, this machine addresses plastic waste issues and contributes to environmental sustainability.

Keywords: *Plastic waste, Plastic shredding machine*

PROTOTYPE

DESIGN PARAMETER





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CHAPTER 6

Design and Fabrication Garbage Collector Machine

Amri Mukhlis Bin Idris [1] and Miqdad Bin Khairulmaini [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): miqdadkos@uitm.edu.my*

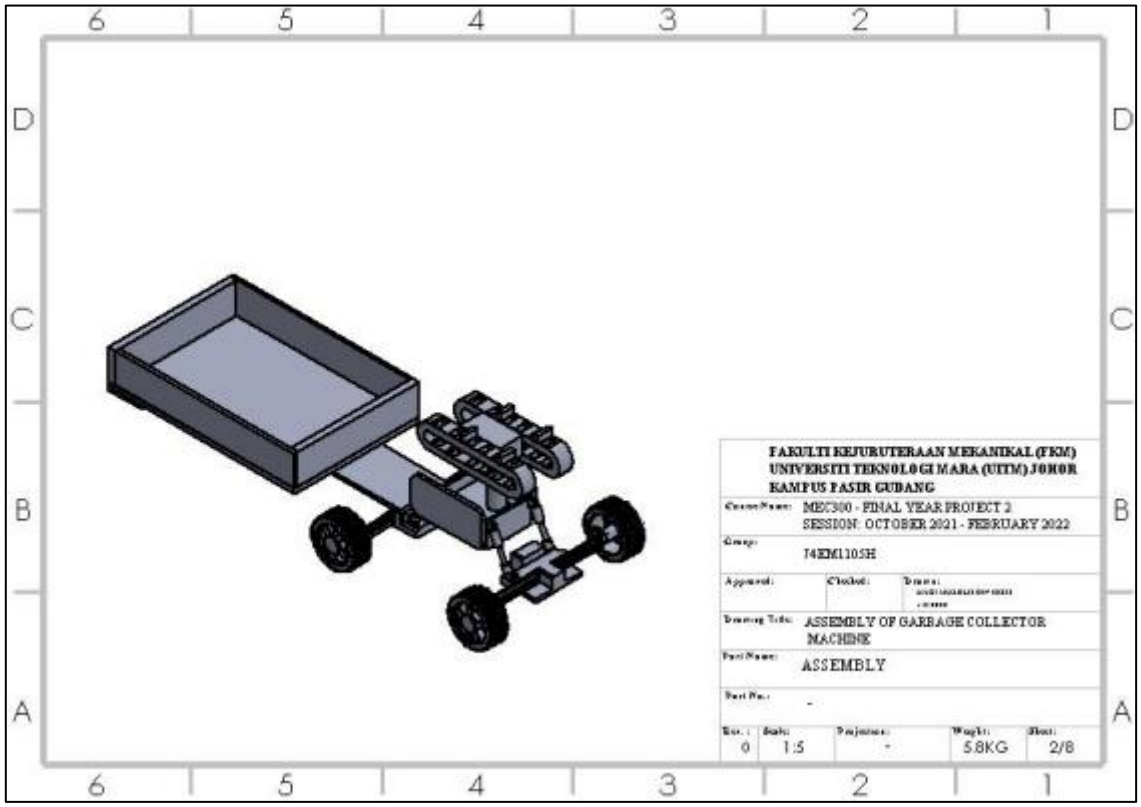
PROJECT DESCRIPTION

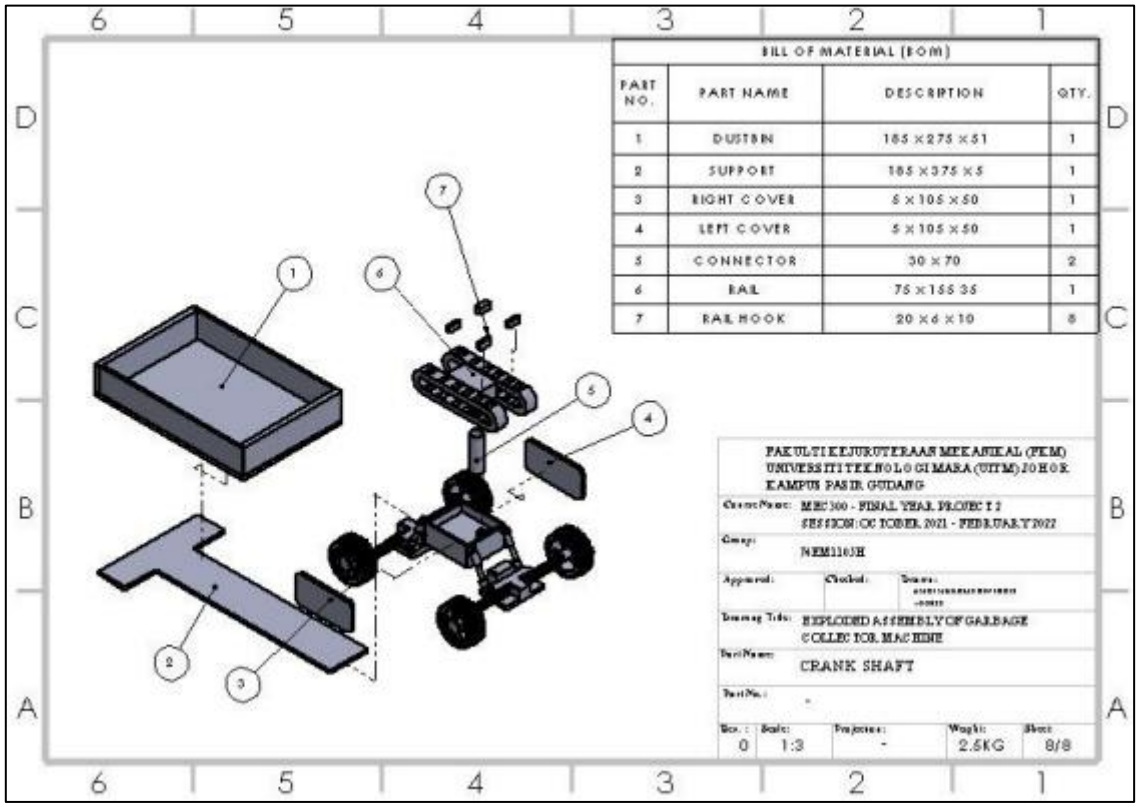
The Wireless Controller Garbage Collector represents an innovative solution aimed at addressing the challenges associated with manual garbage collection. Traditional methods, such as sweeping with a broom, often result in back pain and limited capacity to carry garbage in the dustpan. This project introduces a wireless-controlled collector designed to alleviate these issues. The collector, controlled remotely, autonomously picks up garbage from the ground and stores it in a rear-mounted dustbin. While effective for collecting small debris, the system may encounter limitations in carrying heavier loads and certain types of material due to the design of its hook or rail. Despite these limitations, the project offers significant benefits, including the ability to collect garbage from a distance using remote control. Moving forward, it is recommended to explore alternative hook designs capable of handling a wider range of materials.

Keywords: *Wireless Garbage Collector, Remote-Controlled Waste Manage*

PROTOTYPE

DESIGN PARAMETER





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CHAPTER 7

Multipurpose Sanitizer Machine

Hafizuddin Bin Zamri [1] and Miqdad Bin Khairulmaini [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): miqdadkos@uitm.edu.my*

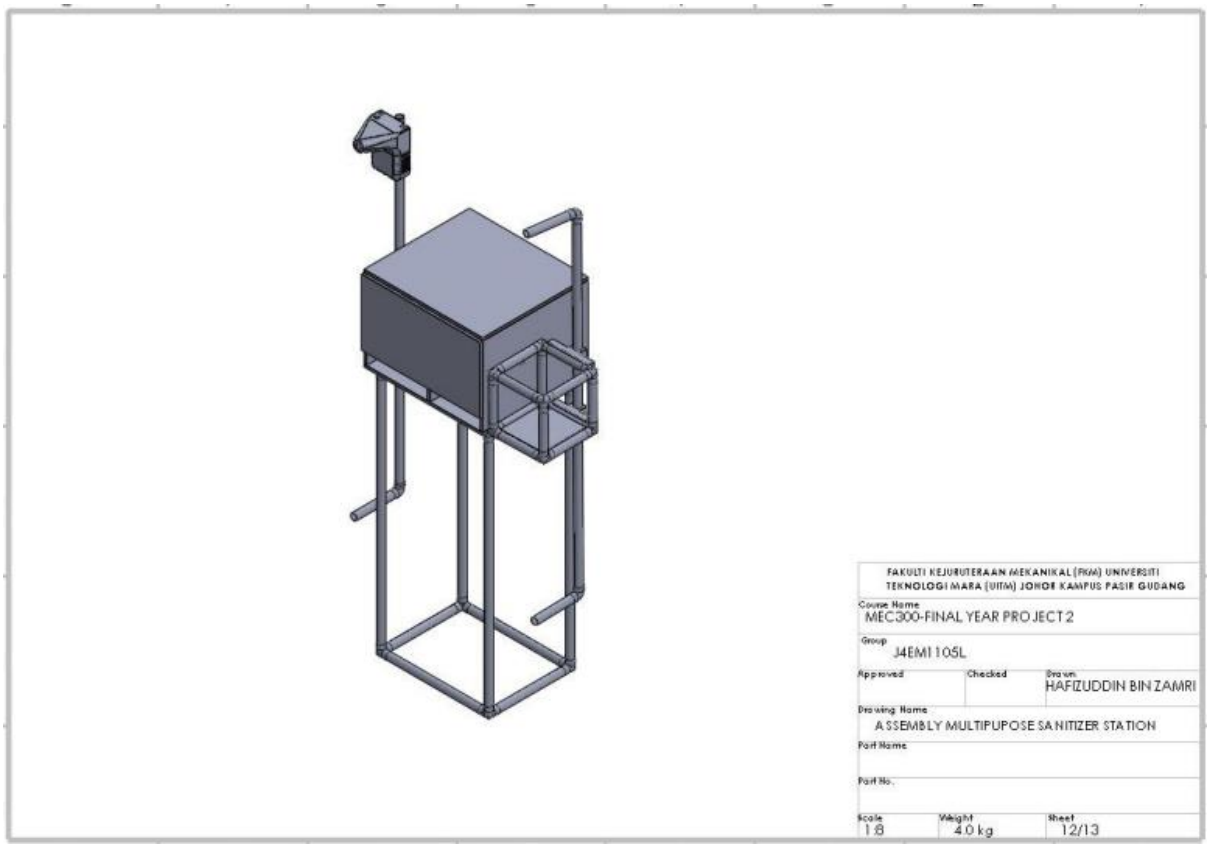
PROJECT DESCRIPTION

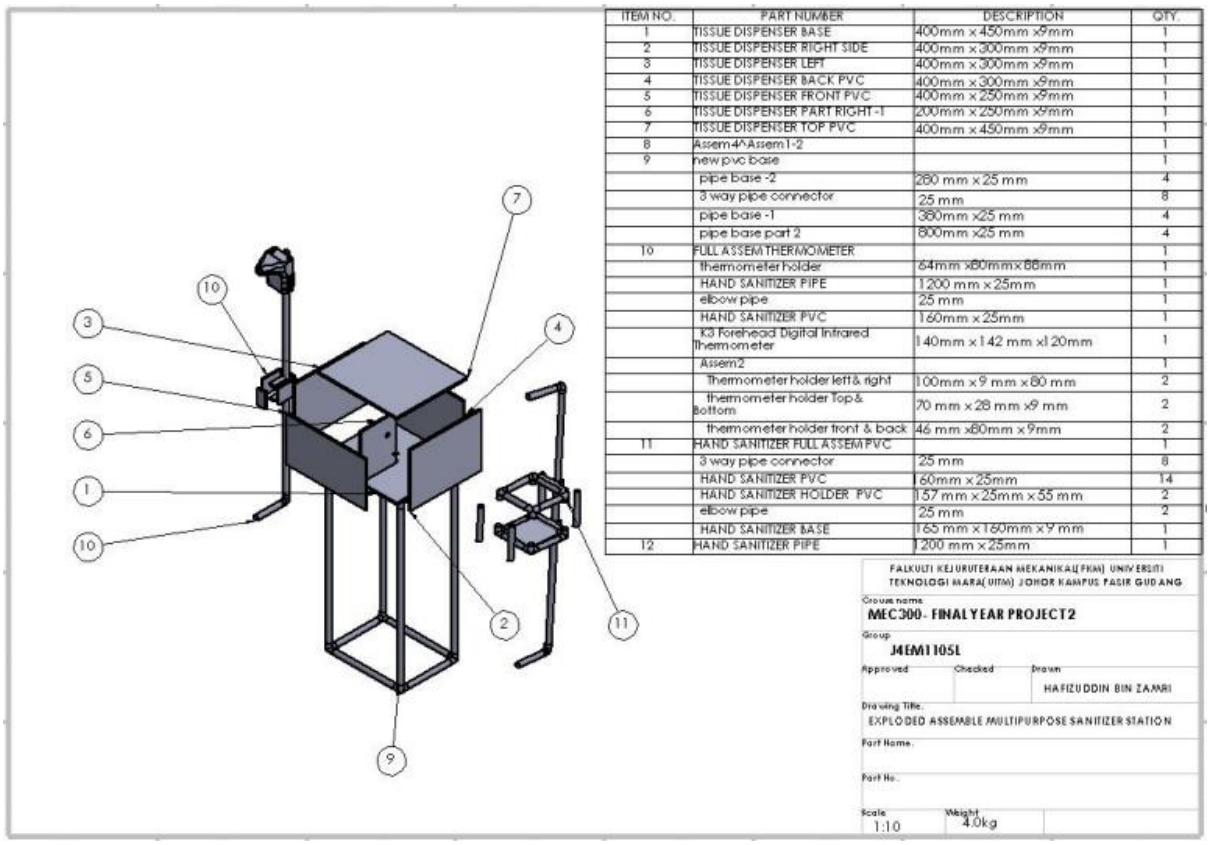
This project addresses the pressing need for improved hygiene practices in public spaces through the development of a multipurpose hand sanitizer station prototype. Current methods of hand sanitization and temperature-taking often present barriers and limitations, leading to suboptimal hygiene practices and increased disease transmission risk. Utilizing a systematic methodology, the project selects suitable designs and materials to create the prototype, incorporating features such as automated hand sanitizer dispensing and temperature screening. The implementation of this innovative solution promises numerous benefits, including promoting proper hygiene practices, reducing disease transmission risk, and enhancing user experience in public spaces. Furthermore, the prototype serves as a scalable solution that can be deployed in various settings, contributing to improved public health and safety on a broader scale.

Keywords: *Hygiene Station Prototype, Multipurpose Sanitizer System*

PROTOTYPE

DESIGN PARAMETER





ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TISSUE DISPENSER BASE	400mm x 450mm x9mm	1
2	TISSUE DISPENSER RIGHT SIDE	400mm x 300mm x9mm	1
3	TISSUE DISPENSER LEFT	400mm x 300mm x9mm	1
4	TISSUE DISPENSER BACK PVC	400mm x 300mm x9mm	1
5	TISSUE DISPENSER FRONT PVC	400mm x 250mm x9mm	1
6	TISSUE DISPENSER PART RIGHT -1	200mm x 250mm x9mm	1
7	TISSUE DISPENSER TOP PVC	400mm x 450mm x9mm	1
8	Assem4^Assem1-2		1
9	new pvc base		1
	pipe base -2	280 mm x 25 mm	4
	3 way pipe connector	25 mm	8
	pipe base -1	380mm x25 mm	4
	pipe base part 2	800mm x25 mm	4
10	FULL ASSEM THERMOMETER		1
	thermometer holder	64mm x80mm x 88mm	1
	HAND SANITIZER PIPE	1200 mm x 25mm	1
	elbow pipe	25 mm	1
	HAND SANITIZER PVC	160mm x 25mm	1
	K3 Forehead Digital Infrared Thermometer	140mm x 142 mm x120mm	1
	Assem2		1
	Thermometer holder left& right	100mm x 9 mm x 80 mm	2
	thermometer holder Top& Bottom	70 mm x 28 mm x9 mm	2
	thermometer holder front & back	46 mm x80mm x 9mm	2
11	HAND SANITIZER FULL ASSEM PVC		1
	3 way pipe connector	25 mm	8
	HAND SANITIZER PVC	160mm x 25mm	14
	HAND SANITIZER HOLDER PVC	157 mm x 25mm x 55 mm	2
	elbow pipe	25 mm	2
	HAND SANITIZER BASE	165 mm x 160mm x 9 mm	1
12	HAND SANITIZER PIPE	1200 mm x 25mm	1

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CHAPTER 8

Design of Adjustable Table Lifter Transport Using Hydraulic Jack

Amy Malissa Mohd Sam [1] and Hazriel Faizal Pahroraji [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): hazriel@uitm.edu.my*

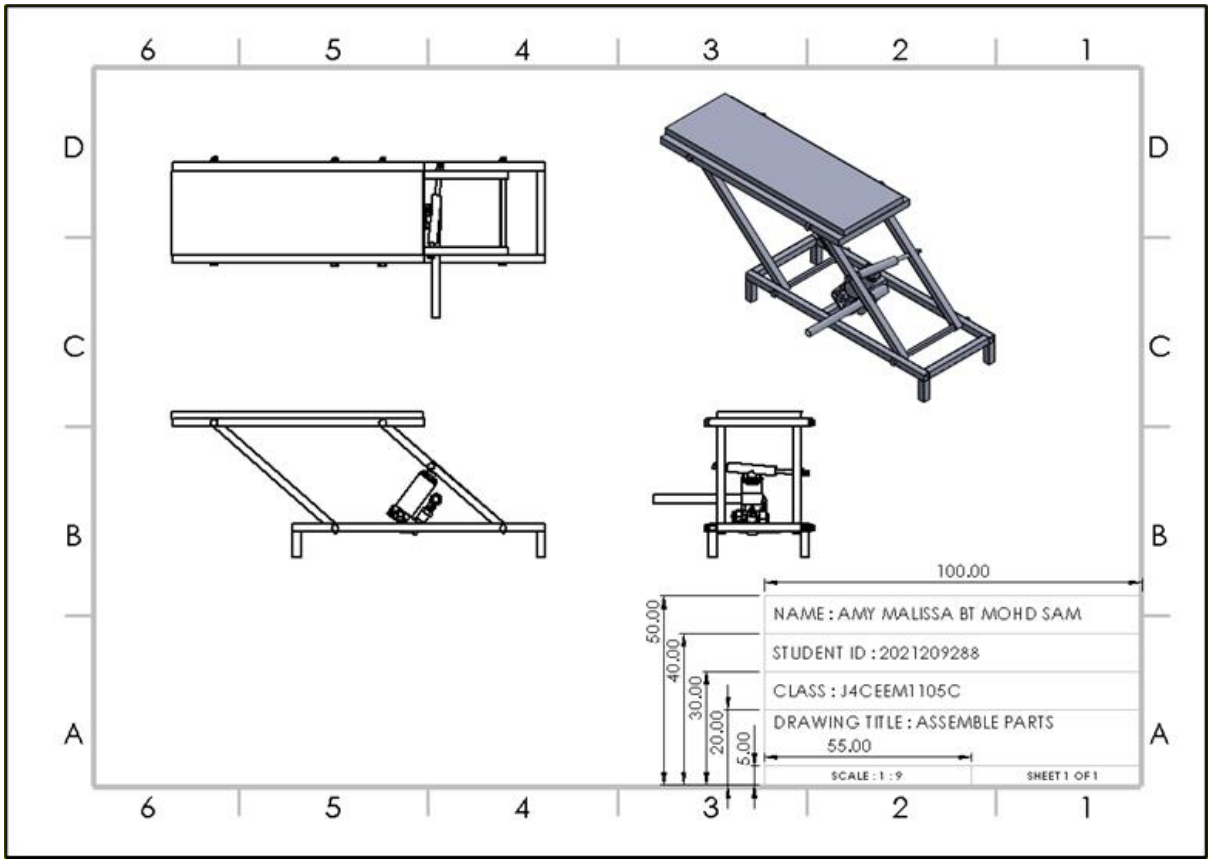
PROJECT DESCRIPTION

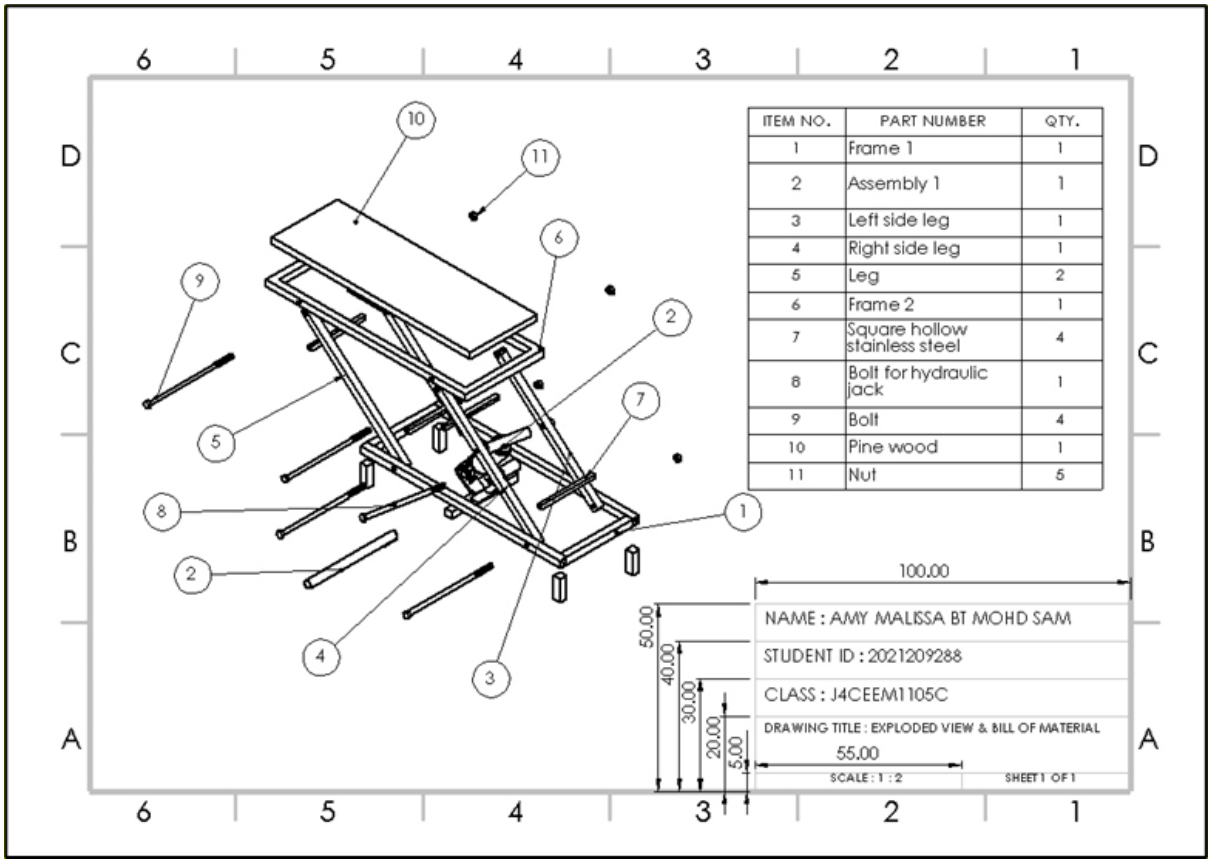
This project is presenting a piece of equipment or a system that uses hydraulic jacks to lift and transport heavy objects or materials, and the adjustable aspect allows you to control the height or position of the lifted load. It is expected to simply move the furniture and heavy appliances from one location to another, allowing to rearrange the furniture. After that, the design of this project also included additional features using hydraulic jacks, it can precisely adjust the height or position of the lifted load. This project discusses about the expected to be easy to maneuver easily, comfortable to use and safer and more secure. In conclusion based on the developed system, authors discussed the advantages and points need to be considered when working on the system.

Keywords: *Hydraulic Jacks, Easy to maneuver, Heavy objects*

PROTOTYPE

DESIGN PARAMETER





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CHAPTER 9

Development of a Prototype Automatic Tennis Ball Launcher

Ahmad Hazim Bin Zuraik [1] and Radzi Abdul Rasih [2*]

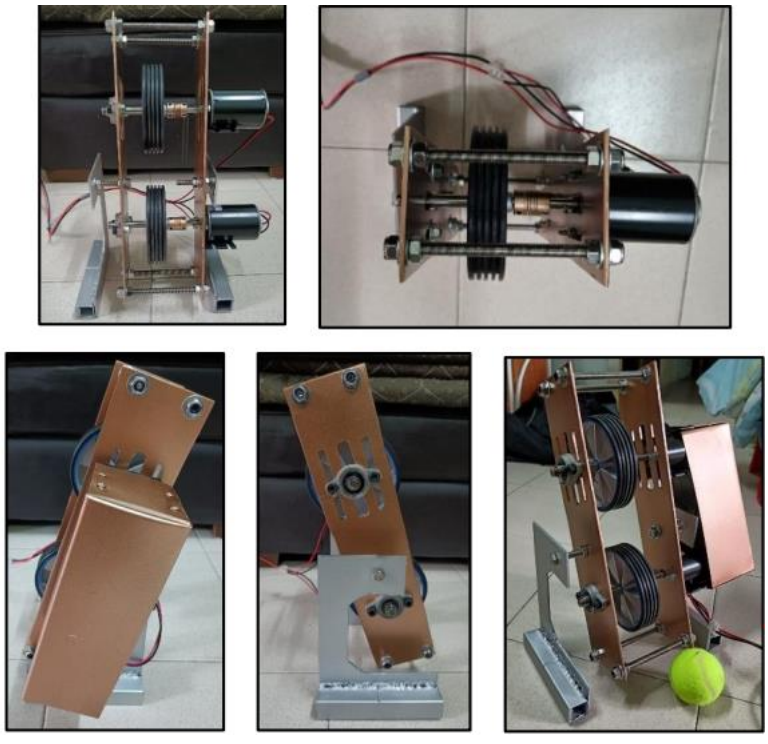
[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): radzi_rasih@uitm.edu.my*

PROJECT DESCRIPTION

This project focuses on designing an automatic tennis ball launcher to help players improve their skills through independent practice. Traditional training methods often require a partner, limiting opportunities for practice. Our device addresses this by accurately and consistently launching balls, simulating real match conditions. It features a motor, a hopper for ball storage, and adjustable settings for speed, trajectory, and direction, along with integrated safety measures to prevent accidents. This launcher offers a convenient training solution that enhances skill development and overall performance. Additionally, it promotes advancements in sports technology and engineering while fostering interest in tennis. Sustainability considerations, including energy efficiency and eco-friendly materials, have been prioritized to minimize environmental impact. Ultimately, the Automatic Tennis Ball Launcher provides a versatile tool for tennis players looking to enhance their abilities and reach their full potential in the sport.

Keywords: *Tennis, Launcher*

PROTOTYPE



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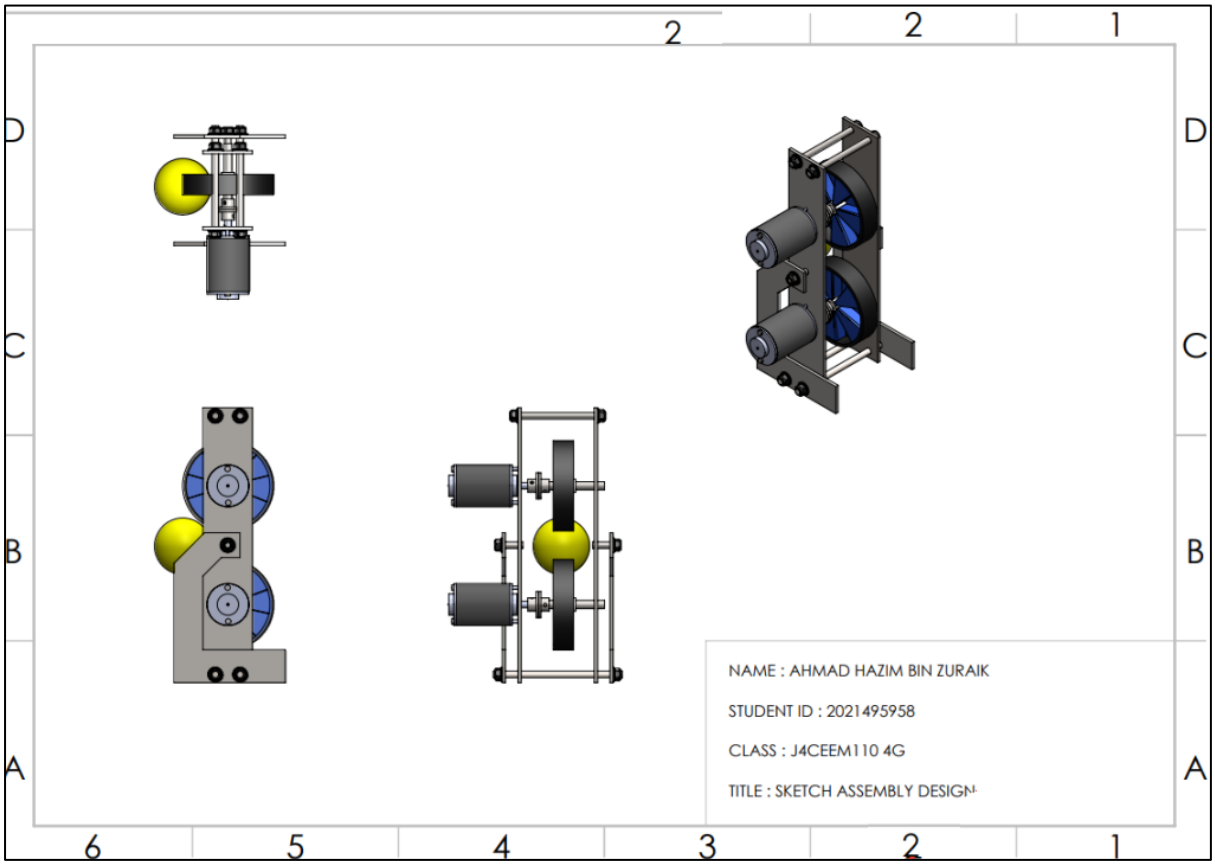

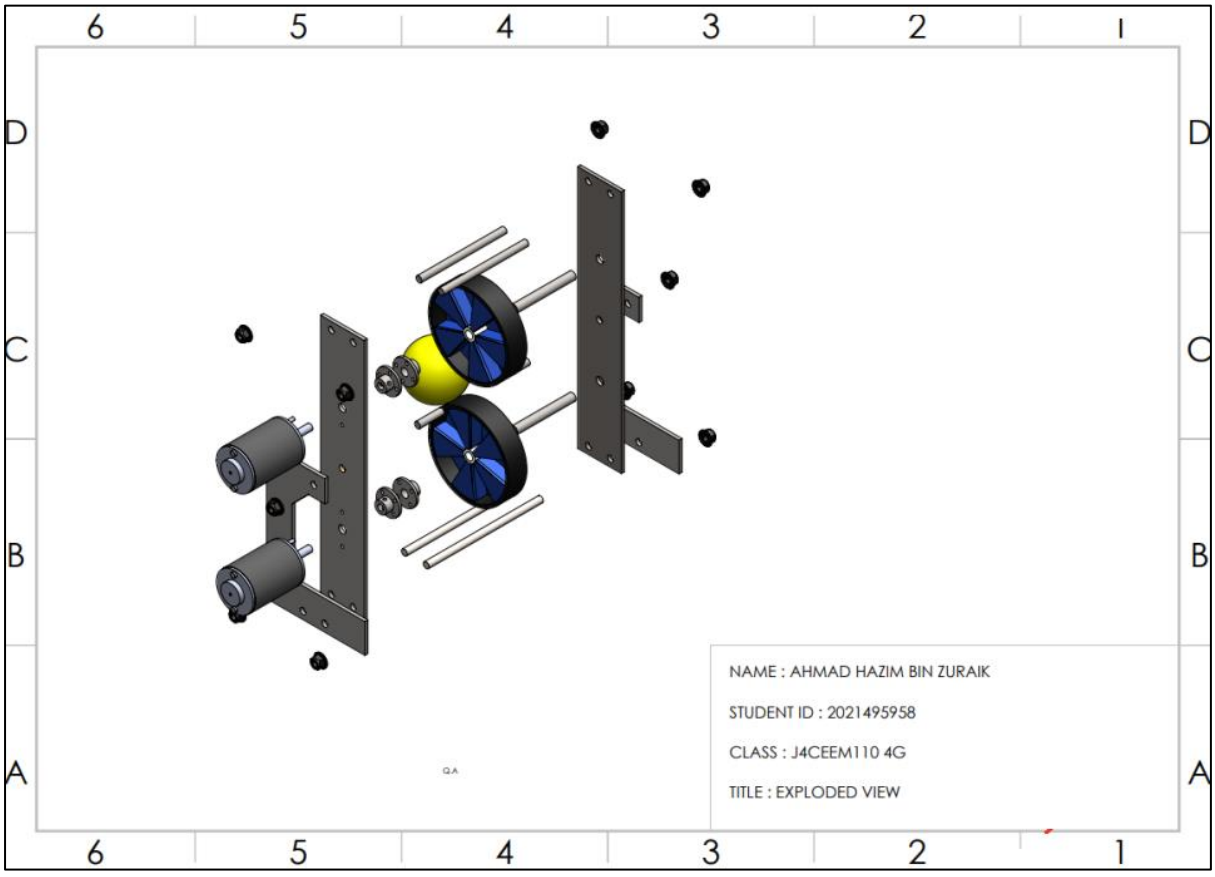

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CHAPTER 10

Development of a Prototype Semi-Automatic Bicycle Hanger

Aiman Asyraf Bin Azhar [1] and Radzi Abdul Rasih [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): radzi_rasih@uitm.edu.my*

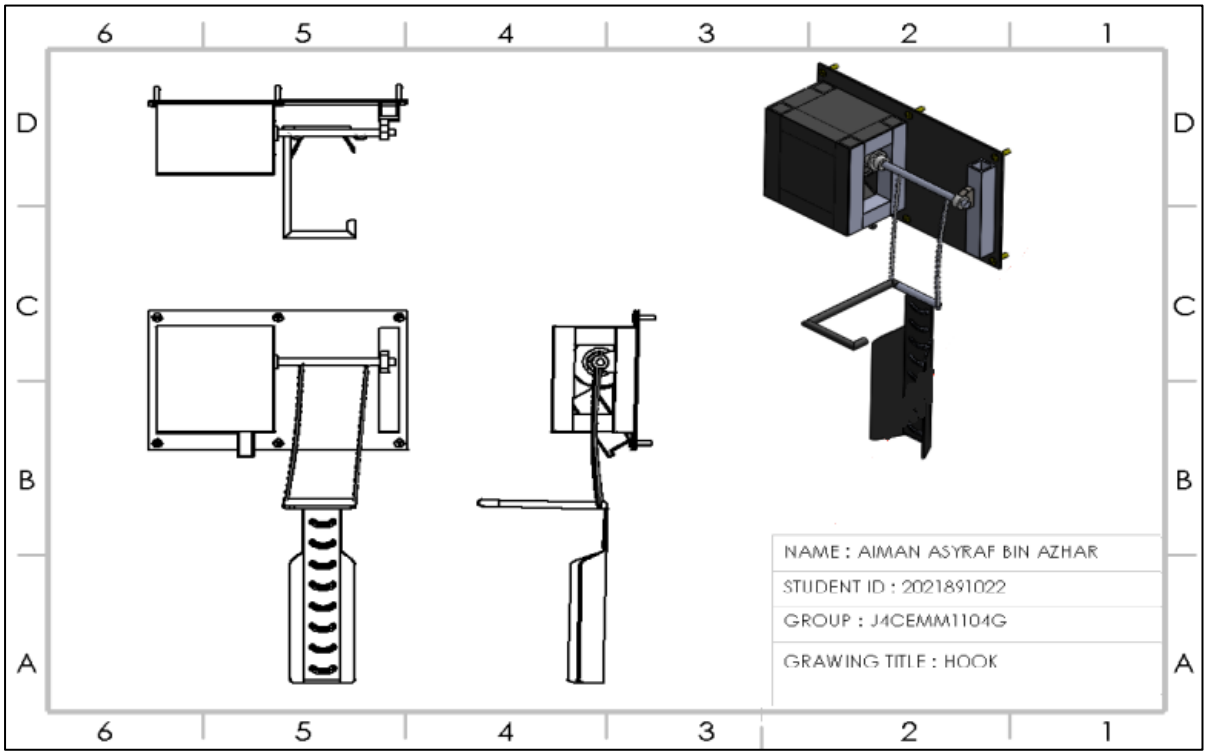
PROJECT DESCRIPTION

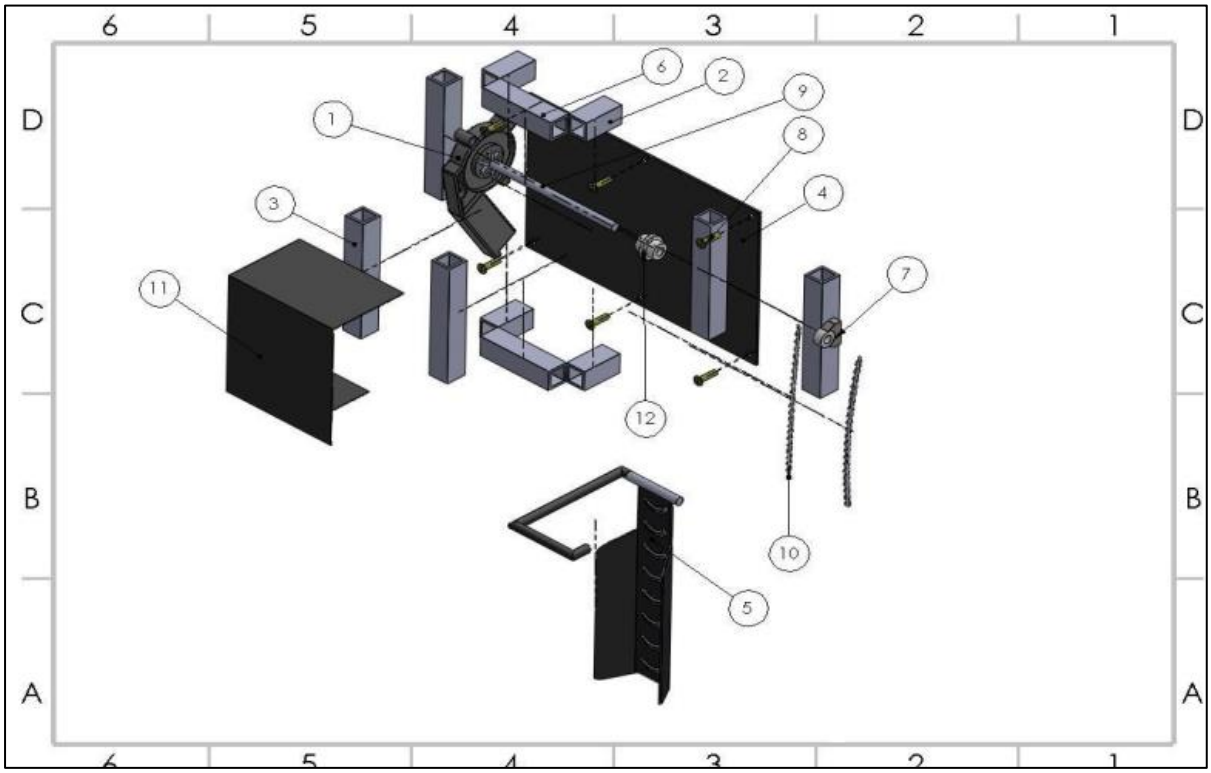
This project aims to address the limitations of manual bicycle hangers by developing an innovative automatic bicycle hanger system. The objective is to design and fabricate a secure and stable product within a budget of RM 300, which enhances the ease and security of bicycle storage. The existing manual hangers lack flexibility in accommodating different bicycle sizes and weights, pose a risk of damage to the bicycle, and make the storage process physically demanding. By utilizing motorized components and advanced design principles, the automatic hanger system will provide a user-friendly solution, specifically targeting bicycle owners facing challenges in crowded spaces. The project will employ a design-based approach, encompassing research, conceptualization, prototyping, and testing. The expected result is a functional automatic bicycle hanger system that improves storage efficiency, accommodating standard-sized bicycles, and enhances convenience and security in bicycle storage, contributing to a practical and affordable solution for bicycle owners.

Keywords: *Bicycle, Hanger*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 11

Design and Fabrication of Semi-Automatic Agricultural Sprayer

Muhammad Izzan Bin Muhammad Ruaad [1] and Radzi Abdul Rasih [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): radzi_rasih@uitm.edu.my*

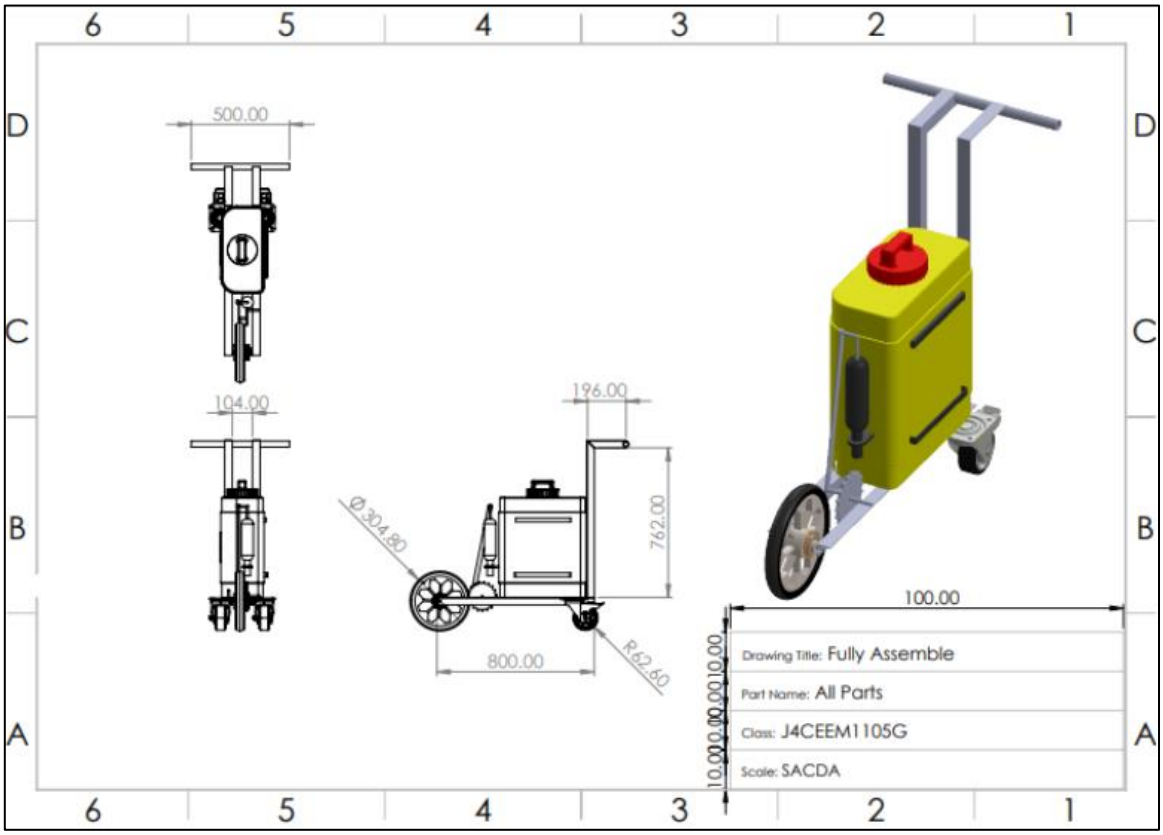
PROJECT DESCRIPTION

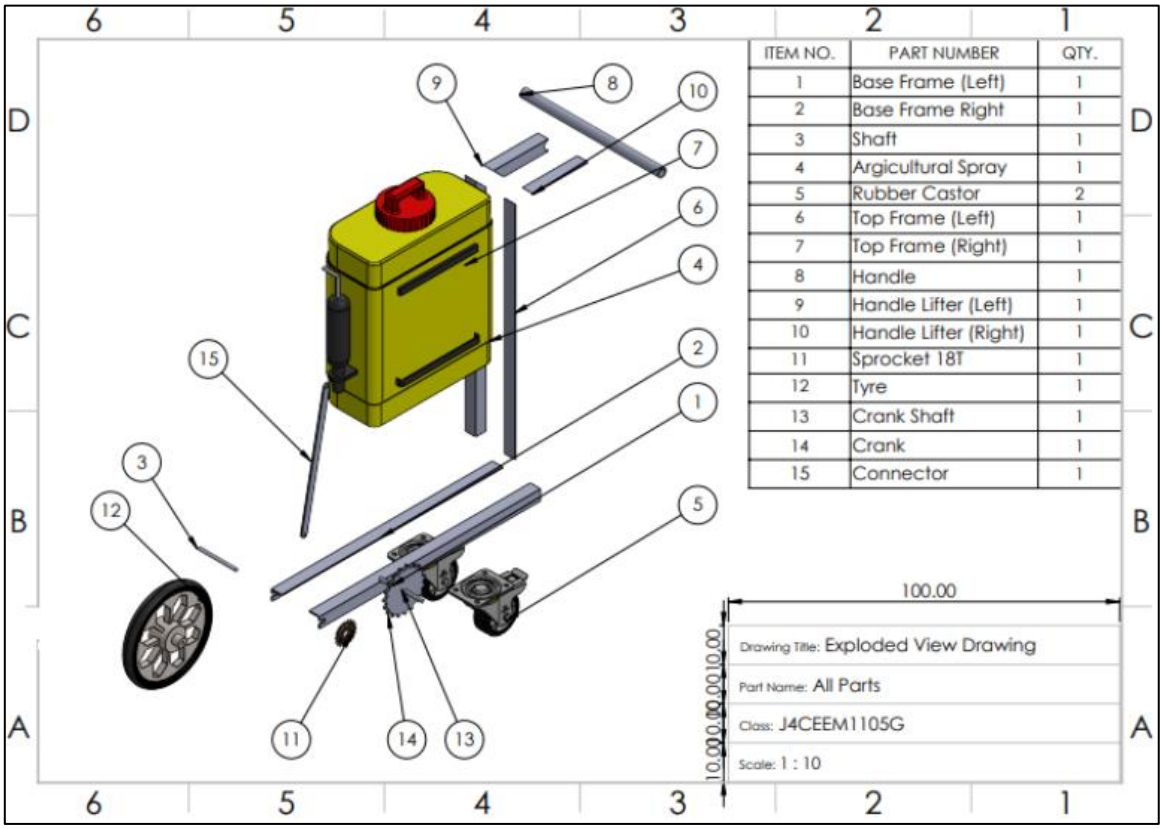
The goal of this project is to design and create a semi-automatic system for agricultural sprayer that will allow people to cultivate and manage a water garden with little human involvement. The development of agricultural sprayer, which takes less energy to run it and maintaining, as an outcome of a growing demand for ecologically friendly and sustainable gardening methods. The foundation and development of a water garden, however, are significantly hampered by the absence of a dependable and effective irrigation system. Therefore, this project aims to create a semi-automatic system for water gardening sprayer that will reducing the need for manual labour and ensuring that plants receive the right amount of water at the appropriate time. In order to develop a system that can maximized water conservation, this project employ a selection of methods, such as analysis of data, prototypes, experimentation, and pilot testing. The anticipated outcome is a practical and effective semi-automatic agricultural sprayer device that will improve the water gardens' sustainability and aesthetic appeal.

Keywords: *Agriculture, Sprayer*

PROTOTYPE

DESIGN PARAMETER





ITEM NO.	PART NUMBER	QTY.
1	Base Frame (Left)	1
2	Base Frame Right	1
3	Shaft	1
4	Argicultural Spray	1
5	Rubber Castor	2
6	Top Frame (Left)	1
7	Top Frame (Right)	1
8	Handle	1
9	Handle Lifter (Left)	1
10	Handle Lifter (Right)	1
11	Sprocket 18T	1
12	Tyre	1
13	Crank Shaft	1
14	Crank	1
15	Connector	1

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CHAPTER 12

Design and Analysis of an Ergonomic Portable Lifting Device

Muhammad Fahmi bin Mohd Jais [1] and Kamariah Binti Md Isa [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): kamariahisa@uitm.edu.my*

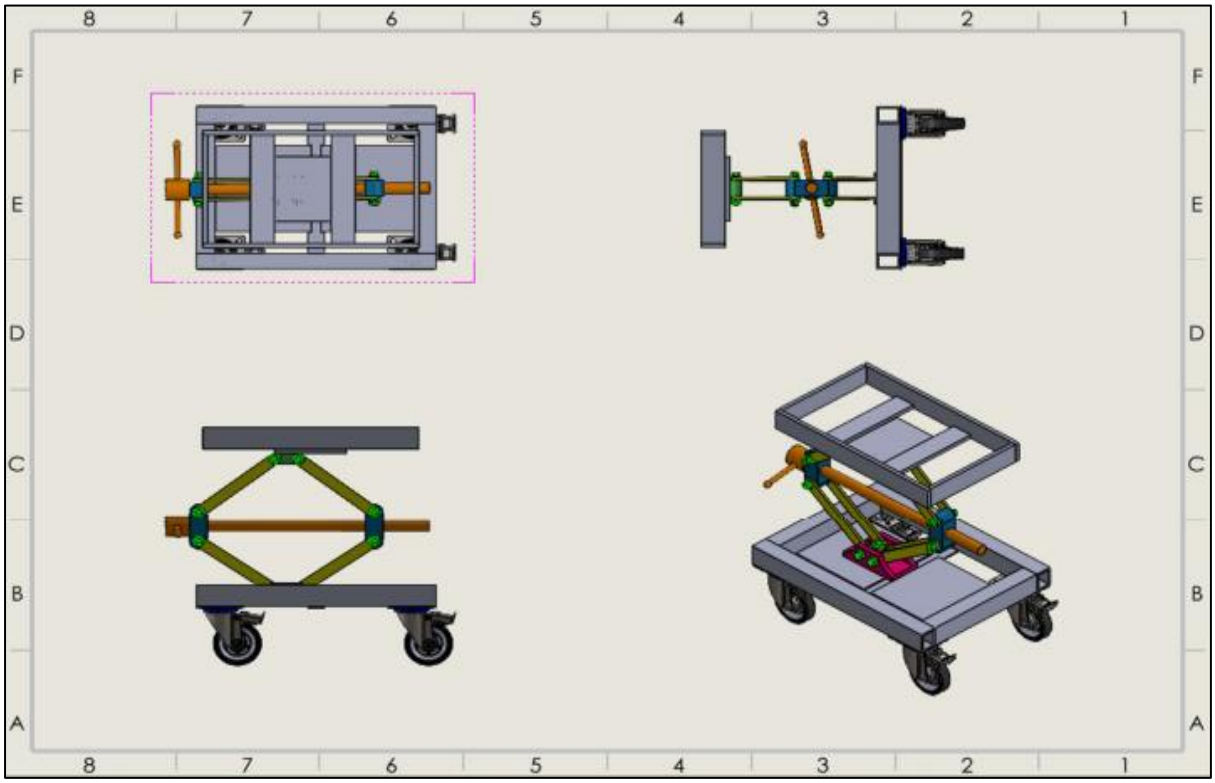
PROJECT DESCRIPTION

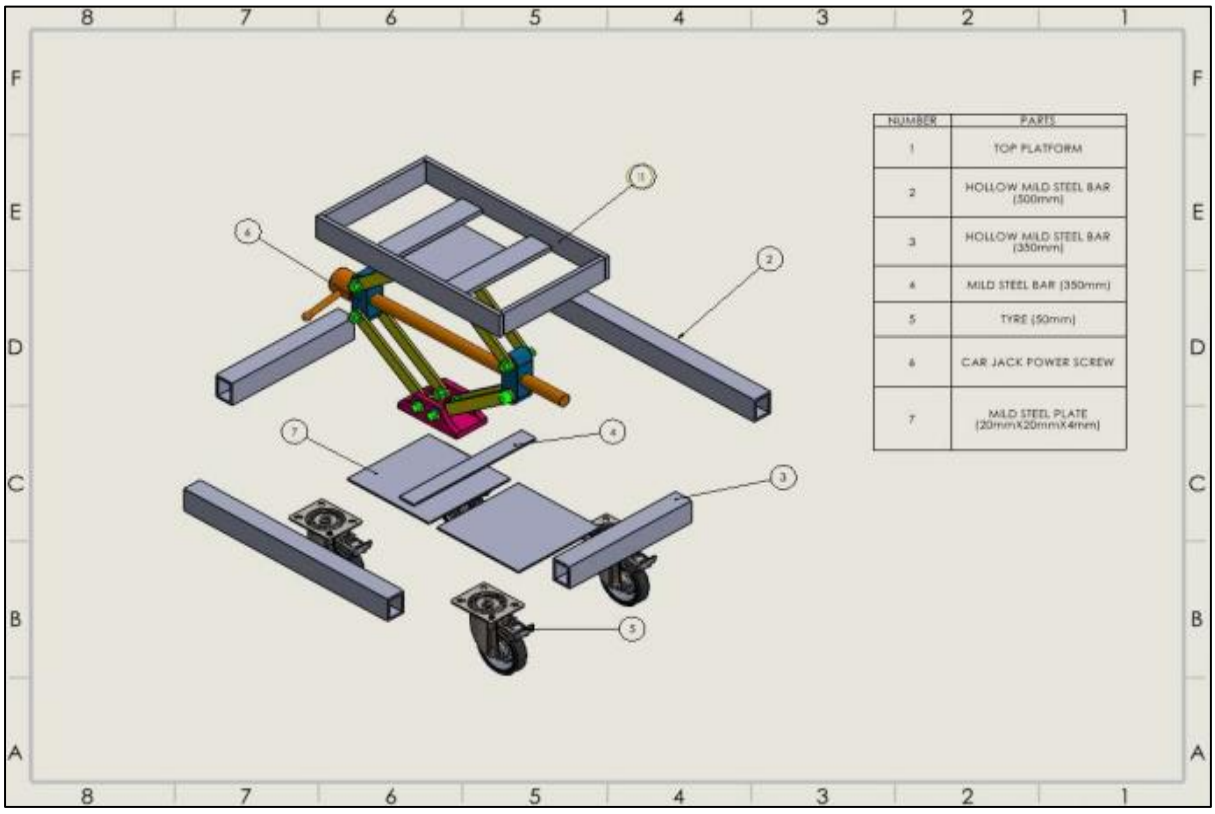
The portable lifting device draws inspiration from the lever principle, aiming to hoist, lower, and transport heavy machinery, equipment, or materials with ease around a workstation, thus streamlining movement and saving labor and time. Innovations include a wheelbase with four rubber wheels for smooth mobility and adjustable design suitable for various material sizes. Research findings indicate difficulty in moving heavy furniture alone, highlighting the need for a practical solution like a portable lifting device for use in homes, warehouses, and factories. Currently available solutions, such as home trolley lifts, are expensive and lack features like side rails for securing items, prompting the project's aim to develop an affordable, user-friendly alternative. Through the standard engineering design process and Solid Works modeling, the project seeks to create a prototype by the project's completion. The device addresses common issues associated with traditional trolleys, such as space consumption, lack of platform protection, and inability to lift objects to a convenient height, ultimately aiming to enhance user comfort and safety while facilitating heavy lifting tasks. The study's significance lies in its potential to assist fragile individuals, prevent injuries, and reduce labor and costs for small warehouse owners.

Keywords: *portable lifting device, trolley*

PROTOTYPE

DESIGN PARAMETER





NUMBER	PARTS
1	TOP PLATFORM
2	HOLLOW MILD STEEL BAR (500mm)
3	HOLLOW MILD STEEL BAR (350mm)
4	MILD STEEL BAR (350mm)
5	TYRE (50mm)
6	CAR JACK POWER SCREW
7	MILD STEEL PLATE (20mmX20mmX4mm)

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CHAPTER 13

Design and Fabrication of Automatic Fish Feeder

Muhammad Ibrahim bin Nor Azman [1] and Muhamad Faris Syafiq Bin Khalid [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): mfarissyafiq@uitm.edu.my*

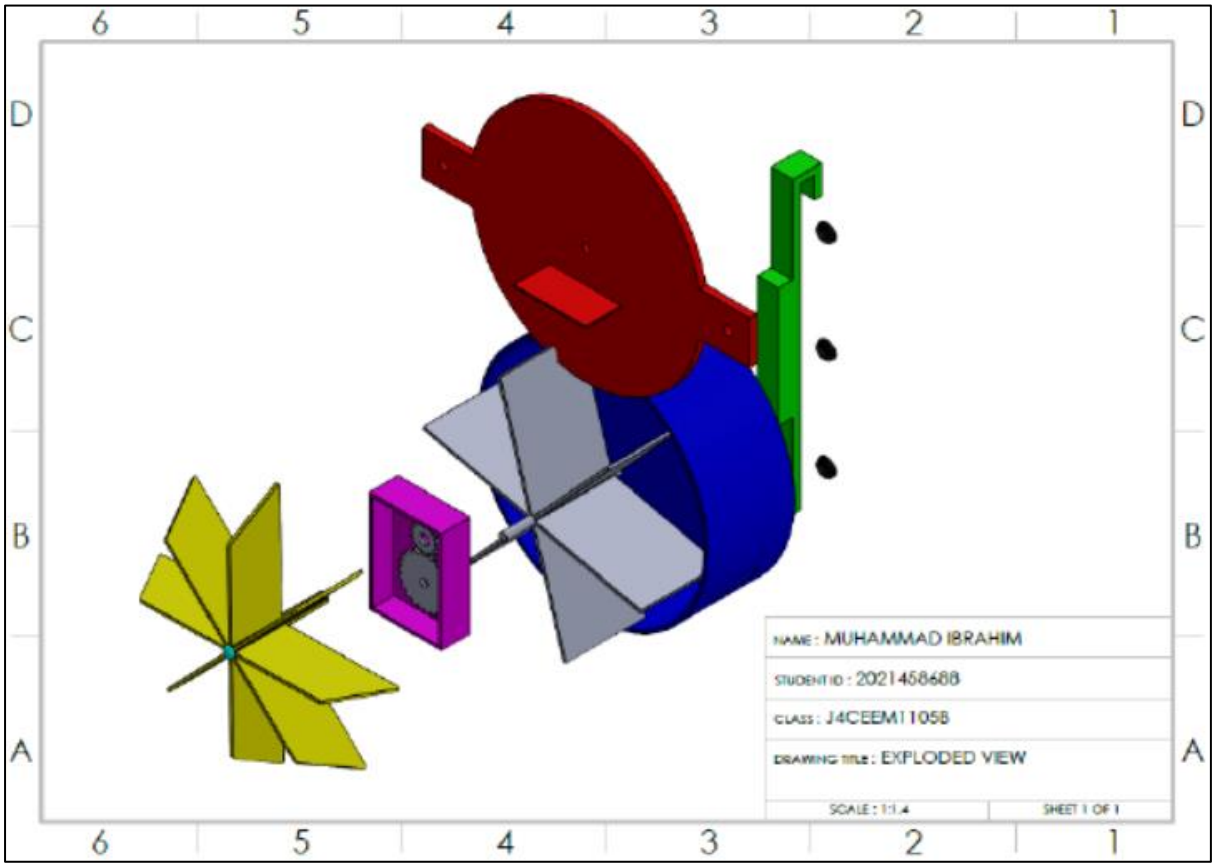
PROJECT DESCRIPTION

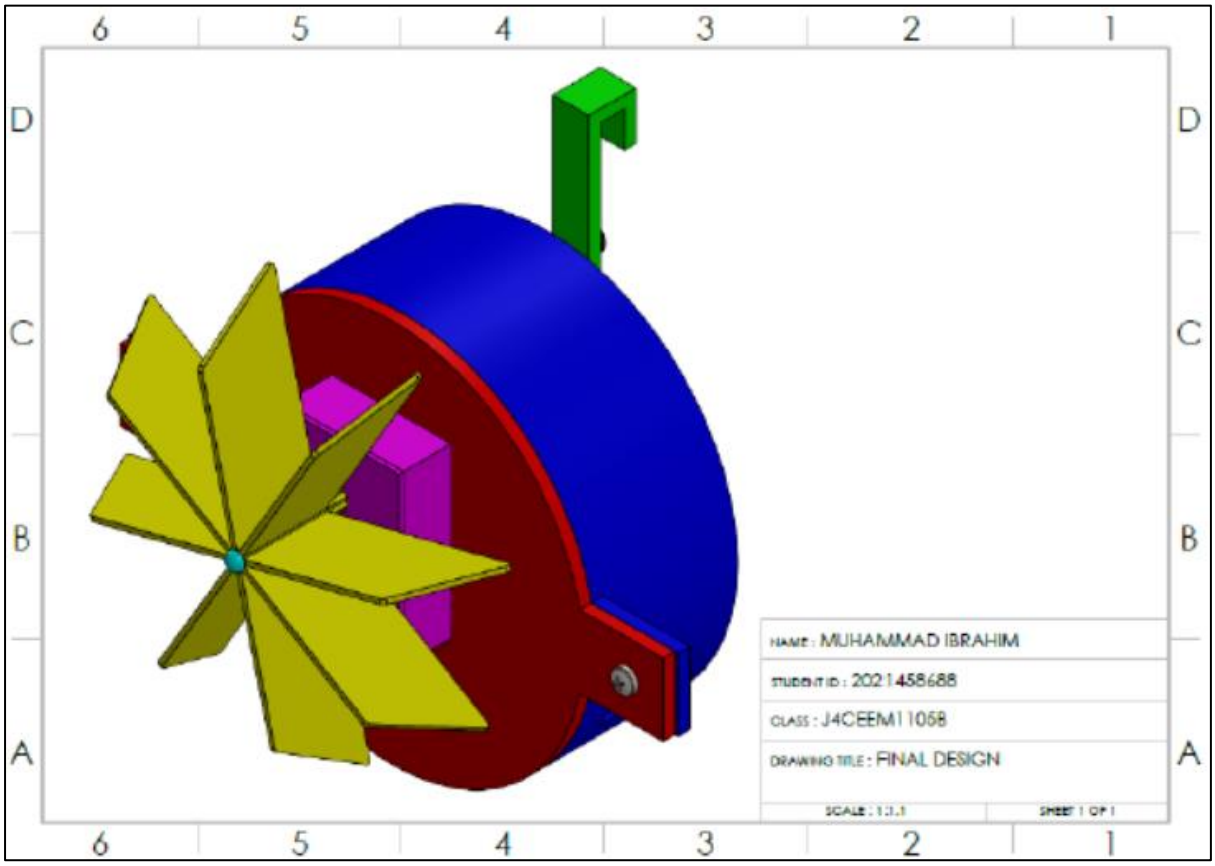
Having fish as pets nowadays is a really common thing, no matter if you are rich or not. Feeding pets is important to make sure they can get enough nutrients and live healthily. The automatic fish feeder is introduced to make sure pets are provided with enough food consistently without you having to consistently monitor them. Automatic fish feeders that are available in the market nowadays are pretty expensive and not much are being sold and produced in the common marketplace. Apart from that, they require a large amount of electricity to run and operate. So, this project introduces a new prototype that has no electricity consumption at all. It is also cheap, easy to use and installed due to lack of complicated mechanism.

Keywords: *Fish Feeder, Automatic*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 14

Design and Fabrication of Potato Peeling Machine

Muhammad Firdaus Bin Hafiz [1] and Muhamad Faris Syafiq Bin Khalid [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): mfarissyafiq@uitm.edu.my*

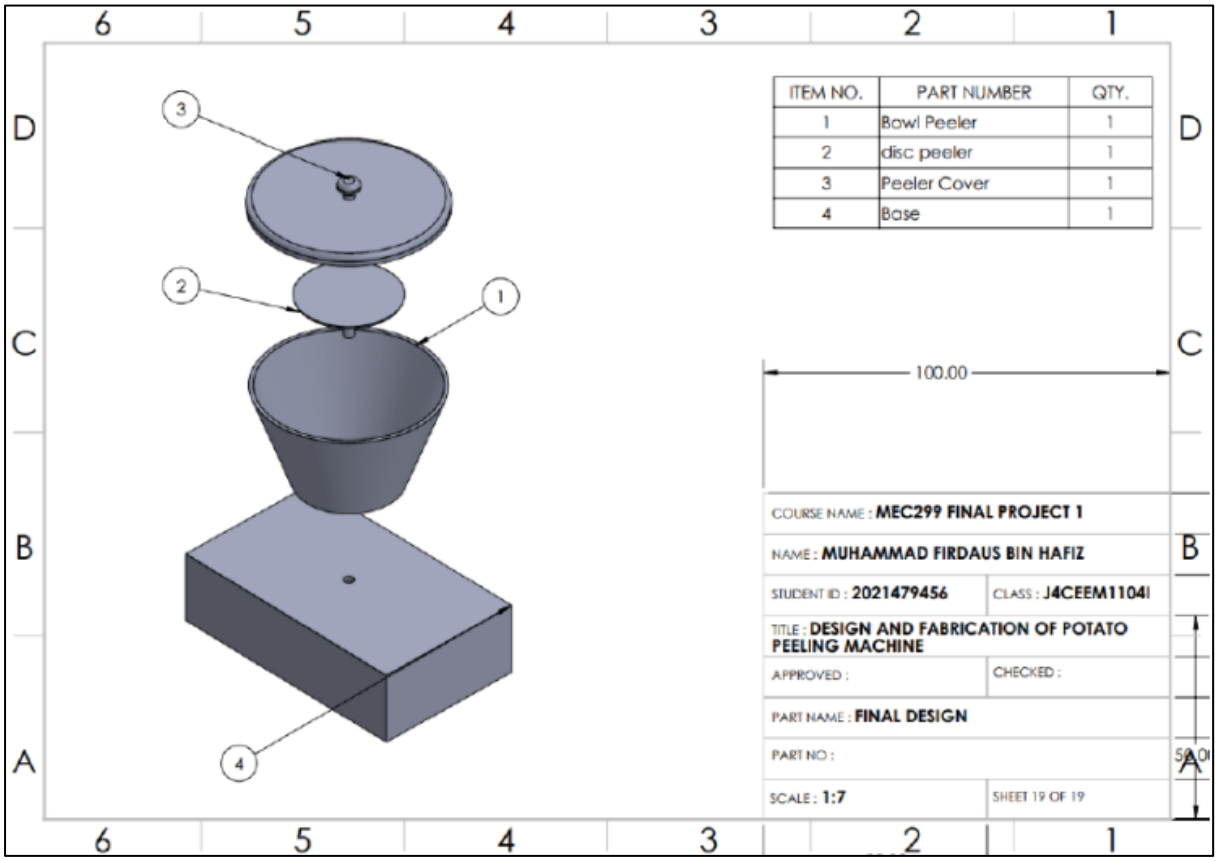
PROJECT DESCRIPTION

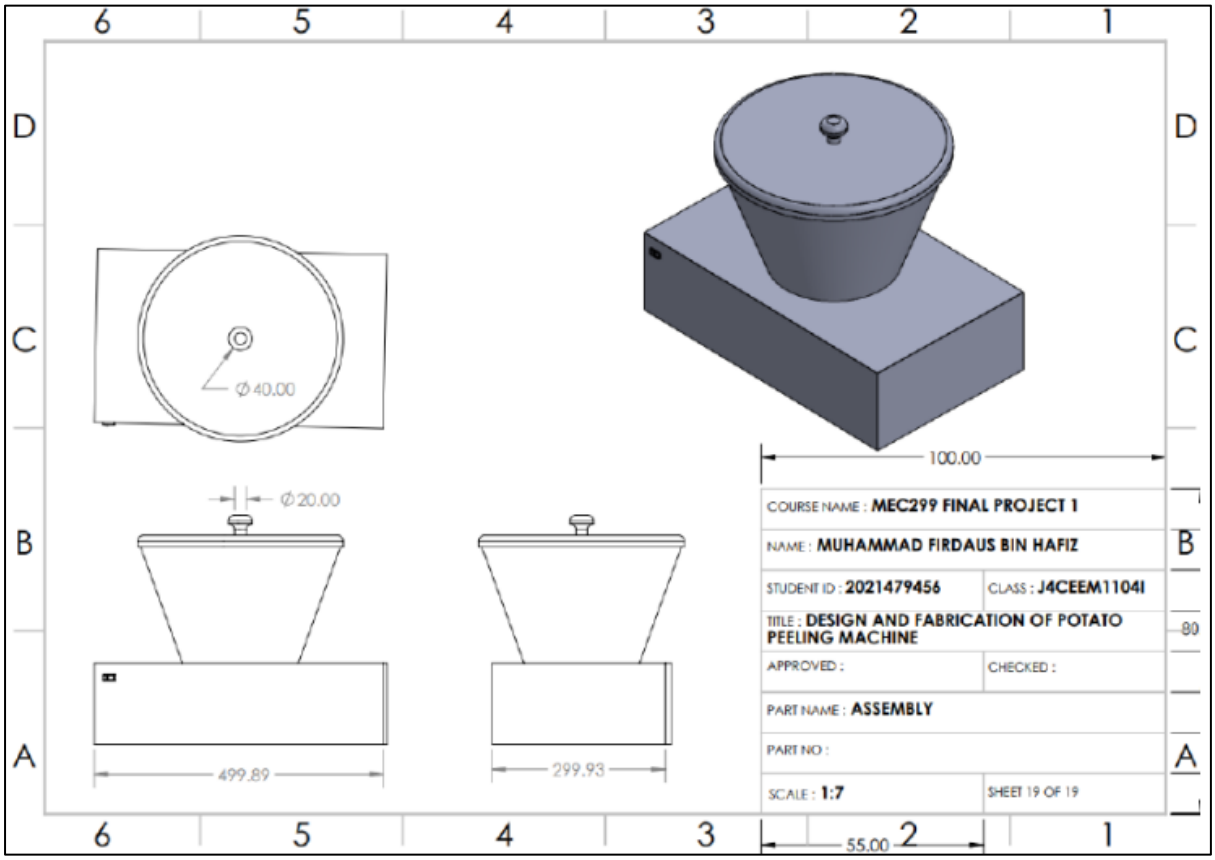
A technical advancement that tries to make peeling potatoes more effective is the potato peeling machine. Potato peeling traditionally takes a lot of times and effort, especially when there are a lot of potatoes to peel. In order to improve the effectiveness and efficiency in the food businesses, the adoption of automatic potato peeling machine is a desireable choice. In this study, I wish to use a variety of cutting edge technologies to construct a potato peeling machine. This machine has a blade to effectively scrape the skin. Utilizing this potato peeling machine has a number of benefits, including the ability to boost production, reduce labour and time requirements, and enhance product quality. Additionally, using this device might lower danger of accidents that comes with laborious potato peeling.

Keywords: *Potato peeling, Peeling machine*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 15

Design and Analysis of Training Ball Thrower Device

Afiq Zul Anas bin Jolaili [1] and Nurulsaidatulsyida Sulong [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): saidatulsyida@uitm.edu.my*

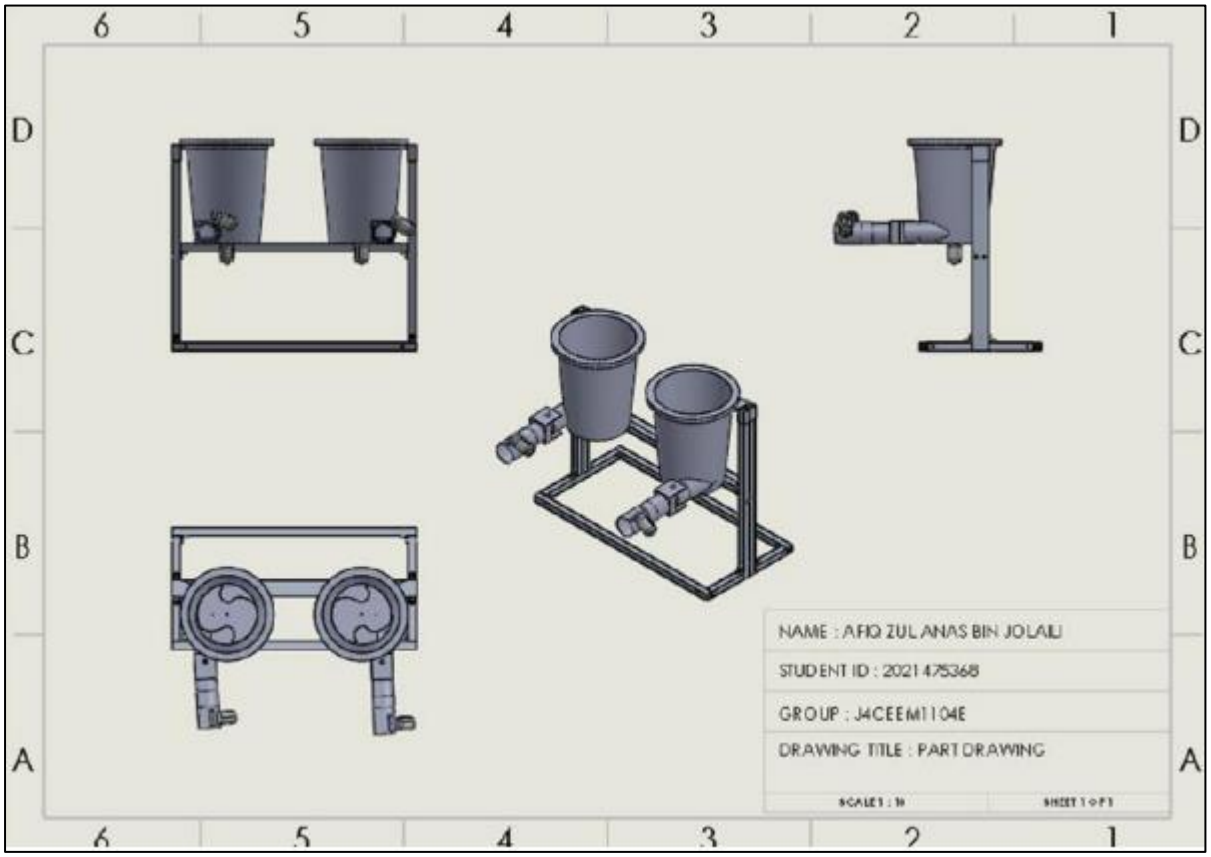
PROJECT DESCRIPTION

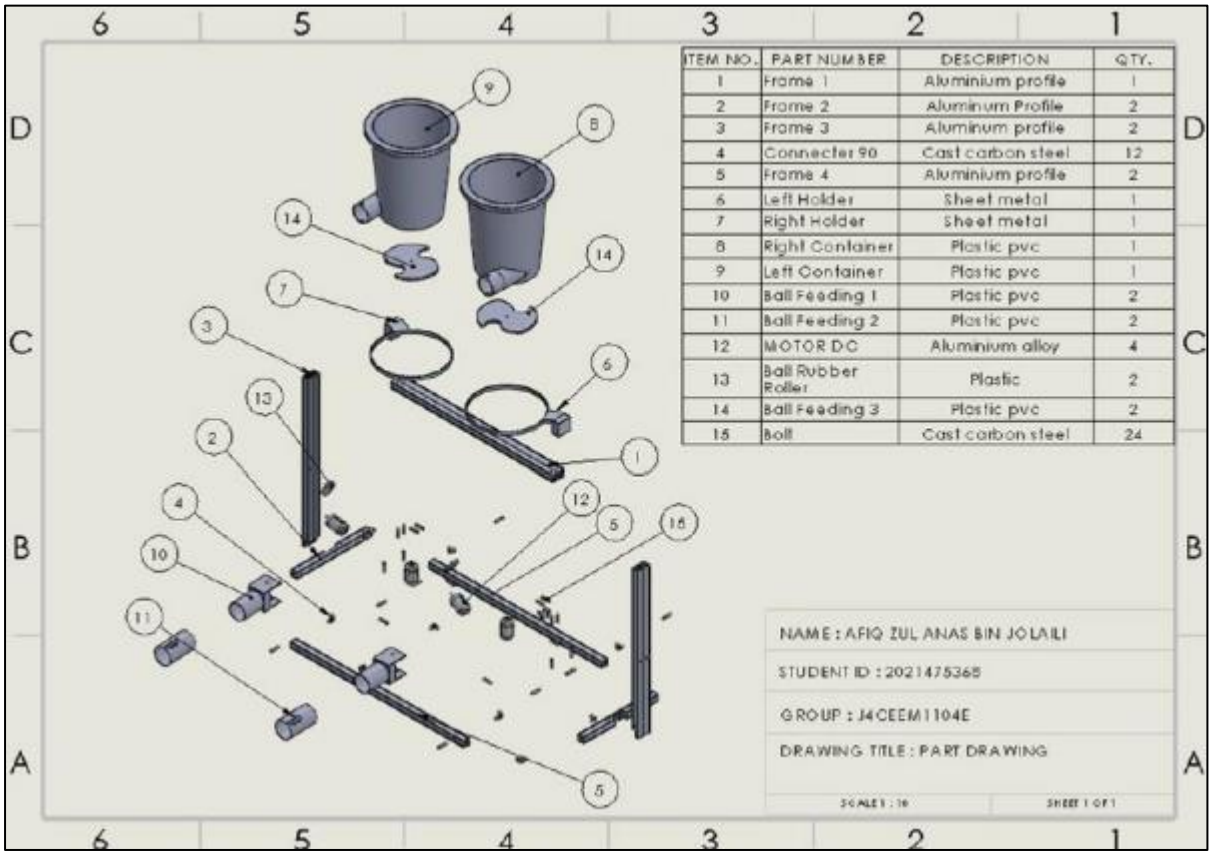
When a human opponent is not available to return a volley, ping pong ball launching devices can be used as a means of practising. At present, there are only a limited number of systems available in the market. However, considering the high cost and complex design of these systems, it may not be advisable for a ping pong player to invest in one of them. The objective of this project was to create a more efficient and cost-effective ping pong ball launcher. The ping pong ball launcher that was created had an innovative design. It utilised motors with variable speed control to distribute the balls onto a launching track and then launch them. The designer will show how their new ping pong launcher works and explain how to help customers choose the more affordable option

Keywords: *ping pong , ball launcher*

PROTOTYPE

DESIGN PARAMETER





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CHAPTER 16

Portable Automatic Hammer

Danish Fathi Sudin [1], Najibah Ab Latif [2*] and Ainaa Maya Munira Ismail [3]

[1,2,3]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): najibahlatif@uitm.edu.my*

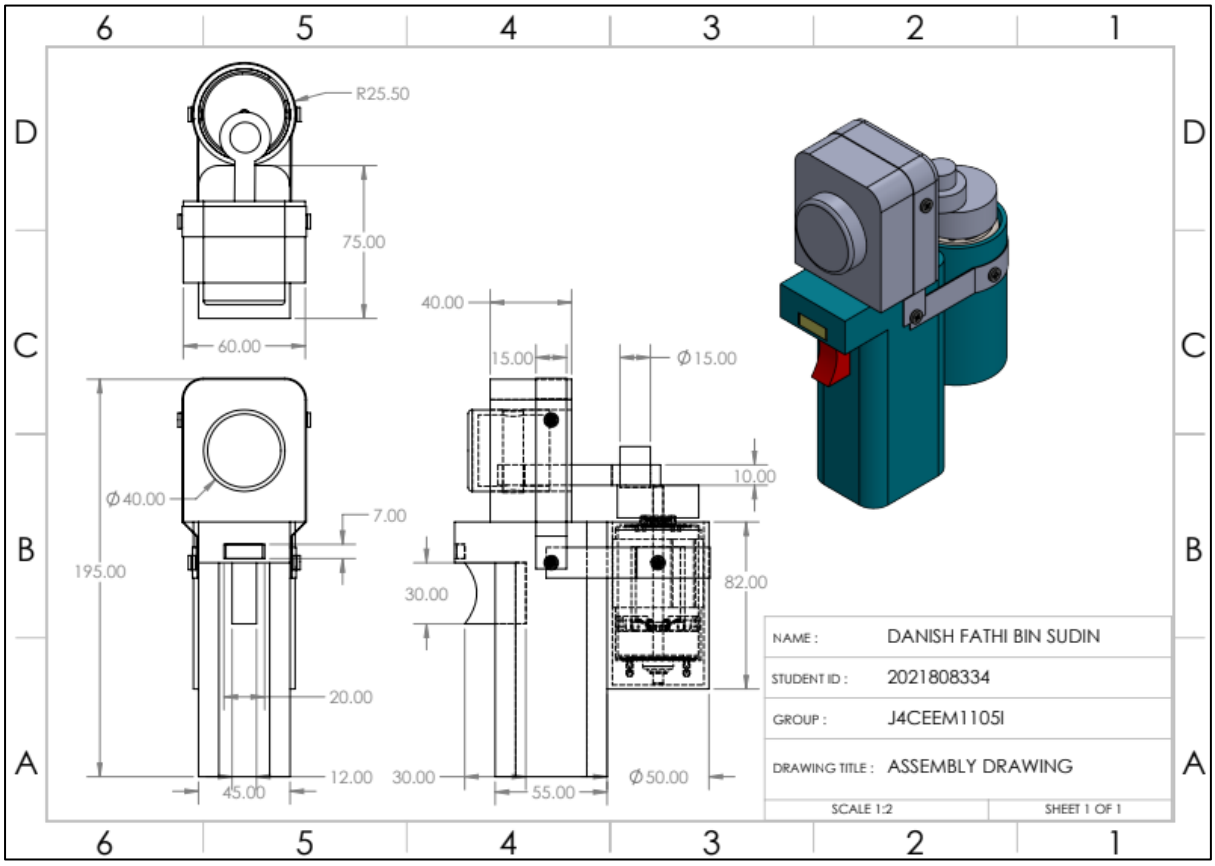
PROJECT DESCRIPTION

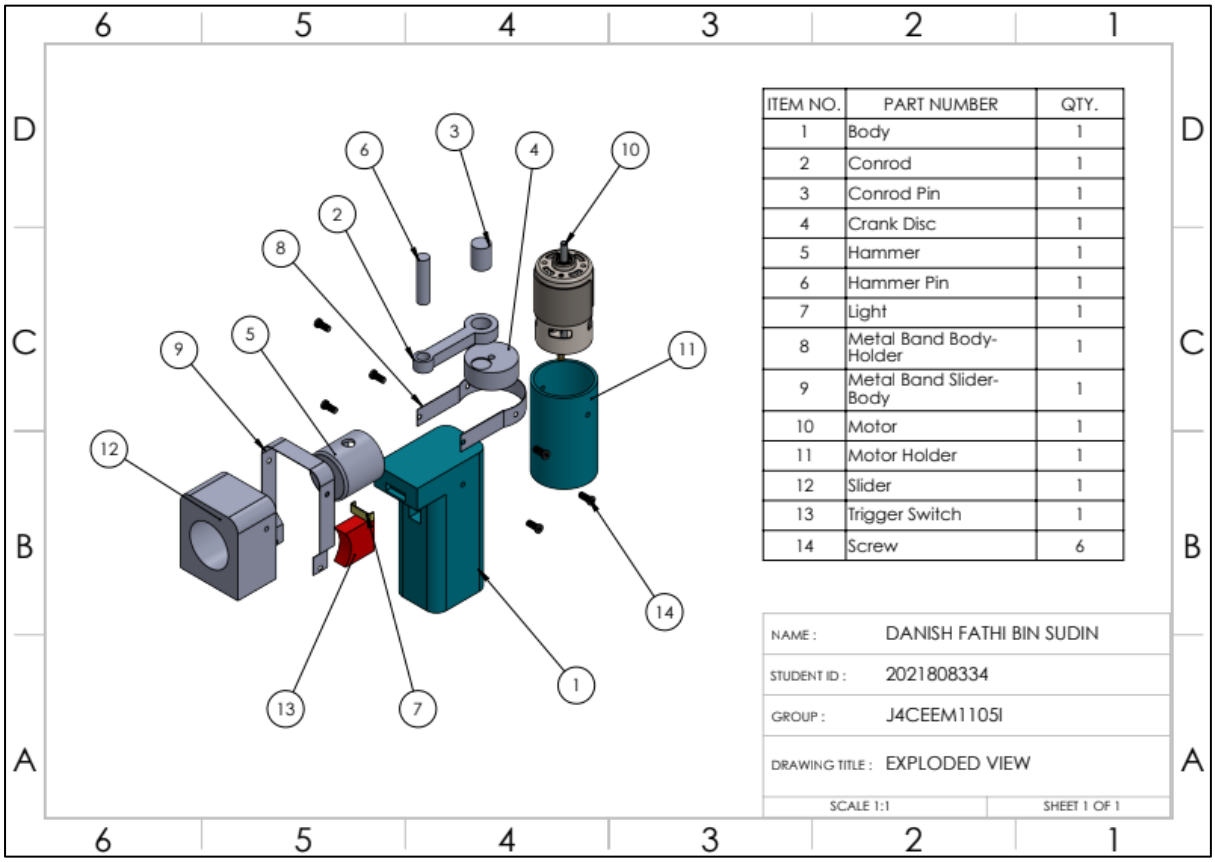
A hammer is an old, time-tested way of delivering a huge force onto a surface. Whether it is to insert a fastener to join two separate pieces of object together, or to shape a hard and ductile surface like metal, or even to be used a weapon to bludgeon one's enemy, a hammer is a reliable way to generate a huge amount of force in a small package. However, as such tool offers that amount of force, it also comes with a problem in which there are no safety measures to reduce the chances of injury such as breaking one's finger or nail when using the hammer. Hence, the objective of this project is to reduce such injury while also reducing the amount of time needed to hammer a fastener such as a nail. Methodologies used for this project are designing the product using Solidworks, cutting, joining and grinding process. In conclusion, developing a portable hammering machine is a challenging and an arduous task, it could have the potential to help thousands of workers to streamline and further boost their efficiency as it lessens their energy usage during hammering.

Keywords: *Hammer, Fastener*

PROTOTYPE

DESIGN PARAMETER





ITEM NO.	PART NUMBER	QTY.
1	Body	1
2	Conrod	1
3	Conrod Pin	1
4	Crank Disc	1
5	Hammer	1
6	Hammer Pin	1
7	Light	1
8	Metal Band Body-Holder	1
9	Metal Band Slider-Body	1
10	Motor	1
11	Motor Holder	1
12	Slider	1
13	Trigger Switch	1
14	Screw	6

e-ISBN: 978-967-0033-32-7

CHAPTER 17

Versatile and Foldabe Gas/box Trolley

Ahmad Yusree Zaini [1] and Zeno Michael [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): zenomichael@uitm.edu.my*

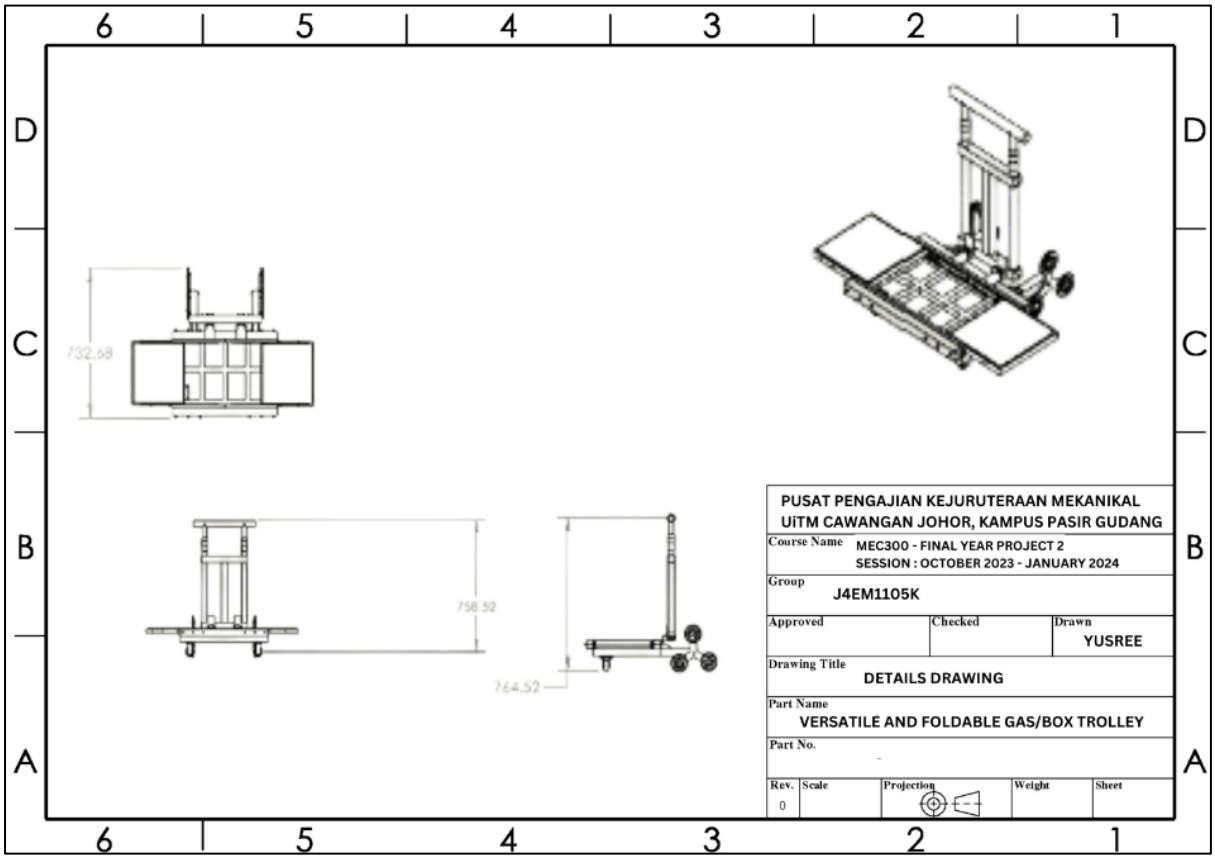
PROJECT DESCRIPTION

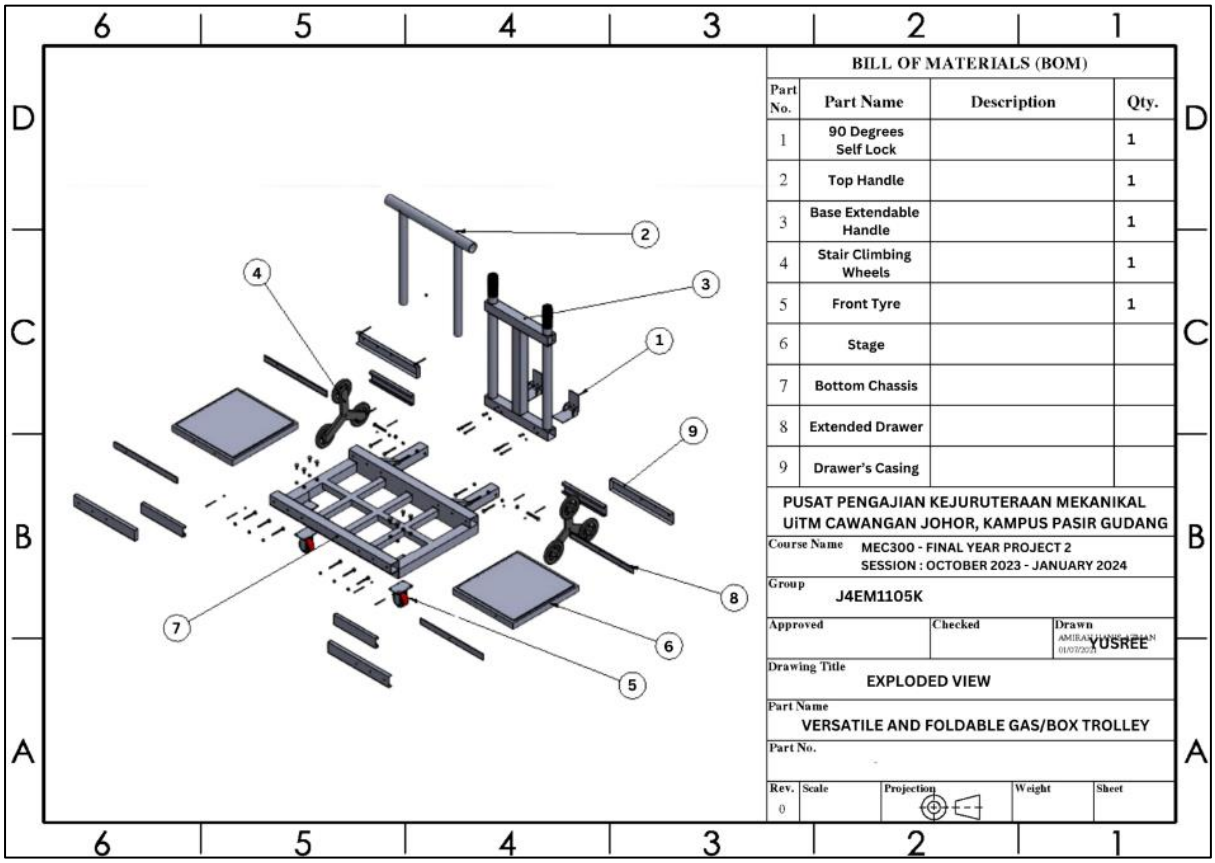
Gas transportation has become an essential for everyone in the South East Asia as it is supplied by using gas tank rather an integrated gas system like in Europe or United States. However, The Eastern nation like Malaysia or Indonesia are becoming more denser populated community as the more families are likely to live in high rise apartment. It is harder especially for old people to transport the gas to their home considering the weight of cooking gas are rather heavy. Also, the gas trolley usually has a one-purposed use that is to increase mobility of the gas tank. So, the customers need to invest more to buy another trolley to transport box or heavy item. Gas trolley that exists are usually has low capacity and only transport one item at the same time. Due to that, this Versatile Gas/Box Trolley is created. This product will go through a design selection process and is required to create an isometric view using state of-art SolidWorks 2019. As a result, this product may help people who have a problem in transporting item and looking for cheapest option.

Keywords: *Foldable, Tolley*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 18

Design and Development of an Enhanced Metacentric Height Measurement Tool for Laboratory Experiment

Muhammad Aiman Mohammad Bahrin [1] and Zeno Michael [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): zenomichael@uitm.edu.my*

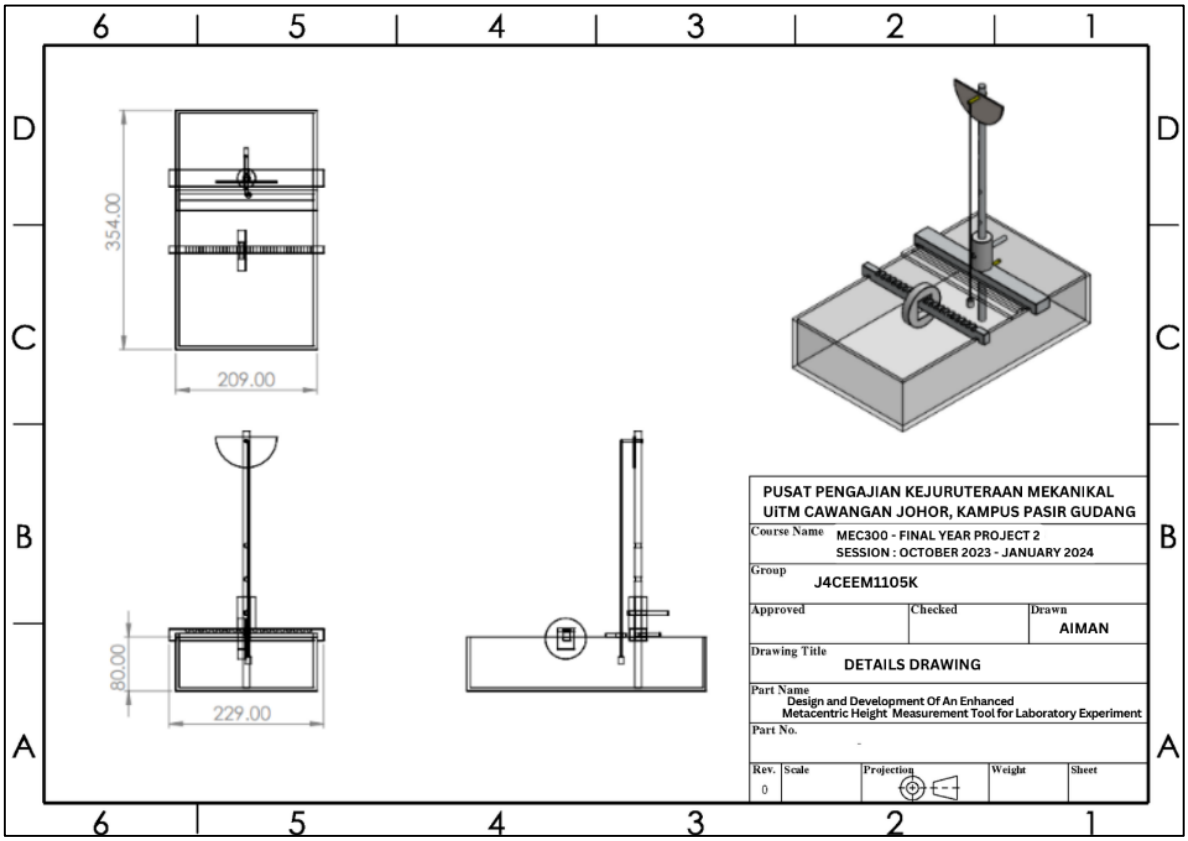
PROJECT DESCRIPTION

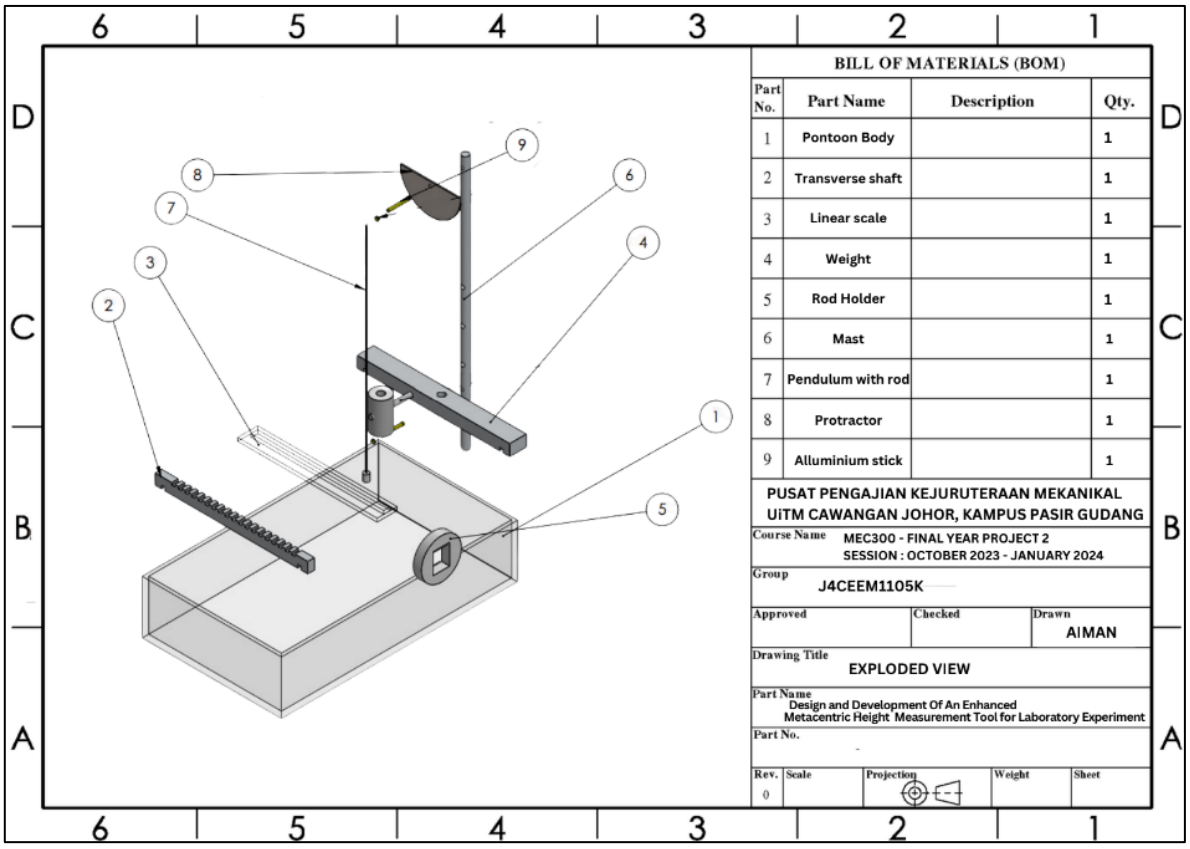
The researches of fluid dynamics and stability of floating objects is the most importance in many fields such as shipbuilding and naval architecture. One measurement tool that is used to analyze the stability of floating objects is the metacentric height. The metacentric height measures the distance between the center of gravity and the metacentre of a floating body. The current metacentric height measurement tools used in laboratory experiments suffers from many problem like inaccurate measurement, limited data acquisition, limited experimental flexibility and lack of user-friendliness. The methodologies used in this project is research and analyze the existing metacentric height measurement techniques and tools, concept development based on identified requirements and objectives , testing and validation for accuracy, reliability, usability and compatibility. After that, for the expected result, it is surely to improve the metacentric height's accuracy in measuring the value, also to enhance data acquisition capabilities and to increase the experimental flexibility during lab experiments.

Keywords: *Metacentric Height, Measurement Tool*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 19

Designing a Portable Tire Lifting System for Effortless Tire Replacement for All

Alvin Naath Magedran [1] and Zeno Michael [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): zenomichael@uitm.edu.my*

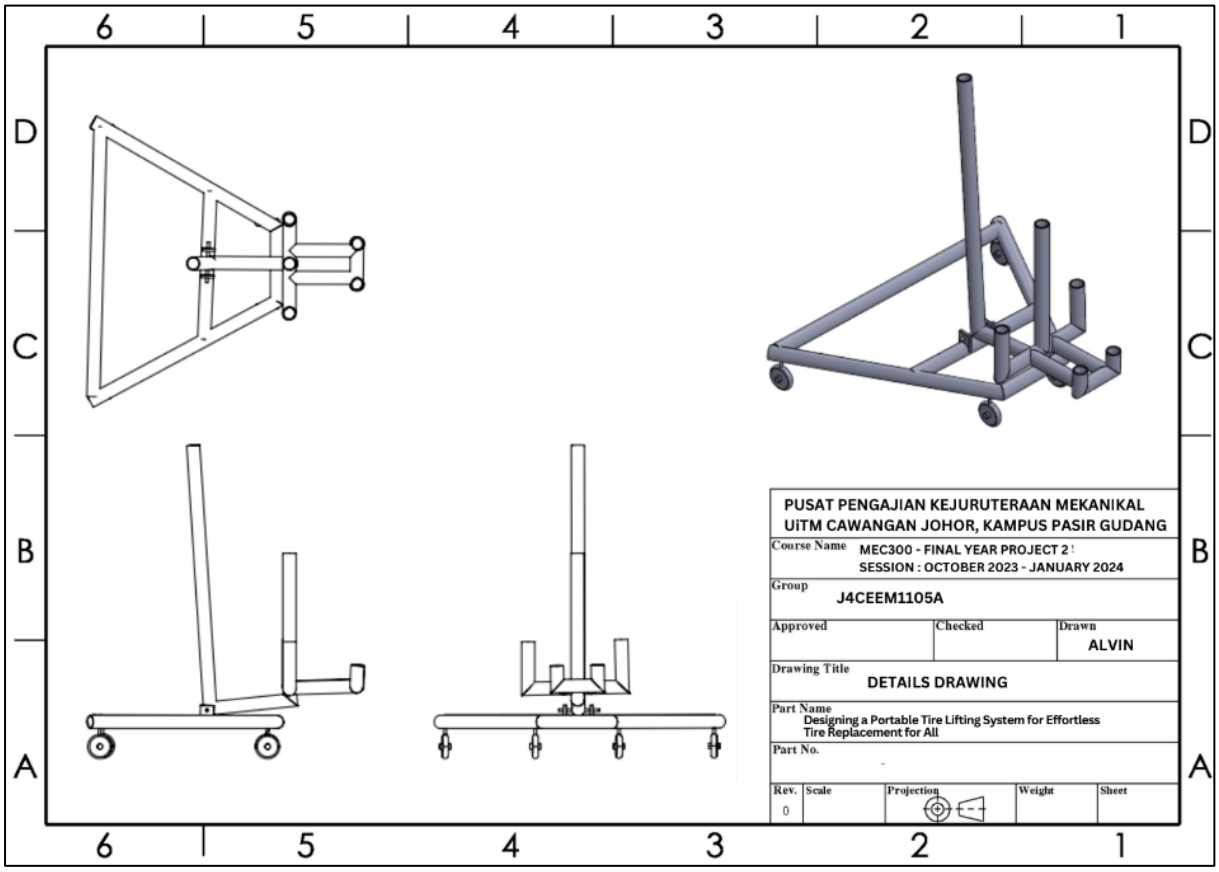
PROJECT DESCRIPTION

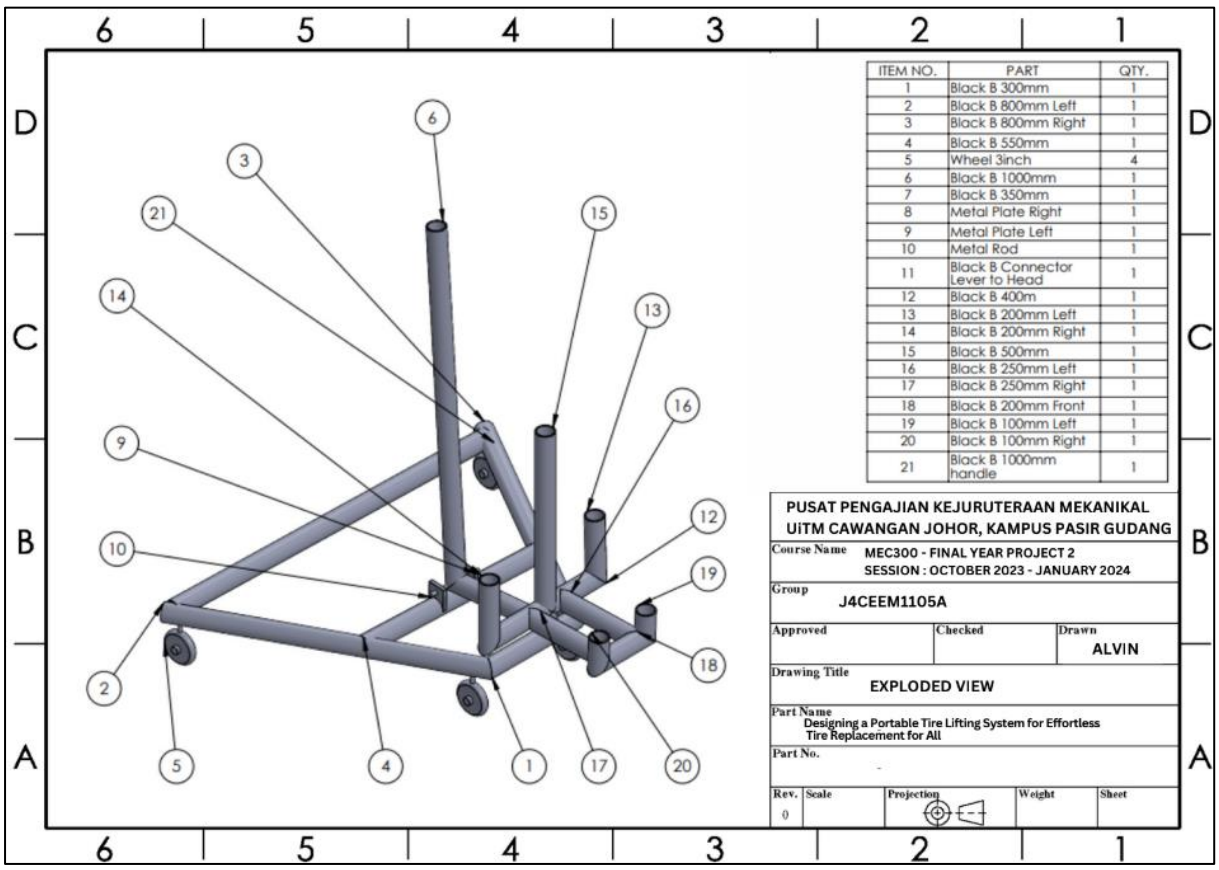
The purpose of this final year project is to help people during the tire replacement process. Manpower needed to carry the tire during the tire replacement process alone is insufficient. Age factors and health issues is also the reasons for this product to be accomplished. State-of-art SolidWorks 2021 will be used in designing a portable tire lifting system for effortless tire replacement for all. As a proof of concept, fabricating the designed portable tire lifting system should be achieved. Expected results from this portable tire lifting system may help users to lift up the tire with ease. By using this device, anyone will be able to replace the tire by themselves. Other than that, this portable tire lifting device is a prototype as a proof of concept to show the system will work. The final product should be detailed in all parameters and also design.

Keywords: *Tyre Liftting, Portable Tire Replacement*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 20

Design and Fabrication of Portable Trolley Garbage Collector

Irdina Qistina Binti Irwan [1] and Radzi Abdul Rasih [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): radzi_rasih@uitm.edu.my*

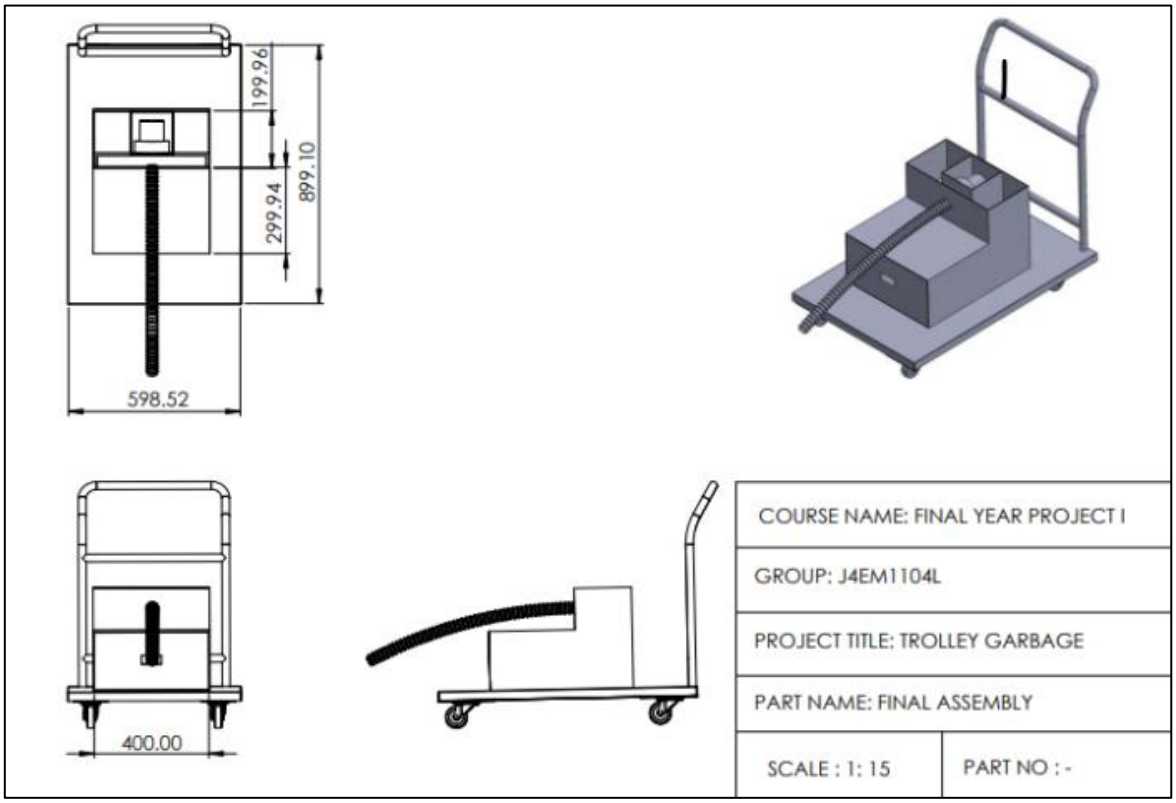
PROJECT DESCRIPTION

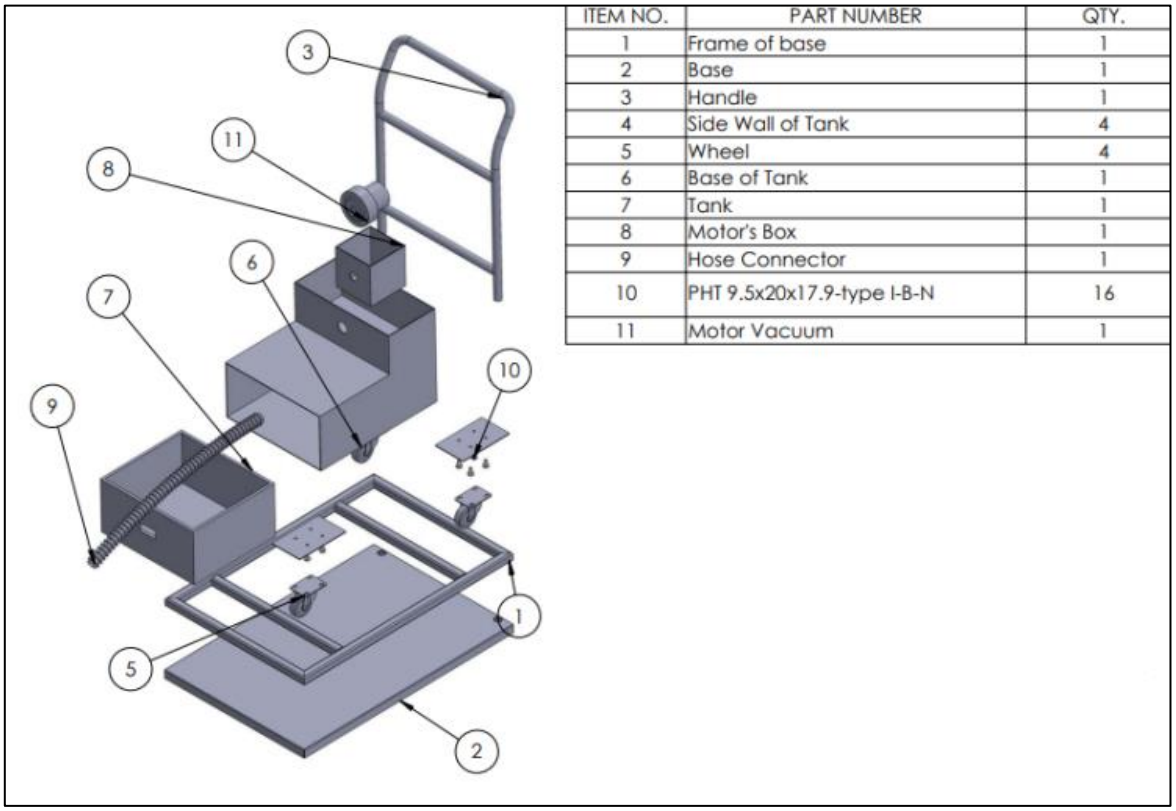
The limits of traditional vacuum cleaners are highlighted in this abstract, and a portable trolley rubbish collector is suggested as a potential improvement. Although vacuums can be used for a variety of cleaning tasks, they are mostly surface-level cleaners and may need additional cleaning methods for the best results. Cleaning damp surfaces can be difficult, and dust bags could get hurt. Additionally, because of the smaller diameter of the vacuum nozzle, vacuum cleaners are limited in their ability to suction bigger debris. In order to address these problems, the proposed portable trolley garbage collector offers enough capacity to hold a variety of rubbish, including solid waste and small debris. Because of the trolley's simple mobility design, it may be used in a variety of locations, including homes, public spaces, and construction sites. This technology encourages hygiene and environmental sustainability by increasing rubbish collection efficiency. The project's goals are to decrease energy use in garbage management and create a hoover trolley that can successfully suction heavier particles.

Keywords: *Garbage, Collector*

PROTOTYPE

DESIGN PARAMETER





ITEM NO.	PART NUMBER	QTY.
1	Frame of base	1
2	Base	1
3	Handle	1
4	Side Wall of Tank	4
5	Wheel	4
6	Base of Tank	1
7	Tank	1
8	Motor's Box	1
9	Hose Connector	1
10	PHT 9.5x20x17.9-type I-B-N	16
11	Motor Vacuum	1

Prototype Design Collection Series 3
e-ISBN: 978-967-0033-32-7

CHAPTER 21

Design and Fabrication of an Manual Mechanical Sweeper for Efficient Floor Cleaning

Fariznil Syahmi Esmalizam [1] and Zeno Michael [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): zenomichael@uitm.edu.my*

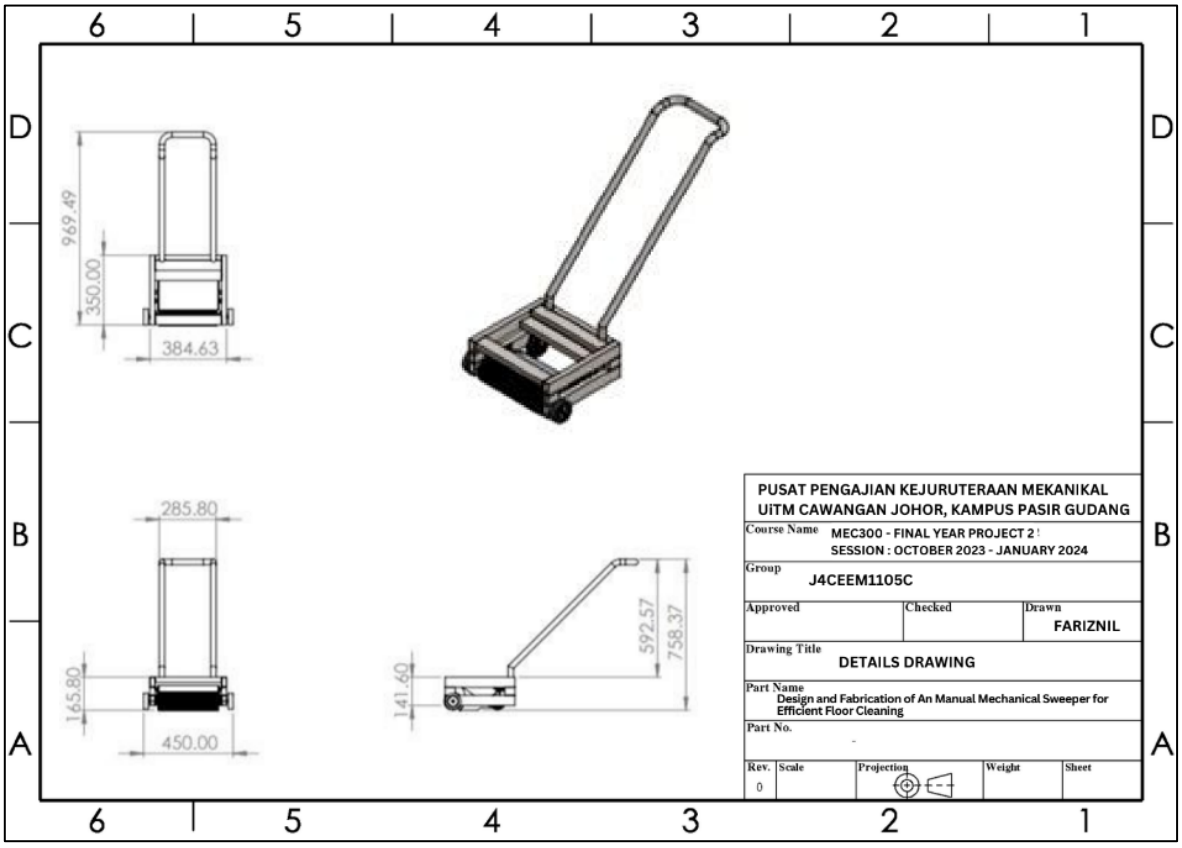
PROJECT DESCRIPTION

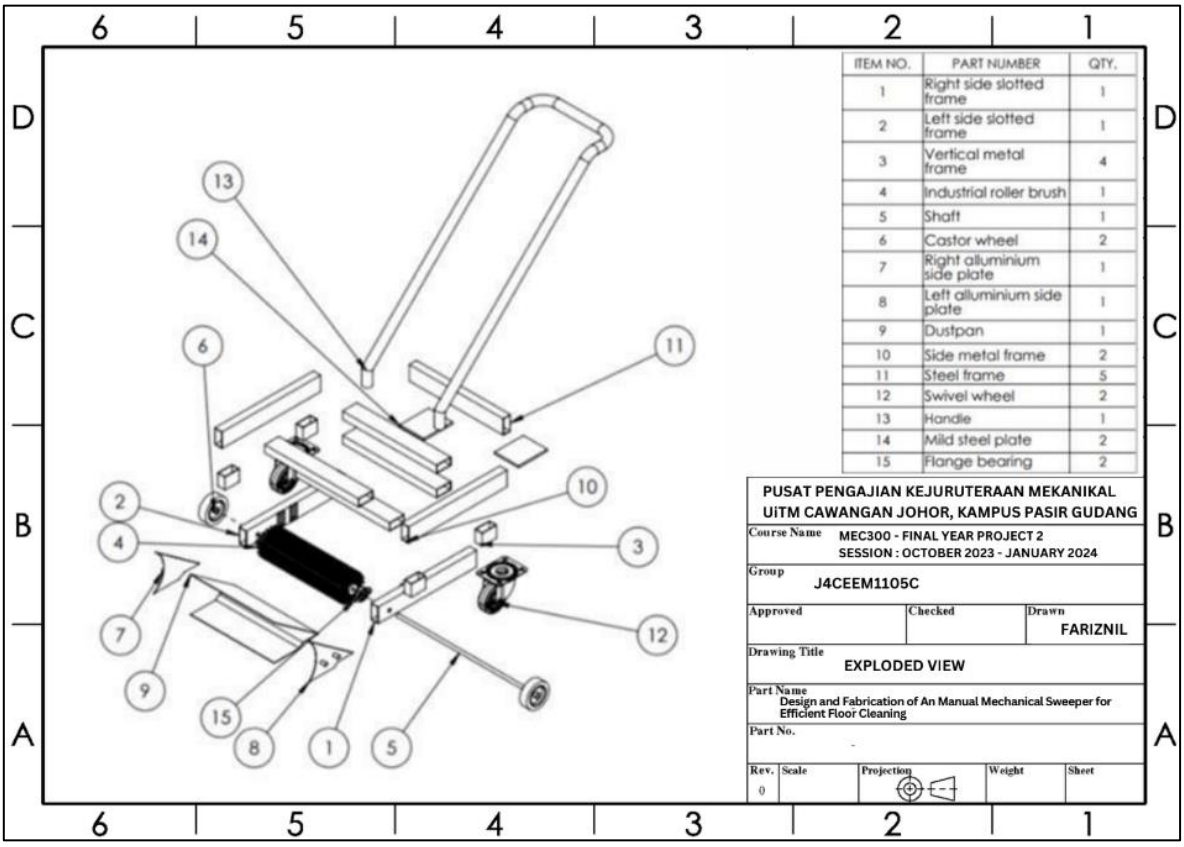
Broom is widely known as a cleaning tool that is used to sweep floors. It is frequently utilized along with a dustpan. Brooms were first created in 1797 by Levi Dickenson, a farmer from Hadley, Massachusetts. Brooms are widely used across the world in every household as they are easier to use for a quick clean up without the hassle of bringing out vacuum cleaner. However, despite there are still difficulties that could be faced to keep our place clean from dust or any dirt. The conventional broom requires us to have a dustpan to collect the dirt or debris, the dustpan could take some space to store and sometimes get in our way when we are sweeping. Hence, that is the reason why this project was carried out, which is to design and fabricate an ecofriendly mechanical sweeper. The expected result is a mechanical sweeper that should be easy to operate and maintain, yet capable of removing a wide variety of substances such as dirt, dust, and small debris.

Keywords: *Mechanical Sweeper, Floor Cleaning*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 22

Design and Development of an Automatic T-Shirt Folding Machine

Nurfatini Diyanah Shahrir Adli [1] and Zeno Michael [2*]

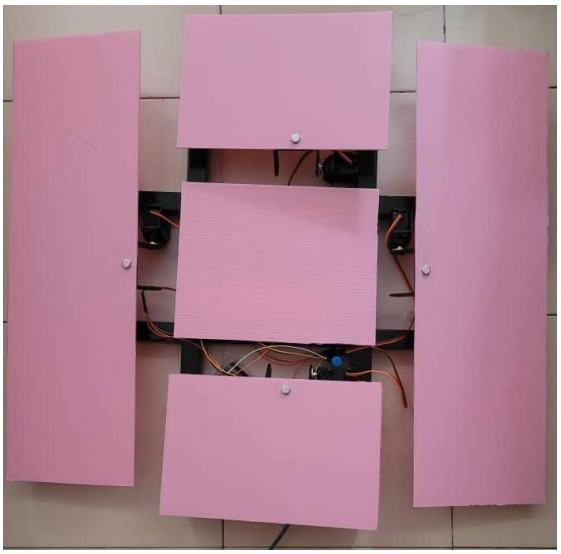
[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): zenomichael@uitm.edu.my*

PROJECT DESCRIPTION

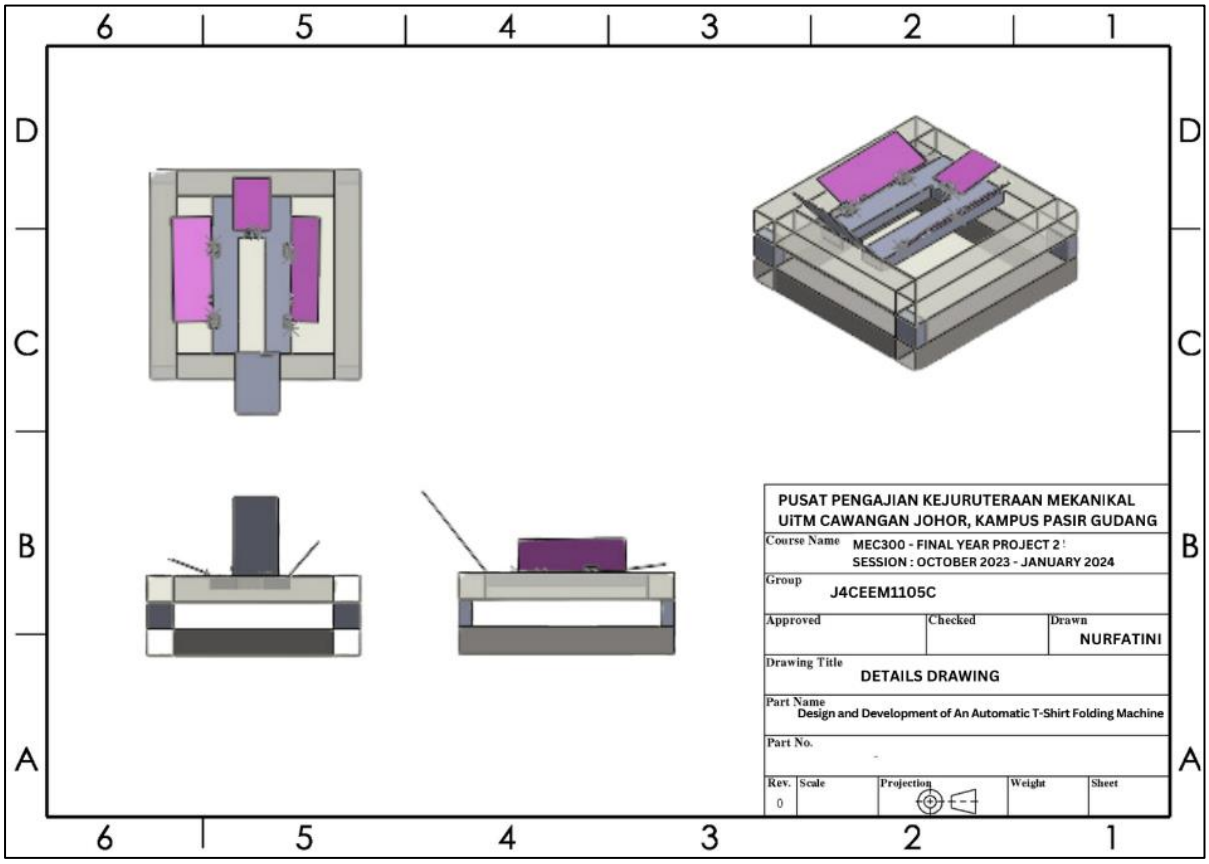
Folding clothes is a chore that most people find tedious to do due to the time, energy and focus needed to. The cost of living in Malaysia for a four-person family can go up to an average of 20829.12 USD in Kuala Lumpur. A result of that are parents who are often very busy and rarely have time to keep the house clean. The purpose of this project is to design and fabricate a machine to help people who are busy to lessen the time needed to fold clothes as well as make it economically viable for them to use. The product should also be ergonomic, so it is lightweight and easily stored while being durable as well. Based on these problems, the machine will be created based on research from e-journals as well as benchmarking from online websites to create this machine. The expected product outcome should be a folding machine that is light, durable, cheap, ergonomic, and fast that can resolve all the problems faced by busy individuals.

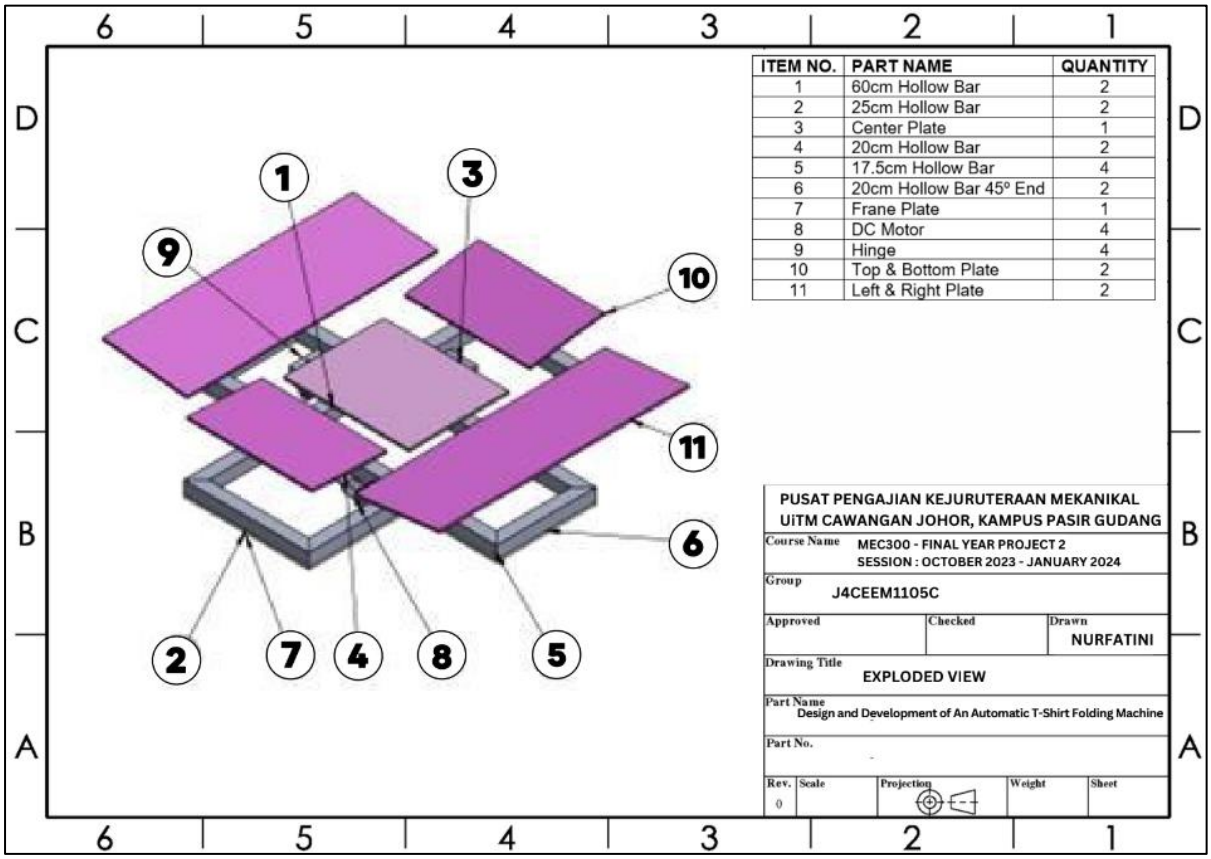
Keywords: *T-Shirt Folding, Automatic Machine*

PROTOTYPE



DESIGN PARAMETER





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CHAPTER 23

Design and Development of a Multi-functional Portable Cutter

Muhammad Syamil Adam Md Sofian [1] and Zeno Michael [2*]

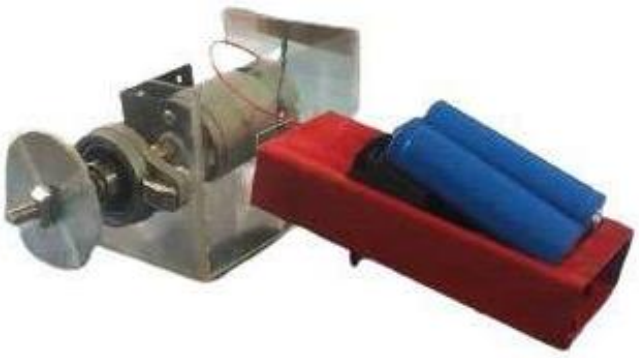
[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): zenomichael@uitm.edu.my*

PROJECT DESCRIPTION

As the world is advancing in technology, humankind is also following its path to make our daily activities more efficient. Introducing the new "Multi-Functional Portable Cutter" that will revolutionize your cutting experience. The objective of this product is to easily cut through any thin layer with a single push without exerting excess energy. We have taken scissors as their ancestor and further developed them to improve their usage. Although using scissors as its ancestor and further developed it to improve its usage. Although using scissors may seem enough to cut any thin layer in our house, it actually takes more energy to cut an object deeper and thicker. This is where the portable cutter comes in. There is no need to exert excessive energy to cut anything anymore, whether the object is thick or long enough for scissors to cut it. By using a rotational blade powered by a motor, this upgraded version of scissors can cut through anything effortlessly, making our cutting activity more convenient.

Keywords: *Multi-functional, Cutter*

PROTOTYPE



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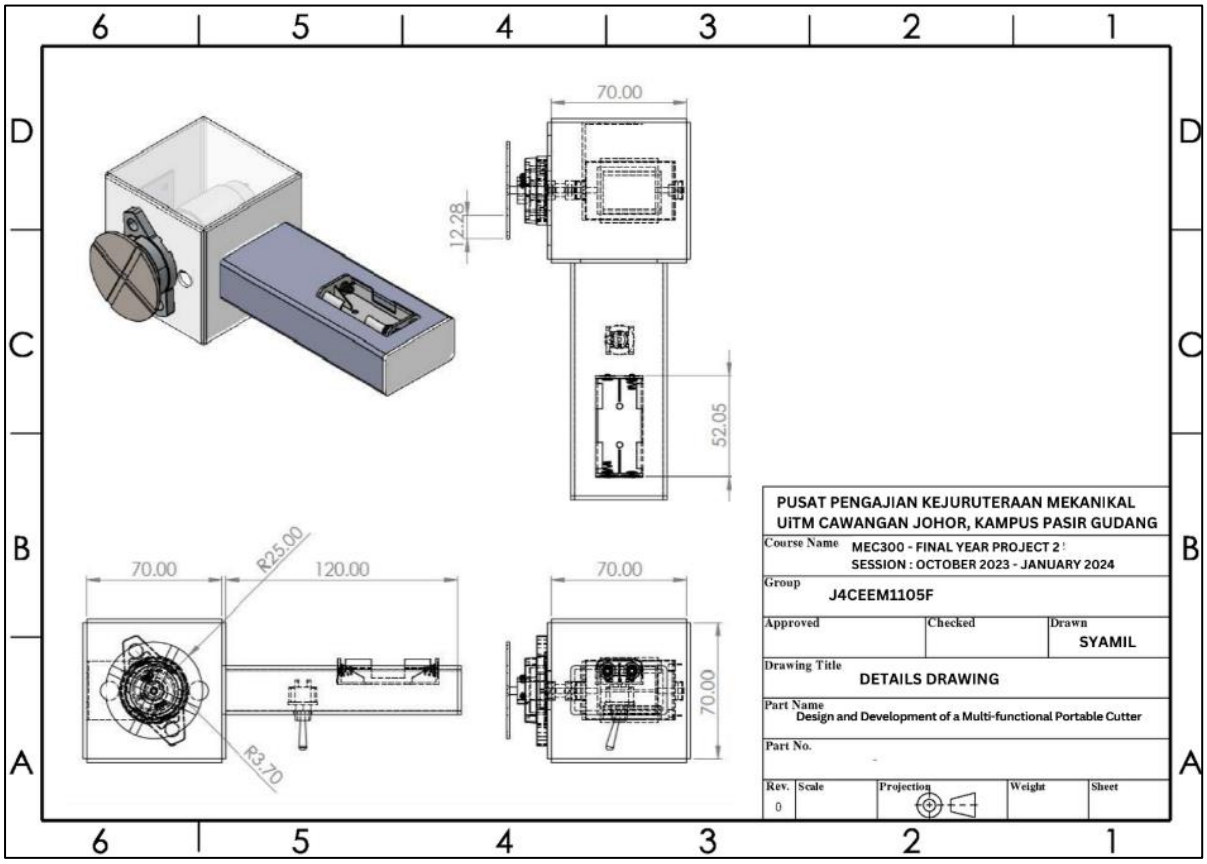

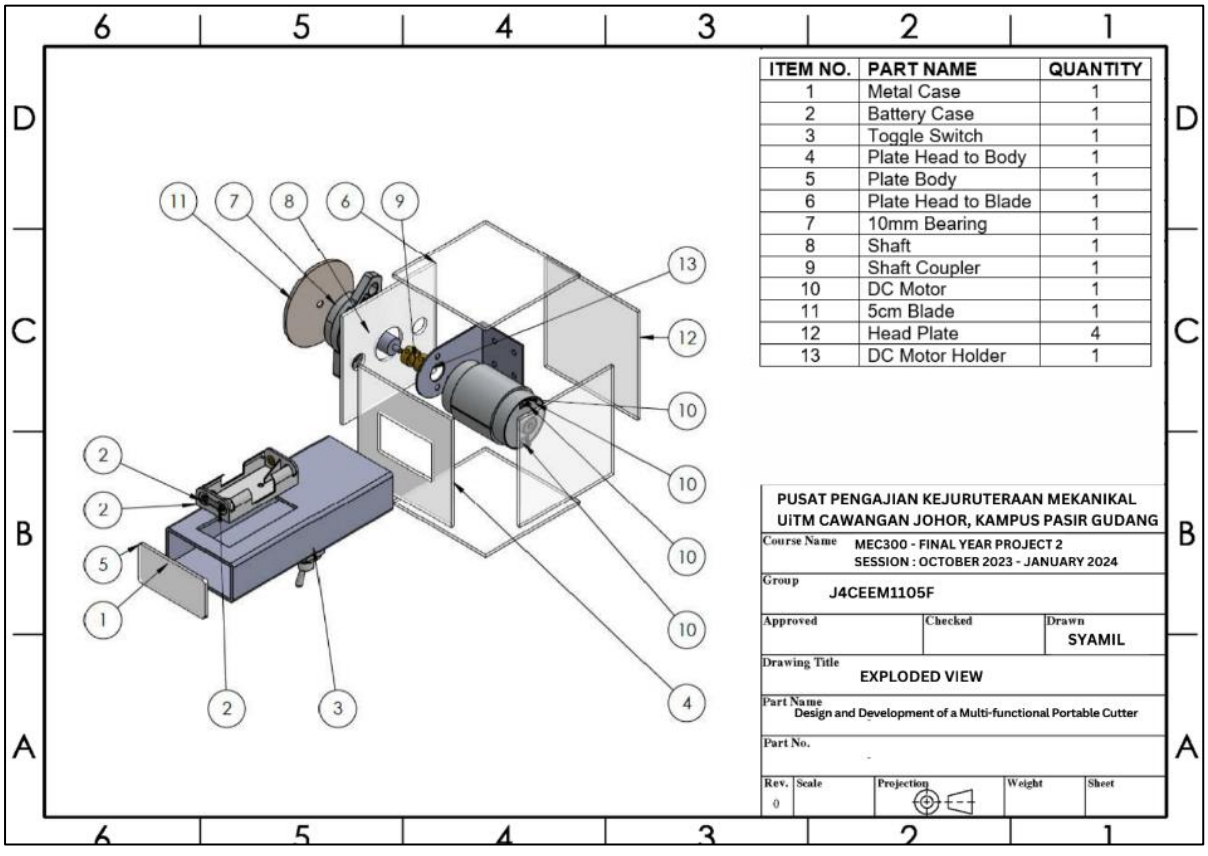

ITEM NO.	PART NAME	QUANTITY
1	Metal Case	1
2	Battery Case	1
3	Toggle Switch	1
4	Plate Head to Body	1
5	Plate Body	1
6	Plate Head to Blade	1
7	10mm Bearing	1
8	Shaft	1
9	Shaft Coupler	1
10	DC Motor	1
11	5cm Blade	1
12	Head Plate	4
13	DC Motor Holder	1

PUSAT PENGAJIAN KEJURUTERAAN MEKANIKAL
UiTM CAWANGAN JOHOR, KAMPUS PASIR GUDANG
Course Name MEC300 - FINAL YEAR PROJECT 2
SESSION : OCTOBER 2023 - JANUARY 2024
Group J4CEEM1105F
Approved
Checked
Drawn SYAMIL
Drawing Title EXPLODED VIEW
Part Name Design and Development of a Multi-functional Portable Cutter
Part No.
Rev. 0
Scale
Projection
Weight
Sheet

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CHAPTER 24

Satay Griller Machine

Emily Elysha Avejaznawan [1] and Ahmad Najmie Rusli [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): ahmad7586@uitm.edu.my*

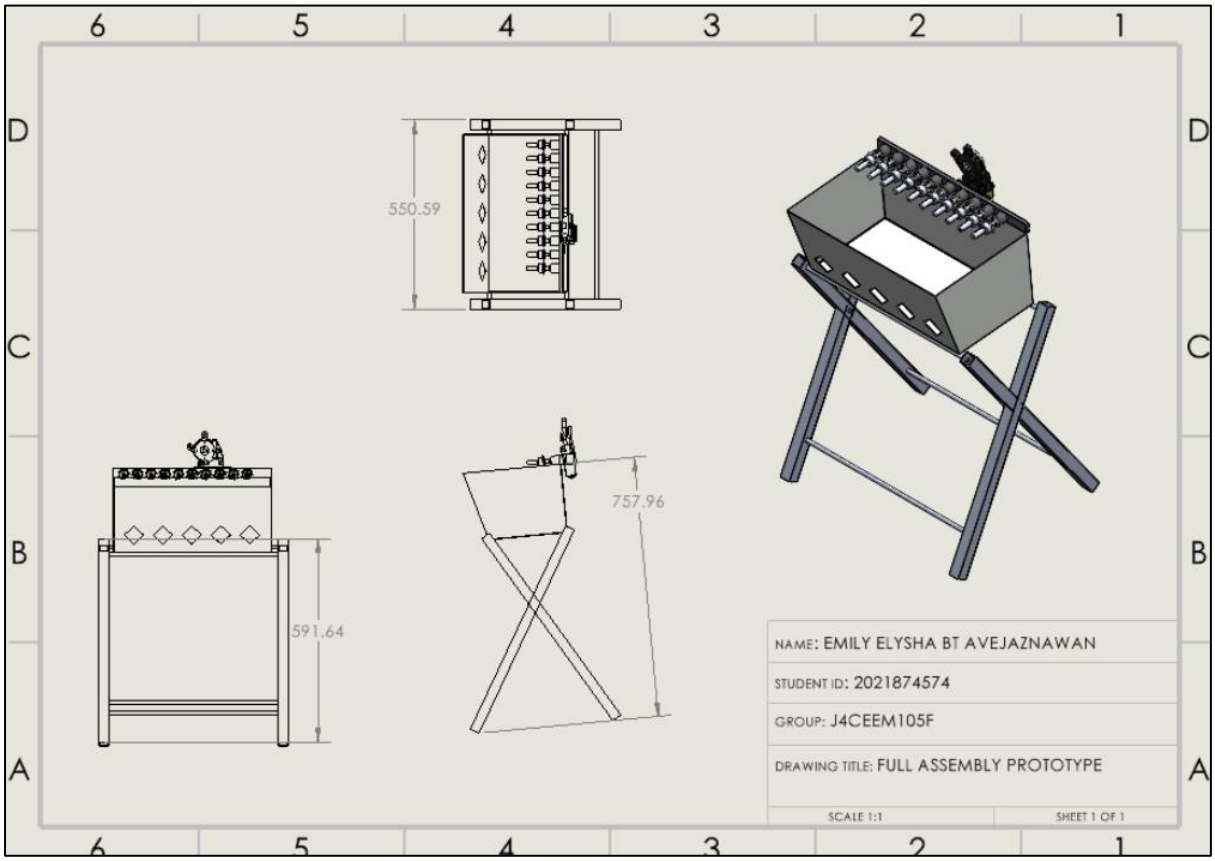
PROJECT DESCRIPTION

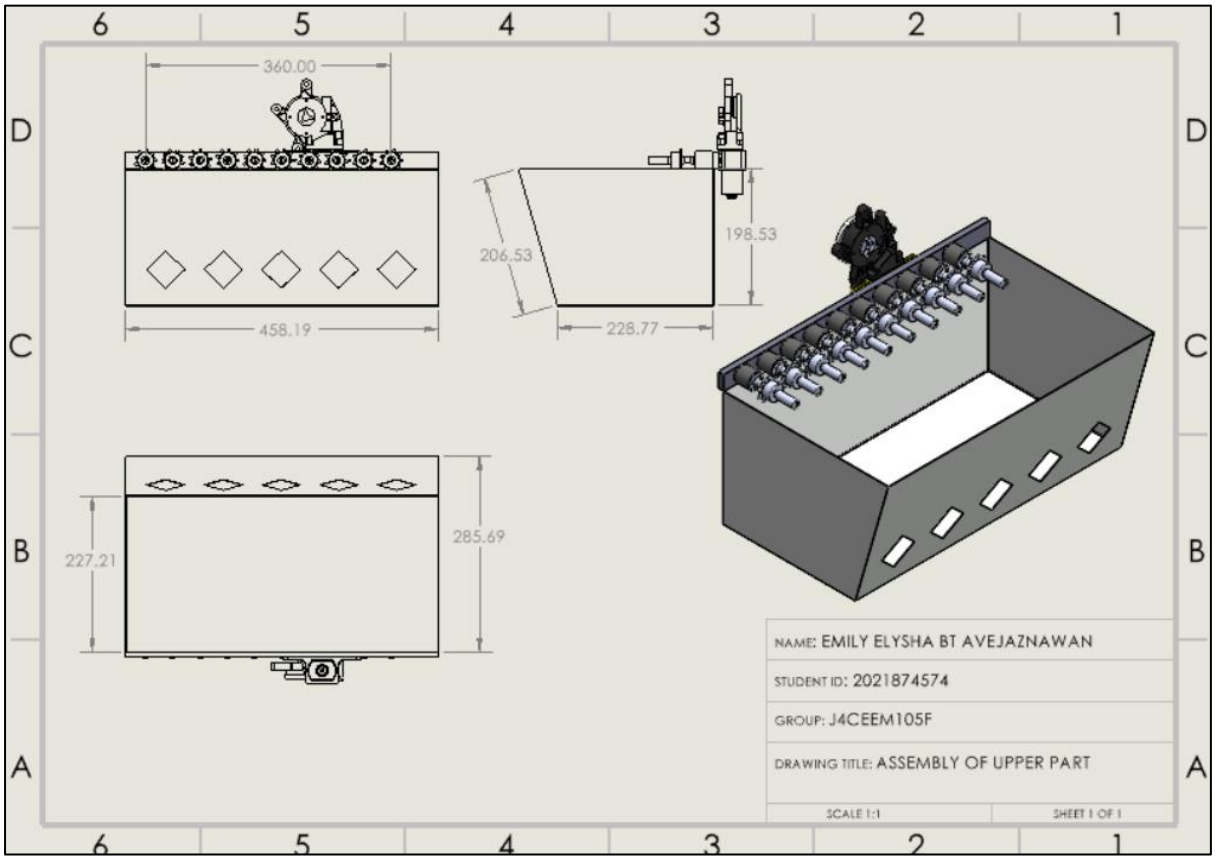
Satay is one of the most famous foods, but sellers often face challenges in monitoring the grilling process. This project was undertaken to develop a highly efficient satay grilling machine that requires less manpower than traditional methods. The machine is equipped with an automatic rotation mechanism powered by a motor, eliminating the need for manual flipping of the satay. Additionally, this project aims to assist satay vendors in meeting the demands of large numbers of customers promptly. Common issues, such as burned satay, extended cooking times, and customer dissatisfaction due to delayed orders, can be resolved with this machine. The primary objective of this project is to enhance the efficiency of the satay grilling process by designing and fabricating an optimized grill. The machine operates using a gear and gear mechanism powered by a 12V DC motor, ensuring smooth and reliable performance.

Keywords: *Satay, Griller*

PROTOTYPE

DESIGN PARAMETER





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CHAPTER 25

Automatic Lemang Cooker Machine (Aulecom)

Nurul Izzah Noor Azman [1] and Ahmad Najmie Rusli [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): ahmad7586@uitm.edu.my*

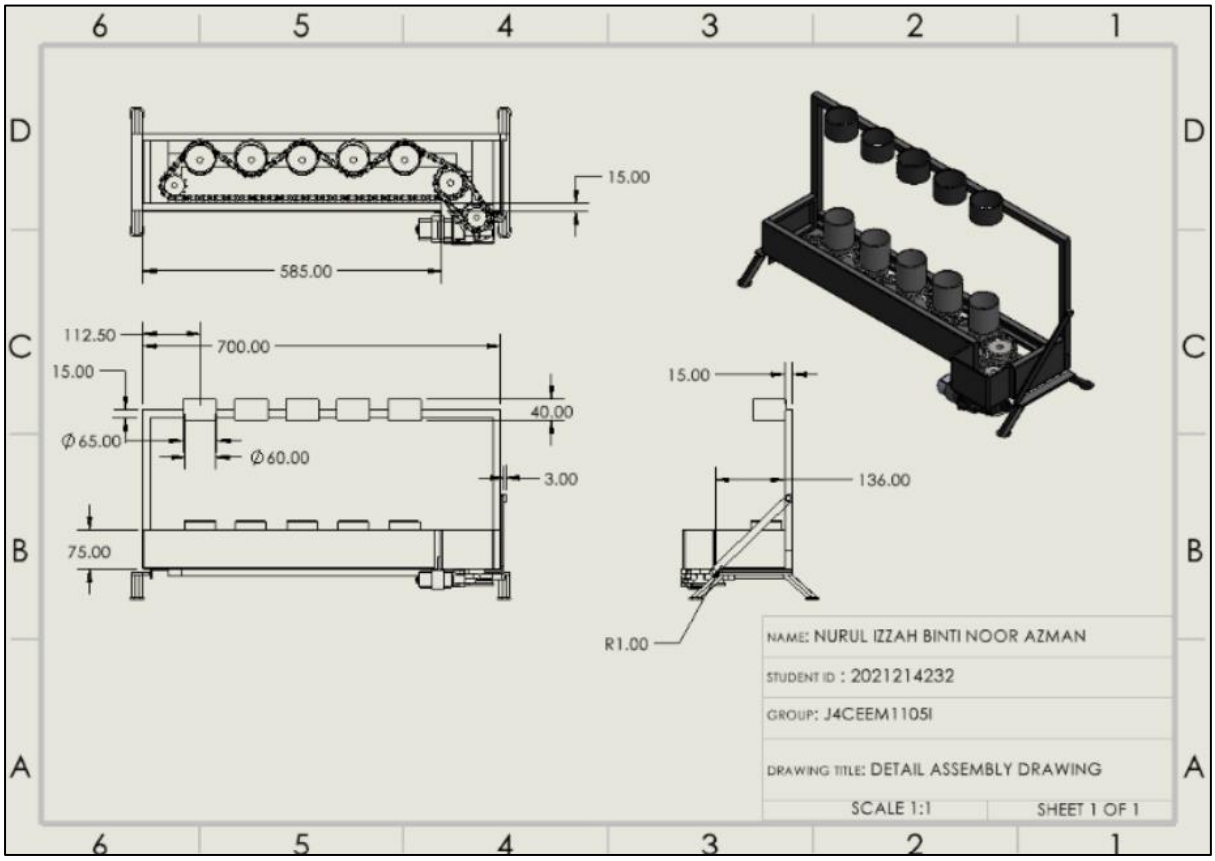
PROJECT DESCRIPTION

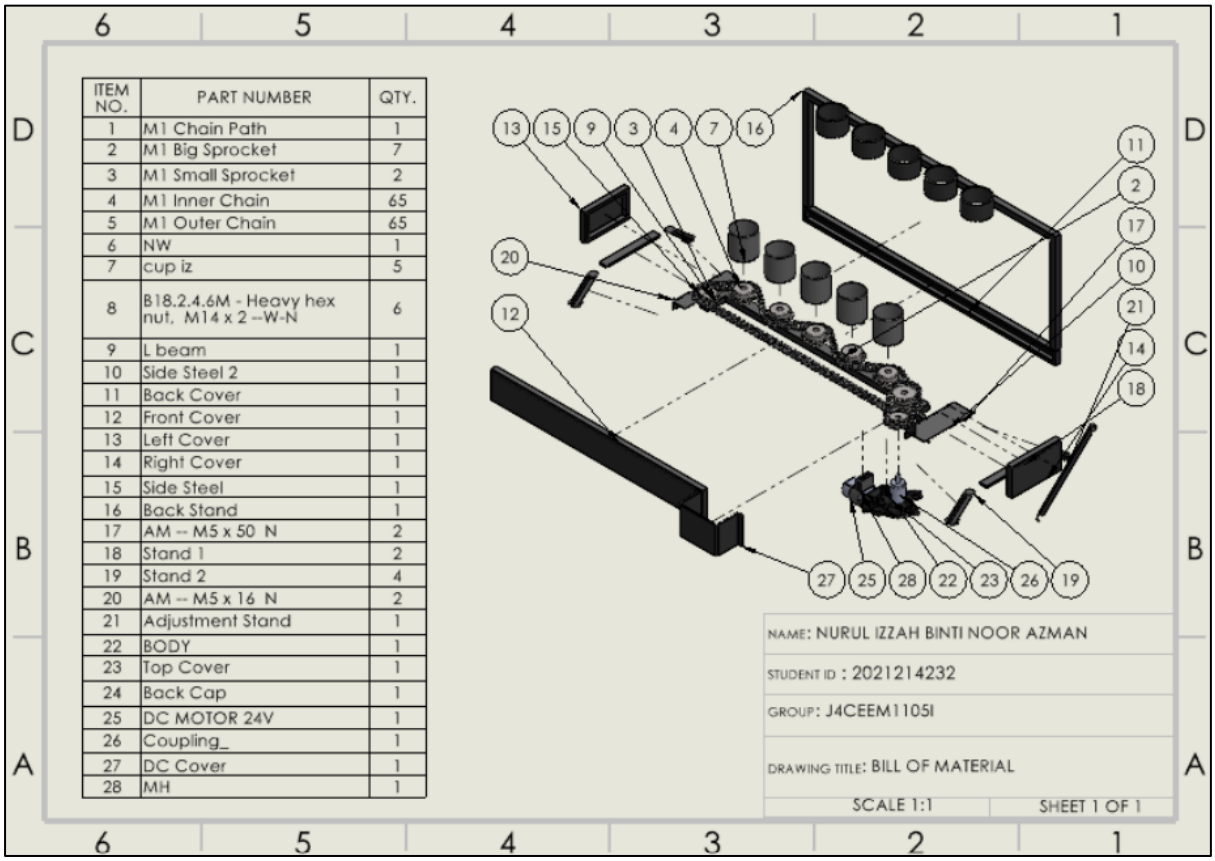
This project introduces a novel prototype lemang cooker machine designed to address the limitations of traditional lemang baking methods. Conventional practices are labor-intensive, inefficient in heat utilization, and result in low production output. The objective of this project is to design and analyze an automatic lemang cooker using SolidWorks 2021 and develop a proof-of-concept prototype. The proposed machine features a half-stove design powered by mechanical motions controlled by a microprocessor, eliminating the need for manual intervention. Its body and stand are constructed from mild steel, and the fabrication process involves welding, drilling, cutting, wiring, and rigorous testing. The results demonstrate that the automatic lemang cooker can successfully prepare up to five lemang simultaneously. This marks a significant improvement over traditional methods, requiring less manpower while enhancing production efficiency. By integrating advanced SolidWorks 2021 technology, the project showcases a modern and innovative approach to lemang cooking.

Keywords: *Lemang, Lemang Cooker*

PROTOTYPE

DESIGN PARAMETER





ITEM NO.	PART NUMBER	QTY.
1	M1 Chain Path	1
2	M1 Big Sprocket	7
3	M1 Small Sprocket	2
4	M1 Inner Chain	65
5	M1 Outer Chain	65
6	NW	1
7	cup iz	5
8	B18.2.4.6M - Heavy hex nut, M14 x 2 --W-N	6
9	L beam	1
10	Side Steel 2	1
11	Back Cover	1
12	Front Cover	1
13	Left Cover	1
14	Right Cover	1
15	Side Steel	1
16	Back Stand	1
17	AM -- M5 x 50 N	2
18	Stand 1	2
19	Stand 2	4
20	AM -- M5 x 16 N	2
21	Adjustment Stand	1
22	BODY	1
23	Top Cover	1
24	Back Cap	1
25	DC MOTOR 24V	1
26	Coupling_	1
27	DC Cover	1
28	MH	1

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CHAPTER 26

A Design of Coconut Meat Scrapping Machine

Muhammad Atiff Zamlee [1] and Ahmad Najmie Rusli [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): ahmad7586@uitm.edu.my*

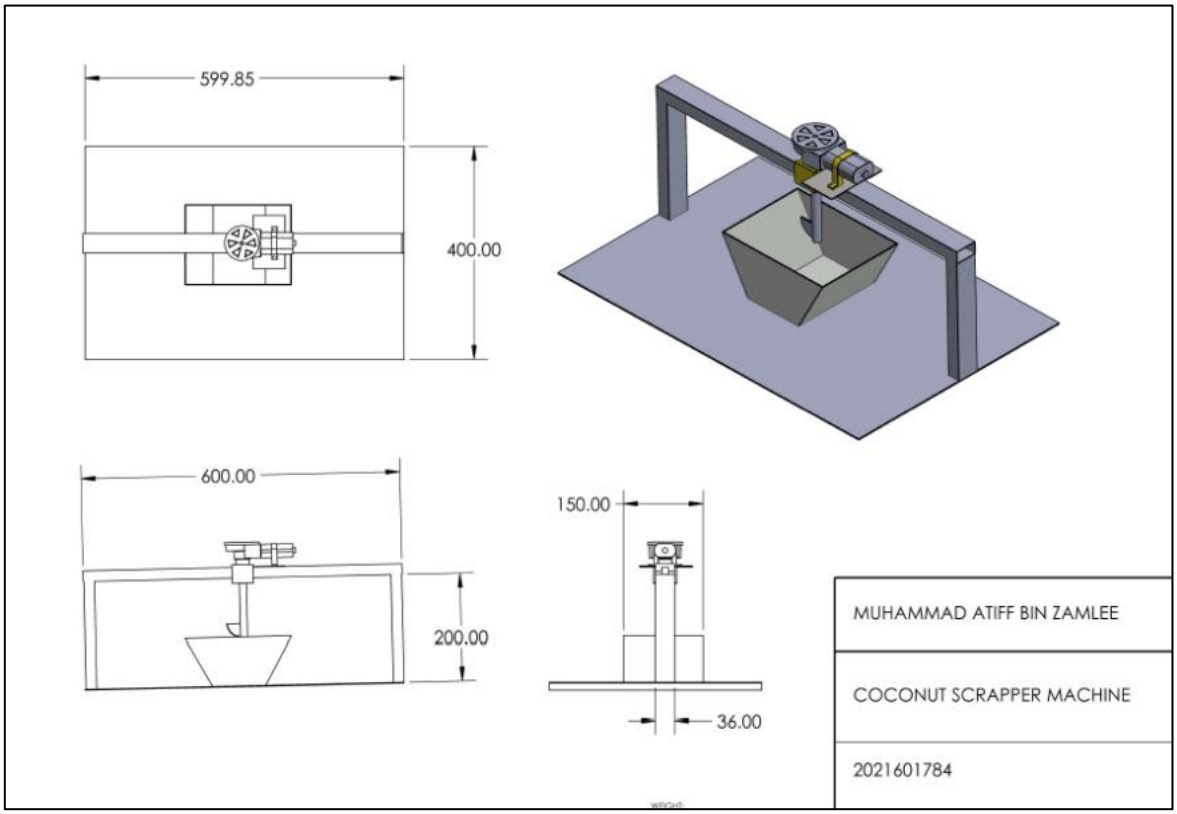
PROJECT DESCRIPTION

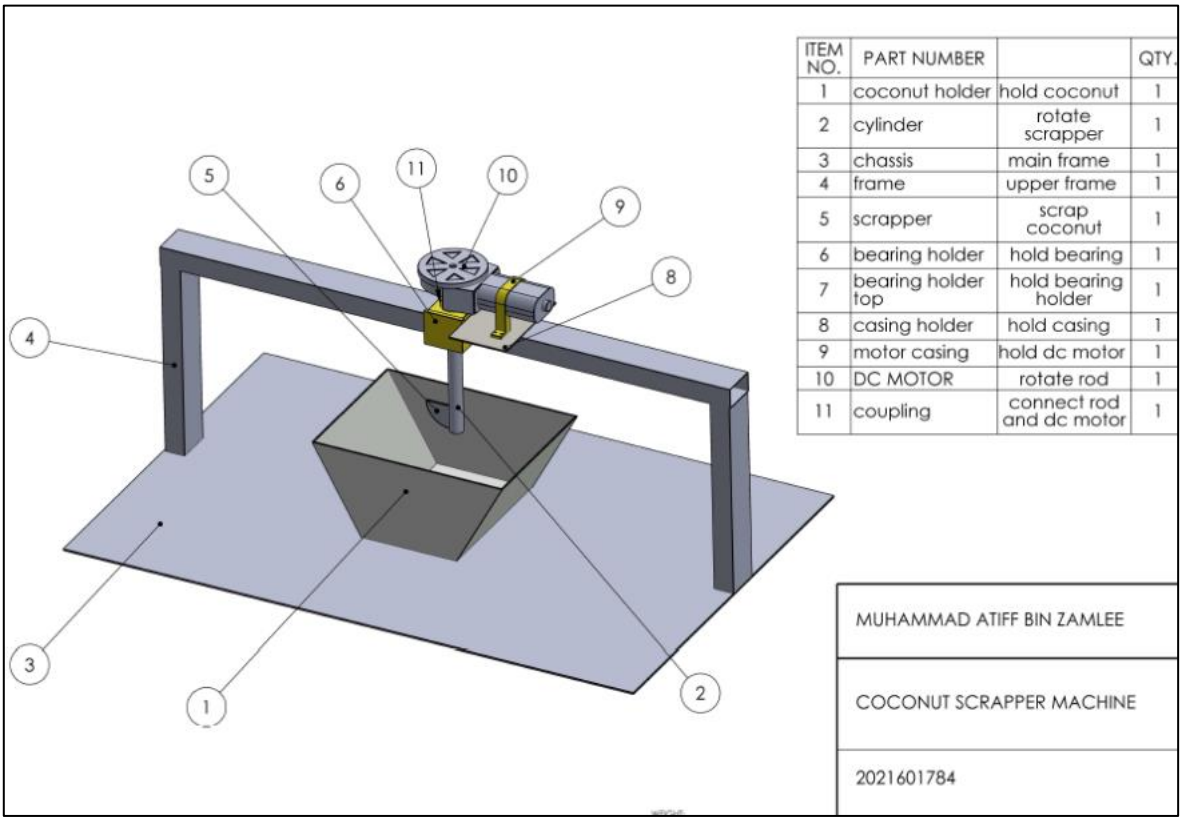
The coconut, the fruit of the coconut palm (Cocos nucifera), is widely valued for its water, milk, oil, and flavourful meat. In recent years, coconuts have gained popularity for their numerous health benefits. Studies indicate that coconuts are highly nutritious, possessing antibacterial and antioxidant properties. Typically, young coconut flesh or meat is found mixed with coconut water. Extracting the meat commonly involves using a spoon, but this method has several drawbacks. It is not hygienic, inefficient for large-scale production, and requires significant time and effort, often resulting in fatigue and muscle soreness. To address these challenges, this project aims to design and fabricate a coconut meat scrapping machine to streamline the process. The primary goal is to create a machine that makes the task easier, faster, and cleaner than manual methods. The objectives of the project include designing, analyzing, and fabricating the coconut meat scrapping machine, with the design and analysis carried out by using SolidWorks. The machine's fabrication will incorporate materials such as aluminium, a DC motor, and custom mechanical components. The resulting machine is compact, with dimensions of approximately 300mm in length, 300mm in width, and 300mm in height, offering a practical solution for more efficient and hygienic coconut meat extraction.

Keywords: *Coconut, Scrapper*

PROTOTYPE

DESIGN PARAMETER





ITEM NO.	PART NUMBER		QTY.
1	coconut holder	hold coconut	1
2	cylinder	rotate scrapper	1
3	chassis	main frame	1
4	frame	upper frame	1
5	scrapper	scrap coconut	1
6	bearing holder	hold bearing	1
7	bearing holder top	hold bearing holder	1
8	casing holder	hold casing	1
9	motor casing	hold dc motor	1
10	DC MOTOR	rotate rod	1
11	coupling	connect rod and dc motor	1

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CHAPTER 27

Rapid Drying Wardrobe

Hasman Selle [1] and Firdaus Sukarman [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): firdaus@uitm.edu.my*

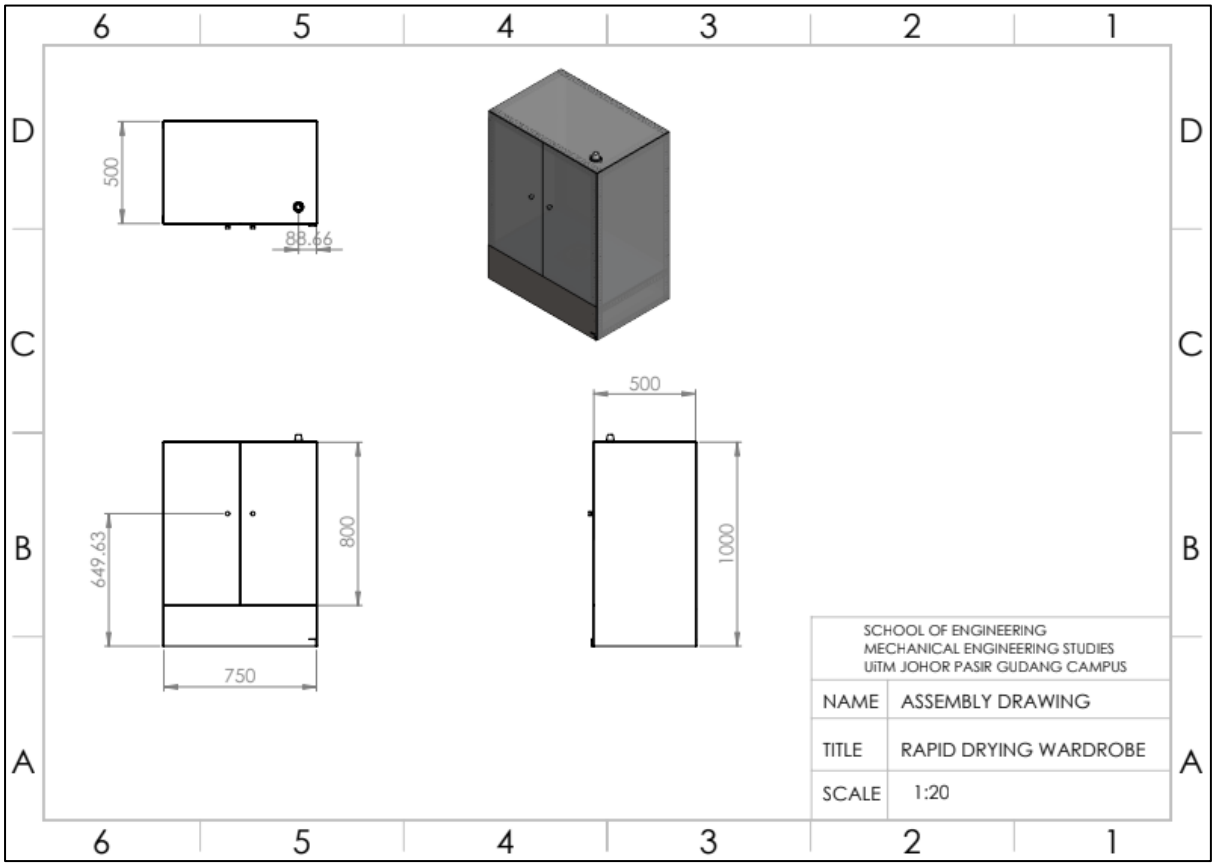
PROJECT DESCRIPTION

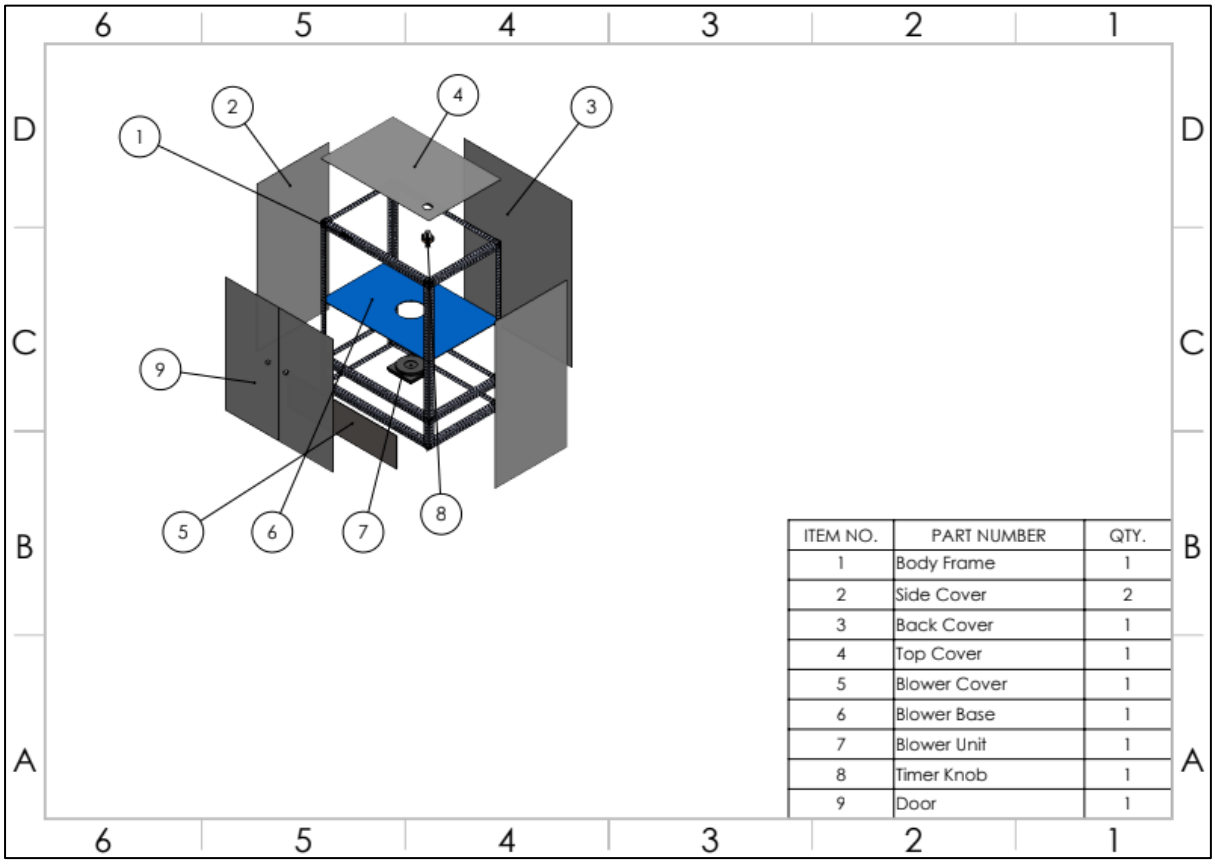
Traditional clothes dryer machines utilise a combination of spinning and heating to dry garments. This method is typically used for wet and wrinkled fabrics after being washed in a washing machine. Improving the drying process requires enhancing air circulation within the loading compartment to accelerate the process. This product design enhances air circulation by hanging the clothing during drying to maximise the drying surface area of the clothes. This method uses a flow of hot air from a blower to eliminate moisture and create faster circulation for speedy drying, unlike a clothes dryer where clothes may still become tangled throughout the drying process. The circulation aids in uniformly distributing heat throughout the hanging clothing with assistance from a bottom blower. The pressure created causes a flow through the laundry and escapes through the top sections. Although the clothing rack has restrictions on the length and type of laundry that can be hung, its main benefits include indoor use and providing a drying option for smaller loads of clothes. The machine can also be used to dry shoes instead of utilising the traditional way of placing them at the back of the refrigerator.

Keywords: *Rapid drying, Household applicances,*

PROTOTYPE

DESIGN PARAMETER





ITEM NO.	PART NUMBER	QTY.
1	Body Frame	1
2	Side Cover	2
3	Back Cover	1
4	Top Cover	1
5	Blower Cover	1
6	Blower Base	1
7	Blower Unit	1
8	Timer Knob	1
9	Door	1

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CHAPTER 28

Adaptive Bicycle (Bike)

Muhammad Akmal Mohd Johan [1] and Azizul Hakim Samsudin [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): azizulhakim@uitm.edu.my*

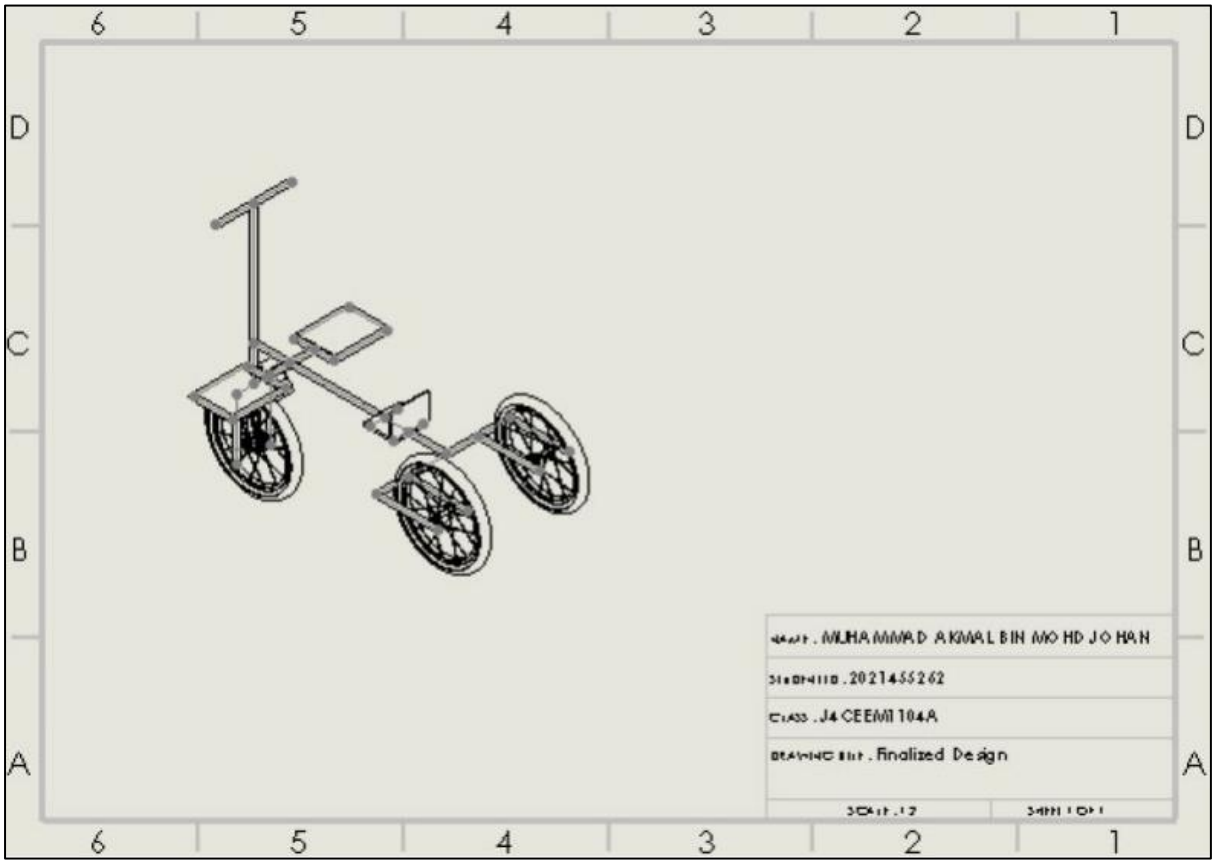
PROJECT DESCRIPTION

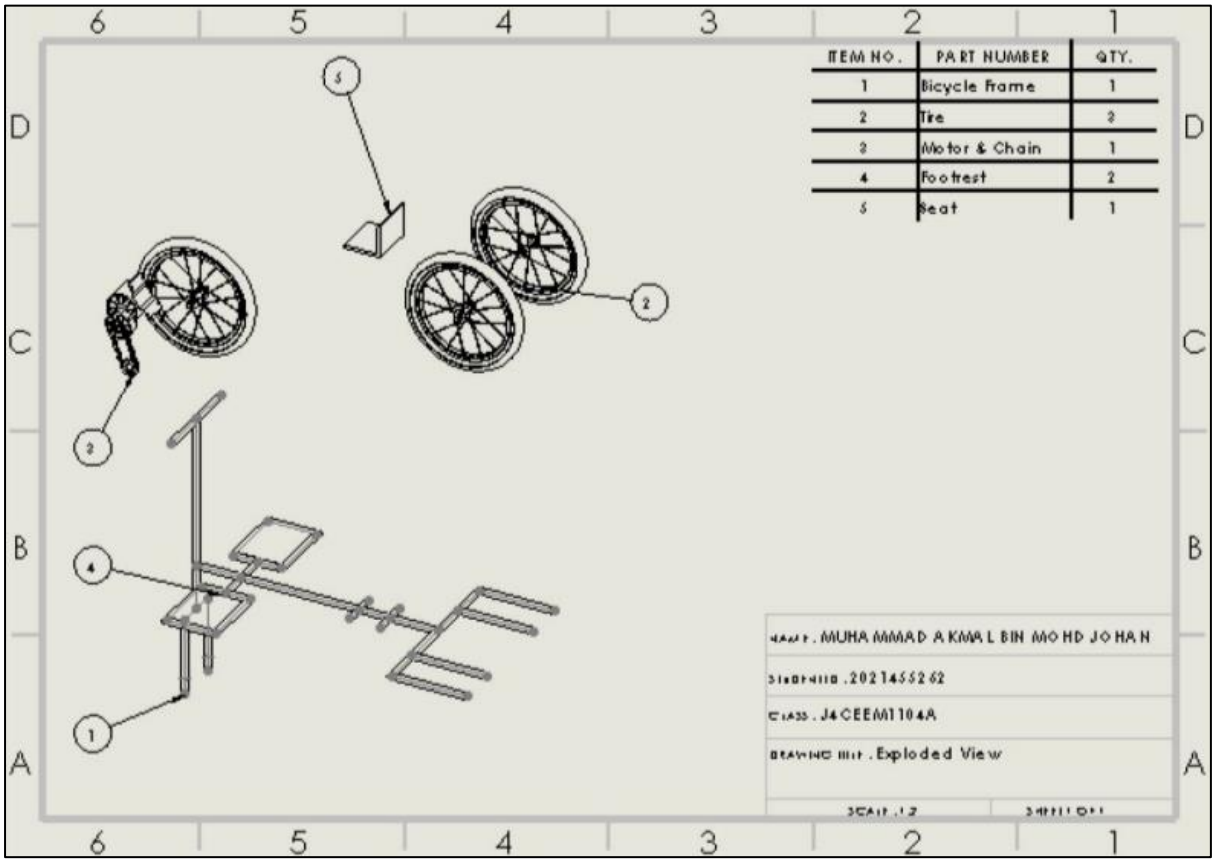
This product investigates the evolution and effect of adapted electric assist bicycles designed for amputee legs, providing an innovative approach to improve mobility and independence. Individuals with amputee legs often encounter challenges in finding suitable mobility solutions. The objective of this experiment is to design a bicycle equip with motorized system that can be used by disabled people. The initiative intends to improve accessibility, independence, and inclusion by designing motorized bicycles adapted to the unique demands of this group. The generation and selection of the ideas of the design will be based on Morphological approach and Pugh method. Other than that, the final selection of the design concept will undergo a simulation process (analysis on the stress, strain and deformation) using SolidWorks software. Based on the simulation results, the highest stresses experience by the design is appears on the side wall. Despite that, the value of stresses shows insignificant to the product and does not gave higher impact to it. The final product was able to be operated with minor modification. Therefore, it can be concluded that this study has achieved its objective.

Keywords: *Disability people, Amputee legs, Adaptive bike*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 29

Automatic Mortar and Pestle

Muhammad Aliff Mohd Zainuddin [1] and Azizul Hakim Samsudin [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): azizulhakim@uitm.edu.my*

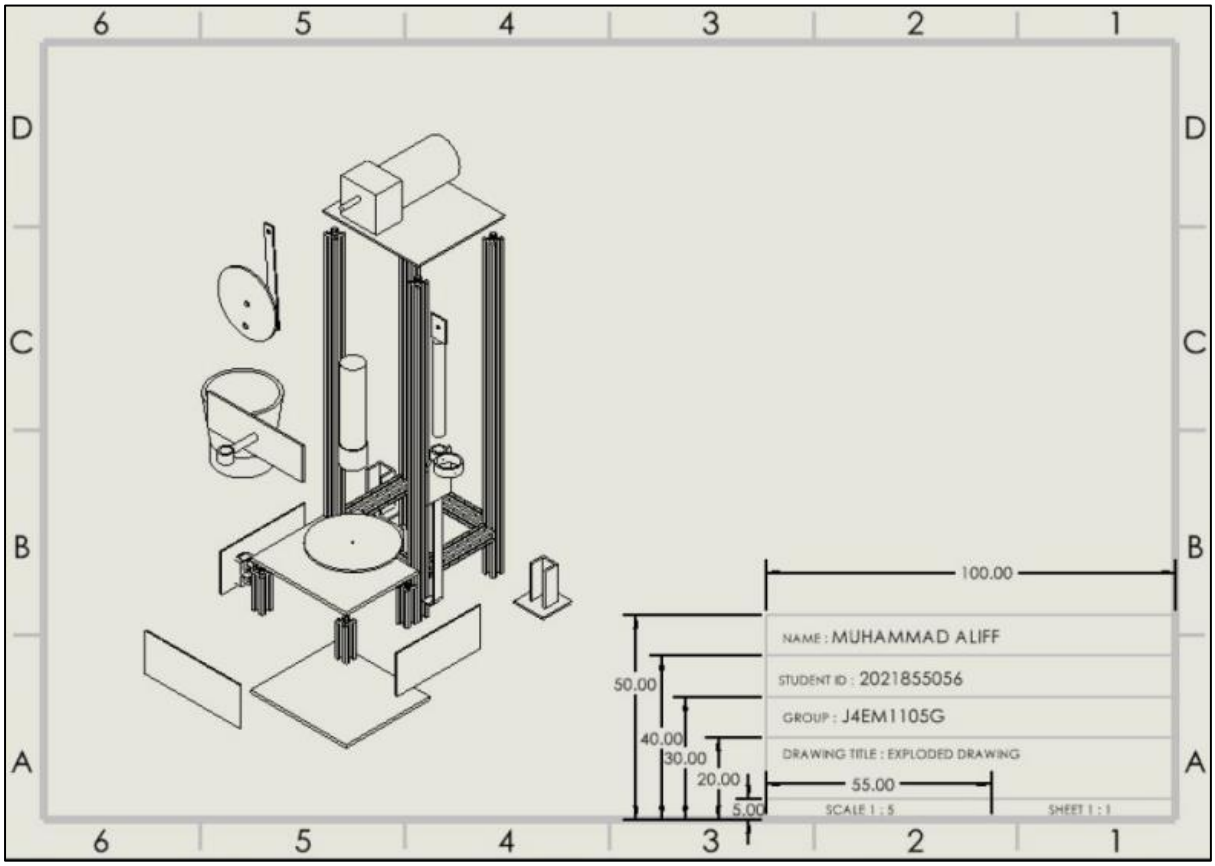
PROJECT DESCRIPTION

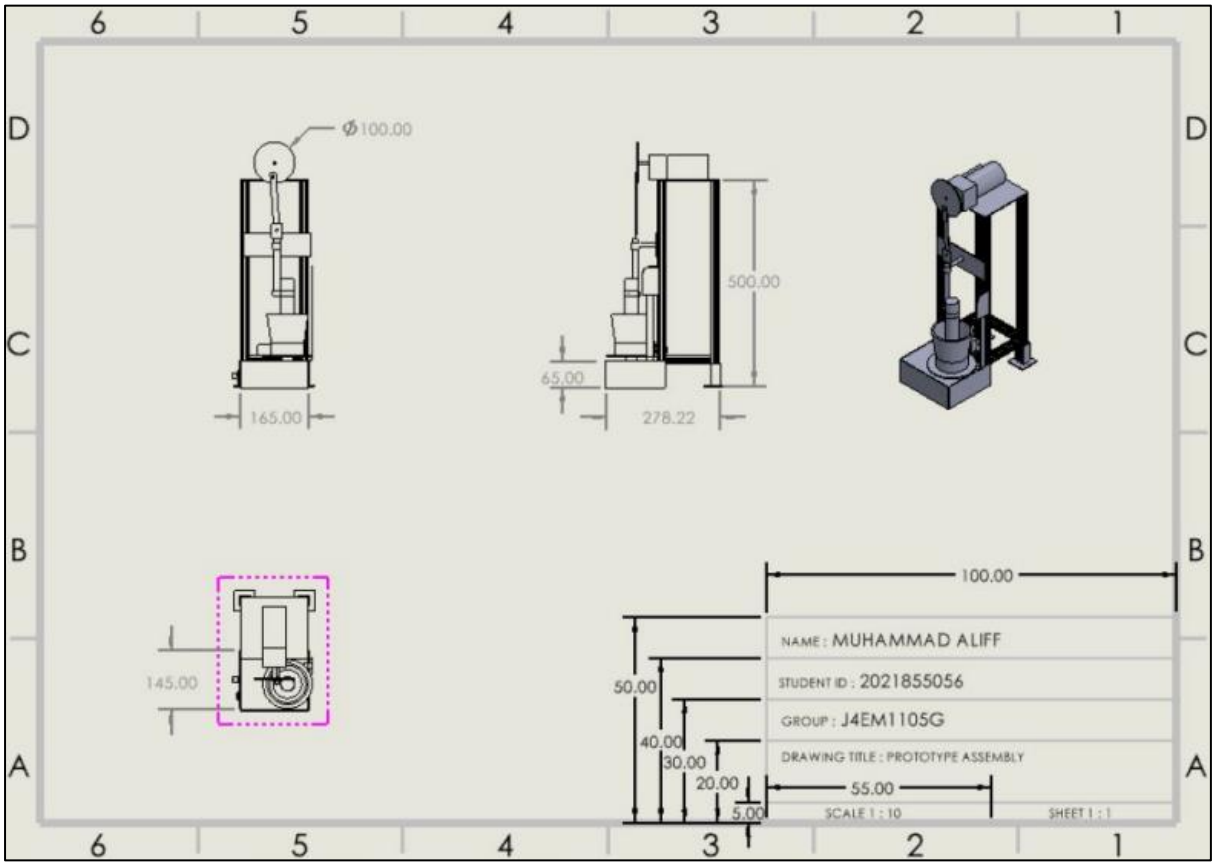
This product introduces an innovative automated mortar and pestle prototype designed to overcome challenges in traditional substance grinding. The primary aim was to create an efficient device automating substance crushing while minimizing manual effort. The core of the design revolved around implementing a crank and slider mechanism as the primary structural element. The generation and selection of the ideas of the design will be based on Morphological approach and Pugh method. Other than that, the final selection of the design concept will undergo a simulation process (analysis on the stress, strain and deformation) using SolidWorks software. Based on the simulation results, the highest stresses experience by the design is appears on the centre of the mortar. Despite that, the value of stresses shows insignificant to the product and does not gave higher impact to it. Thorough testing with substances like onions and garlic, it can be note that the final product was able to be operated with minor modification. Therefore, it can be concluded that this study has achieved its objective.

Keywords: *Mortar, Pestle*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 30

Mechanical One-Handed Grass Clipping Cleaner

Syakirah Aqilah Syahril Mukhzani [1] and Azizul Hakim Samsudin [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): azizulhakim@uitm.edu.my*

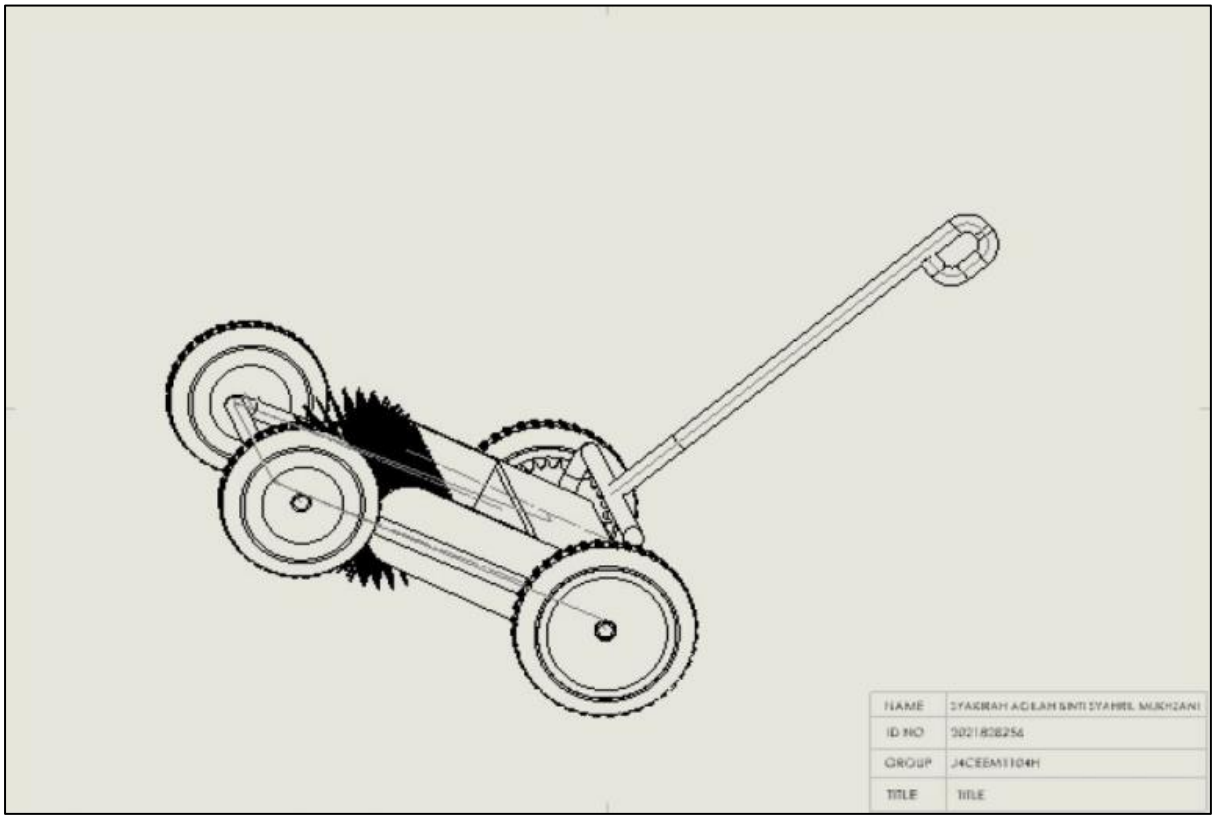
PROJECT DESCRIPTION

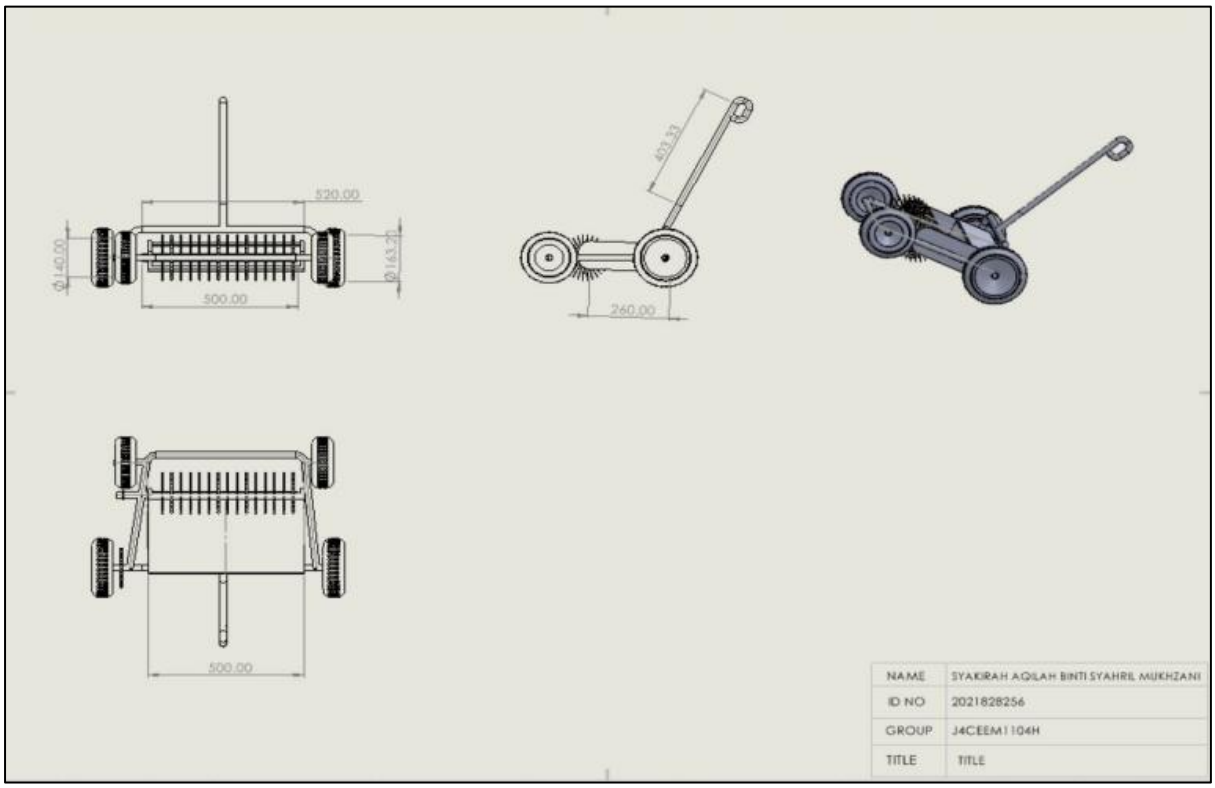
This study examines the role of single-handed mechanical grass clipping cleaner as farmers need an easier way to clean grass clipping after the grass is cut. Using traditional rakes is not effective as it consumes time and energy to clean a larger field. Moreover, when using the blower, it required fuel to power up the blower motor. This method is high cost and not environmentally friendly as the blower will exhaust harmful gases. The objective of this project is to design a single-handed mechanical grass clipping cleaning device that can be operated by a single person by benchmarking and comparing the design with related available products in the market. An analysis is made to the finalised design on the rotating element part to study the maximum stress that can be withstand by it while the mechanical grass clipping cleaner is operating. Moreover, to fabricate single handed mechanical grass clipping cleaner that is only powered by power transmission mechanism. In conclusion, the prototype is fabricated, and it works when the rotating element rotates to collect the grass clipping into the collecting bin. The rotating element is rotated by the power that is transmitted by the sprocket and chain from the back tire. Result shows grass clippings are collected inside the bin effortlessly without producing any sound and harmful emissions.

Keywords: *Mechanical, Grass Cutter*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 31

Development of an Automatic Cat Sand Filter

Muhammad Haziq Mohd Zaman [1], Norhisyam Jenal [2*] and Siti Aishah Taib [3]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
[3]Academy of Language Studies, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim
**Corresponding author (e-mail): hisyam0324@uitm.edu.my*

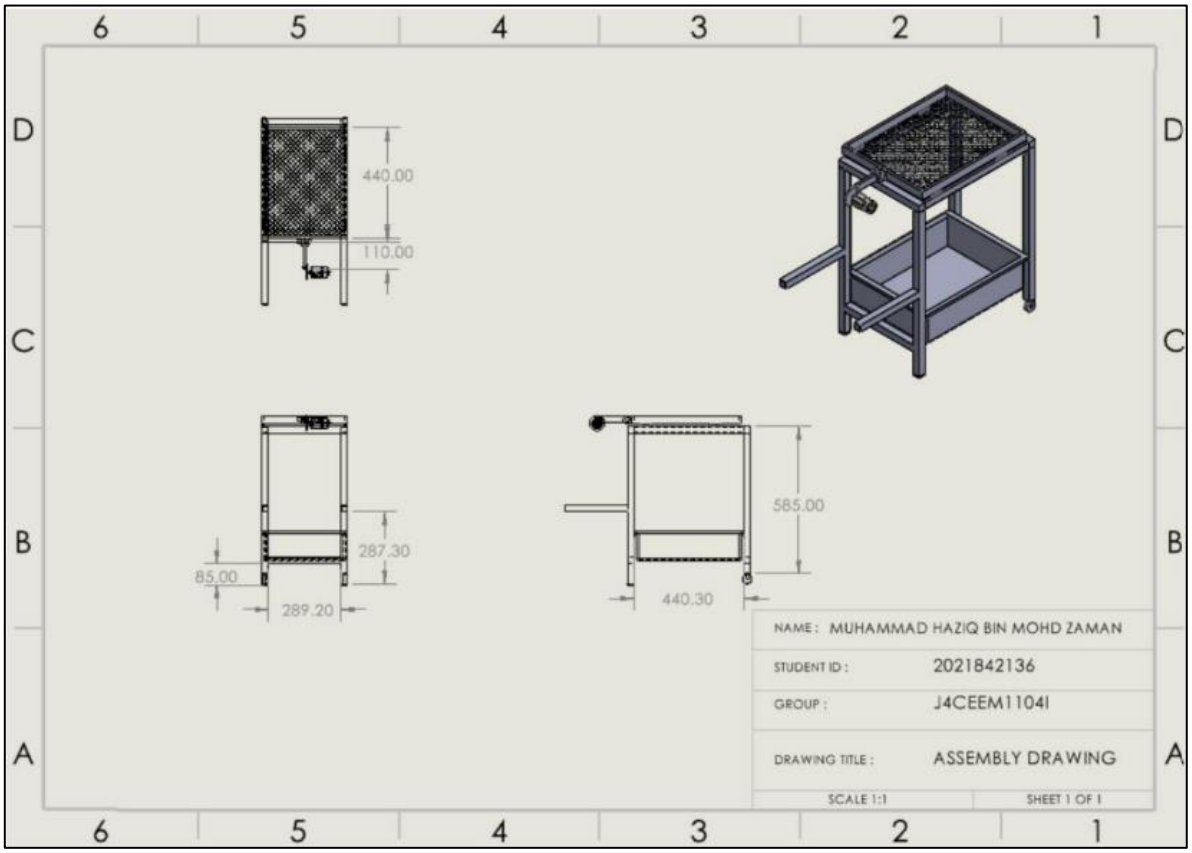
PROJECT DESCRIPTION

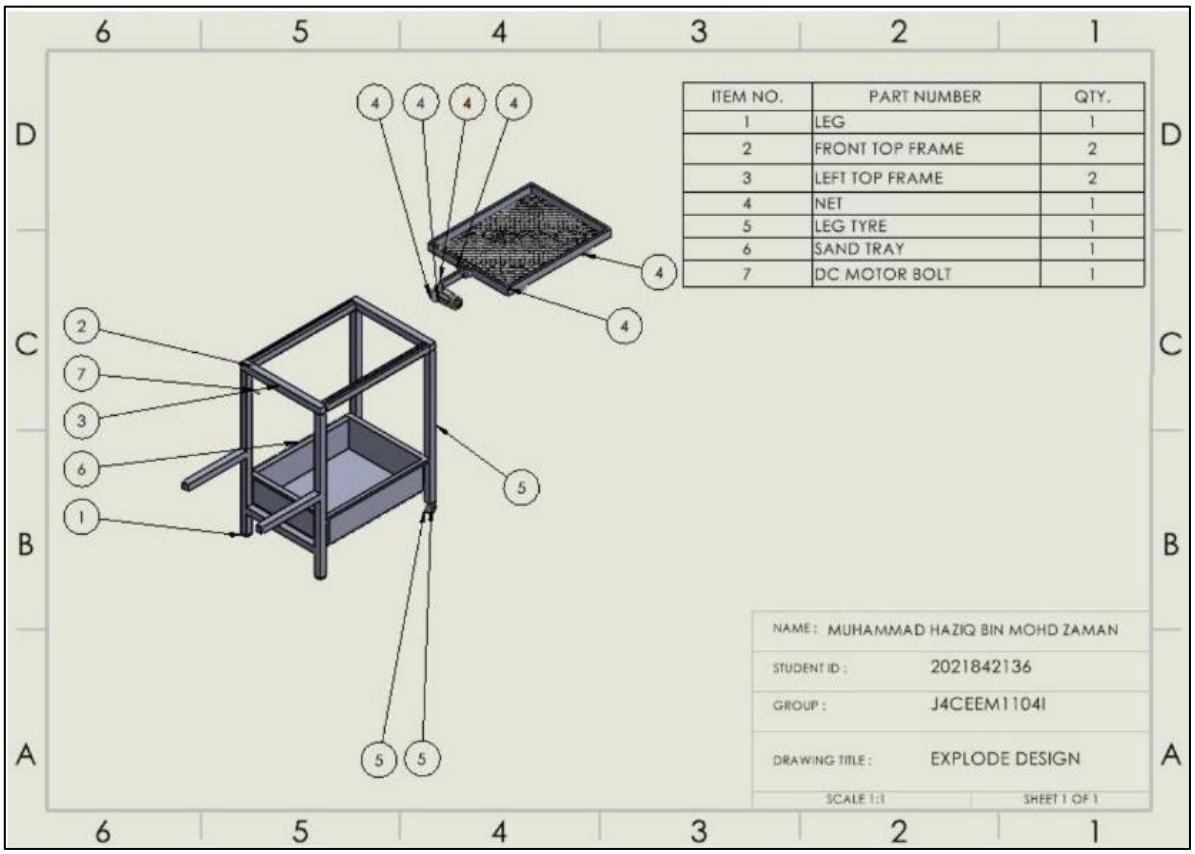
Pet shops and pet owners use sandboxes to manage pets' urine and feces. The process of cleaning sandboxes and separating clean sand from the used ones manually is time and energy consuming. A possible solution for these problems is by utilizing technology in developing a semi-automated sand filter. This project focuses on the design and development of a cat sand filter prototype. The prototype makes cleaning the cat sandbox much quicker and more enjoyable. The filter uses an electrical supply to run a motor that automatically separates clean and dirty sand through a reciprocating system. The technical design process was done using SolidWorks and the fabrication processes such as cutting, welding, drilling, and painting were done using materials available from the store. The product acts as a helper for the sand cleaning process and minimizes the time spent on the process.

Keywords: *Pet, Sand filter*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 32

Design and Fabrication of Wheel Hoe and Wheel Hiller (WHOLLER)

Muhammad Amsyar bin Mohd Jais [1] and Syidatul Akma Binti Sulaiman [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): syidatul_akma7091@uitm.edu.my*

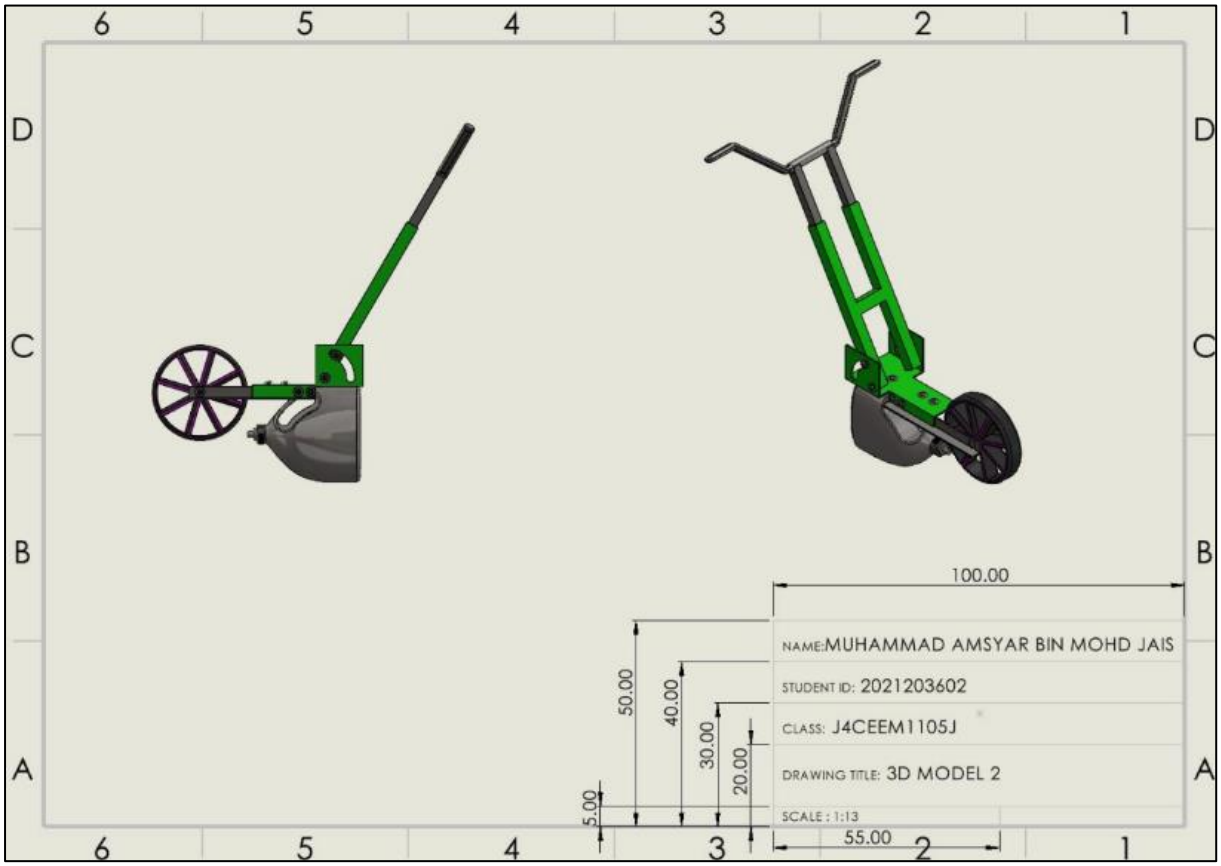
PROJECT DESCRIPTION

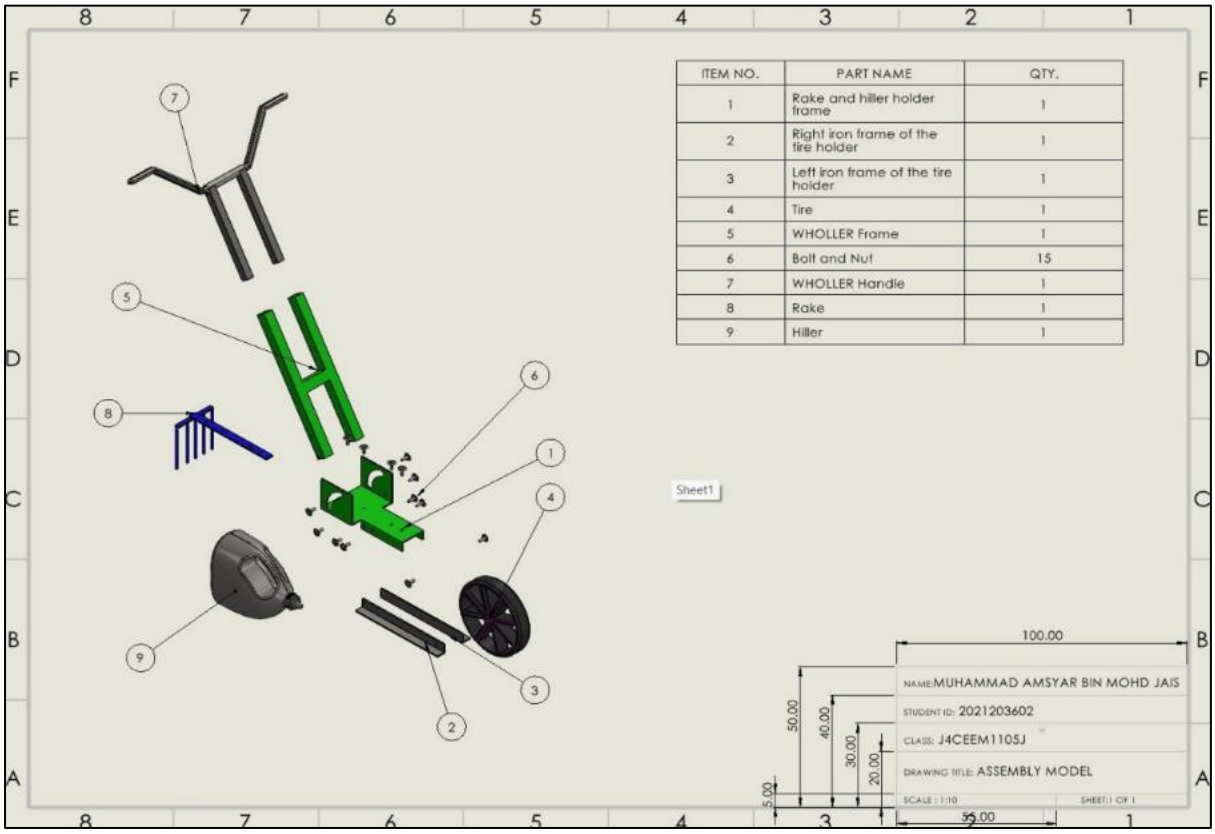
Many economies, especially those in developing nations, are based mostly on agriculture. Conversely, a number of issues commonly faced by small-scale farmers restrict their output and financial success. The absence of contemporary agricultural tools and equipment, which results in tedious, time-consuming, and ineffective work, is one of the biggest challenges.The limits of conventional agricultural tools—which need a lot of physical labour, time, and resources— were brought to light in the issue statement. The goal of the project was to create an efficient and economical instrument that would relieve farmers' workloads and boost their output. To maximise the tool's performance, this design project used simulation and computer-aided design (CAD) technologies. This project includes other mechanical components in addition to (CAD), such assembly, drilling, welding, fitting, and others. Welding, assembling, and the usage of easily accessible materials were all part of the fabrication process. An easy-to-use, reasonably priced, and effective tool for planting, growing, and weeding was the anticipated outcome. This instrument will support sustainable agricultural methods and increase small-scale farmers' output.

Keywords: *Easy to use, Sustainable agriculture*

PROTOTYPE

DESIGN PARAMETER





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CHAPTER 33

Development of New Design and Analysis of Pedal Scooter

Muhammad Arif Izzuddin Bin Apandi [1] and Nurulsaidatulsyida Sulong [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): saidatulsyida@uitm.edu.my*

PROJECT DESCRIPTION

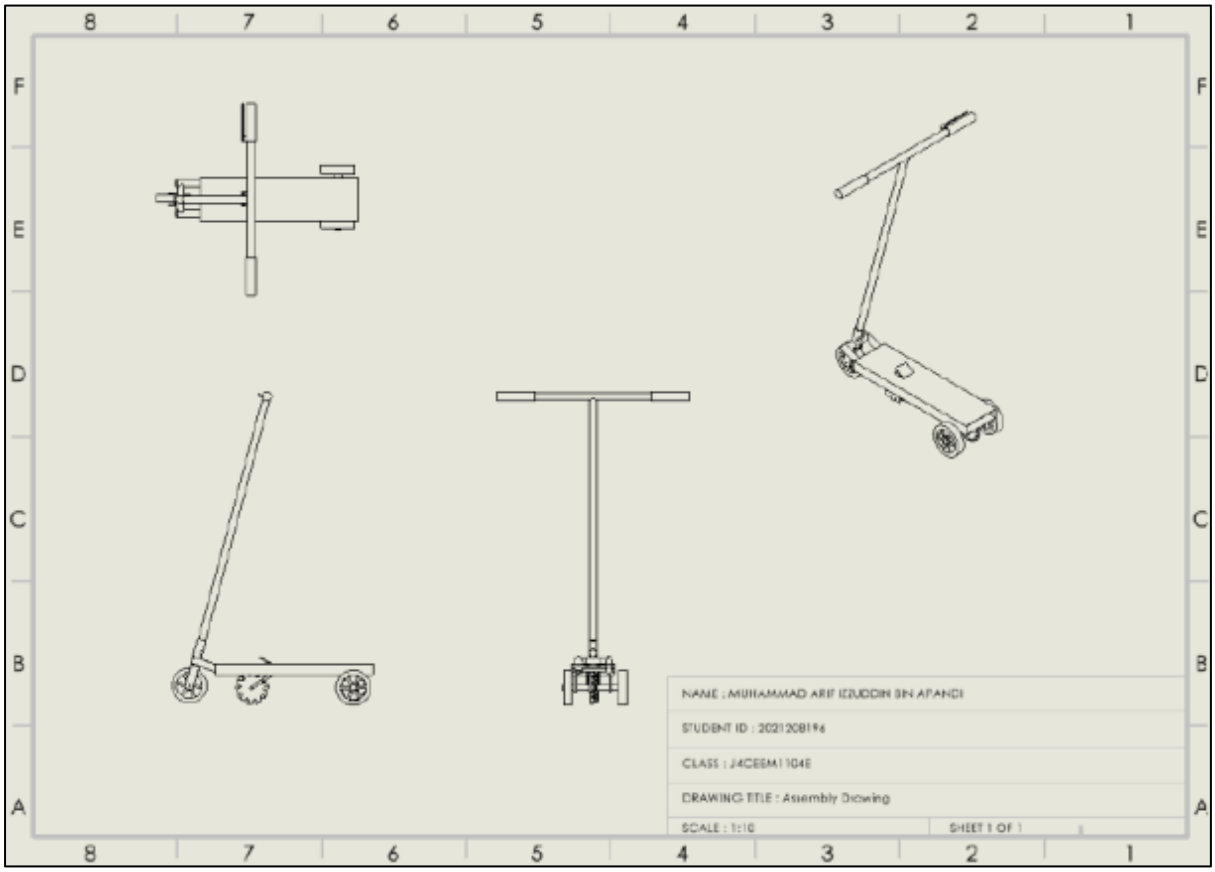
As students, the journey of going to classes by walking is one of the reasons of skipping class. That's why some of them will try to find a way to make it easy. Besides that, students especially in universities love to have some fresh air in the evening after class to ease their minds. Therefore, the invention of pedal scooter is a good transportation for these kinds of situations. Even though with the creations that are already invented such as electric scooters, pedal scooter can be a better option by looking in the green lifestyle perspective. Besides that, some people might say that pedal scooter is already been invented but this invention is slightly different. The good of this pedal scooter is more stable compared to other scooters. This is because the pedal scooter has two wheels at the back rather than one just like the other scooters previously. Besides, its use pedal to move rather than pushing using our leg. So, it will consume less energy to move, and students will not be tired when arriving at class. Furthermore, this pedal scooter offer cheaper price so that most of the student can have their scooter and make them easier to go to classes.

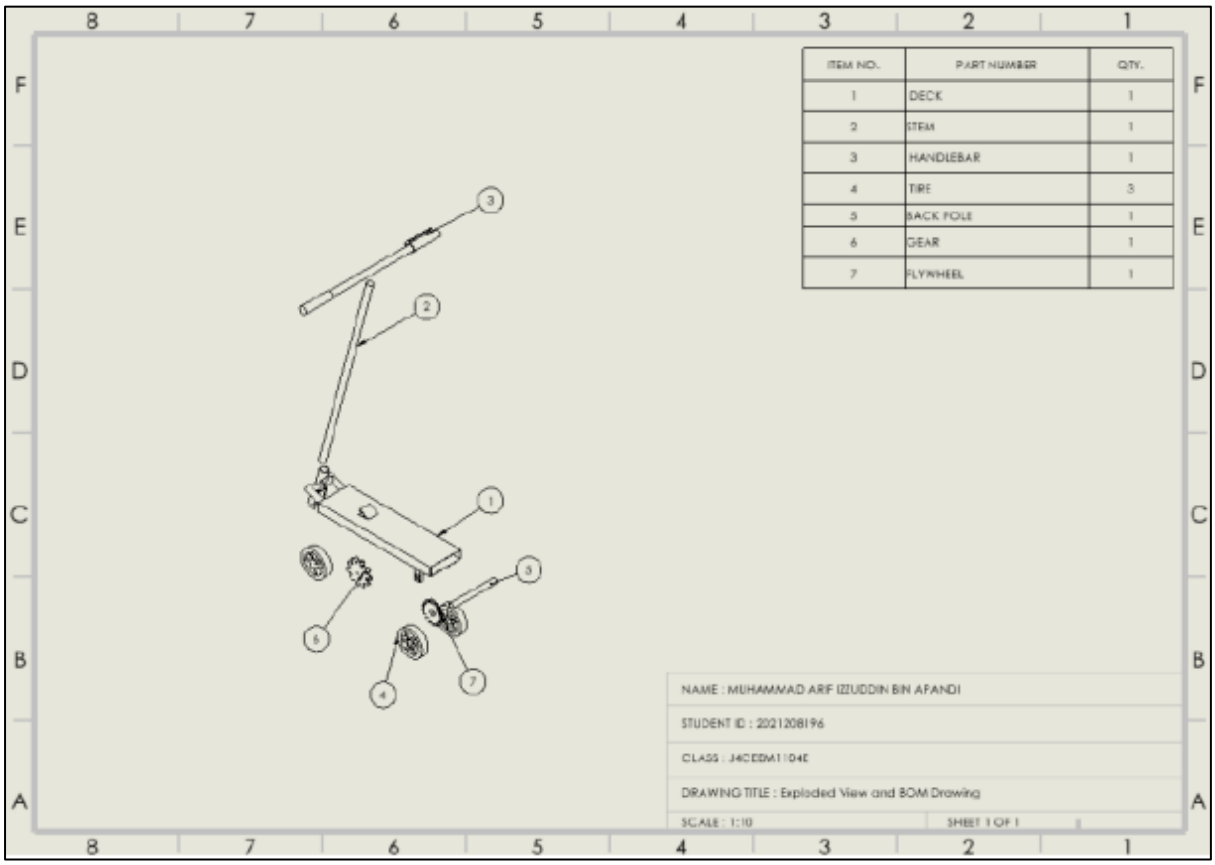
Keywords: *pedal scooter , green lifestyle*

PROTOTYPE



DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 34

Design and Development of an Automatic Hammering Machine

Muhammad Al-Imran Mohd Jailani [1] and Zeno Michael [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): zenomichael@uitm.edu.my*

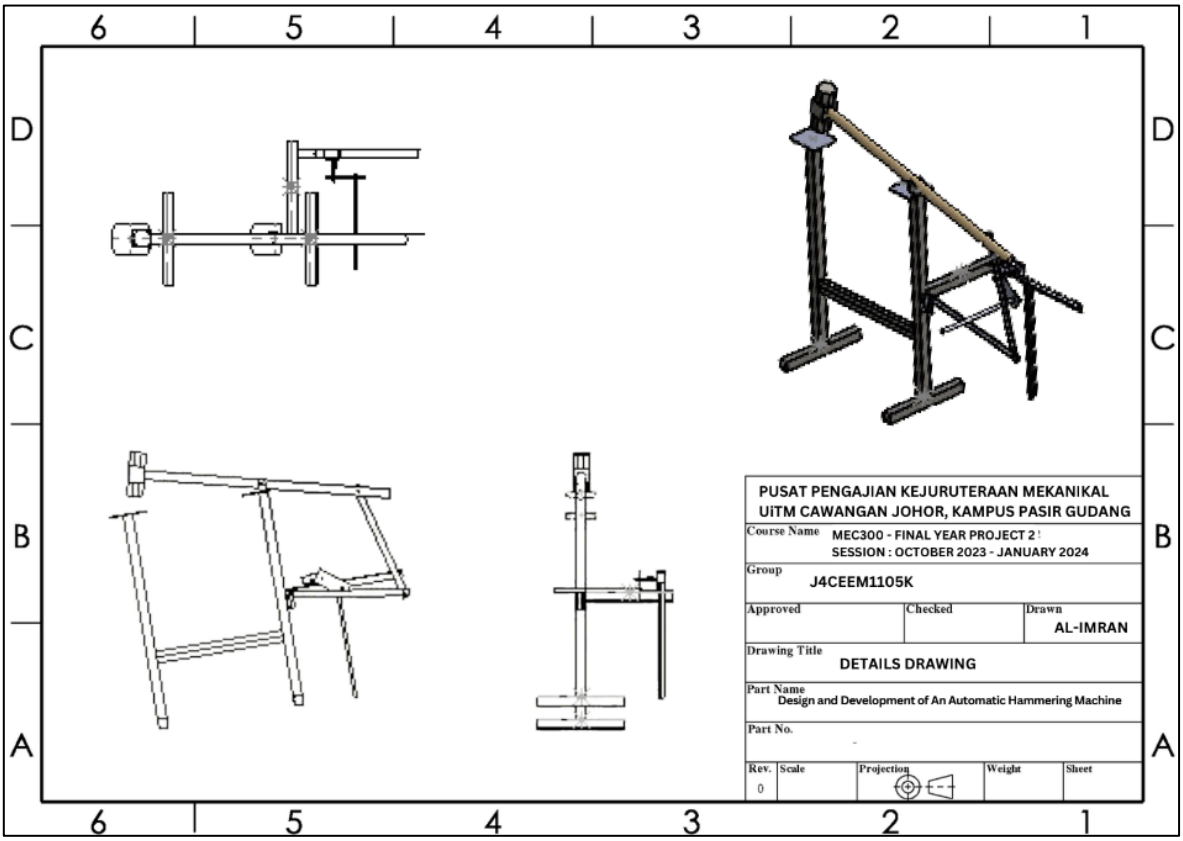
PROJECT DESCRIPTION

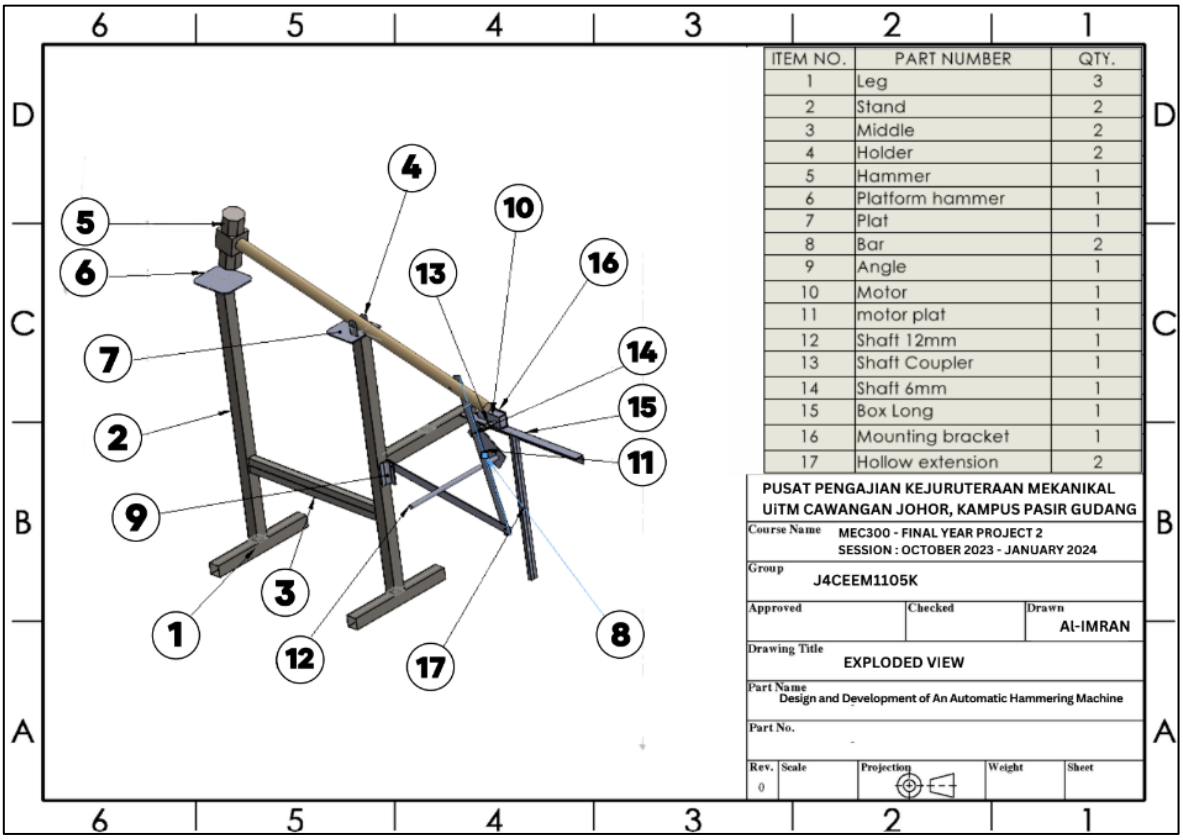
Hammering is an essential activity, most if not all industrial and construction activity. There is no denying the importance of hammering activity. However, with the increase passage of time hammering have become an activity that is too tiring to do nowadays because of technological advancement. This create a need for hammering to keep up with the advancement and needs of companies and industries. This gives a rise to various types of hammering machine being created. The existence of hammer machines made the lives of individuals and companies much easier and increased the production time of project being completed. This also allows work to be completed at a faster rate than before. Hammering machines use motor as its power source. By using a high-power motor, the machine rotational speed increases and thus makes it much faster to do its work. It can also accomplish simple work while individual works on much complicated tasks that cannot be done by machine. This machine will increase productivity and consistency at work and produces high quality work at all times.

Keywords: *Automatic Hammer, Hammer Machine*

PROTOTYPE

DESIGN PARAMETER





ITEM NO.	PART NUMBER	QTY.
1	Leg	3
2	Stand	2
3	Middle	2
4	Holder	2
5	Hammer	1
6	Platform hammer	1
7	Plat	1
8	Bar	2
9	Angle	1
10	Motor	1
11	motor plat	1
12	Shaft 12mm	1
13	Shaft Coupler	1
14	Shaft 6mm	1
15	Box Long	1
16	Mounting bracket	1
17	Hollow extension	2

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CHAPTER 35

A Design of Hijab Dryer and Air-Dresser

Nur Syafiqah Saiful Nani [1] and Ahmad Najmie Rusli [2*]

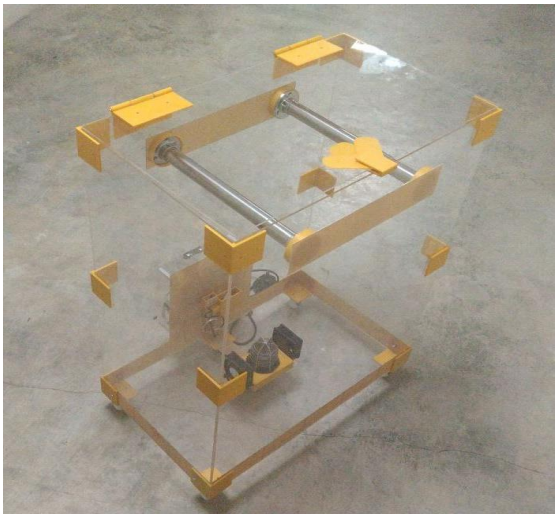
[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): ahmad7586@uitm.edu.my*

PROJECT DESCRIPTION

Hijabs, a vital part of many women's modest fashion, require careful handling to maintain their quality and longevity. Traditional methods of drying and ironing often lead to wrinkles and fabric damage, further compounded by improper storage after ironing. Working women with tight schedules and housewives managing multiple responsibilities often struggle to dedicate sufficient time to proper hijab care. Despite this, the market currently lacks specialized appliances designed for efficient hijab drying and wrinkle prevention. To address this gap, the prototype was developed as a comprehensive solution to save time while preserving the pristine condition of hijabs. This project focuses on designing, analyzing, and fabricating the hijab dryer and air dresser prototype. In the initial phase, the detailed modeling and airflow simulations were performed using SolidWorks 2021 to optimize the design and address any inaccuracies. The project highlights the significance of developing targeted solutions in household appliances, presenting an innovative approach to simplifying and enhancing hijab care.

Keywords: *Hijab, Dryer*

PROTOTYPE



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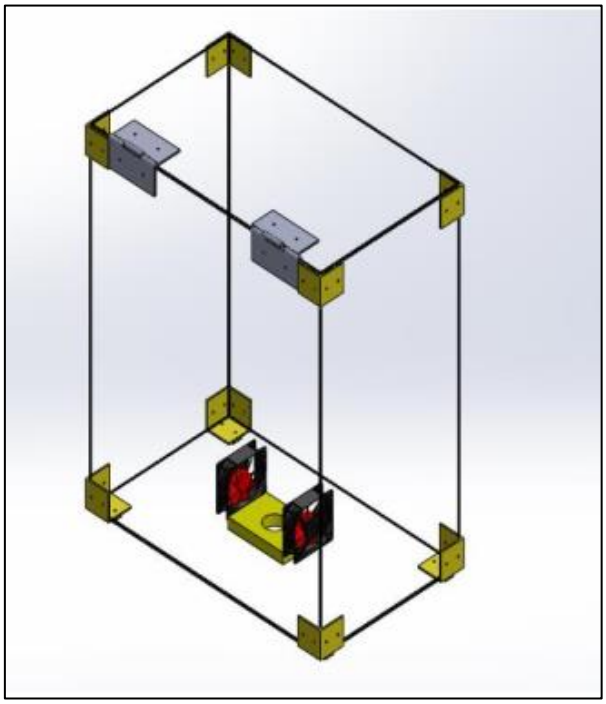
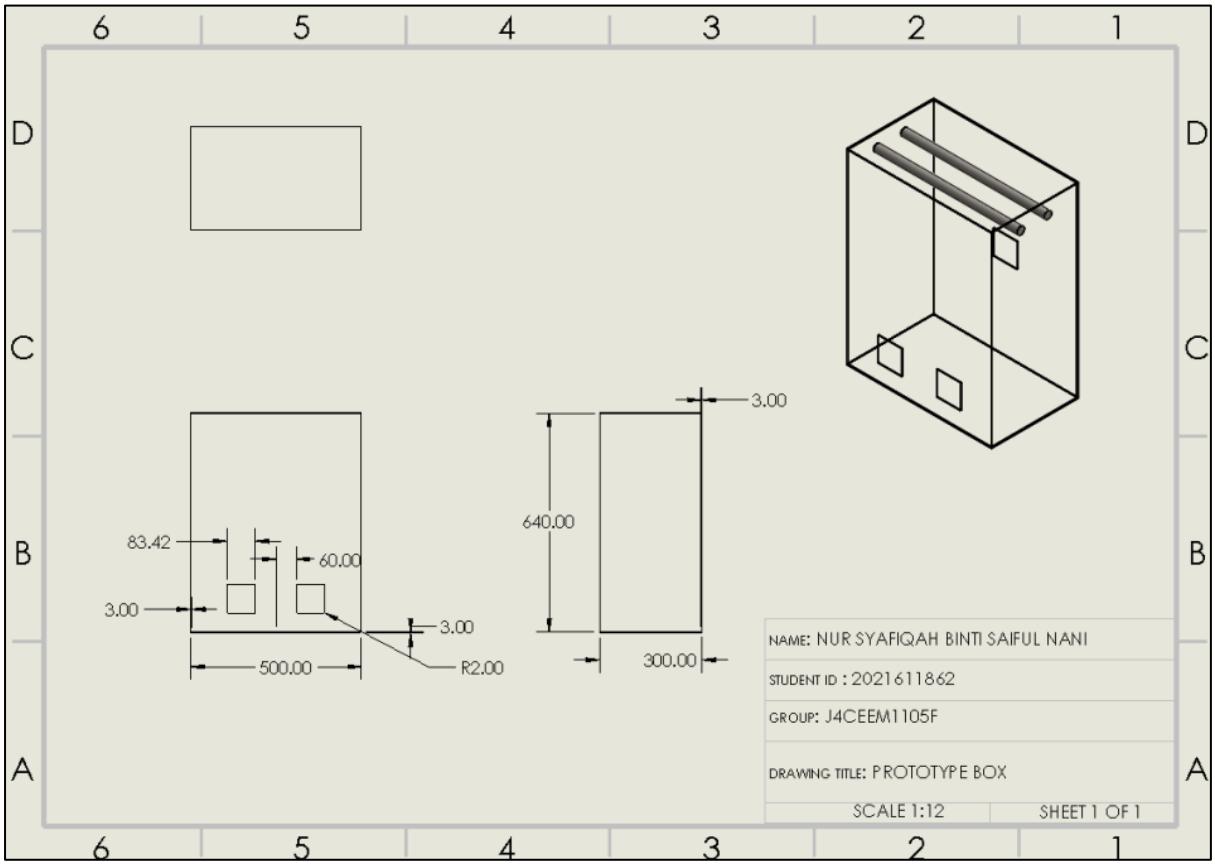




e-ISBN: 978-967-0033-32-7

CHAPTER 36

A Design of Door-Gift Packing Machine

Siti Nursabrina Abdul Rauf [1] and Ahmad Najmie Rusli [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): ahmad7586@uitm.edu.my*

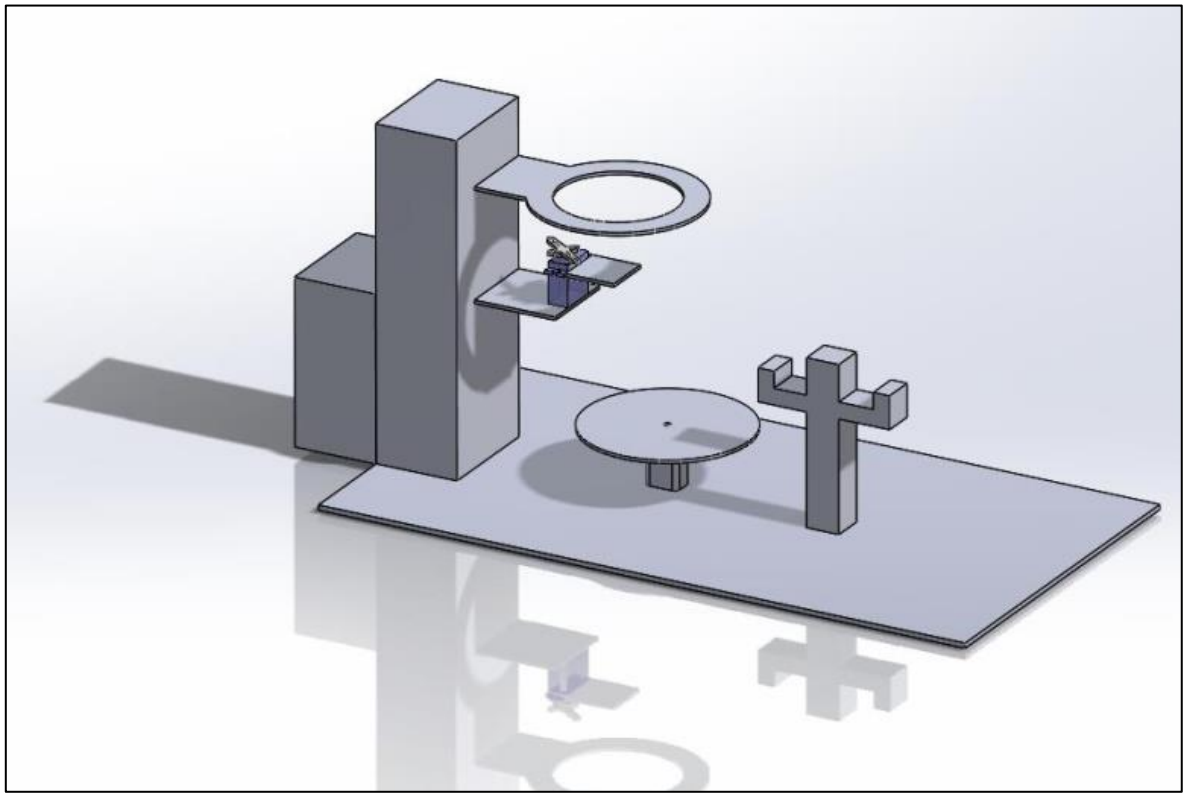
PROJECT DESCRIPTION

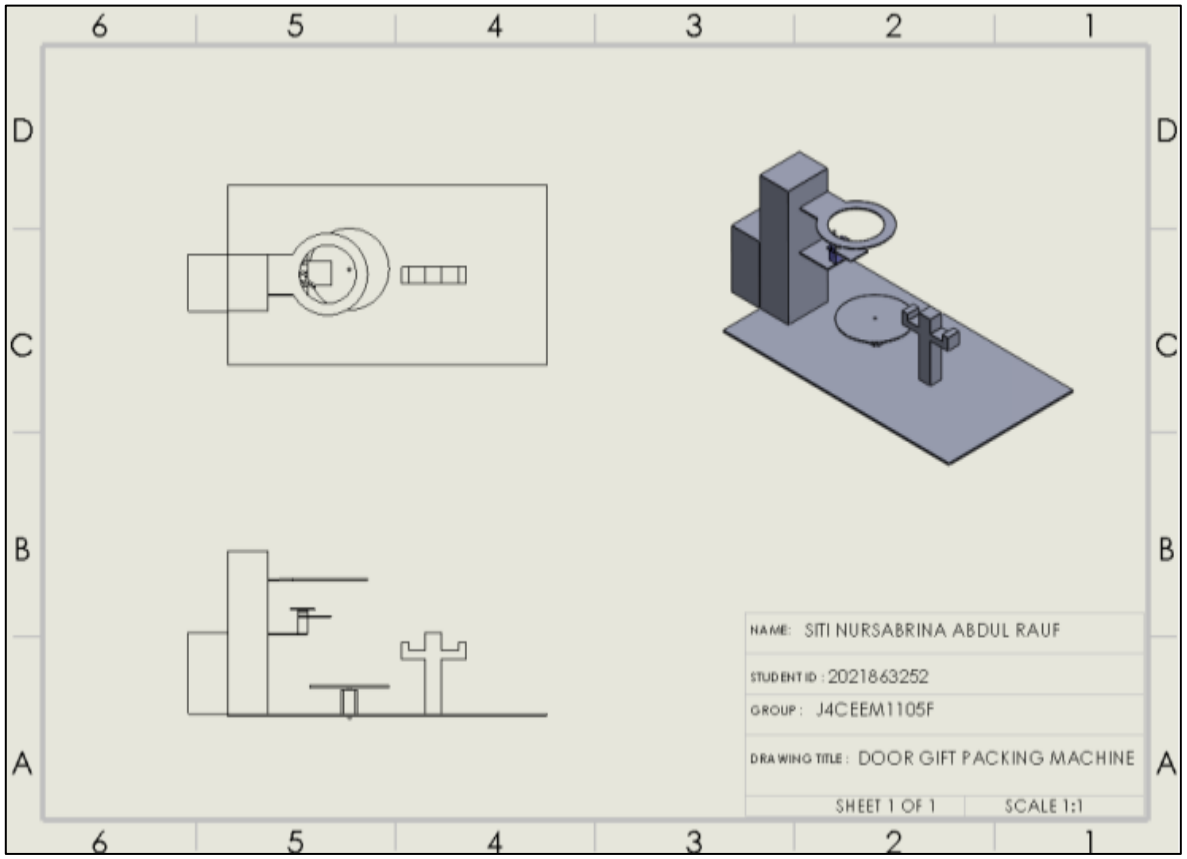
This project is particularly significant for small business owners involved in door gift packaging. The project, titled Door Gift Packing Machine, was proposed to address the limitations of current methods, where door gifts are packed manually. Manual packing requires substantial manpower, consumes a lot of time, and is physically tiring. The primary objective of this project is to reduce the challenges faced by door gift sellers by introducing a more efficient packing solution. The machine will feature three main processes: sorting, packing, and sealing. Additionally, the project will incorporate mechanical, electrical, and control system mechanisms. This product is designed as a semi-automatic machine, as it combines automated functions with some manual processes, offering a practical and efficient solution for door gift packaging.

Keywords: *Doorgift, Packing*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 37

Semi-automated Clothes Folding Machine

Ahmad Zahin bin Razak [1] and Mohd Fadzli Bin Ismail [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): mohdfadzli@uitm.edu.my*

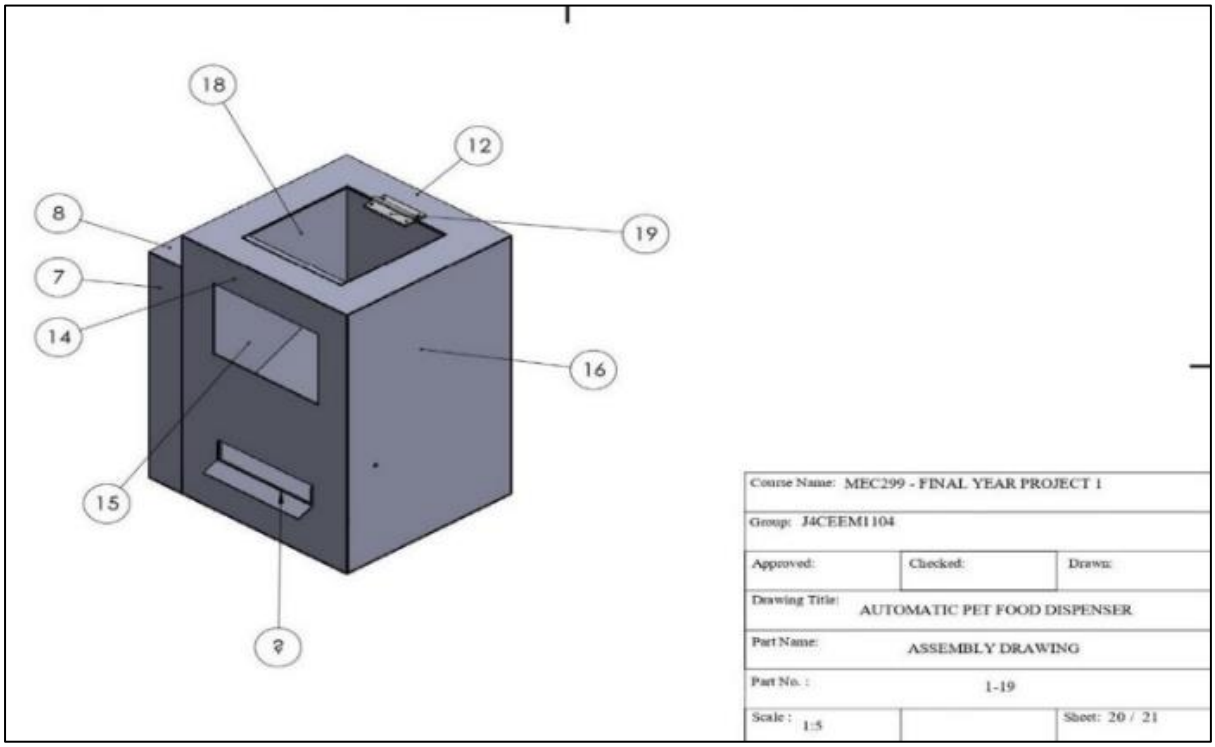
PROJECT DESCRIPTION

T-shirt folding is a universal method for keeping clothes organized and packed. However, the manual folding process for clothes is time-consuming and labor-intensive, resulting in inefficiency and inconsistent folding. The aim of this project is to design and fabricate a semi-automated clothes folding machine that improves efficiency and consistency in clothes folding. The fabrication of the machine involves the cutting and joining processes of the frame and electronic wiring of the Arduino Uno microcontroller. Clothes folding is automated with the aid of the Arduino Uno microcontrollers. Once the cloth is ready on the flipfold, the start button is pushed, and the cloth will be folded in four sequences. As a result, the clothes are folded in an efficient and consistent manner. In conclusion, this project contributes to streamlining the clothing folding process, enhancing productivity, and reducing manual labor.

Keywords: *Arduino Uno, Folding clothes*

PROTOTYPE

DESIGN PARAMETER



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Group: J4CEEM1104		
Approved:	Checked:	Drawn:
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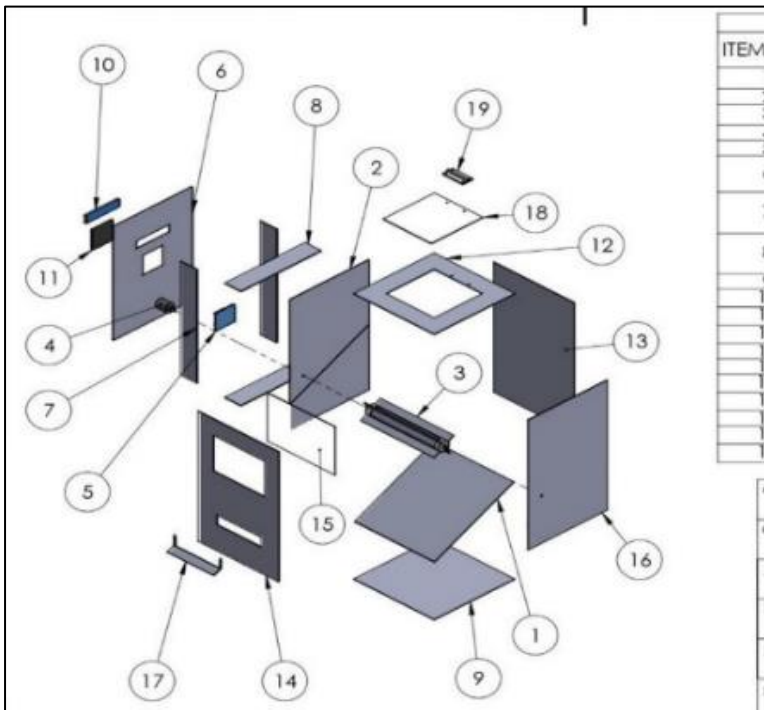
Part Name: ASSEMBLY DRAWING		
Part No. : 1-19		
Scale : 1:5		Sheet: 20 / 21



BOM Table

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Leaning Plane	SHEET METAL	1
2	Left Plane	SHEET METAL	1
3	Dispenser shaft	PVC & PLASTICS	1
4	12V Motor	12V DC MOTOR	1
5	Arduino UNO	MICROCONTROLLER	1
6	Compartment Front Plane	SHEET METAL	1
7	Compartment Left-Right Plane	SHEET METAL	2
8	Compartment Top-Bottom Plane	SHEET METAL	2
9	Bottom Plane	SHEET METAL	1
10	LED Display	16*2 DISPLAY	1
11	Keypads	4*4 BUTTONS	1
12	Top Plane	SHEET METAL	1
13	Rear Plane	SHEET METAL	1
14	Front Plane	SHEET METAL	1
15	Acrylic Sheet	ACRYLIC SHEET	1
16	Right Plane	SHEET METAL	1
17	Exit Cover	SHEET METAL	1
18	Storage Cover	ACRYLIC SHEET	1
19	Steel Hinge	STEEL	1

Course Name: MEC299 - FINAL YEAR PROJECT 1		
Group: J4CEEM1104		
Approved:	Checked:	Drawn:
Drawing Title: AUTOMATIC PET FOOD DISPENSER		
Part Name: EXPLODED DRAWING		
Part No. : 1 - 19		
Scale : 1:10		Sheet: 21 / 21

e-ISBN: 978-967-0033-32-7

CHAPTER 38

Development of a 4-Stroke Engine Prototype

Muhammad Aidilhakim Mohd Yunus [1], Norhisyam Jenal [2*] and Siti Aishah Taib [3]

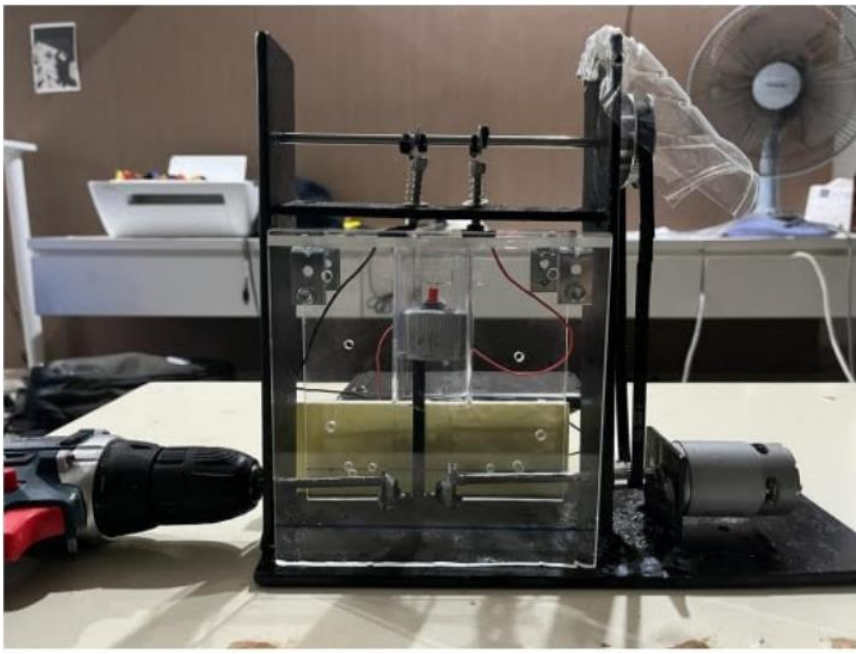
[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
[3]Academy of Language Studies, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim
**Corresponding author (e-mail): hisyam0324@uitm.edu.my*

PROJECT DESCRIPTION

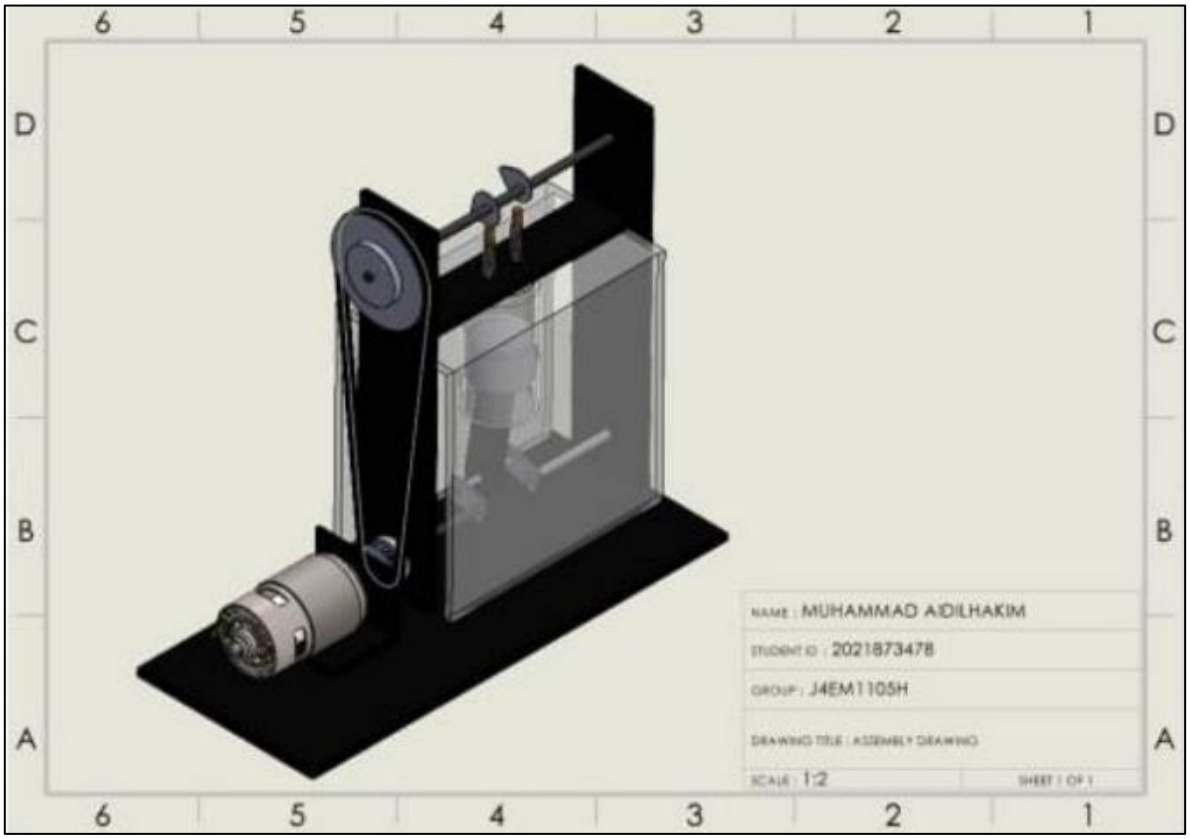
The 4-stroke engine is widely used as the main engine system for cars. Simulations are done to provide an understanding of how the engine works since the pistons and cylinders are fully enclosed in the engine block. Thus there is a need for an alternative application that can help imitate the engine functionality. This research focuses on the design and development of a 4-stroke engine prototype for education purposes. The design process was done using SolidWorks. The fabrication processes involving cutting, welding, grinding, and drilling were done in the workshop using suitable materials available in the market. The semi-automated prototype can show the movement of the crankshaft, camshaft, timing belt, and spark plug during a 4-stroke cycle. The prototype is expected to aid the teachers in providing a clearer view of the 4-stroke engine for the students in class.

Keywords: *4-stroke engine, Education*

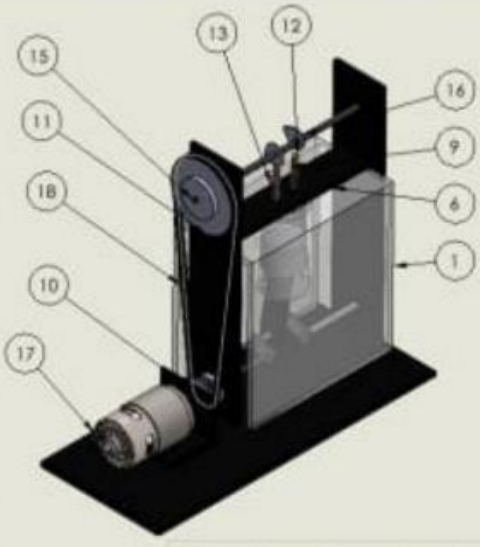
PROTOTYPE



DESIGN PARAMETER



ITEM NO.	PART NUMBER	QTY.
1	cover block engine	1
2	crank (REAL)	2
3	Crankshaft (40 mm)	1
4	crankshaft (60 mm)	1
5	Crankshaft (80 mm)	1
6	frame engine block	1
7	piston head (REAL)	1
8	piston pin (REAL)	1
9	Spring	2
10	Timing Belt (20 teeth)	1
11	Timing Belt (60 teeth)	1
12	Valve	2
13	valve holder (REAL)	1
14	CONNECTING ROD REAL	1
15	Camshaft	1
16	CAM REAL	2
17	DC Motor	1
18	Belt6-5^Assem1	1



e-ISBN: 978-967-0033-32-7

CHAPTER 39

Development of a Portable Drink Dispenser

Aiman Hadif Azizul [1], Norhisyam Jenal [2*] and Siti Aishah Taib [3]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
[3]Academy of Language Studies, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim
**Corresponding author (e-mail): hisyam0324@uitm.edu.my*

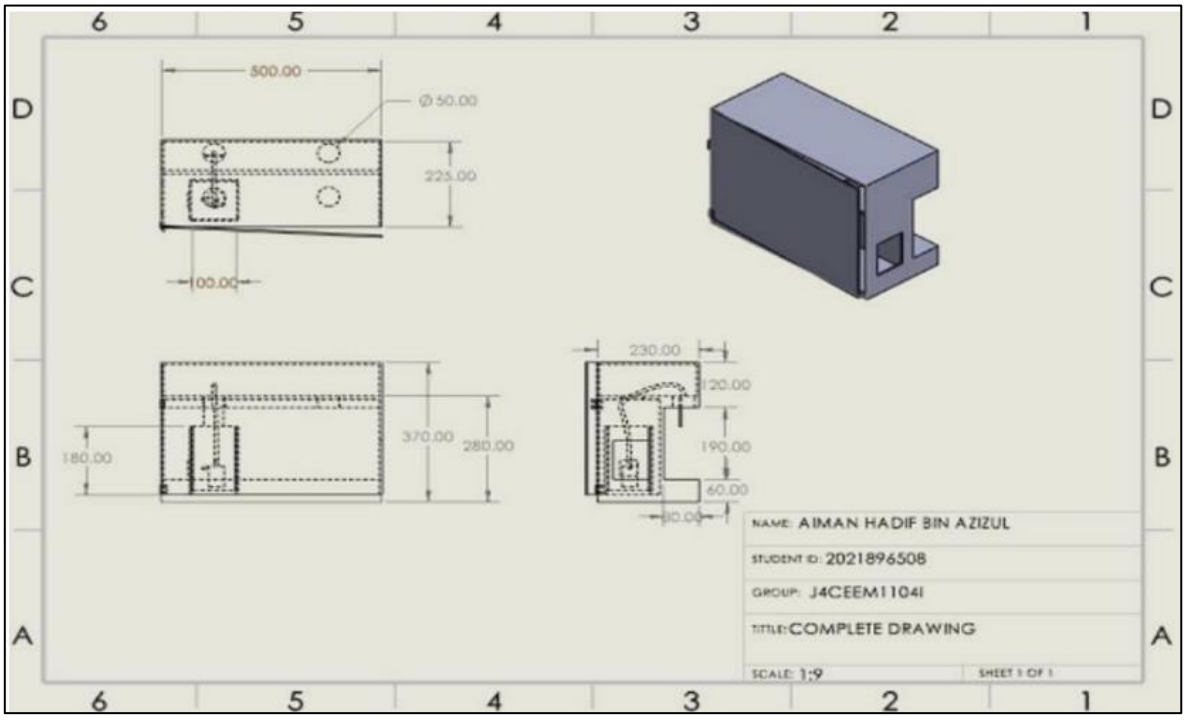
PROJECT DESCRIPTION

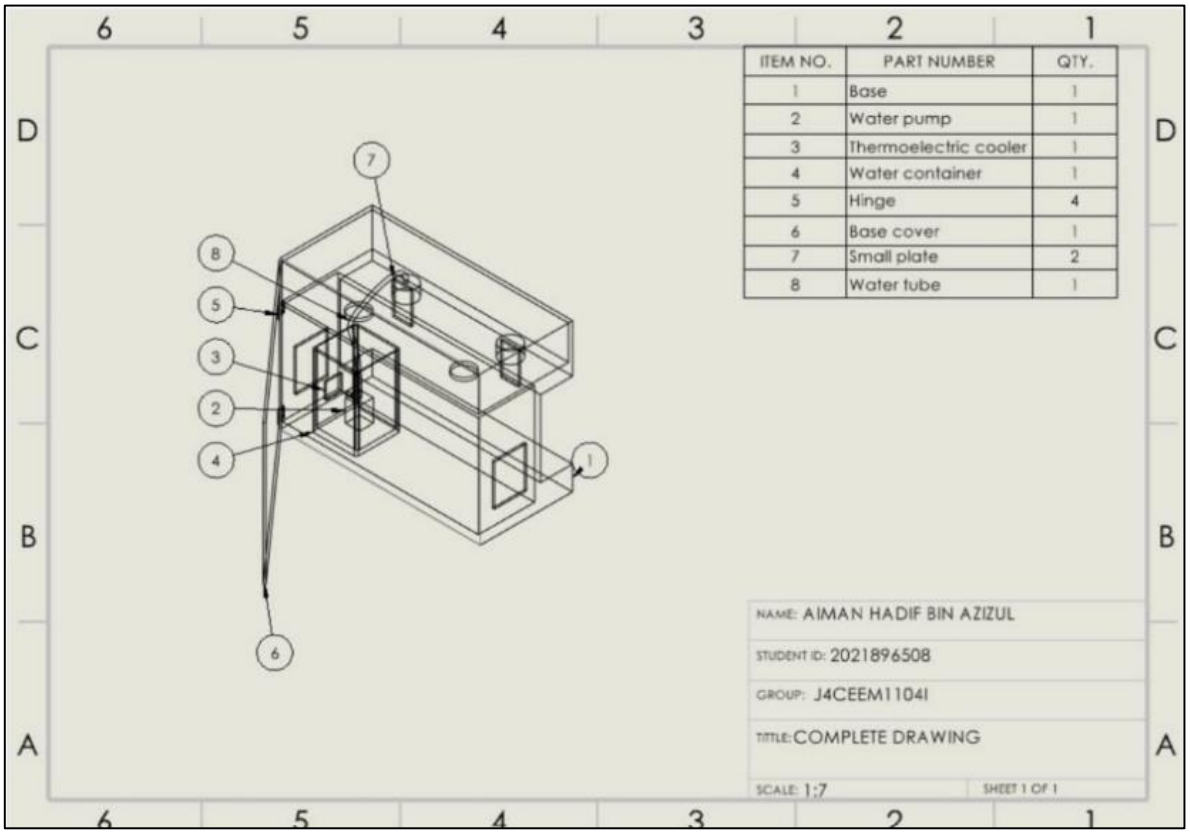
Water dispensers used in homes are normally designed to be stationary and not suitable to be transported from one place to another. The possibility of a portable product that can dispense and lower the temperature of drinks is an exciting prospect. The study focuses on the design and development of a portable drink dispenser. The product uses an electrical pump to dispense drinks and a Peltier module to cool the drinks in the tank. The design of the product was drawn using SolidWorks, and processes such as measuring, cutting, and drilling were done in the faculty's workshop. The final product is capable of dispensing drinks with a click of a button, and the temperature of the drinks was cooled down a few degrees Celsius below room temperature. The product is beneficial to customers who need a simple and portable dispenser for outdoor activities and small functions.

Keywords: *Water dispenser, Peltier*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 40

Development of Plastic Bottle Recycling Machine

Mohamad Hilmi Kamisan [1], Norhisyam Jenal [2*] and Siti Aishah Taib [3]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
[3]Academy of Language Studies, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim
**Corresponding author (e-mail): hisyam0324@uitm.edu.my*

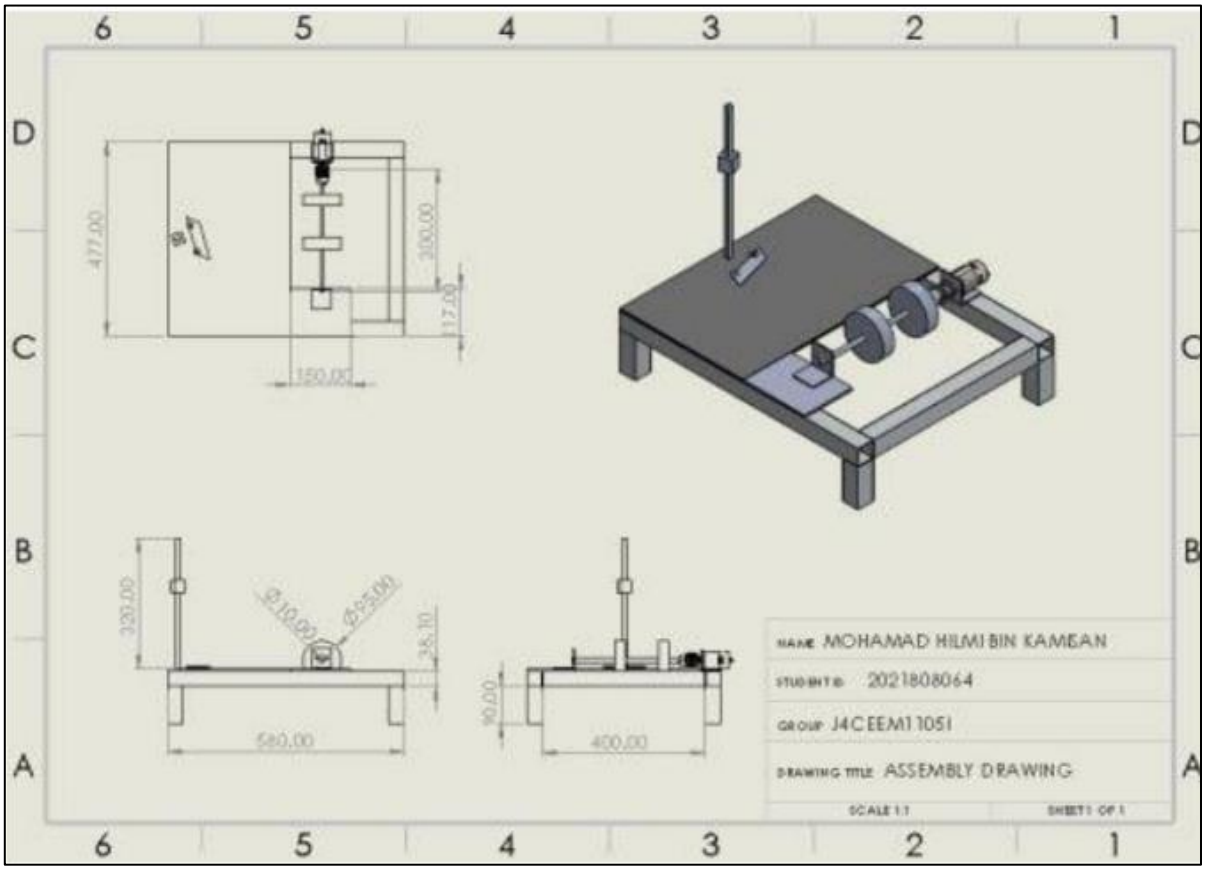
PROJECT DESCRIPTION

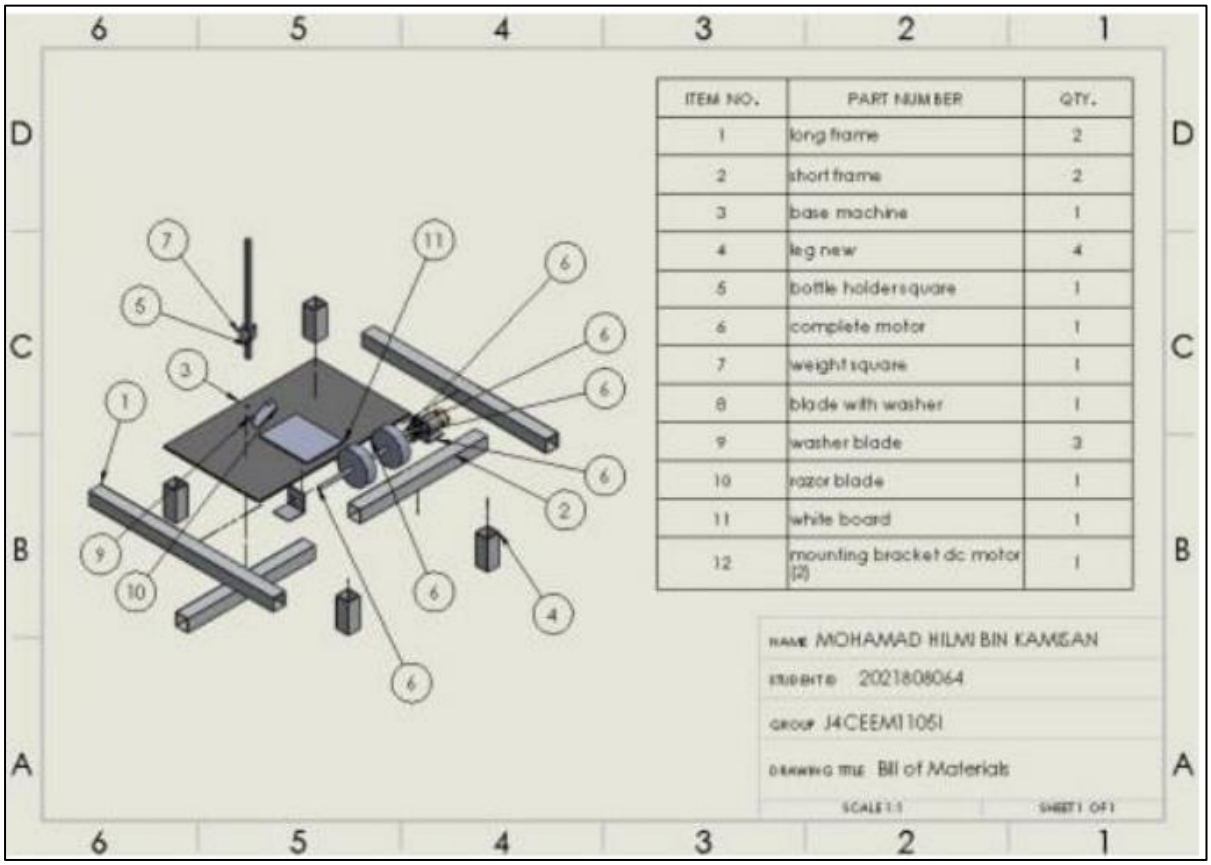
Plastic is used by people around the world and without proper disposal, it has become one of the causes of pollution on earth. Bottles for drinks are mostly produced using plastic due to the ease of production and low cost. A way to minimize the pollution of plastic bottles is to recycle them and some recycling processes require the plastic bottle to undergo the shredding process. The focus of the project is to design and develop a motorized plastic bottle cutter machine. The machine can cut the bottle into strips for ease of disposal and recycling. The machine uses the concept of a rotating valve that will pull a plastic strip from a plastic bottle through a cutter while rolling the plastic strips. The drawing for the project was done using SolidWorks and the fabrication processes were completed using in-house tools and machines. The final semi-automated prototype can cut the plastic strips according to the required size with the aid of an operator. This product is expected to provide a solution for cleaners and recyclers to recycle plastic bottles in a more convenient way without requiring a bigger storage space.

Keywords: *Plastic bottle, Cutter*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 41

Design and Fabrication of an Efficient Trolley with Pulley Mechanism

Muhamad Haziq bin Mohd Baharudin [1] and Syidatul Akma Binti Sulaiman [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): syidatul_akma7091@uitm.edu.my*

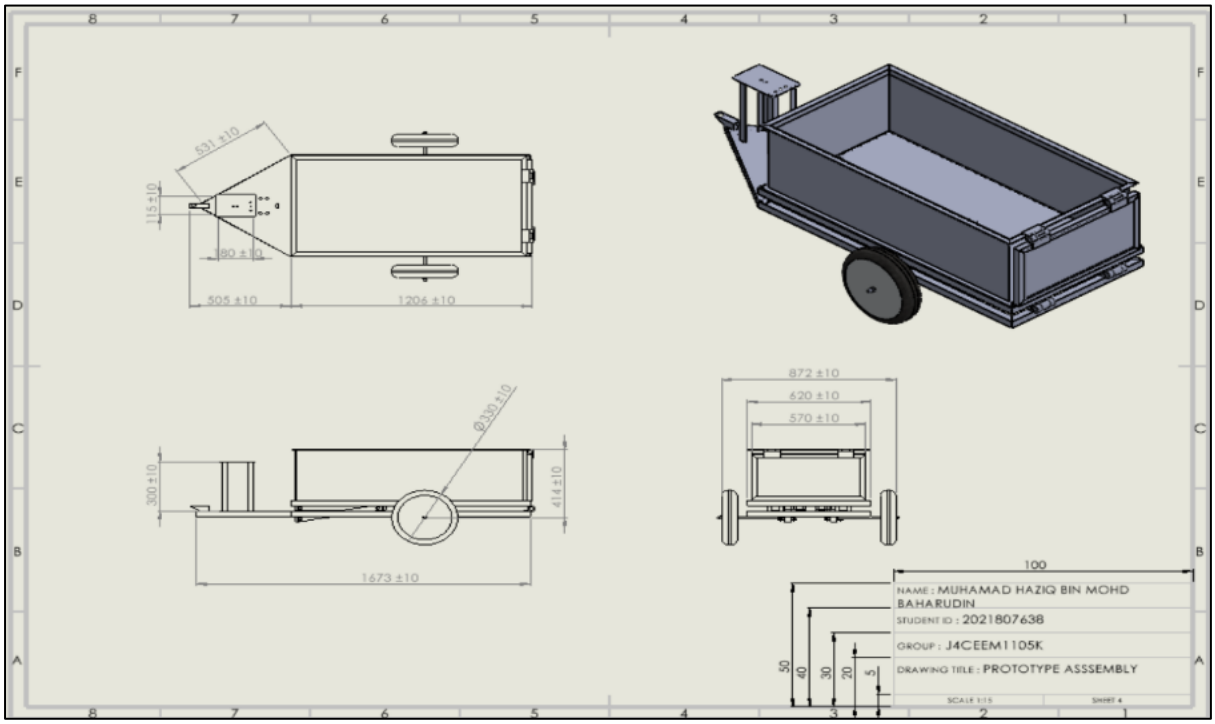
PROJECT DESCRIPTION

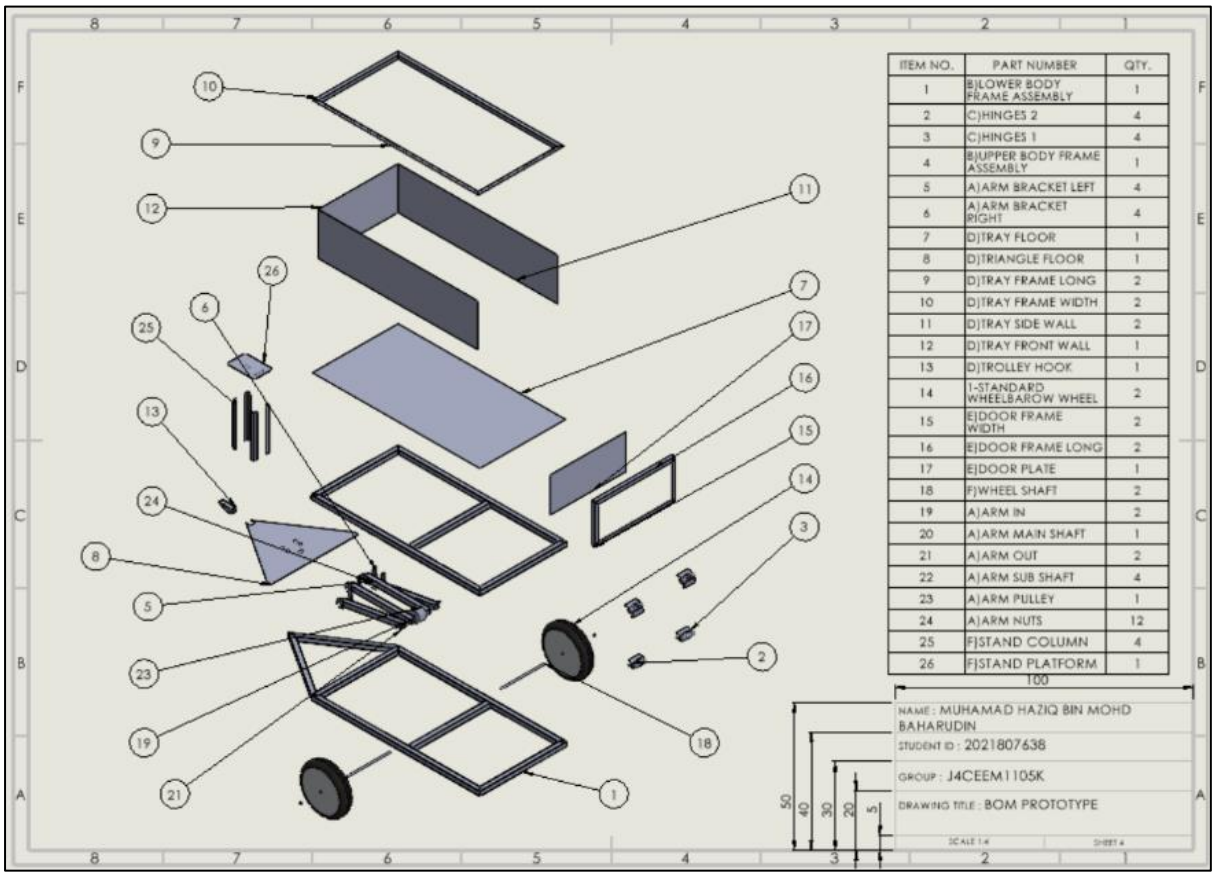
This project aims to address the limitations of traditional wheelbarrows by combining the functionality of a dump truck with the portability and ease of use of a wheelbarrow. The project proposes a pulling system mechanism that allows the user to pull the load behind them, utilizing gears and pulleys to transfer the pulling force to the wheels. Additionally, the vehicle will be equipped with a pulley system to facilitate easy unloading. The objective of this study is to develop a practical and innovative method for transporting light to medium amounts of loose material. By fusing the functions of a wheelbarrow and a dump truck, this project has potential applications in various industries. It aims to increase productivity, reduce physical strain on workers, and provide a cost-effective solution. The project will involve the design and analysis of the trolley using SolidWorks software, optimization for efficient unloading, and the use of steel bar and sheet metal for construction. The expected results include the creation of an efficient trolley that combines the benefits of a wheelbarrow and a dump truck, enhancing the ease and speed of transporting loads while remaining affordable and practical for a wide range of users.

Keywords: *Trolley, Pulley*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 42

Design and Development of Small Hydro Turbine using Vertical Wind Blade Power Generator

Mohamad Idham Ishak [1], Ainaa Maya Munira Ismail [2*] and Najibah Ab Latif [3]

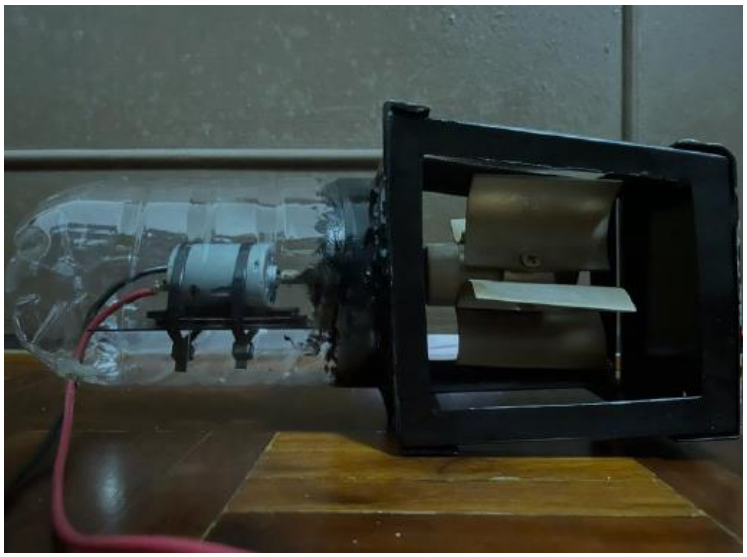
[1,2,3]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): ainaa7609@uitm.edu.my*

PROJECT DESCRIPTION

Renewable energy sources are growing in significance as the global community pursues sustainable alternatives to conventional methods of energy production. Hydropower is a source of energy that employs the force of flowing water to produce electricity. Small-scale hydropower plants are often more viable and economical than large-scale installations in numerous instances. Hydro turbines are not widely employed in Malaysia for electricity production. Thus, a small hydro turbine can be employed to generate electricity for communication devices or electrical appliances. Therefore, the objective of this research is to create a small hydro turbine power generator utilizing vertical wind turbine blades that can be operated in any location, including remote areas. This will be accomplished by the use of several manufacturing processes, including machining, sheet metal fabrication, joining techniques, and other mechanical methods. With a maximum power of 2 kW, the intended result of providing electricity and facilitating the user's daily tasks using renewable energy was achieved.

Keywords: *small hydro turbine, vertical wind turbine blades*

PROTOTYPE



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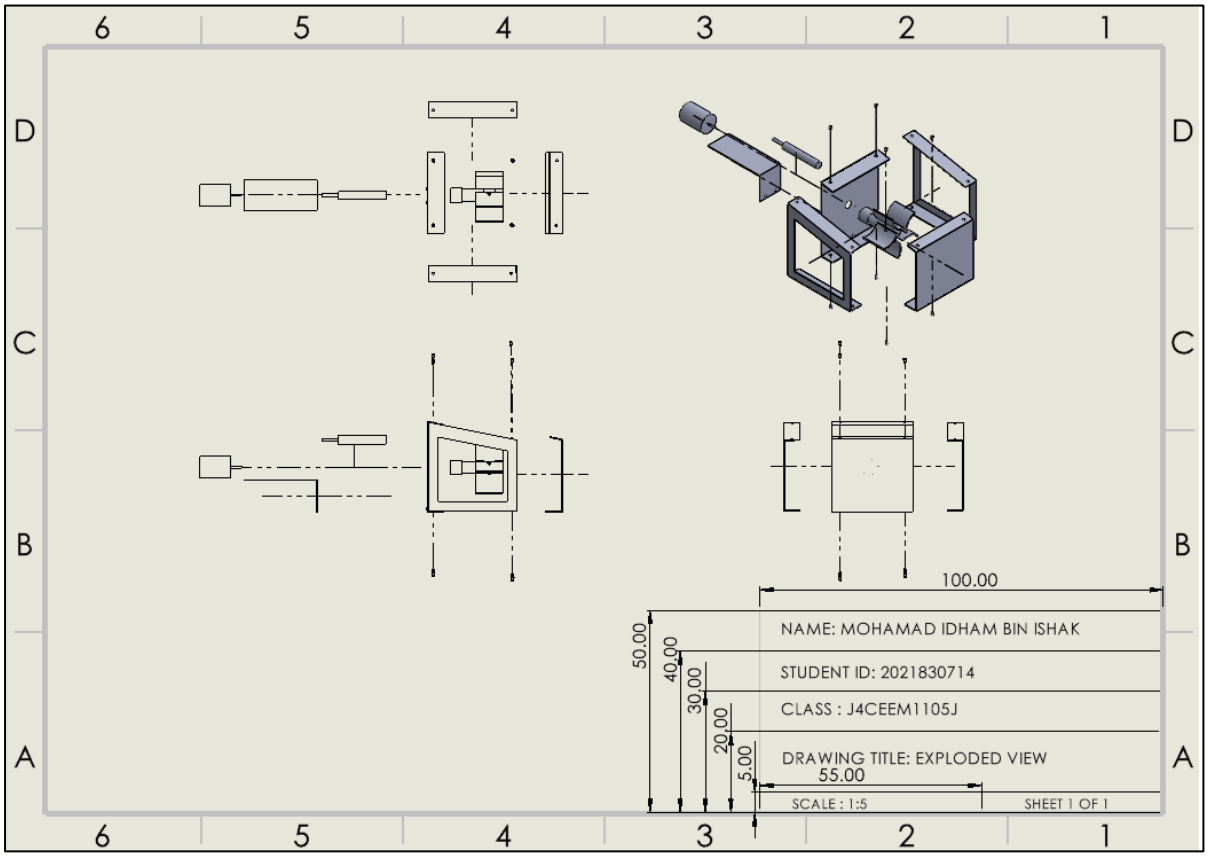
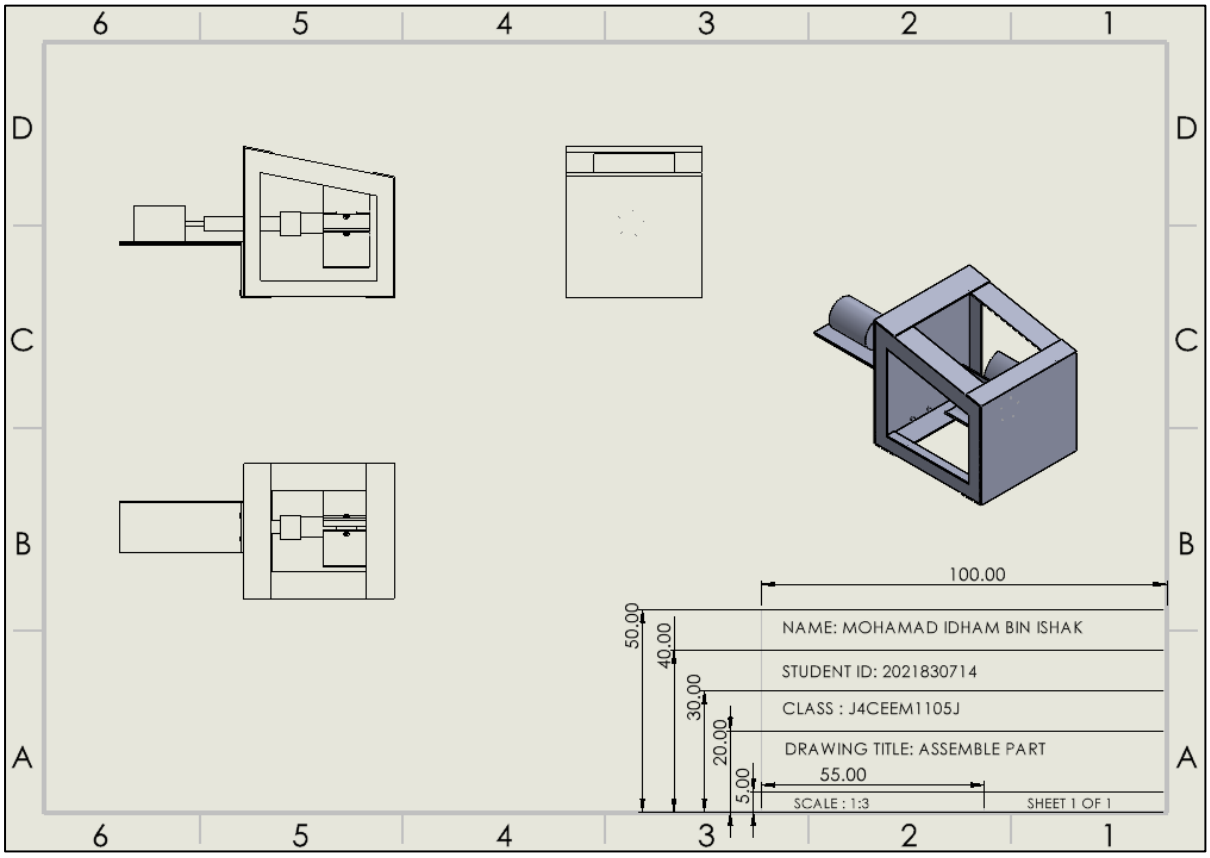




CHAPTER 43

Development of Mini Hydro Turbine

Muhammad Anwar Yusri [1], Ainaa Maya Munira Ismail [2*] and Najibah Ab Latif [3]

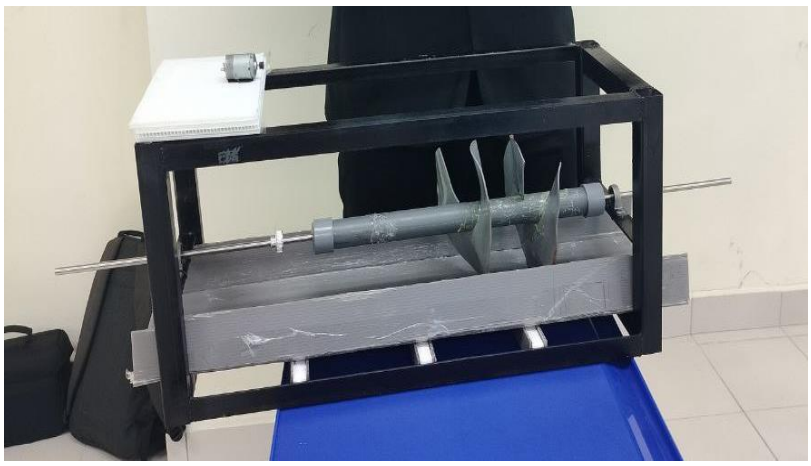
[1,2,3]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): ainaa7609@uitm.edu.my*

PROJECT DESCRIPTION

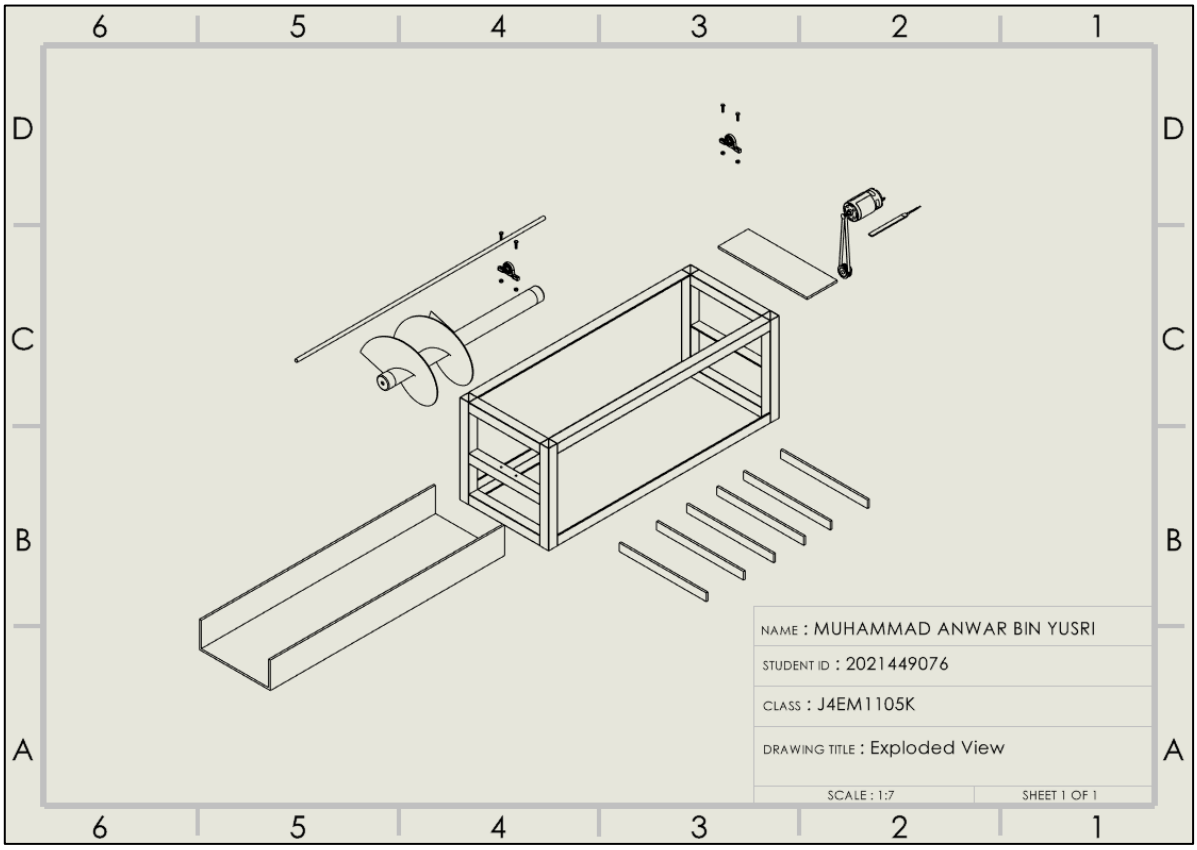
The current widespread usage of nonrenewable energy sources presents an important risk to ecological health. Thus, there is an urgent demand for renewable energy sources that exclusively exploit natural materials. The lack of renewable energy in our environment can be attributed to the exorbitant upfront expenses, limited awareness, and unreliable availability of resources. The objective of this study is to develop a mini-scale hydro turbine power generator adopting advanced SolidWorks technology, to promote the widespread adoption of renewable energy sources. This product involves machining procedures such as welding, cutting, grinding, and drilling. The prototype is capable of generating approximately 2.47 watts of power. Therefore, it can assist in providing energy whenever feasible.

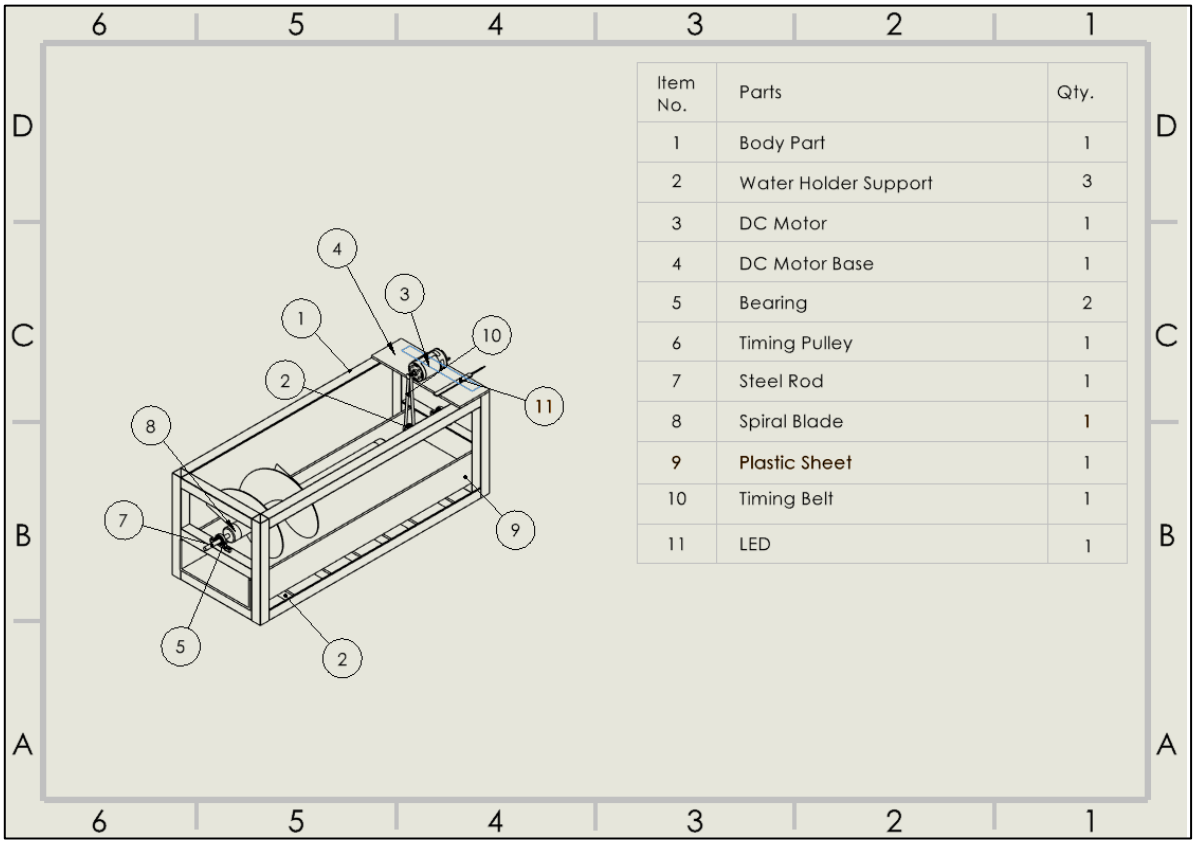
Keywords: *mini-scale hydro turbine, renewable energy sources*

PROTOTYPE



DESIGN PARAMETER





Item No.	Parts	Qty.
1	Body Part	1
2	Water Holder Support	3
3	DC Motor	1
4	DC Motor Base	1
5	Bearing	2
6	Timing Pulley	1
7	Steel Rod	1
8	Spiral Blade	1
9	Plastic Sheet	1
10	Timing Belt	1
11	LED	1

e-ISBN: 978-967-0033-32-7

CHAPTER 44

Design of Playground Equipment with The Ability to Generate Electricity

Muhammad Azim Hamidan [1], Ainaa Maya Munira Ismail [2*] and Najibah Ab Latif [3]

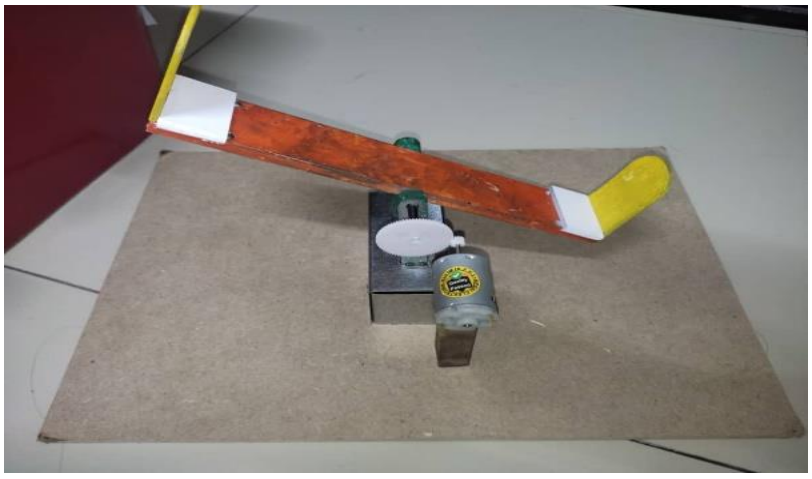
[1,2,3]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): ainaa7609@uitm.edu.my*

PROJECT DESCRIPTION

A multitude of playgrounds are forsaken and minimal occupied. Considering their accessibility and attraction, electronics are particularly susceptible to being used. A great deal of playground equipment operates on mechanical principles. Nevertheless, a limitation arises when the generation of mechanical energy is inconsistent due to certain factors that impact the playground. This project aims to create and construct a playground that is capable of producing mechanical energy and converting it into electrical power. The data for this project can be gathered by thorough and accurate study. Hence, it facilitated the development of a playground specifically designed for children as the primary user. This is due to their possession of the most appropriate and promising characteristics that will enhance the efficiency of this facility. Ultimately, this project has been effectively developed and demonstrated to deliver a beneficial influence on users, the nation, and the environment.

Keywords: *playground equipment, mechanical energy*

PROTOTYPE



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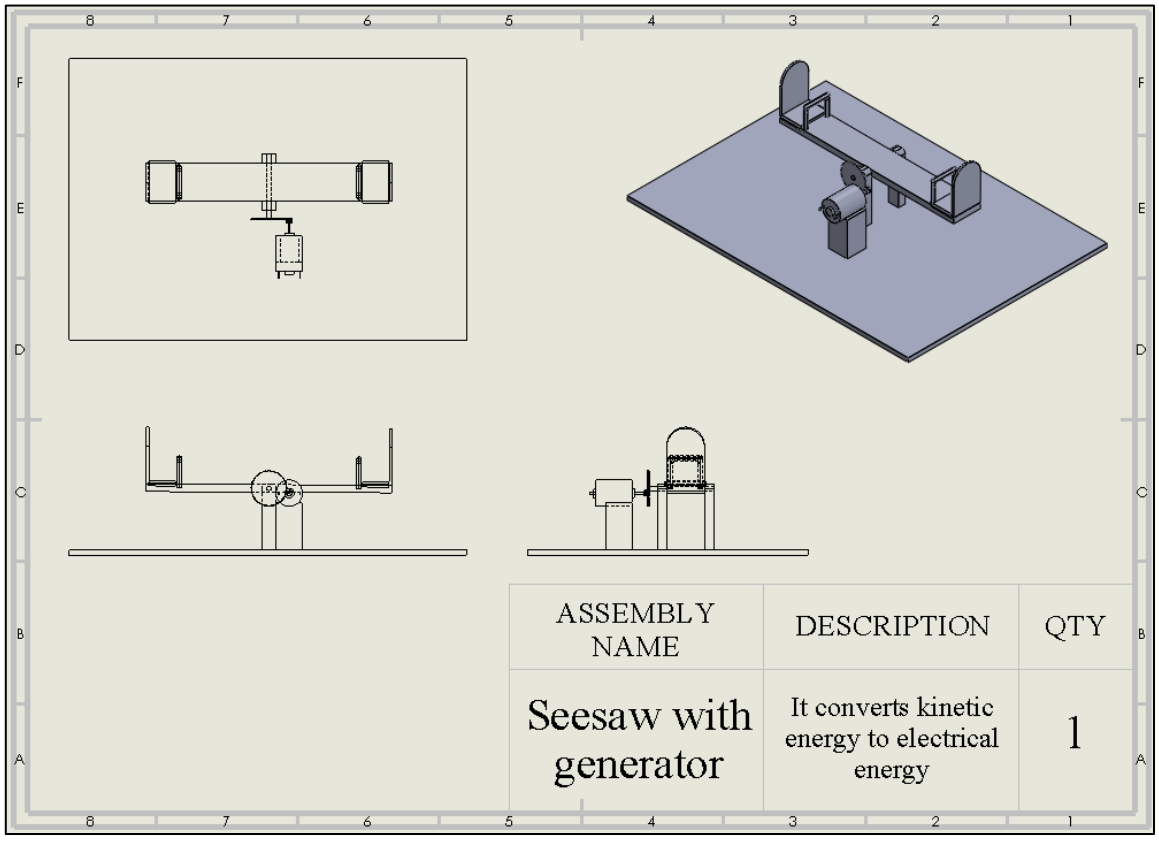
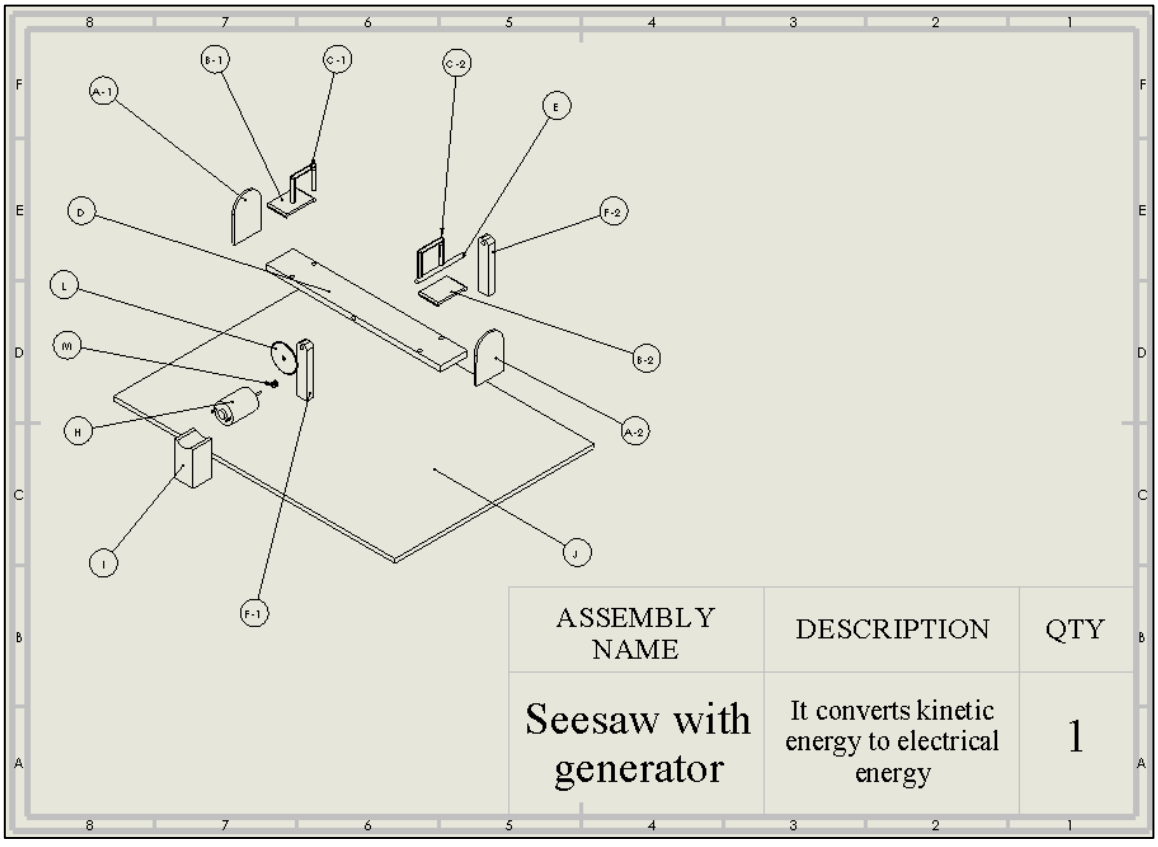


ASSEMBLY NAME	DESCRIPTION	QTY
Seesaw with generator	It converts kinetic energy to electrical energy	1



ASSEMBLY NAME	DESCRIPTION	QTY
Seesaw with generator	It converts kinetic energy to electrical energy	1

e-ISBN: 978-967-0033-32-7

CHAPTER 45

Design of Mechanical Flower Rack

Muhammad Abdul Rahman Muhamad Abdul Malik [1], Ainaa Maya Munira Ismail [2*] and Najibah Ab Latif [3]

[1,2,3]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): ainaa7609@uitm.edu.my*

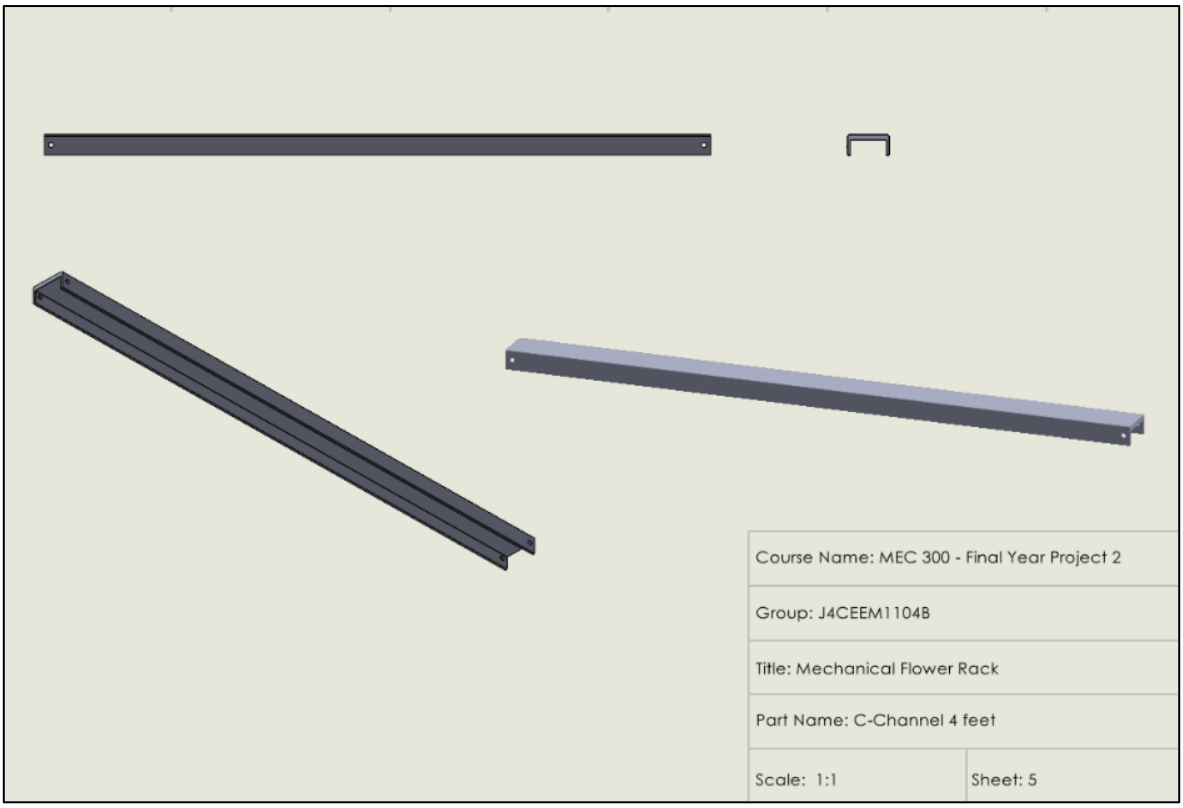
PROJECT DESCRIPTION

The Mechanical Flower Rack is an innovative and eco-friendly beneficial device for hanging plants. This study focuses on the absence of sustainable and cutting-edge flower racks available in the market. The majority of flower racks are constructed from non-sustainable materials and do not possess mechanical elements, hence rendering it unfeasible to exhibit a diverse assortment of plants and flowers. It has applications in research, ideation, prototyping, and experimentation. Hence, the objective of this project is to construct a flower rack that is both utilitarian and visually appealing, while employing environmentally sustainable materials and mechanical elements. The flower rack possesses qualities of durability, utility, and attractiveness. The space may encompass a diverse array of plants and flowers, with a primary focus on promoting environmental sustainability. The significance of this product lies in its contribution to sustainable engineering and design, its practicality for plant enthusiasts, and its potential to inspire future improvements. Overall, this project has been successfully constructed and shown to be advantageous to ordinary consumers.

Keywords: *mechanical flower rack , sustainable engineering*

PROTOTYPE

DESIGN PARAMETER



e-ISBN: 978-967-0033-32-7

CHAPTER 46

Design and Fabrication of Smart Alarm Clock for Effortless Mornings

Muhamad Fakhri Aniq Bin Che Ismadi [1] and Radzi Abdul Rasih [2*]

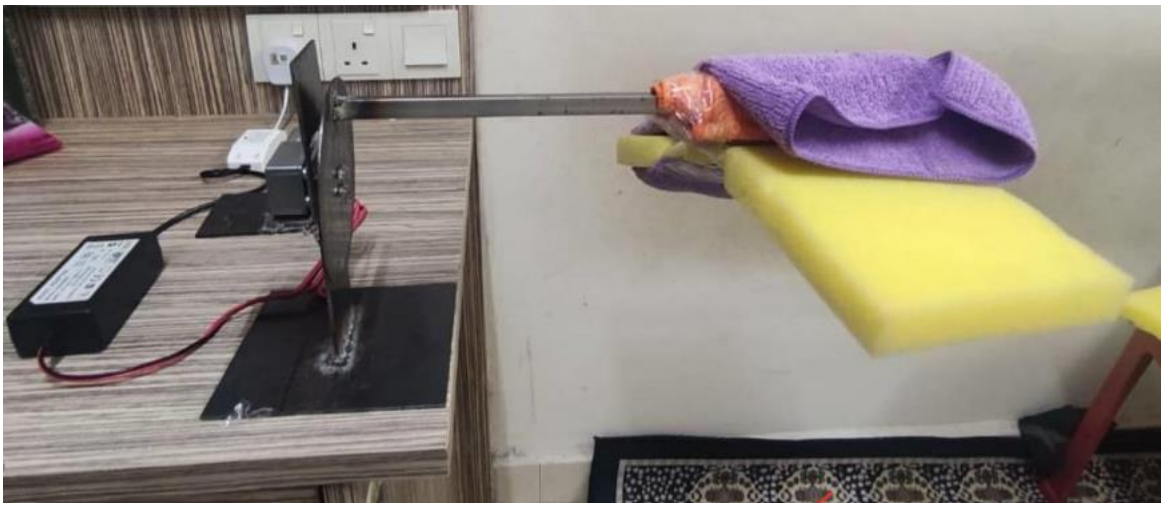
[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): radzi_rasih@uitm.edu.my*

PROJECT DESCRIPTION

Alarm clocks are widely used and come in a variety of forms. Their usefulness has been demonstrated over time. But modern consumers want things that are more than just functional; they want something that can be used for several purposes and is inventive. With a focus on portability and physical engagement, this concept seeks to reinvent the conventional alarm clock from a new angle. While most of the items on the market are good, they frequently don't allow for user customization or inclusive design. This project fills this gap by creating a unique alarm clock that makes use of readily available materials and effective manufacturing techniques. It acknowledges the special requirements of those with hearing impairments and students living in dorms and workers who occasionally need to wake up early. The goal is to surpass user expectations by the smooth integration of useful features with an interesting and approachable design. Essentially, the goal of this project is to reinvent the alarm clock by creating a new benchmark for usability, portability, and a user-friendly interface.

Keywords: *Smart Alarm, Smart Clock*

PROTOTYPE



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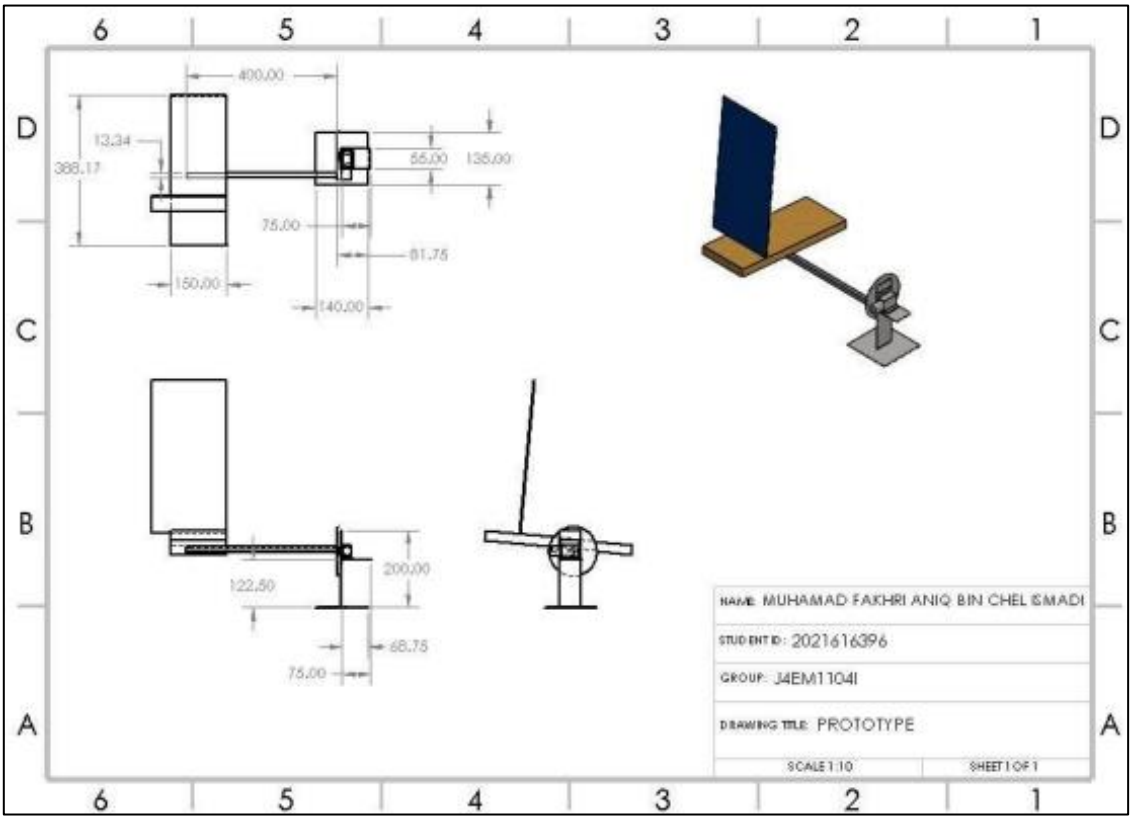


e-ISBN: 978-967-0033-32-7

CHAPTER 47

Design, Analysis and Fabrication of Bladeless Fan

Muhammad Al Amin Mohammad Nazlyn [1] and Suhadiyana Hanapi [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): suhadiyana@uitm.edu.my*

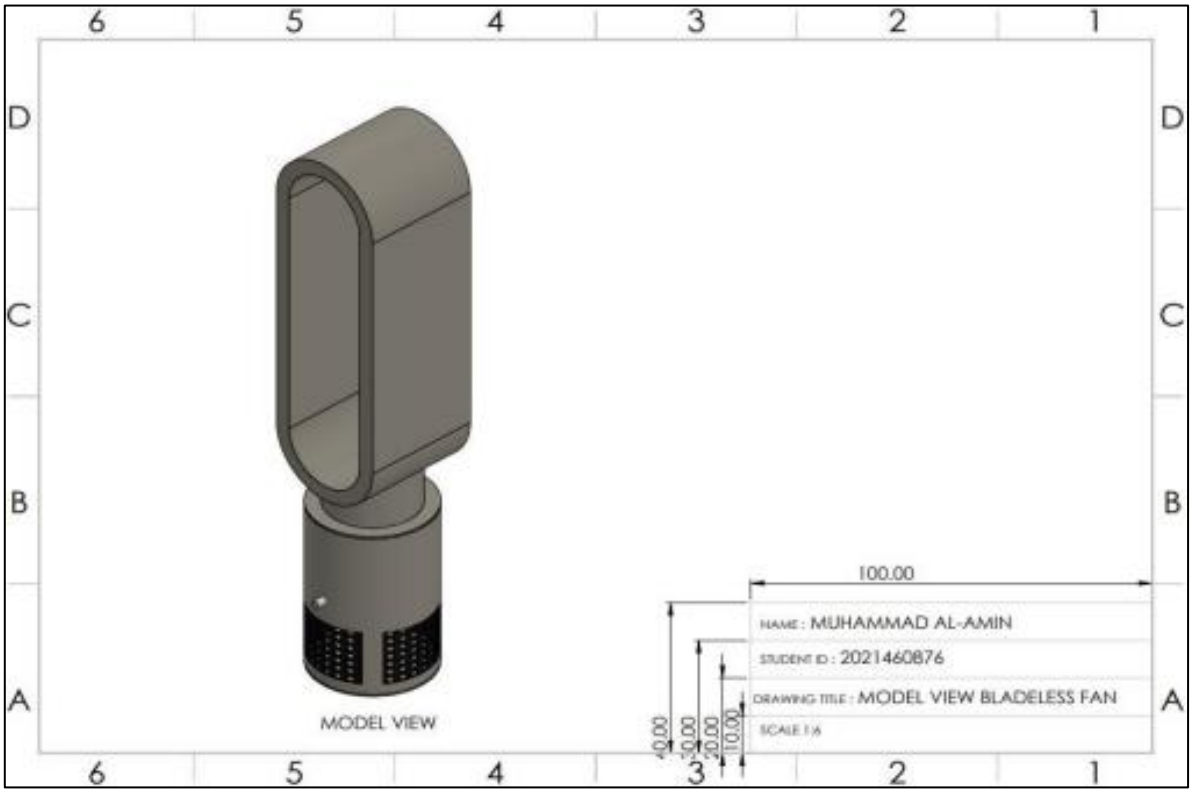
PROJECT DESCRIPTION

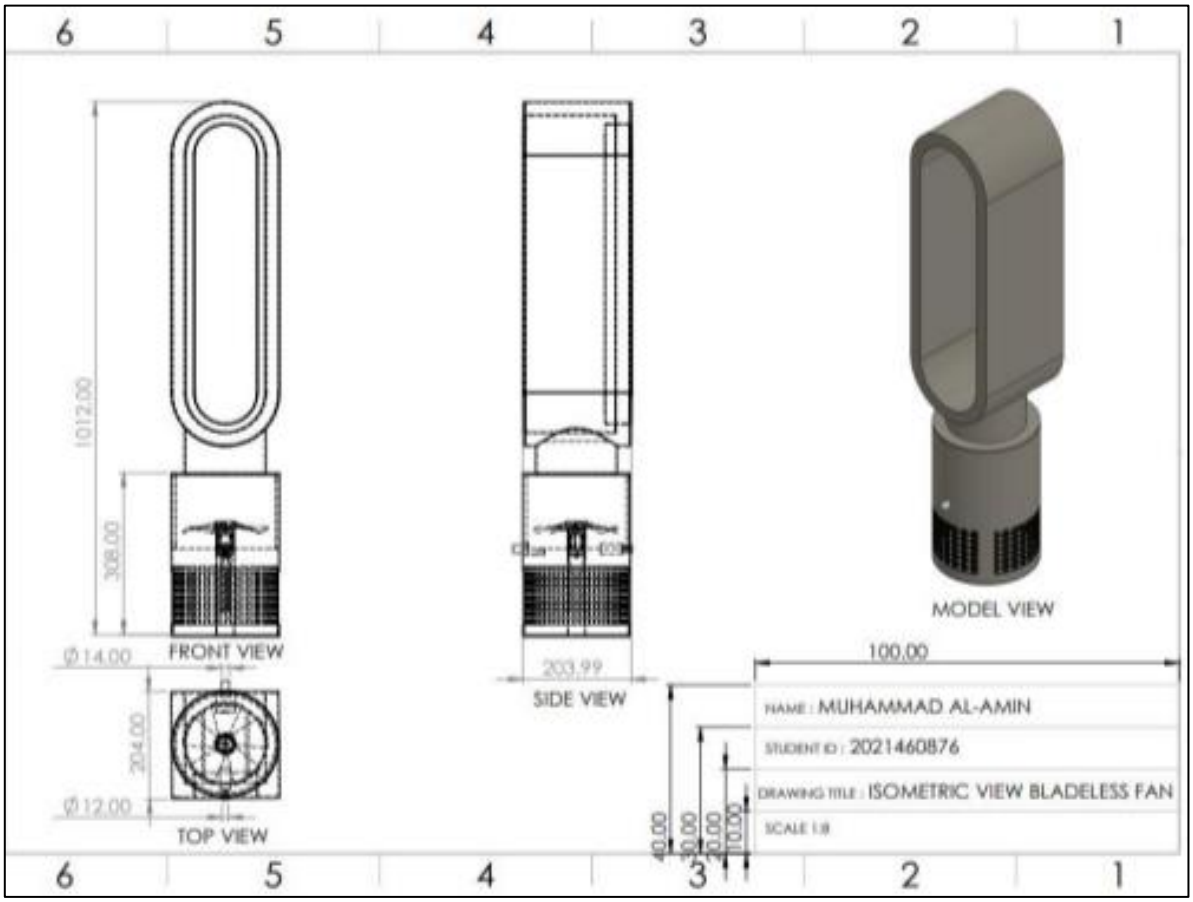
Introducing the innovative portable bladeless fan— a cutting-edge type of cooling solution that redefines comfort & convenience. This sleek & elegant fan prioritizes safety without sacrificing style thanks to its lightweight & compact design, making it perfect for people with hectic schedules. It provides rapid cooling wherever needed, making it ideal for people who lead active lives at work, on outdoor excursions, or on the road. As there are no visible blades, families & outdoor enthusiasts looking for a fashionable & safe cooling companion can feel at ease. Users who care about the environment will find its energy efficiency appealing as it complies with modern sustainability standards. This bladeless fan offers a useful and fashionable cooling solution for modern lifestyles in a portable package by combining mobility, safety, and eco-friendly design.

Keywords: *Bladeless Fan, Modern*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 48

Design and Fabricate Serving Lid with Heater

Adam Huzaifah Bin Maizatul Faizal [1] and Nurulsaidatulsyida Sulong [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): saidatulsyida@uitm.edu.my*

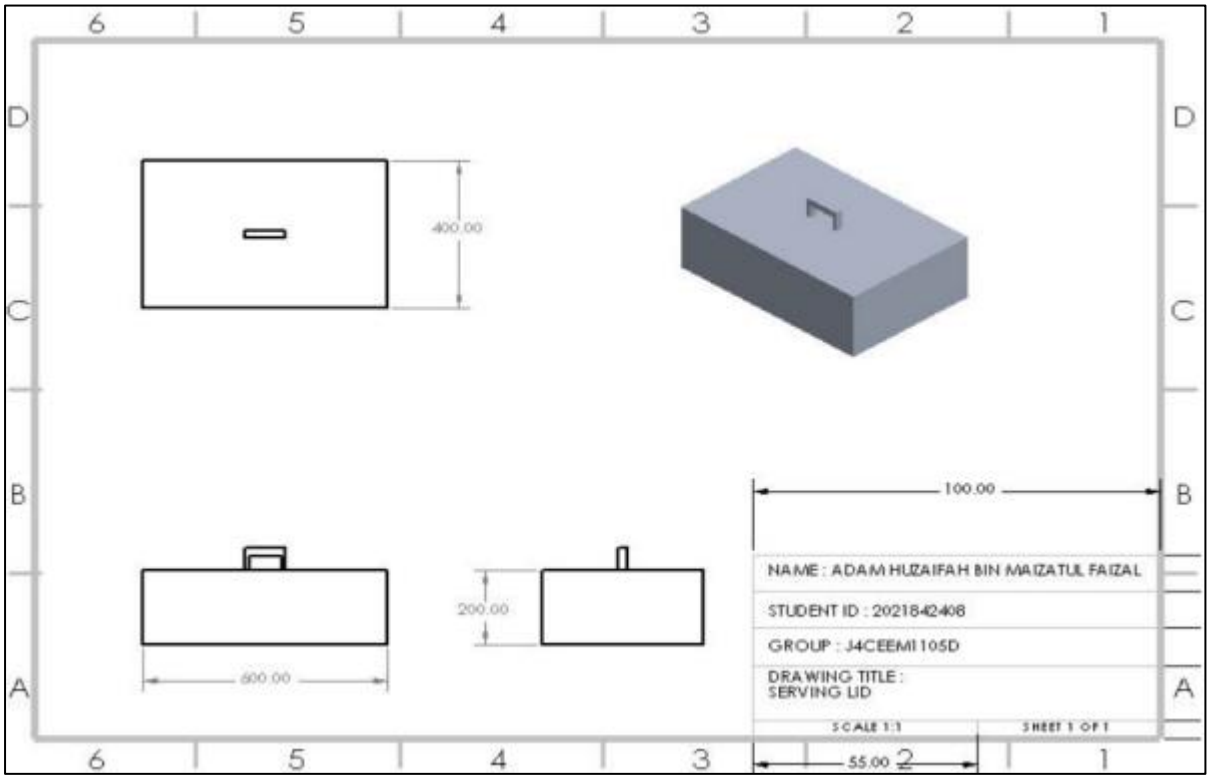
PROJECT DESCRIPTION

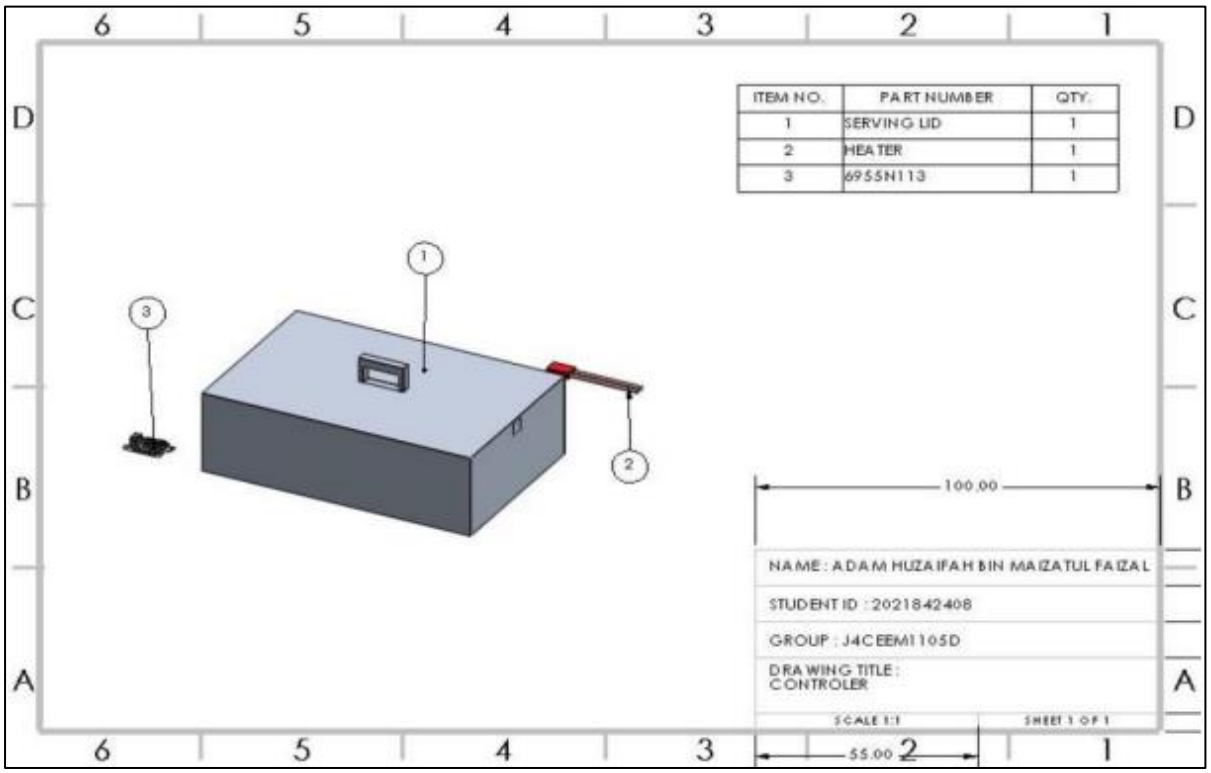
Majority of Malaysians tend to enjoy hot or warm dishes for a variety of reasons. It will increase their appetite and the food tastes better when it is still hot or warm. The problem is the dishes will slowly be cooling down meanwhile waiting for others to enjoy the food. Due to this problem, the serving lid with heater was created to prevent the food from getting cool. Just like a normal serving lid, it has a heat insulation cover inside the serving lid. It also created especially for camping purpose because of its portable design.

Keywords: *serving lid , heater*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 49

Design and Analysis of Portable Shoe Rack

Muhammad Hazeeq Haiqall Bin Alparid [1] and Nurulsaidatulsyida Sulong [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): saidatulsyida@uitm.edu.my*

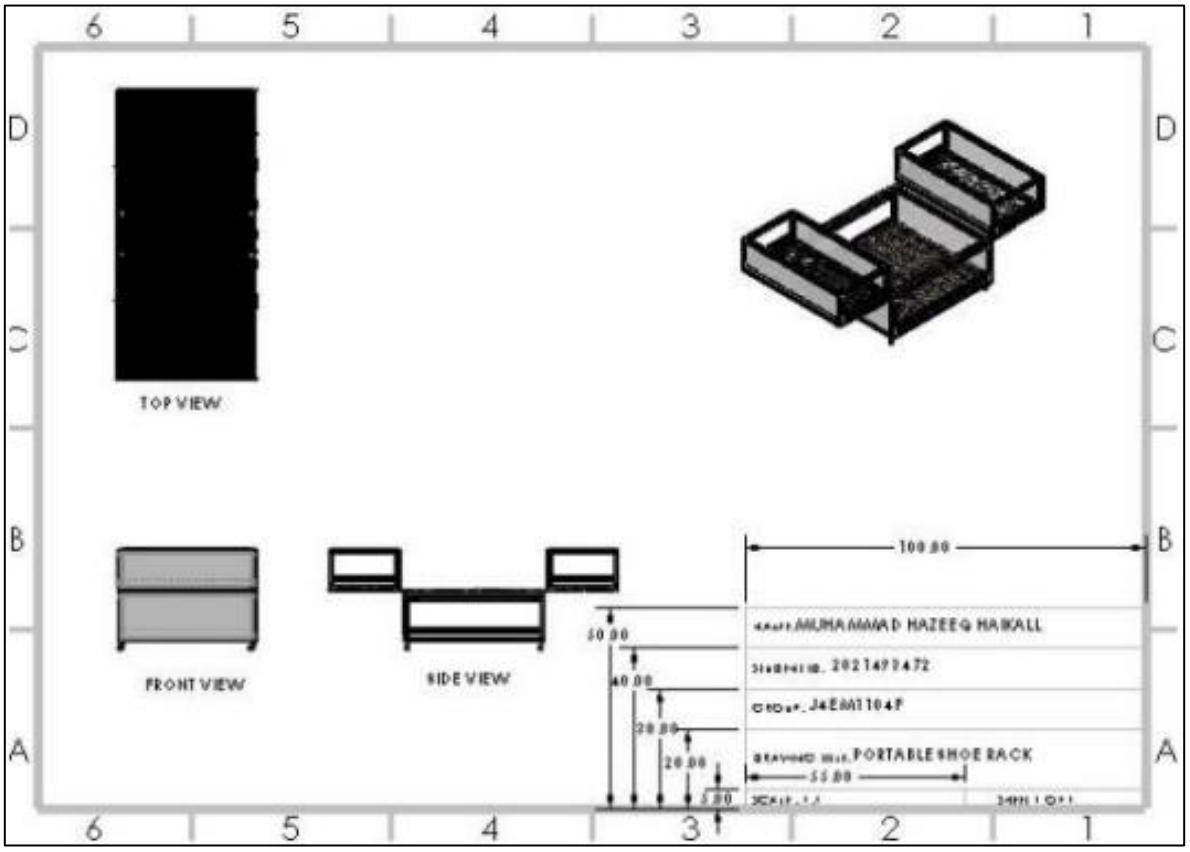
PROJECT DESCRIPTION

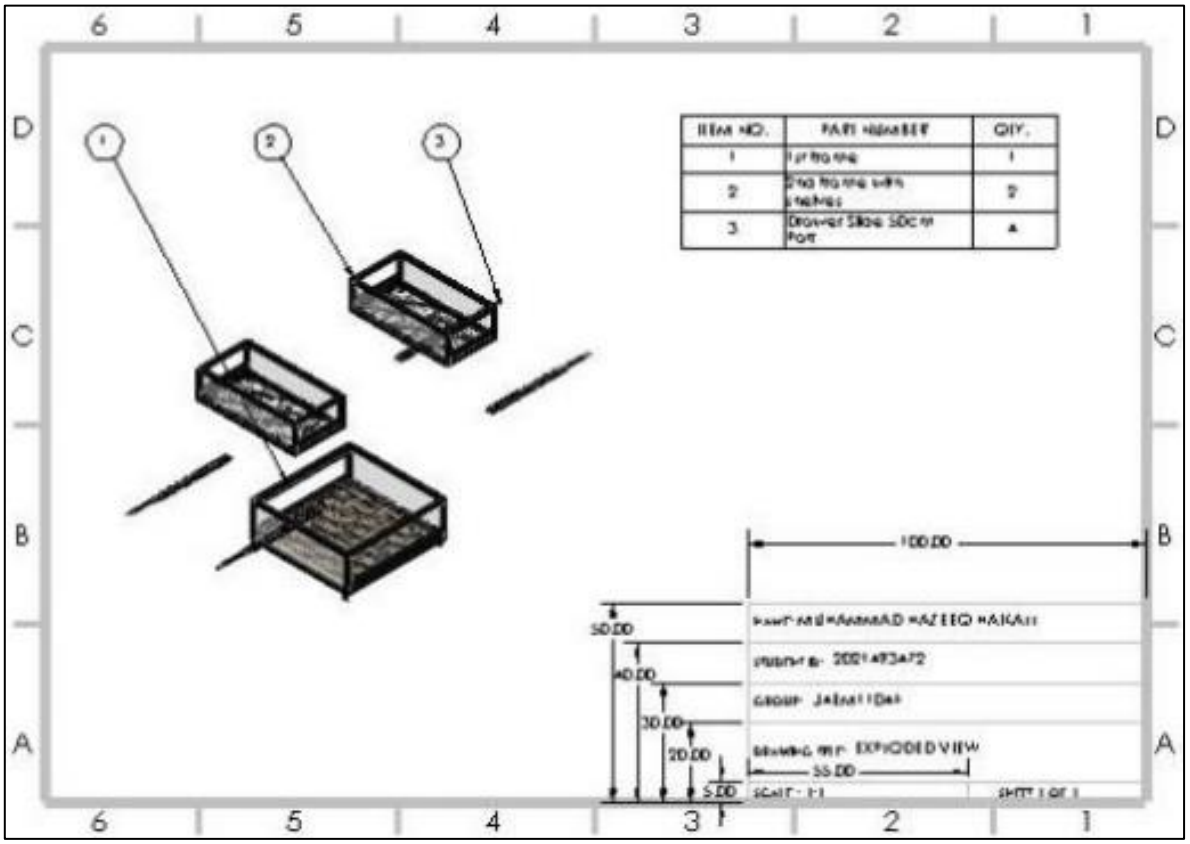
Shoe racks are common furniture storage units available in the existing market with many various designs. According to the previous design, most existing products are in good working condition. Furthermore, nowadays products also provide space or a seating area at the top but mostly are not portable. Most consumers prefer products that provide multipurpose shoe racks. The objective of this project is to come up with fresh ideas for making foldable and multi-purpose shelves also minimize the space. This shoe rack is to create multi-functional and portable shoe racks for everyone's use. Besides, this portable shoe rack builds up from expanded metal, hollow mild steel and ACP make it economical and having artificial looks and can make anyone love it. In nutshell, this product is designed to assist consumers organize their shoes properly and exceed their expectations with a pleasant experience when using it.

Keywords: *foldable , shoes rack*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 50

Development of a Prototype of Mini Robot Vacuum Cleaner

Ahmad Zalikh Iqmal Bin Abdullah Hanapi [1] and Nurulsaidatulsyida Sulong [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): saidatulsyida@uitm.edu.my*

PROJECT DESCRIPTION

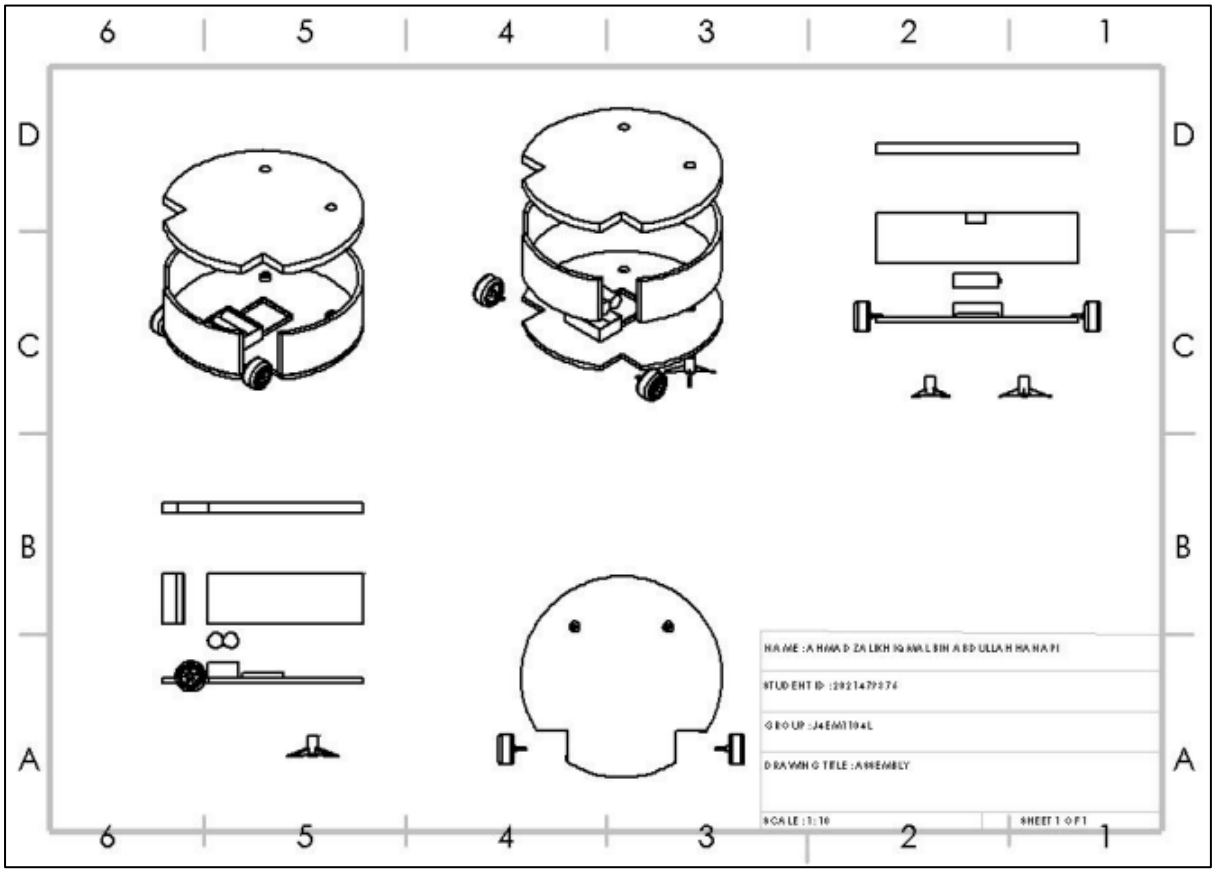
A recent study by Hospitality GEM highlighted unclean tables as the fourth most common grievance among diners. Customers typically avoid visibly dirty tables, but they might unknowingly choose seemingly clean yet still dirty ones. In Malaysia, several restaurants were recently shut down due to rat and cockroach infestations, and a viral video exposed maggots in fried chicken at another establishment. While online reviews help gauge cleanliness, the most trustworthy ratings are the grades displayed in restaurants. Dirty tables, leftover food and a shortage of cleaners contribute to uncleanliness, but hiring more workers is often financially challenging for restaurants. Therefore, there is a need to develop a manpower-free solution, such as portable robot vacuum cleaner, which can assist restaurants in maintaining cleanliness. This innovative project aims to benefit various restaurants and simplify table cleaning for workers by using advanced technology for automated cleaning.

Keywords: *cleanliness , robot vacuum*

PROTOTYPE

e-ISBN: 978-967-0033-32-7

DESIGN PARAMETER



Prototype Design Collection Series 3
e-ISBN: 978-967-0033-32-7

CHAPTER 51

Design and Fabrication of Young Coconut Slicer Machine

Hafiy Harith Hizam [1] and Ahmad Najmie Rusli [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): ahmad7586@uitm.edu.my*

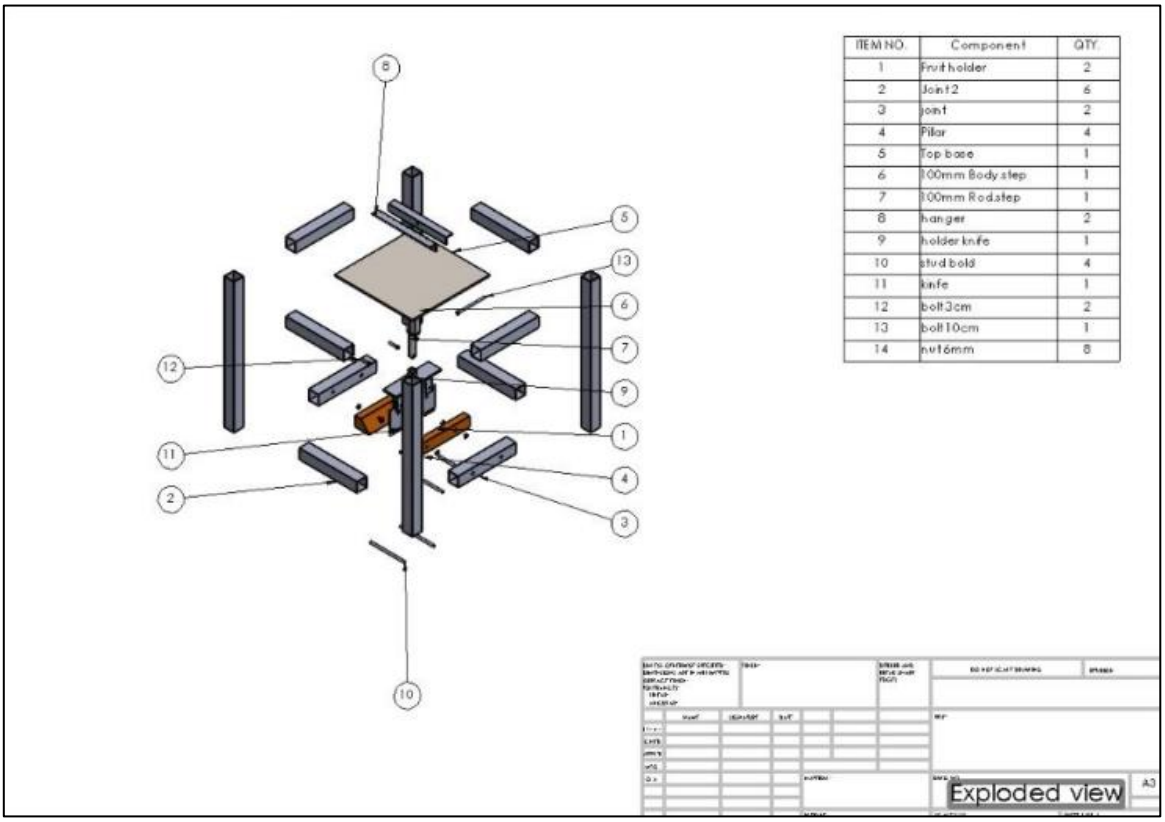
PROJECT DESCRIPTION

Despite the high sales rate, most vendors still extract coconut water using traditional methods. Typically, they cut a hole in the top of the fragile coconut with a sharp knife. This process requires considerable skill and effort, making it dangerous for beginners. Additionally, the method is labour-intensive, resulting in lower efficiency, and often causes shoulder strain for vendors, especially when handling large quantities. To address these challenges, this project aims to design and fabricate a coconut slicer machine specifically for young coconuts to simplify juice extraction. The objectives of the project include designing, analyzing, and fabricating the coconut slicer machine. The design and analysis will be conducted using SolidWorks software. The fabrication of the machine will use aluminium, a linear actuator, and custom mechanical components. The final machine will have dimensions of approximately 300mm x 300mm x 500mm, providing a safer, more efficient, and ergonomic solution for extracting coconut water.

Keywords: *Coconut, Slicer*

PROTOTYPE

DESIGN PARAMETER



ITEM NO.	Component	QTY.
1	Fruit holder	2
2	Joint 2	6
3	joint	2
4	Pillar	4
5	Top base	1
6	100mm Body step	1
7	100mm Rod step	1
8	hanger	2
9	holder knife	1
10	stud bold	4
11	knife	1
12	bolt 3cm	2
13	bolt 10cm	1
14	nut 6mm	8

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CHAPTER 52

Loosen Soil Bicycle

Mohamad Ameerul Aieman Nazri [1], Najibah Ab Latif [2*] and Ainaa Maya Munira Ismail [3]

[1,2,3]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): najibahlatif@uitm.edu.my*

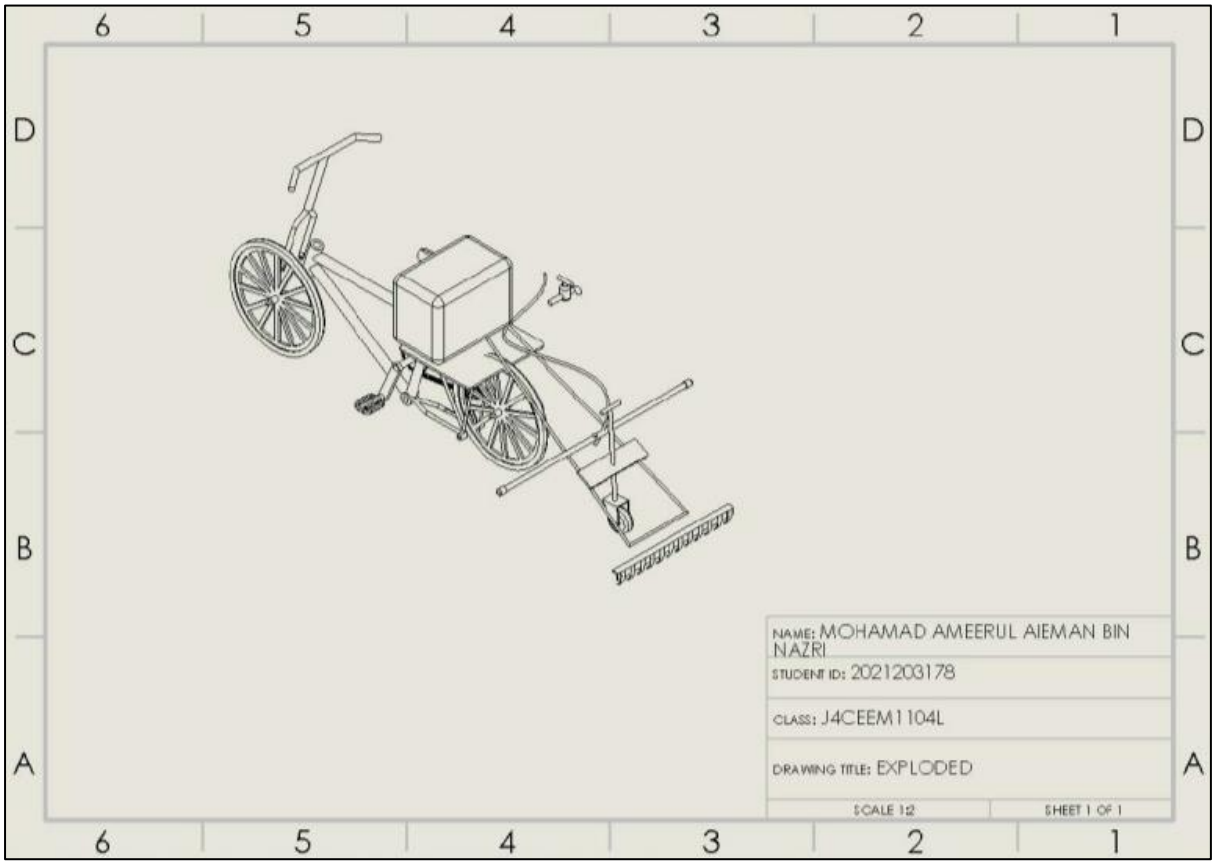
PROJECT DESCRIPTION

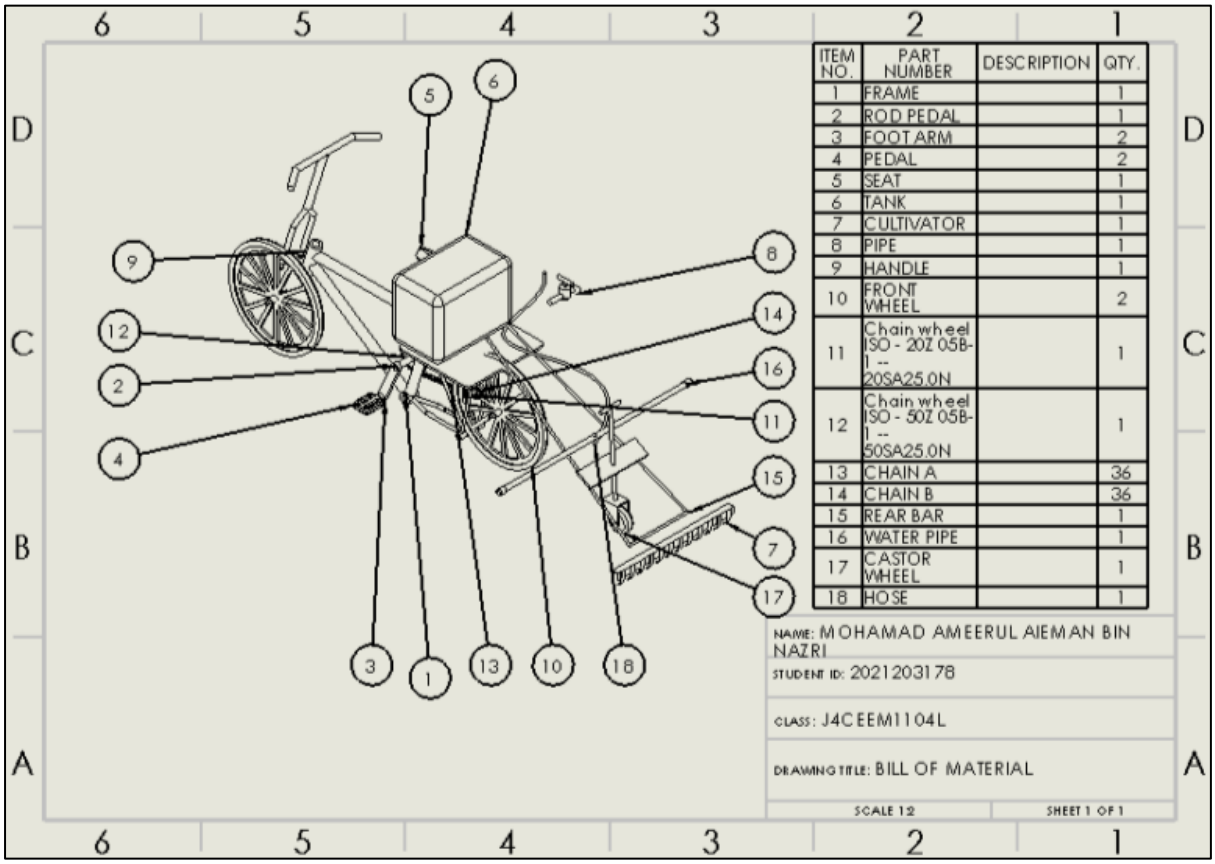
In this era of globalization, technology is one of the best initiatives to improve the quality of an agriculturally based product. Basically, this Loosen Soil Bicycle has the same function as the existing product but with more advanced and more suitable for the users. The Loosen Soil Bicycle consists of a bicycle frame with two wheels and a blade or tines attached to the frame. Fabrication methods included designing, measuring, cutting and assembling of the materials. The objective of this project is to reduce the strain on the user's muscles and joints. The Loosen Soil Bicycle can help gardeners and farmers to work more efficiently and effectively in their fields, resulting in healthier crops and greater yields.

Keywords: *Soil, Loosen, Bicycle*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 53

Development of a Prototype Shoes Dryer Box Using Heater

Muhammad Fandi Bin Ramlee [1] and Nurulsaidatulsyida Sulong [2*]

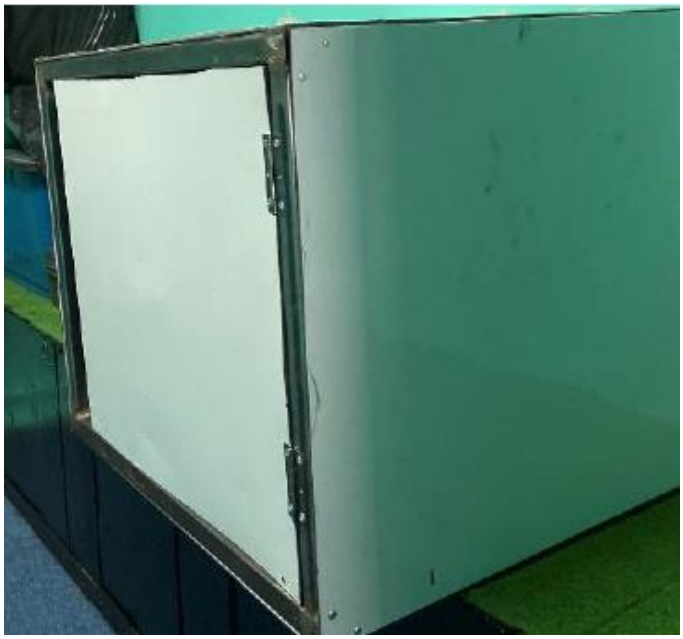
[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): saidatulsyida@uitm.edu.my*

PROJECT DESCRIPTION

The shoe dryer box is a convenient and innovative solution designed to effectively dry and refresh footwear. This compact and user-friendly device utilizes advanced technology to eliminate moisture and unpleasant odors from shoes. The shoe dryer box incorporates a gentle yet efficient drying mechanism that circulates warm air within its enclosed chamber. This process accelerates the evaporation of moisture, helping to prevent the growth of bacteria and fungi that can cause foot-related issues. Additionally, the box is equipped with a built-in deodorizing system that neutralizes odors, leaving shoes fresh and ready to wear. The shoe dryer box is not only practical but also energy-efficient, providing a safe and reliable solution for individuals seeking to maintain the cleanliness and longevity of their footwear.

Keywords: *shoes dryer , cleanliness*

PROTOTYPE



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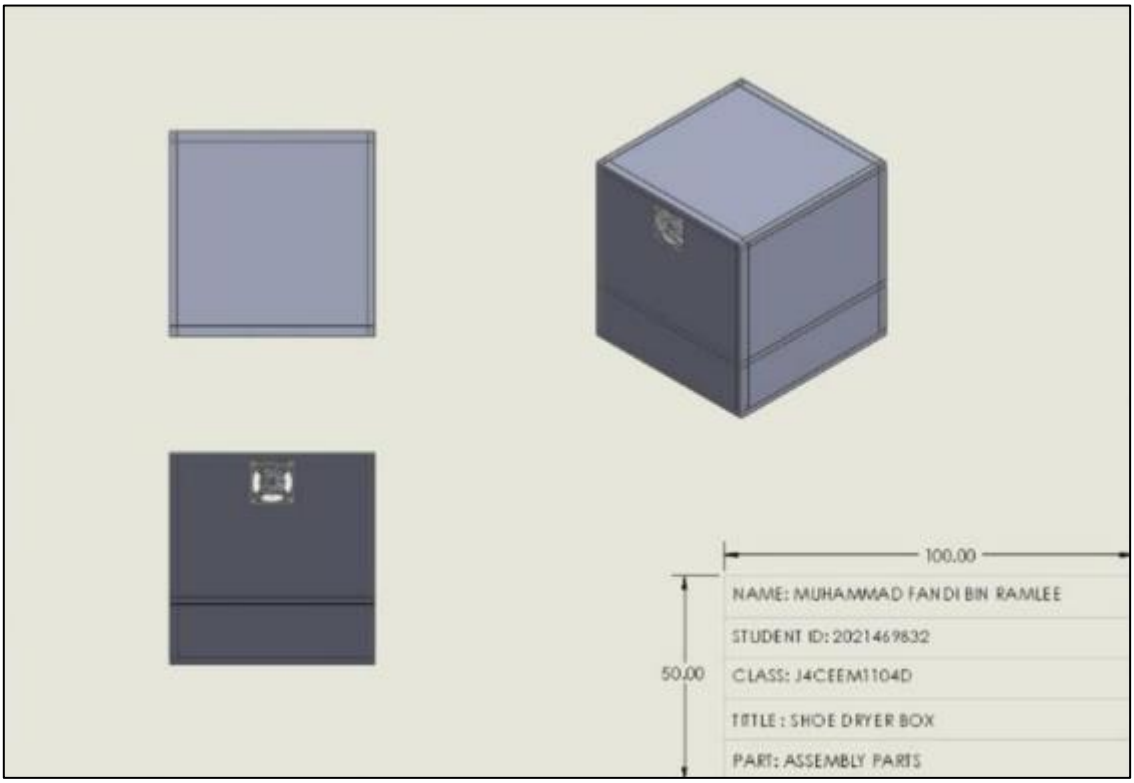
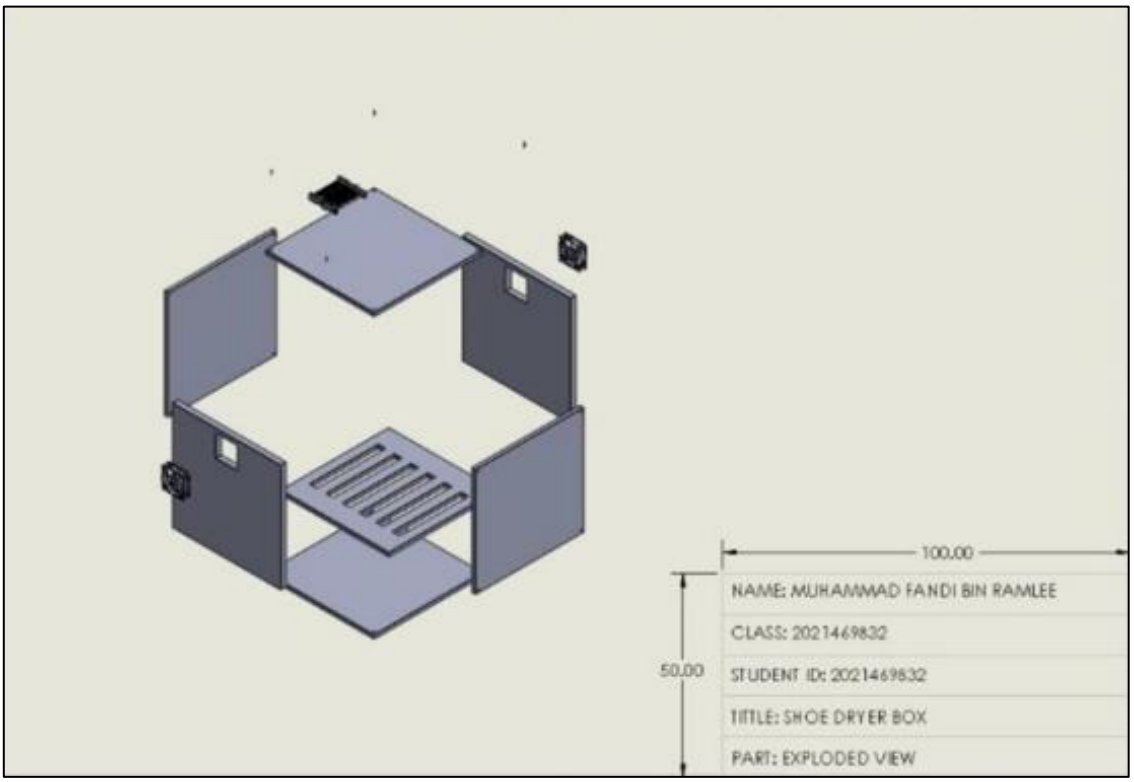




e-ISBN: 978-967-0033-32-7

CHAPTER 54

Design and Fabrication of Mini Crane

Syahirahtul Nabihah Binti Rushaidi [1] and Muhamad Faris Syafiq Bin Khalid [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): mfarissyafiq@uitm.edu.my*

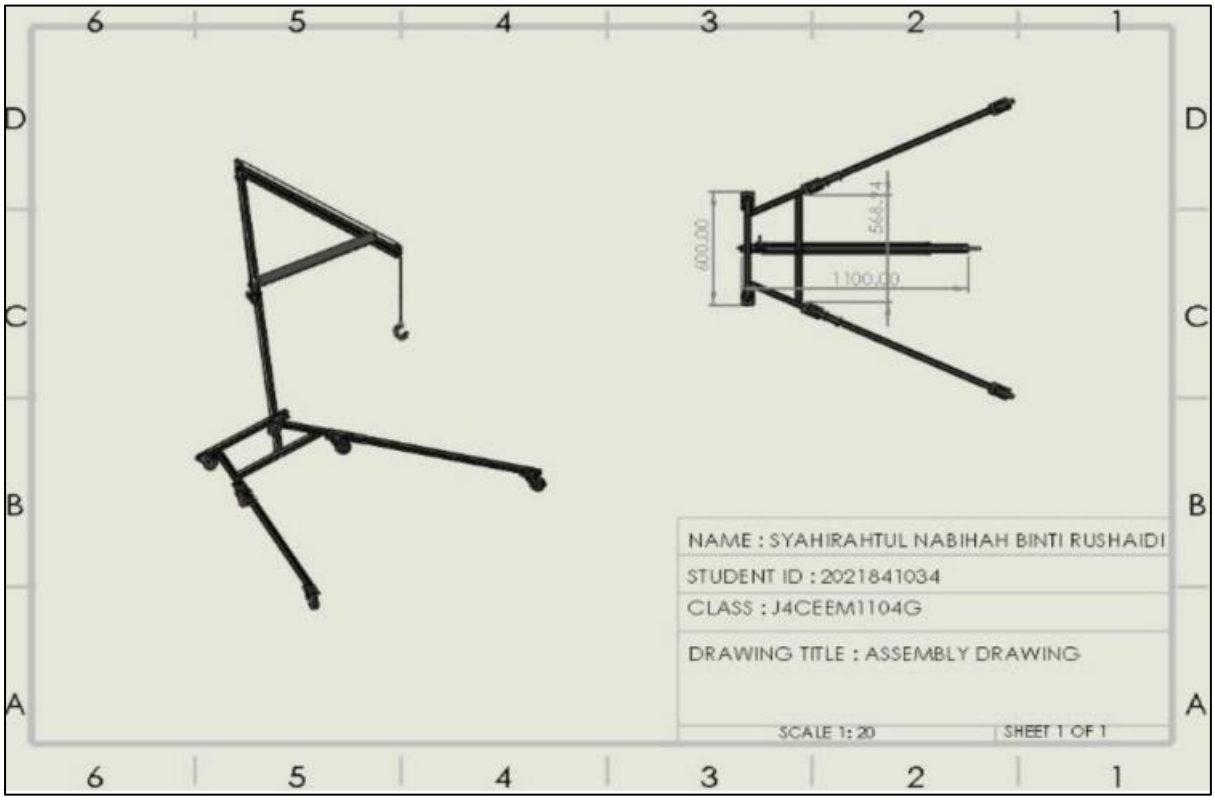
PROJECT DESCRIPTION

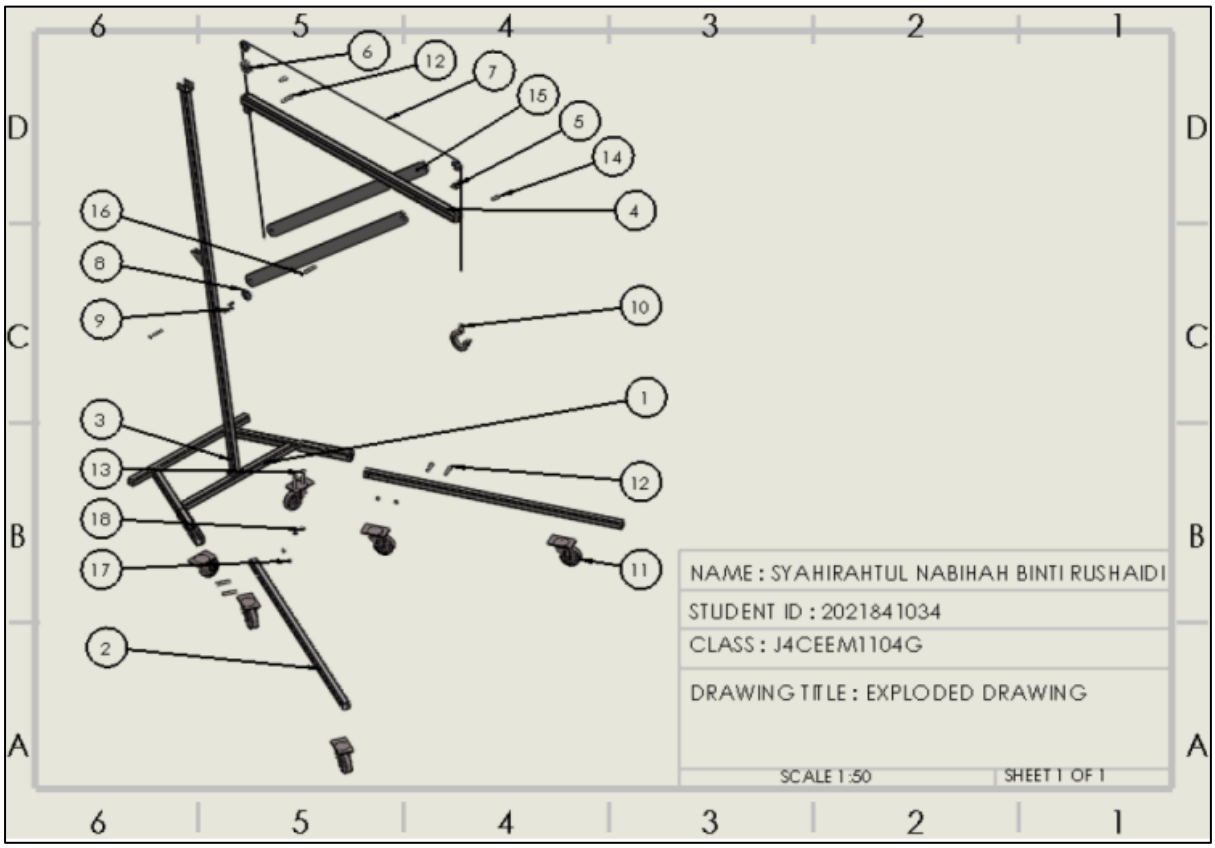
Cranes serve as pivotal hoisting mechanisms for lifting large, heavy objects. These devices typically employ a crane hook affixed to a metal chain or wire rope, which is then raised via a pulley system. Mini cranes are specifically engineered for versatility, featuring foldable designs that enable placement in tight spaces with ease. The lifting mechanism of these cranes involves the utilization of a wire rope. This wire rope undergoes a meticulous process wherein multiple wire strands are woven together, passing through coiling wheels that compress and shape each wire, ultimately forming a consolidated structure. This process not only consolidates the strands but also reduces their diameters prior to winding around the core, enhancing the overall strength and durability of the wire rope. One end of this wire rope is attached to a hook for lifting purposes, while the other end is coiled around the pulley system. Through this sophisticated engineering, cranes, including their mini counterparts, facilitate the efficient and safe lifting of heavy loads in various environments, showcasing their indispensable role in construction, manufacturing, and numerous other industries.

Keywords: *Mini crane, portable*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 55

Design and Fabricated Mini Electric Sander Belt Machine

Muhammad Bariq bin Mohd Bakhit [1] and Ab Aziz bin Mohd Yusof [2*]

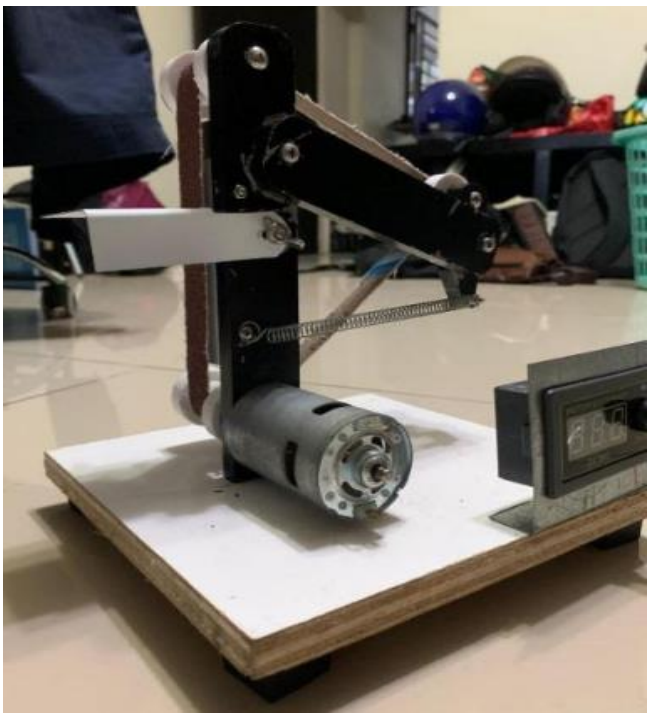
[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): abaziz86@uitm.edu.my*

PROJECT DESCRIPTION

A machine is an equipment that is created to make work easier. It is a tool that amplifies the effect of human effort. Many machines are available on the market, and they come in every size and price range. The problem with machines nowadays is that they are expensive and hard to get in mini sizes. Thus, this project was carried out to design and fabricate a mini electrical sander belt. The machine will go through a design process using SOLIDWORKS and be fabricated using drilling, cutting, and grinding processes. The material that will be used is aluminium. The possible outcome should be that by turning on the switch, the sander belt will start operating and can be used for grinding small items, such as shaping the knife and reshaping the drill bit. The expected mini machine will be much more helpful for small projects and affordable for most users.

Keywords: *Electric Sander Belt, Mini Machine*

PROTOTYPE



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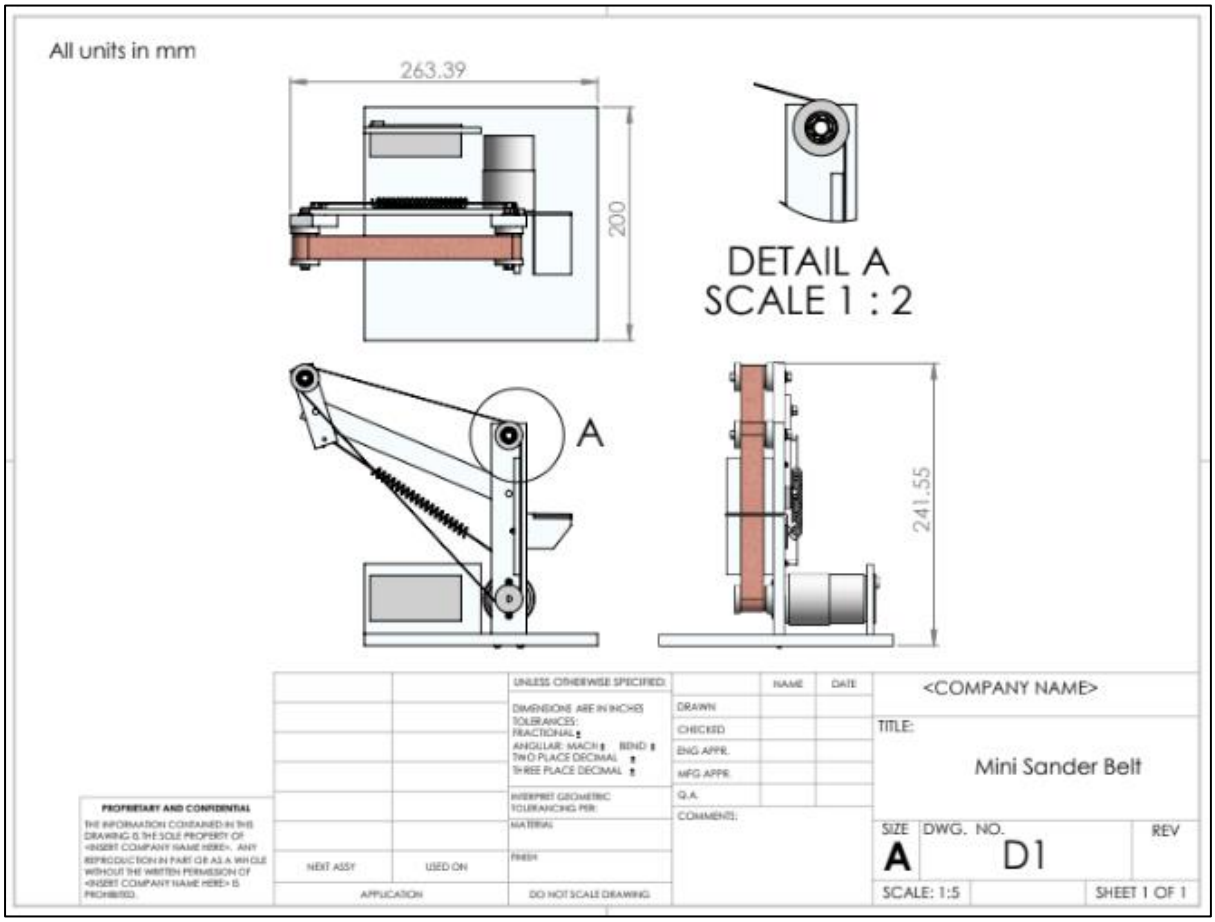


e-ISBN: 978-967-0033-32-7

CHAPTER 56

Design and Fabrication of Mini Coin Sorter Machine

Ikhwan Hafiz bin Hayaroni [1] and Ab Aziz bin Mohd Yusof [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): abaziz86@uitm.edu.my*

PROJECT DESCRIPTION

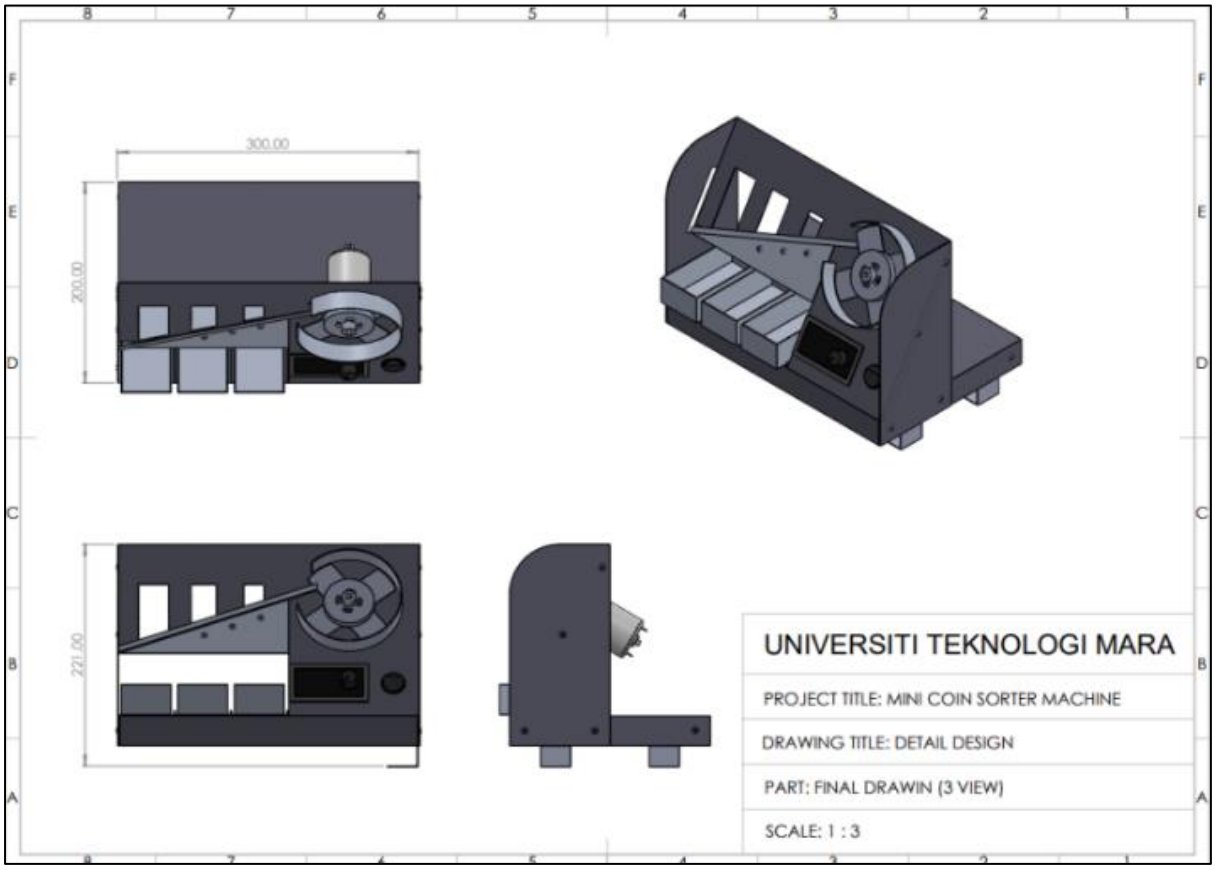
A mini coin sorter machine is a device that will manage or sort coins into its category. Every coin in our home is kept in one container without knowing the category of each coin. Our community has a problem with unorganized issues in their daily life. This machine is precisely to help our community to solve the unorganized coinat their home. This project included objectives that needed to be achieved at the end, such as designing the prototype and fabricating the project machine. Besides, the project will also study what a mini coin sorter machine is, what the concept or mechanism of the machine is, how the fabrication process is going and how the result of the machine operates from the material that will be used to fabricate the product and what component and how many of that need to apply. In addition, calculations such as cost and engineering need to be made, as shown in this dissertation report. Besides that, this dissertation also discusses the advantages and limitations of the mini coin sorter machine to see how far the mini coin sorter machine can operate. Also, the users' manual operation and the machine's safety precautions will be stated. The machine fabricated from low-quality material and limitations utilities at the workplace will affect the final product of the final year project, and we need to discuss recommendations. With this discussion in this dissertation report, some improvements can be made in the future.

Keywords: *Coin Sorter, Mini Machine*

PROTOTYPE

e-ISBN: 978-967-0033-32-7

DESIGN PARAMETER



Prototype Design Collection Series 3
e-ISBN: 978-967-0033-32-7

CHAPTER 57

Development and Construction of an Infrared Automatic On/Off Pet Water Fountain

Ainin Sofea Bt Abd Razak [1] and Hazim Sharudin [2*]

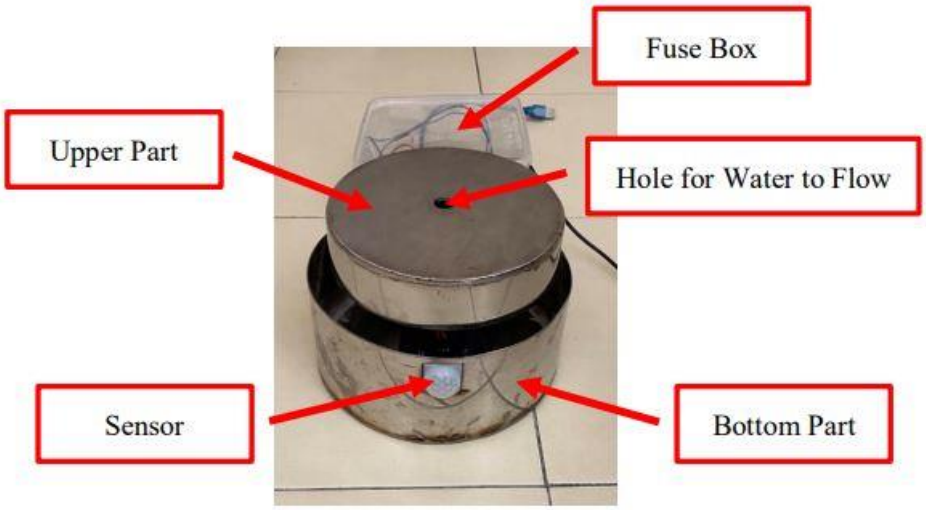
[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): hazim@uitm.edu.my*

PROJECT DESCRIPTION

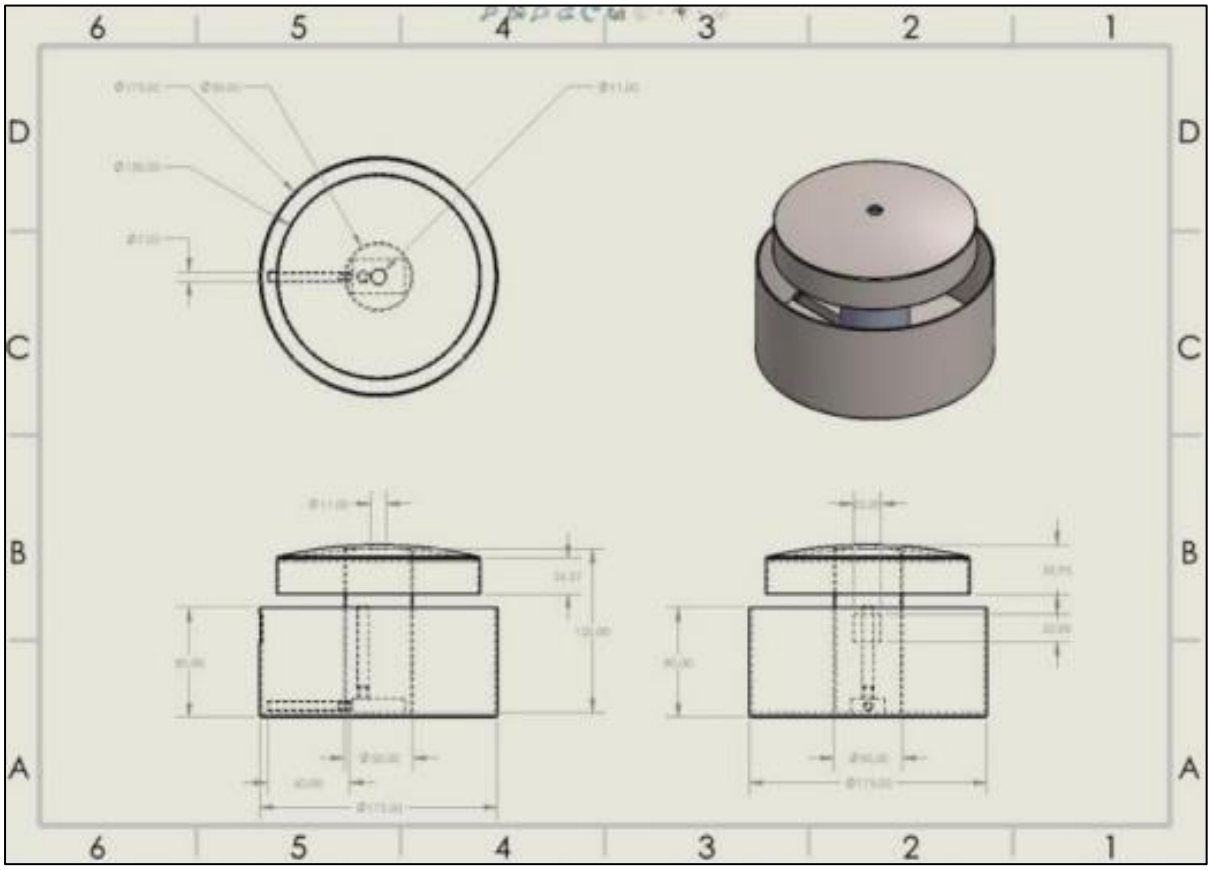
Pet owners typically use bowls to provide food and water for their pets' daily needs. However, busy cat owners often struggle to find time to attend to their pets, particularly in ensuring a consistent supply of clean drinking water. This poses a risk to pets' health as stagnant water can become contaminated over time. To address this issue, this project proposes the development and construction of a pet water fountain equipped with an infrared sensor and an automatic on-off switch, effectively regulating water output. Ensuring access to clean water is vital in preventing pets from contracting various diseases. When a pet approaches within a specified distance of the auto water fountain, it activates, providing a fountain of water. Subsequently, it automatically switches off when there is no movement detected. This design aims to alleviate the challenges faced by pet owners in ensuring their pets have access to clean drinking water.

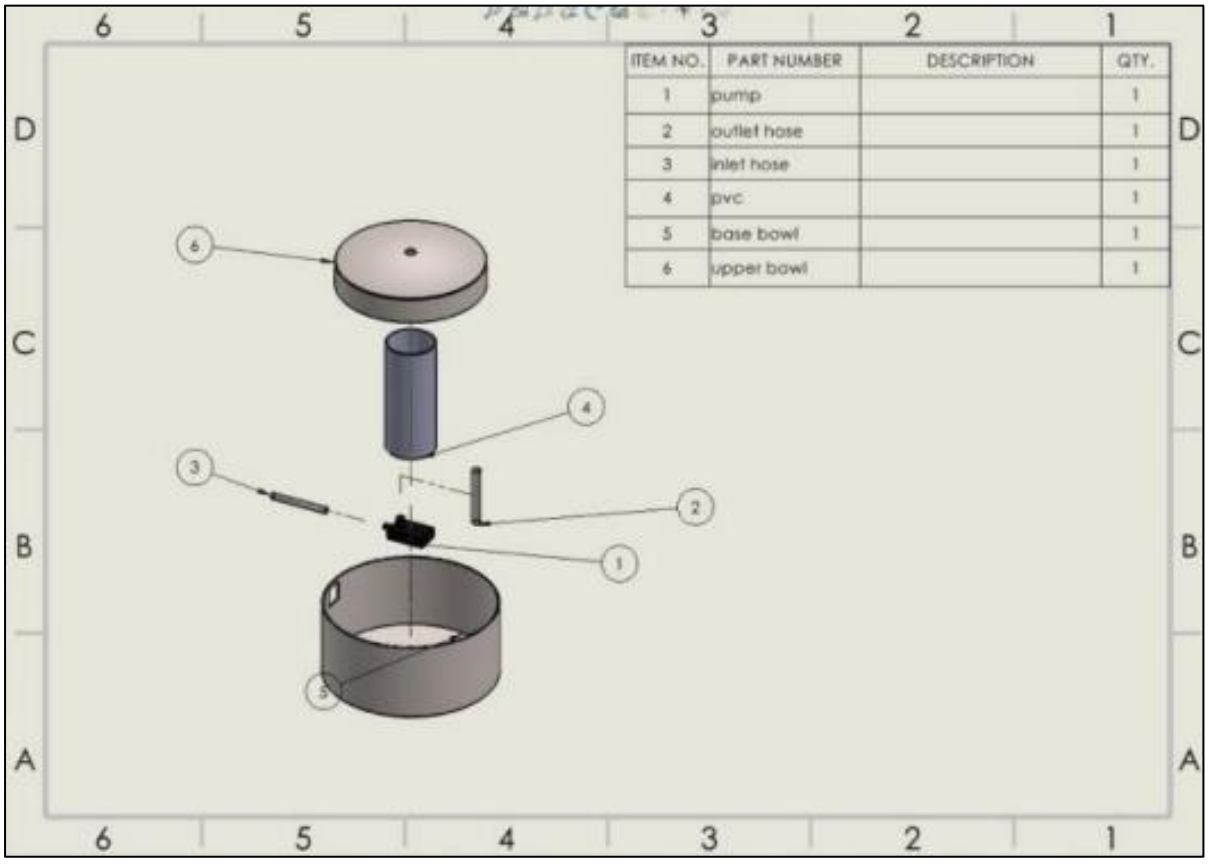
Keywords: *Pets, Water Fountain*

PROTOTYPE



DESIGN PARAMETER





ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	pump		1
2	outlet hose		1
3	inlet hose		1
4	pvc		1
5	base bowl		1
6	upper bowl		1

e-ISBN: 978-967-0033-32-7

CHAPTER 58

Design and Fabrication of Smart Watering Plant System

Muhammad Zulhelmi bin Mohd Azri [1] and Syidatul Akma Binti Sulaiman [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): syidatul_akma7091@uitm.edu.my*

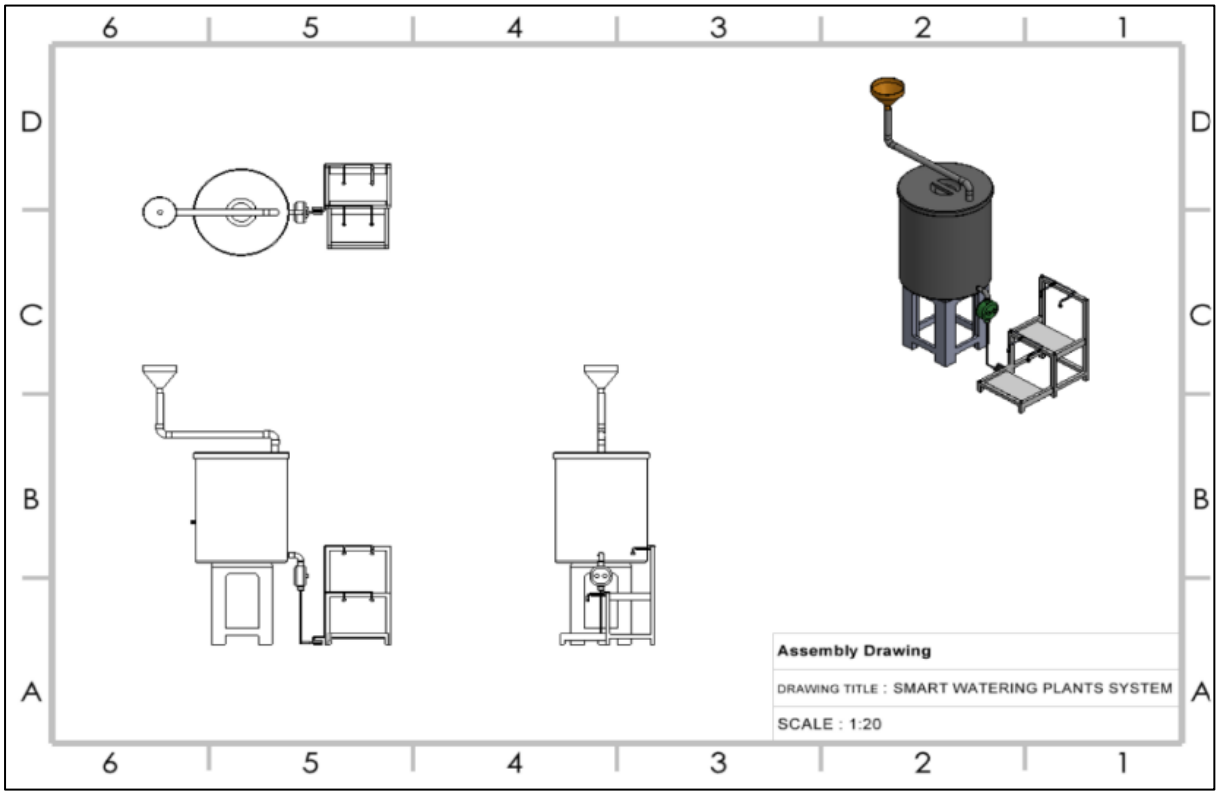
PROJECT DESCRIPTION

Houseplants bring many benefits and will create good ecosystem inside our house. The plants need to be watered every day and different types of plants need different amounts of water. Sometimes, people are too busy or not at home, therefore they will leave the plants unattended. Traditional ways of watering plants can waste a lot of water. The main objective of this project is to fabricate a smart watering plants system that focusing on sustainability and self-working system. This system uses a water tank that receives two sources of water, rainwater and tap water. A float valve will be connected to the inlet of tap water. It will stop the supply just after the water level is sufficient and the rest will be filled by rainwater. A control unit will be connected to the outlet of water tank. Users need to set watering intervals and how long it takes in one watering session. A water pump was added to the system to make sure the water can reach all parts of the system. Users can set different amount of water that will be watered to every plant by using the adjustable dripper. By installing this system, the plants will get enough water consistently. It can also boost productivity in our daily life. This system can save water consumption and helpful in maintaining the sustainability of nature. Hopefully this project can encourage more people to take care of plants and lead the community towards green.

Keywords: *Smart Watering, Plant System*

PROTOTYPE


DESIGN PARAMETER



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e-ISBN: 978-967-0033-32-7

CHAPTER 59

Design and Fabrication of Whiteboard Cleaner

M. Shazwan Shahrudin [1] and R. M. Aslam Raja Arif [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): rajaaslam@uitm.edu.my*

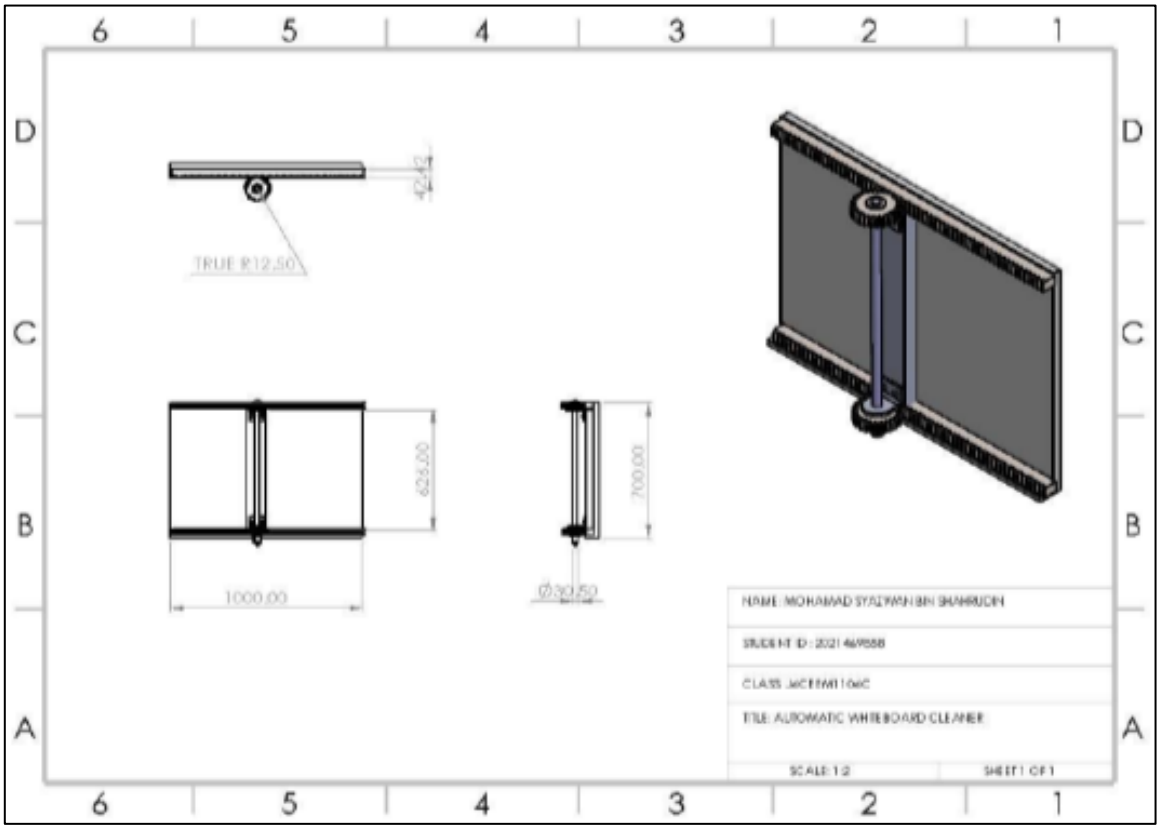
PROJECT DESCRIPTION

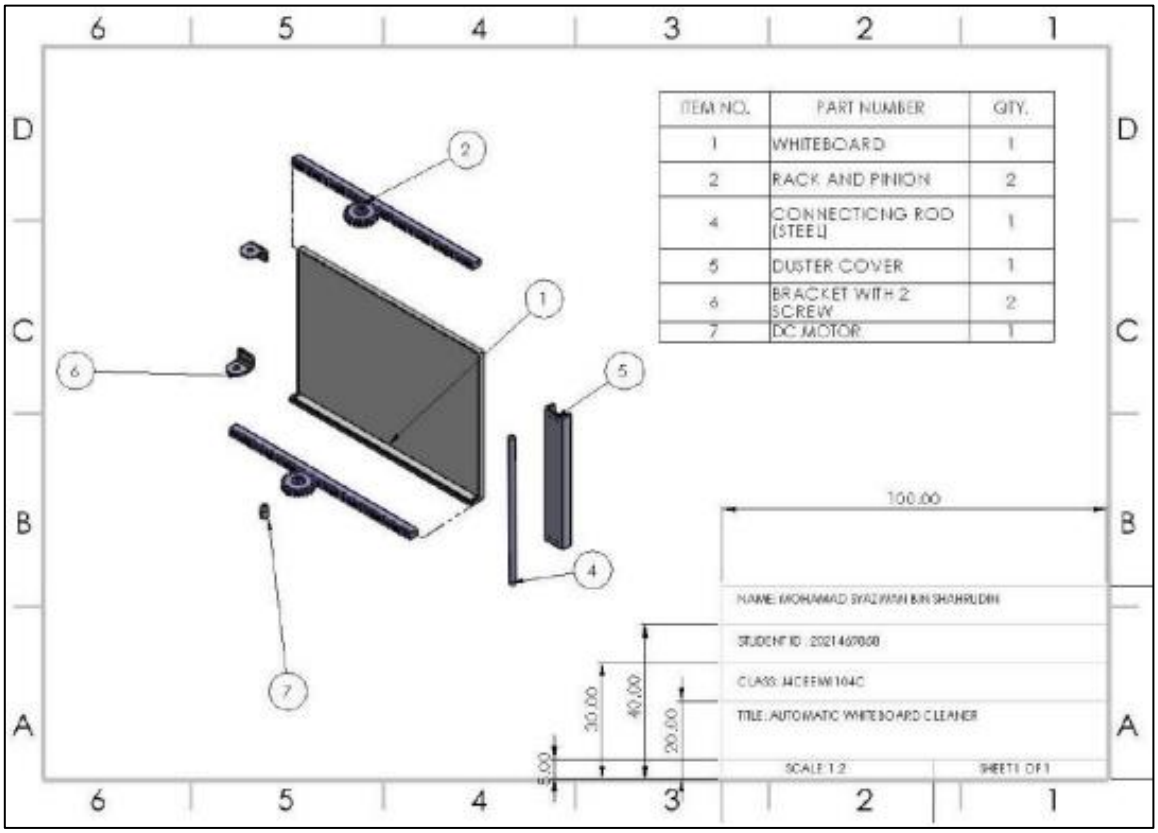
This project presents an innovative solution to the everlasting challenge of maintaining whiteboard cleanliness consistently. The primary aim of this project is to ease human effort and diminish manual labor by introducing a novel mechanism design scheme. This scheme entails mounting a duster onto a wooden block, enabling vertical movements in both forward and reverse directions through a rack and pinion mechanism, all powered by a DC motor. By implementing this mechanism, the system ensures efficient cleaning operations with minimal human intervention. The outcomes of this project are versatile and impactful. Firstly, the system represents a significant improvement in whiteboard maintenance, offering a blend of convenience and efficacy. Secondly, by automating the cleaning process, it helps users to allocate their time and energy to more productive tasks. Thirdly, the reduction in manual labor not only enhances operational efficiency but also minimizes strain on personnel, contributing to a healthier and more ergonomic workspace. Moreover, this automated solution holds promise for various sectors reliant on whiteboard utilization, including education, business, and healthcare, where maintaining clean and presentable whiteboards is essential for effective communication and collaboration. In essence, this project highlights the transformative potential of automated whiteboard cleaning systems, promoting their significance in simplifying maintenance processes and improving overall productivity and well-being in diverse settings.

Keywords: *Automated cleaning, Whiteboard maintenance*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 60

Design, Analysis and Fabrication of Air Conveyor

Alvin Francis [1] and R. M. Aslam Raja Arif [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): rajaaslam@uitm.edu.my*

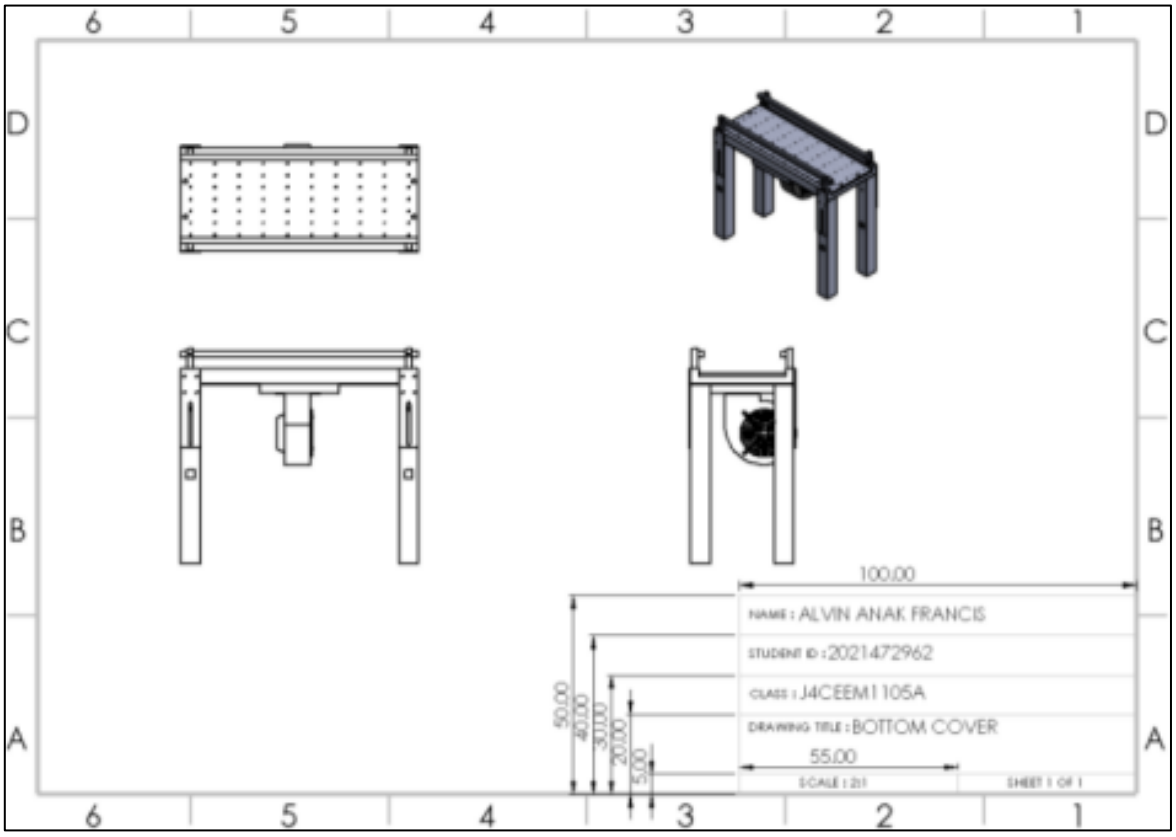
PROJECT DESCRIPTION

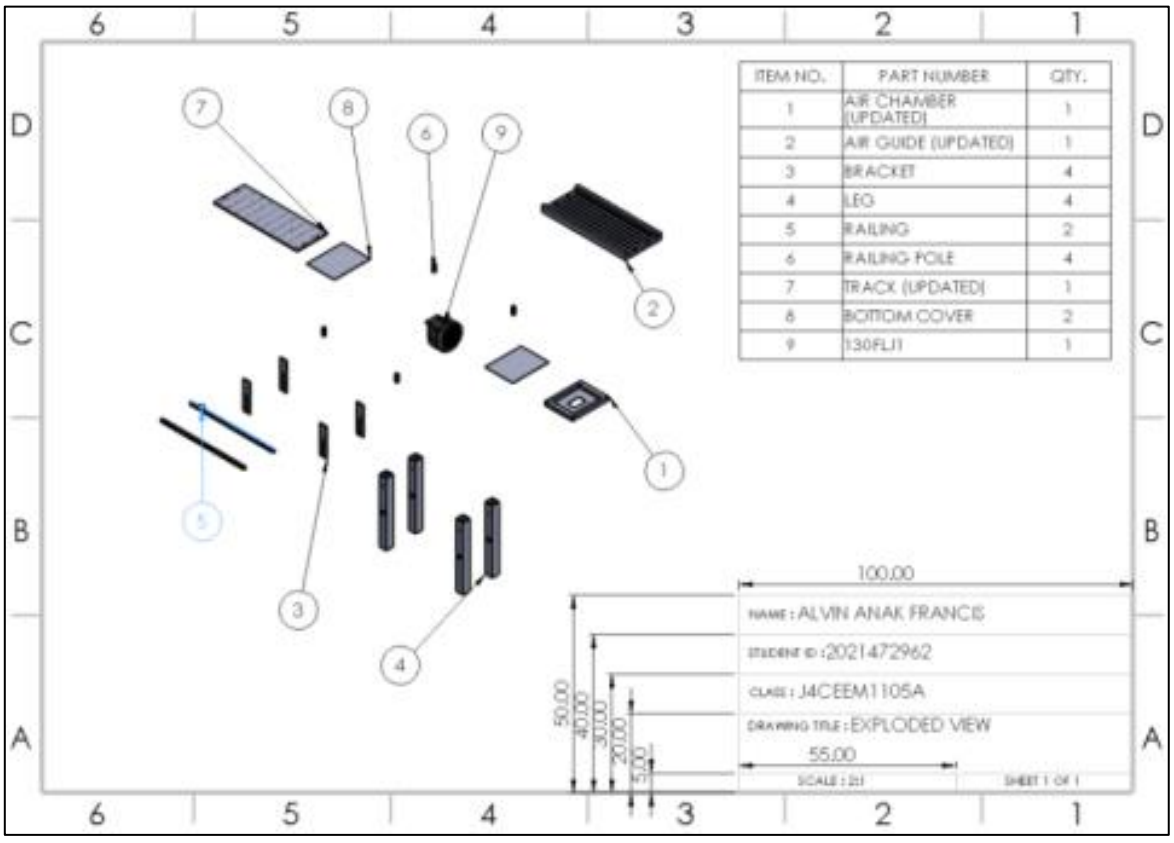
This abstract provides an overview of the historical evolution of conveyor systems spanning centuries, tracing their origins from their initial use in coal mines during the late 18th century to their modern-day applications. While these systems have undergone significant advancements with the introduction of powered belts and rollers, persistent challenges such as belt slippage, tracking errors, material spillage, wear and tear, and belt misalignment continue to impede their efficiency. In response to these challenges, this project proposes the development and implementation of an innovative solution: the air conveyor system. Unlike traditional conveyor systems, the air conveyor system is engineered to mitigate issues of belt slippage and tracking caused by misalignment, thus reducing maintenance requirements and enhancing operational reliability. Leveraging insights from a comprehensive review of existing research, this project endeavors to design an air conveyor system capable of effectively transporting lightweight items within manufacturing and packaging facilities. By addressing longstanding limitations and harnessing modern technology, the proposed air conveyor system represents a significant advancement in conveyor technology. Through its innovative design and potential for widespread adoption, the air conveyor system stands to enhance productivity and competitiveness across various industrial sectors, marking a significant milestone in the evolution of conveyor technology.

Keywords: *Air conveyor system, Material handling technology*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 61

Design, Analysis and Fabrication of Automatic Cat Feeder

Jazzly E. Johan Effendy [1] and R. M. Aslam Raja Arif [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): rajaaslam@uitm.edu.my*

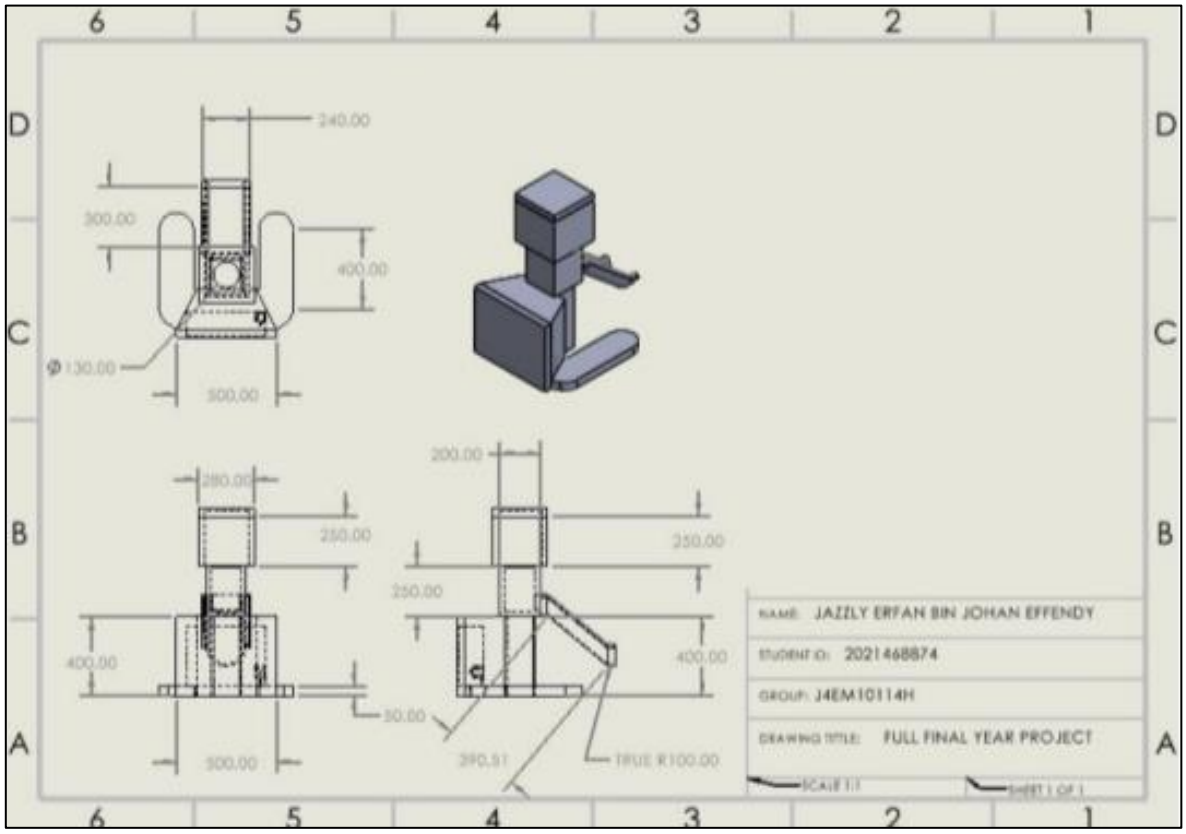
PROJECT DESCRIPTION

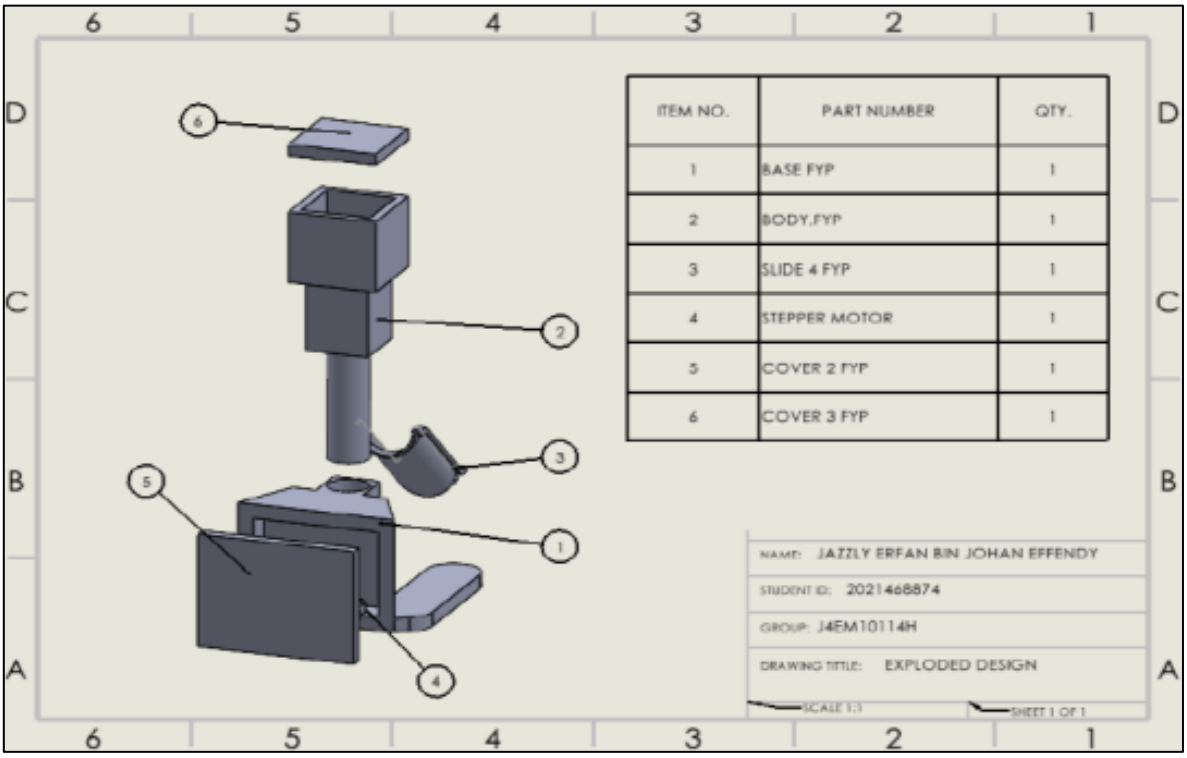
This abstract introduces an automatic cat feeder project aimed at addressing the challenges faced by cat owners in ensuring their pets receive timely and appropriate nourishment. In modern daily life, time constraints often hinder cat owners from providing consistent feeding schedules, potentially jeopardizing their cats' health and well-being. The automatic cat feeder serves as a solution to this dilemma, offering convenience and peace of mind to cat owners while ensuring their feline companions remain happy and healthy. Typically equipped with a food hopper that refills via gravity, the feeder may also feature programmable settings to dispense precise food portions at predetermined intervals throughout the day, week, or month. This functionality proves invaluable for pet owners managing their pets' diets, as it enables precise control over food portions and feeding frequencies. Moreover, the automated feeding system helps regulate meal timings, benefiting cats undergoing weight management or low-calorie diets by preventing overeating and promoting healthier eating habits. By facilitating controlled and consistent feeding, the automatic cat feeder not only supports the well-being of individual pets but also contributes to the broader goal of promoting responsible pet ownership and enhancing the bond between humans and their feline companions.

Keywords: *Automatic cat feeder, Pet nutrition management*

PROTOTYPE

DESIGN PARAMETER





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e-ISBN: 978-967-0033-32-7

CHAPTER 62

Coconut Meat Shredder Machine

Samuel Jau Henry [1] and Ahmad Faidzal Khodori [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): ahmad4727@uitm.edu.my*

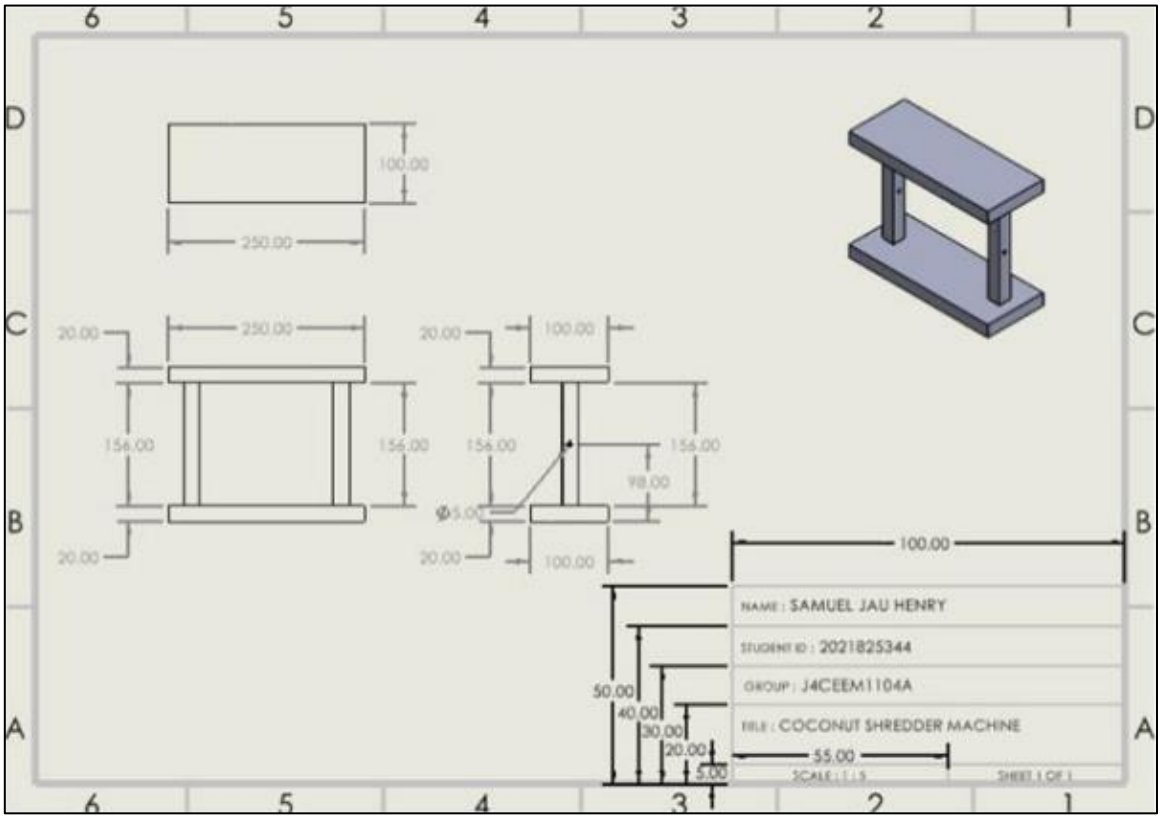
PROJECT DESCRIPTION

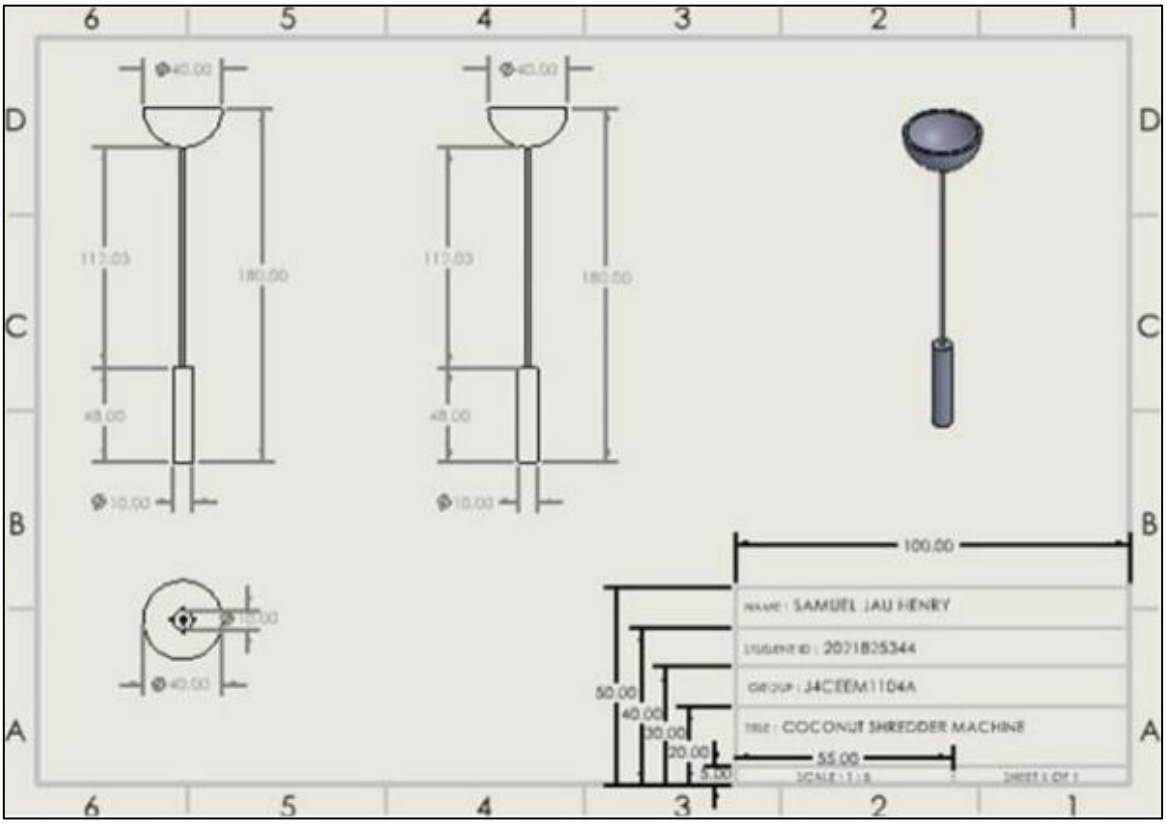
This project focuses on the development and enhancement of an existing coconut meat shredder machine, aimed at improving safety, efficiency, and overall performance. Coconut meat is a key ingredient in various food recipes, beverages, and other food-based products worldwide. However, current coconut shredding machines frequently encounter issues such as material jamming, uneven shredding, and occasional overheating, compromising both the quality of the output and user safety. The primary objective of this project is to address these challenges by redesigning the machine with advanced safety mechanisms and user-friendly controls. The upgraded machine operates by securely clamping the coconut in place and utilizing an automated shredding mechanism, allowing the user to control the clamp manually. This minimizes the risk of accidents, ensures consistent shredding, and reduces mechanical failures such as jamming or overheating. The proposed design not only enhances operational safety but also improves the shredding process, making it more reliable and efficient for widespread use in food production industries.

Keywords: *Coconut, Shredder*

PROTOTYPE

DESIGN PARAMETER





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e-ISBN: 978-967-0033-32-7

CHAPTER 63

Ducktail Lifted System

Muhamad Syahmi Mohd Sanusi [1] and Ahmad Faidzal Khodori [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): ahmad4727@uitm.edu.my*

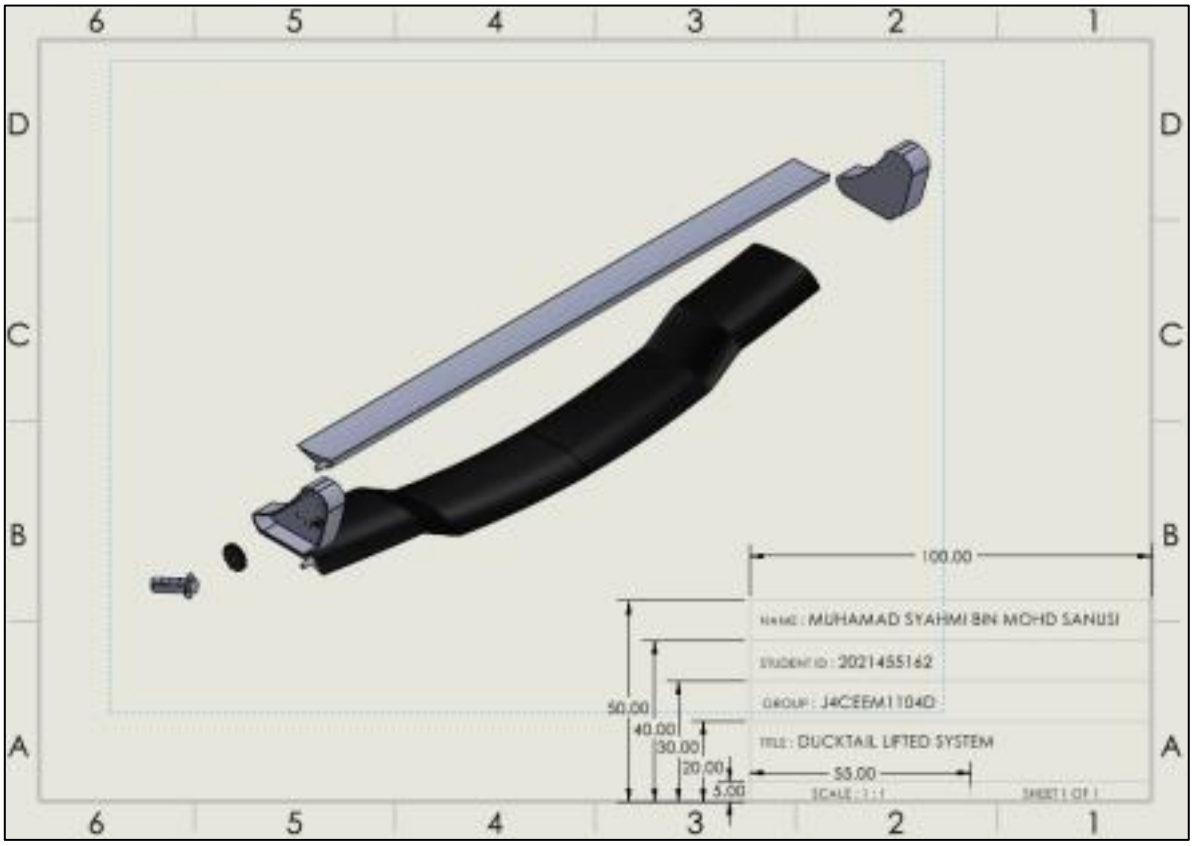
PROJECT DESCRIPTION

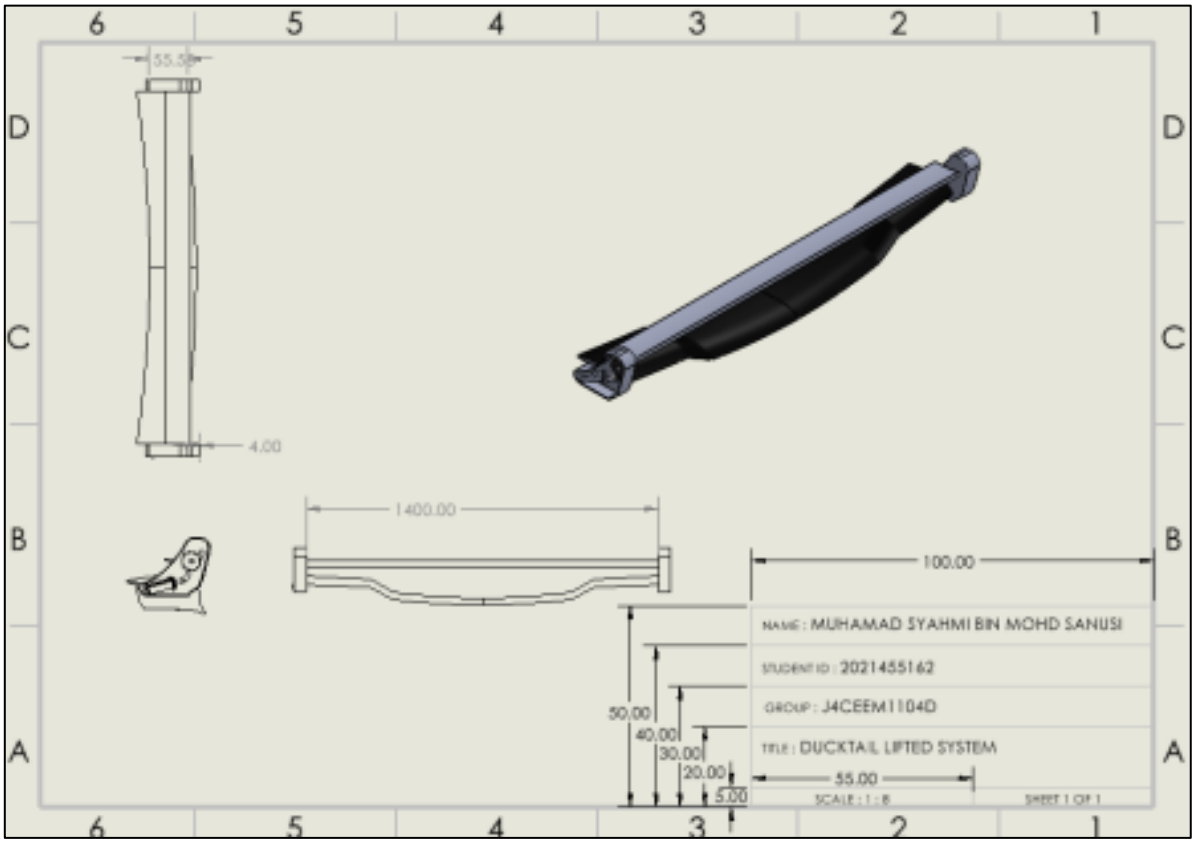
The Ducktail Lifted System is an innovative spoiler designed to be lifted when the brake pedal is pressed, enhancing both aerodynamics and braking efficiency. This product features a unique two-layer ducktail spoiler, which was custom-designed to address the issue of vehicle instability at high speeds. The system uses a combination of hydraulic and pneumatic mechanisms to control the movement of both layers. The primary problem this project aims to solve is the sense of instability that local drivers experience when driving at high speeds on highways, as well as the additional effort required for rapid braking. The objectives of this project include designing a functional two-layer ducktail that is aesthetically evergreen and can be fabricated using cost-effective materials. The methodology involves thorough research and conducting surveys. The expected outcome is a functional system where both layers of the ducktail spoiler will lift automatically when the brake pedal or a remote control is activated, while maintaining the structural integrity and strength of the spoiler.

Keywords: *Ducktail, Lifted*

PROTOTYPE

DESIGN PARAMETER





e-ISBN: 978-967-0033-32-7

CHAPTER 64

Design and Fabrication of Power Hacksaw Machine

Joshua Aji Anak Stephen [1] and Ahmad Faidzal Khodori [2*]

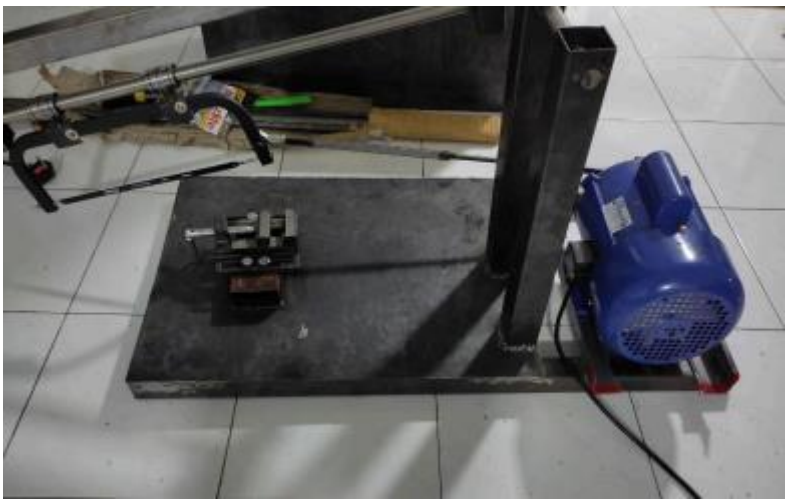
[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): ahmad4727@uitm.edu.my*

PROJECT DESCRIPTION

Power hacksaws have become essential tools in modern industries due to their ability to operate with external power sources such as electric motors and hydraulic systems. However, the problem with manual hacksaws is that they require significant physical effort, leading to operator fatigue. Additionally, the power hacksaws available on the market are often too expensive, making them inaccessible to many users. The objective of this project is to design a cost-effective power hacksaw that reduces manual effort while maintaining the functionality of existing power hacksaws. This design aims to provide an affordable solution that can still perform heavy-duty cutting tasks efficiently, particularly with thick metals. The system will use external power, such as an electric motor, to handle tough materials, reducing operator fatigue and effort. The expected outcome is a power hacksaw that is easy to use, affordable, and capable of handling heavy-duty applications, making it a practical solution for industrial use.

Keywords: *Hacksaw, Machine*

PROTOTYPE



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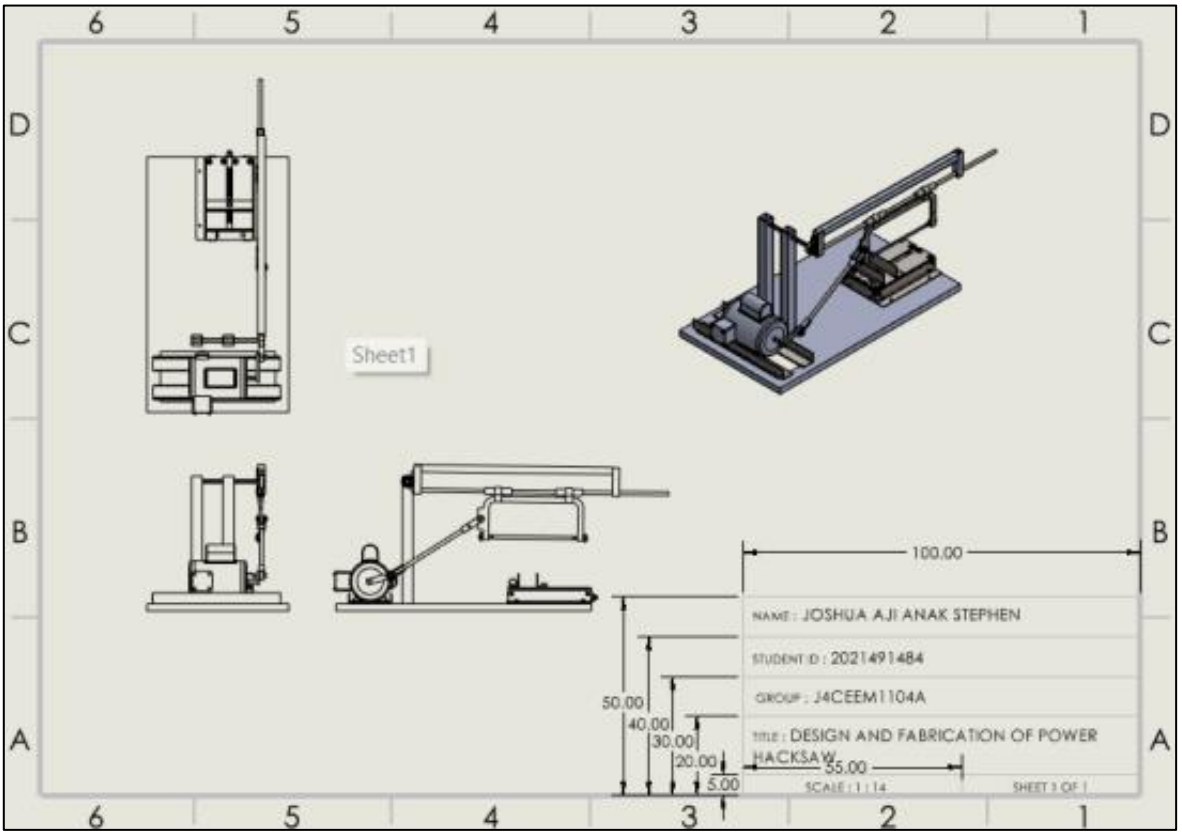
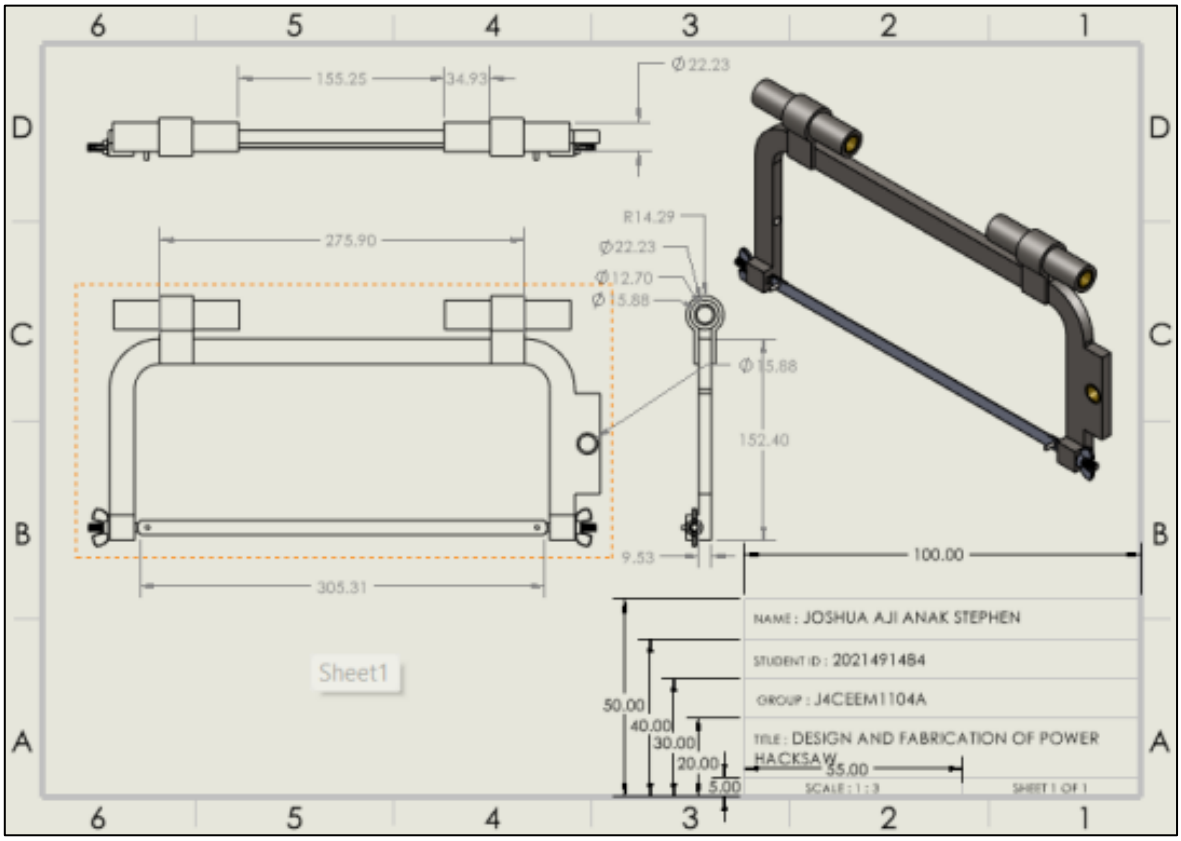




Prototype Design Collection Series 3
e-ISBN: 978-967-0033-32-7

CHAPTER 65

Development of a Prototype Tennis Ball Launcher Using Two Rotating Wheels Powered by DC Motor

Czyruzzikry Bin Czyrell [1] and Ahmad Faidzal Khodori [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): ahmad4727@uitm.edu.my*

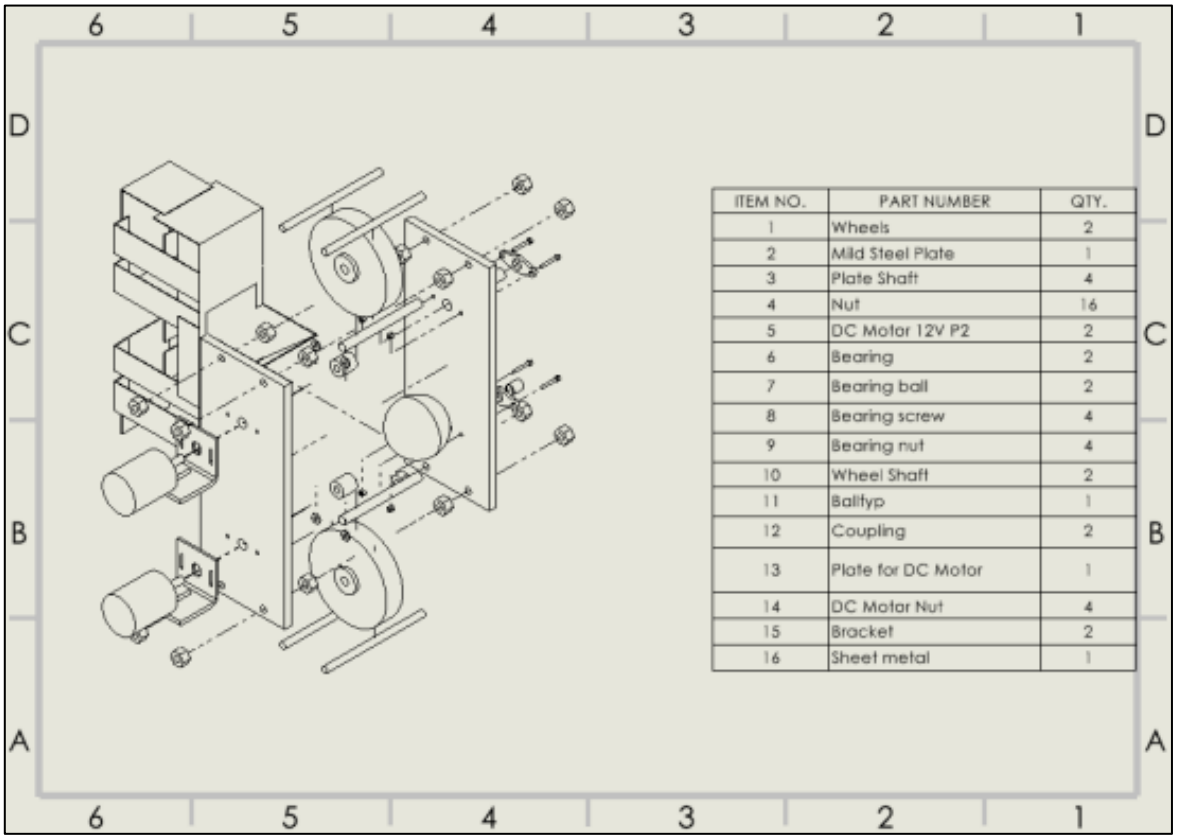
PROJECT DESCRIPTION

This project focuses on the design and development of a tennis ball launcher, a device that propels tennis balls at high speeds to simulate player performance for training, practice, and recreational use. The launcher consists of three main components: the launching mechanism, the ball feeding system, and the control system. The launching mechanism generates the force to propel the ball, typically utilizing a motor-driven flywheel or pneumatic piston to compress and release energy efficiently. In this study, a mathematical analysis is conducted to explore the technical feasibility of an innovative tennis ball launcher. The motion equations of the tennis ball are formulated and solved numerically to analyze its trajectory based on varying initial conditions, such as elevation and roller angles. A new design featuring two counter-rotating rollers is also mathematically evaluated. Experimental measurements determine the tennis ball's physical properties, such as stiffness (Young's modulus) and friction coefficients. This comprehensive study highlights the potential for enhancing current tennis ball launchers by improving training efficiency and offering precise control over ball speed, trajectory, and distance.

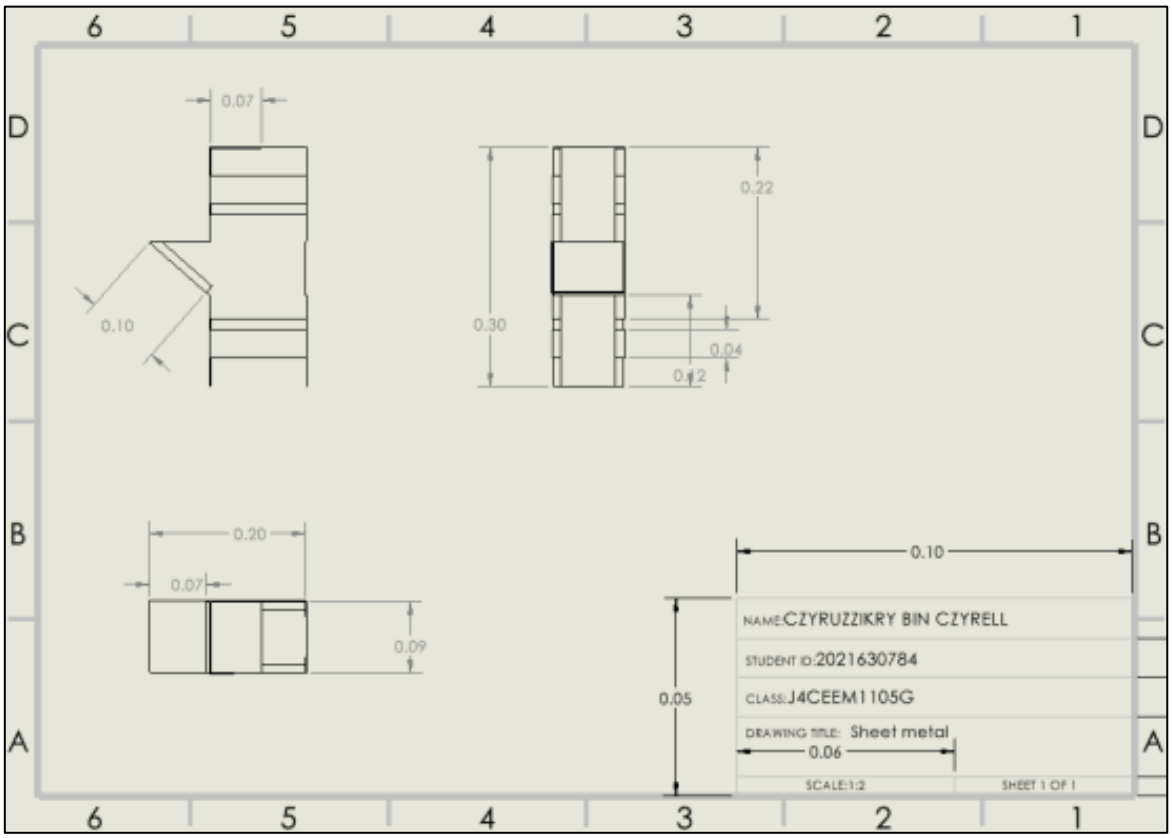
Keywords: *Hacksaw, Machine*

PROTOTYPE

DESIGN PARAMETER



ITEM NO.	PART NUMBER	QTY.
1	Wheels	2
2	Mild Steel Plate	1
3	Plate Shaft	4
4	Nut	16
5	DC Motor 12V P2	2
6	Bearing	2
7	Bearing ball	2
8	Bearing screw	4
9	Bearing nut	4
10	Wheel Shaft	2
11	Ballfyp	1
12	Coupling	2
13	Plate for DC Motor	1
14	DC Motor Nut	4
15	Bracket	2
16	Sheet metal	1



e-ISBN: 978-967-0033-32-7

CHAPTER 66

Design Development of an Automatic Compact Drying Machine

Muhammad Hazrin Amri Mohd Hariri [1], Norjasween Abdul Malik [2*] and Nurrul Amilin Zainal Abidin [3]

[1,2,3]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): norjasween@uitm.edu.my*

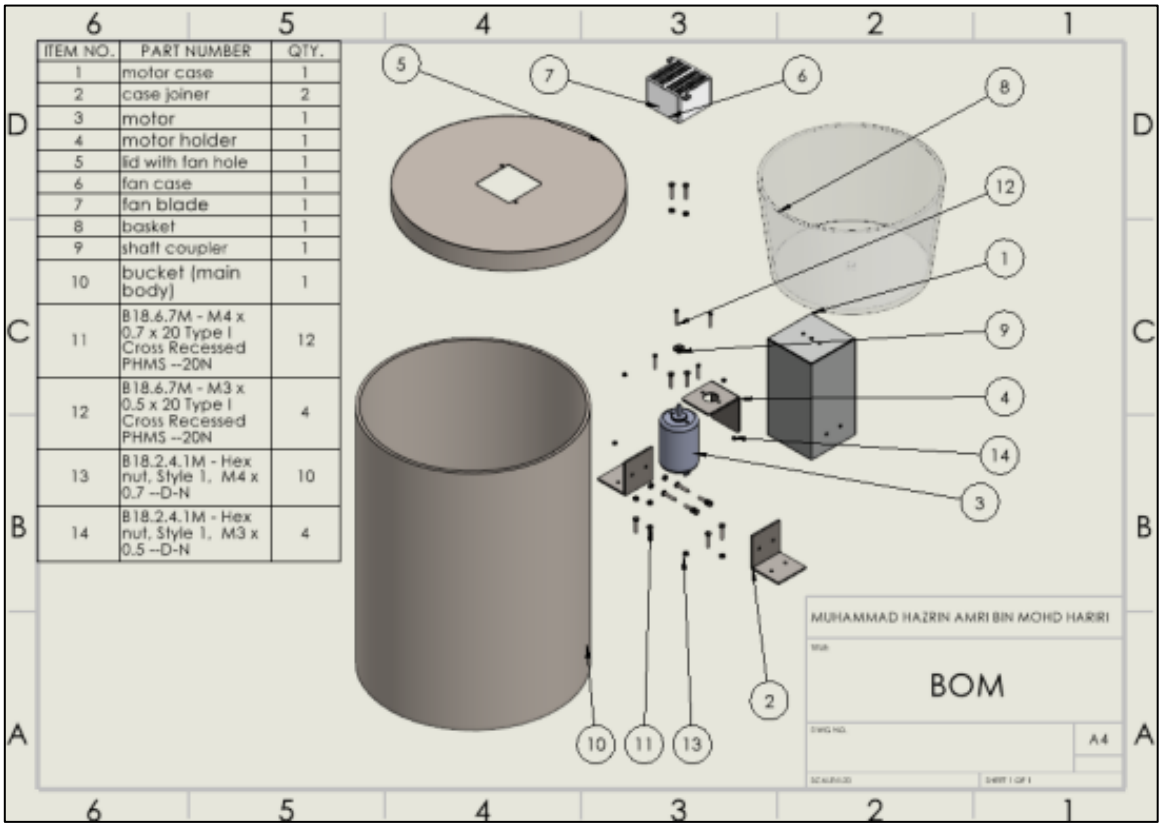
PROJECT DESCRIPTION

Automatic drying machines have been use in the western part of the world for more than a century now. To date, automatic drying machines have become one of the most important household appliances, as it reduces the amount of laundry work over time. Automatic drying machines, like any other technology, can encounter various problems that may affect their performance, efficiency, and reliability. Some of the common problems associated are failure to dry completely, overheating, noise and vibration. Fluctuations or interruptions in the power supply can also disrupt the operation of drying machine as well as other technical malfunctions. Addressing these problems often requires troubleshooting by either the user or qualified technicians, depending on the nature and severity of the issue. This project therefore aimed to design and fabricate a compact, portable, with fewer electrical parts and components to counter these issues. The proposed product consist of heating element and thermostat to ensure the set temperature is maintained. The drum, rotating during the operation promotes even drying and proper airflow. An electric fan or blower is equipped on top of the drum, circulates the heated air through the drum, facilitating the evaporation of moisture. The exhaust vent expels the hot and moist air outside, while a lint filer captures debris from the clothes.

Keywords: *Automatic drying machine, Heating element, Thermostat,*

PROTOTYPE

DESIGN PARAMETER



ITEM NO.	PART NUMBER	QTY.
1	motor case	1
2	case joiner	2
3	motor	1
4	motor holder	1
5	lid with fan hole	1
6	fan case	1
7	fan blade	1
8	basket	1
9	shaft coupler	1
10	bucket (main body)	1
11	B18.6.7M - M4 x 0.7 x 20 Type I Cross Recessed PHMS --20N	12
12	B18.6.7M - M3 x 0.5 x 20 Type I Cross Recessed PHMS --20N	4
13	B18.2.4.1M - Hex nut, Style 1, M4 x 0.7 --D-N	10
14	B18.2.4.1M - Hex nut, Style 1, M3 x 0.5 --D-N	4

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CHAPTER 67

Development of Drain Garbage Collector

Raja Azizul Hadi Raja Muhammad Izatulhairi [1] and Nurul Hanna Mas'aud [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): nurul989@uitm.edu.my*

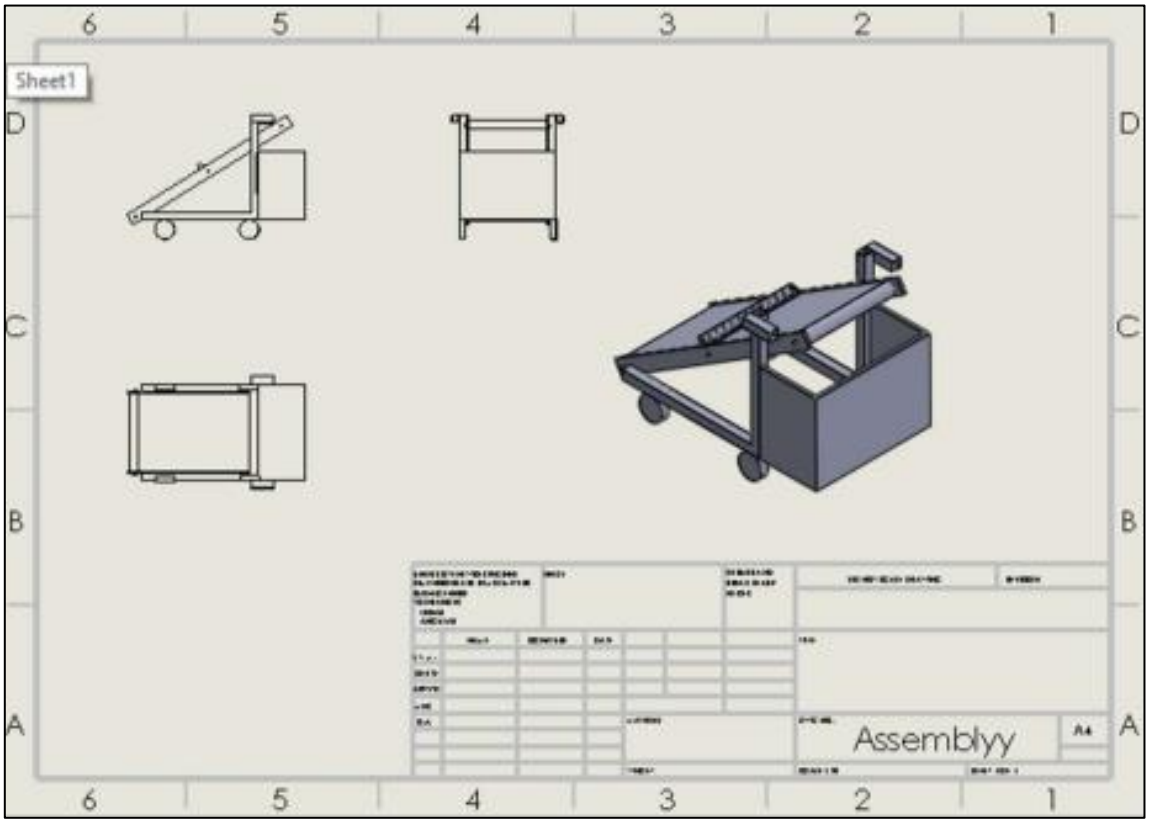
PROJECT DESCRIPTION

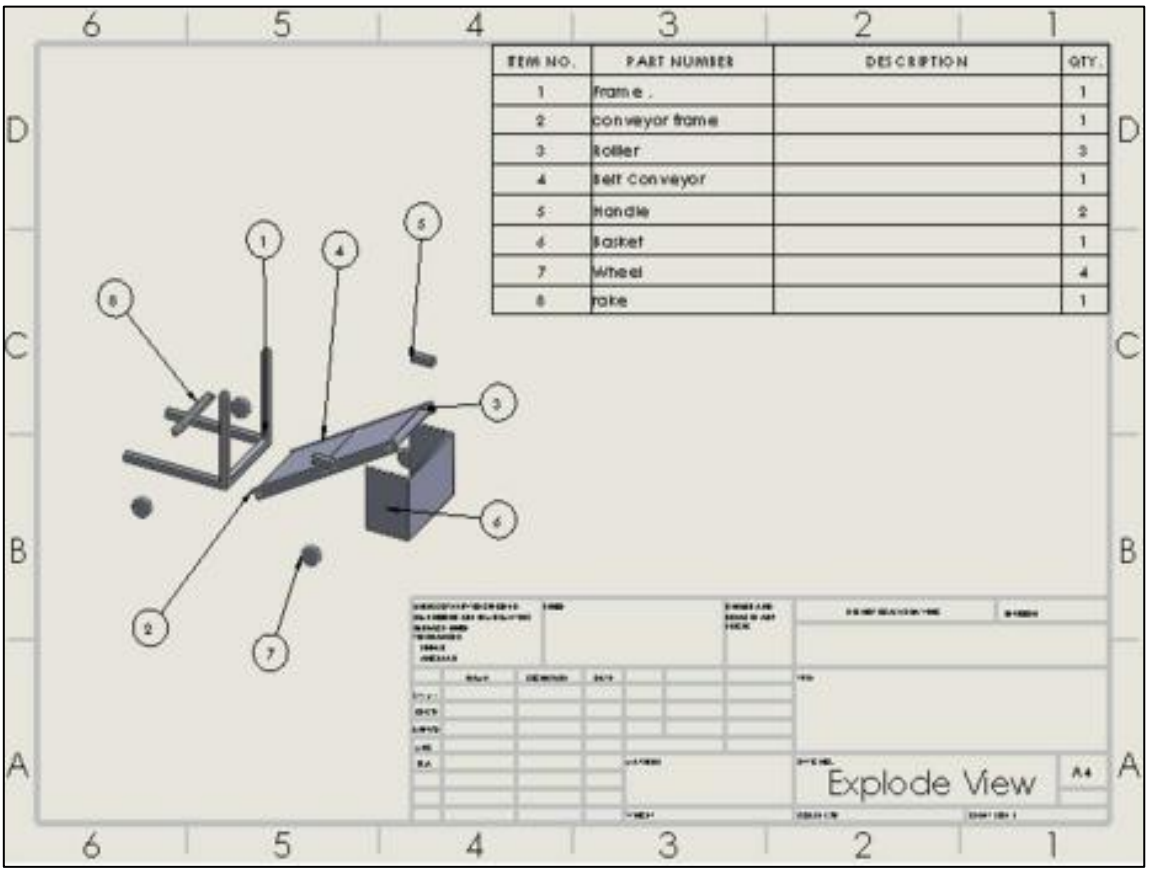
The prevailing problem regarding the critical issues of flooding, dengue transmission, and environmental pollution are resulting from obstructed drainage systems. Traditional manual cleaning methods are inadequate to address these challenges effectively, necessitating the development of automated solutions. Therefore, the aim of this study is to design and fabricate an innovative automatic drain garbage collector. The development process involves conceptualization, prototyping, testing, and refinement. Through iterative design iterations and feasibility assessments, the drain garbage collector system evolves to meet the requirements of urban drainage systems effectively. Considerations such as durability, adaptability to varying drain geometries, and environmental impact are integral to the design process. These processes are conducted by a systematic approach encompassing concept design generation, design selection, detailed design, and fabrication. Utilizing techniques such as morphological charts for concept generation and Pugh charts for design selection ensures a methodical and rational decision-making process. Subsequently, detailed design using modern software tools precedes the fabrication stage, ensuring precision and functionality in the final product. The anticipated outcome of this endeavor is twofold: first, the drain garbage collector system is expected to effectively manage drain cleanliness, thereby mitigating flood risks, reducing dengue transmission vectors, and curbing pollution levels in urban environments. Second, by automating the drain cleaning process, the system aims to minimize human effort, enhancing operational efficiency and resource utilization.

Keywords: *Drainage system, Garbage Collector, Sustainable*

PROTOTYPE

DESIGN PARAMETER





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CHAPTER 68

Design and Fabrication of Hydroponic System for Indoor Gardening

Danish Syahmi Bin Sharul Azian [1] and Mohd Ghazali Mohd Hamami [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): ghazali.hamami@uitm.edu.my*

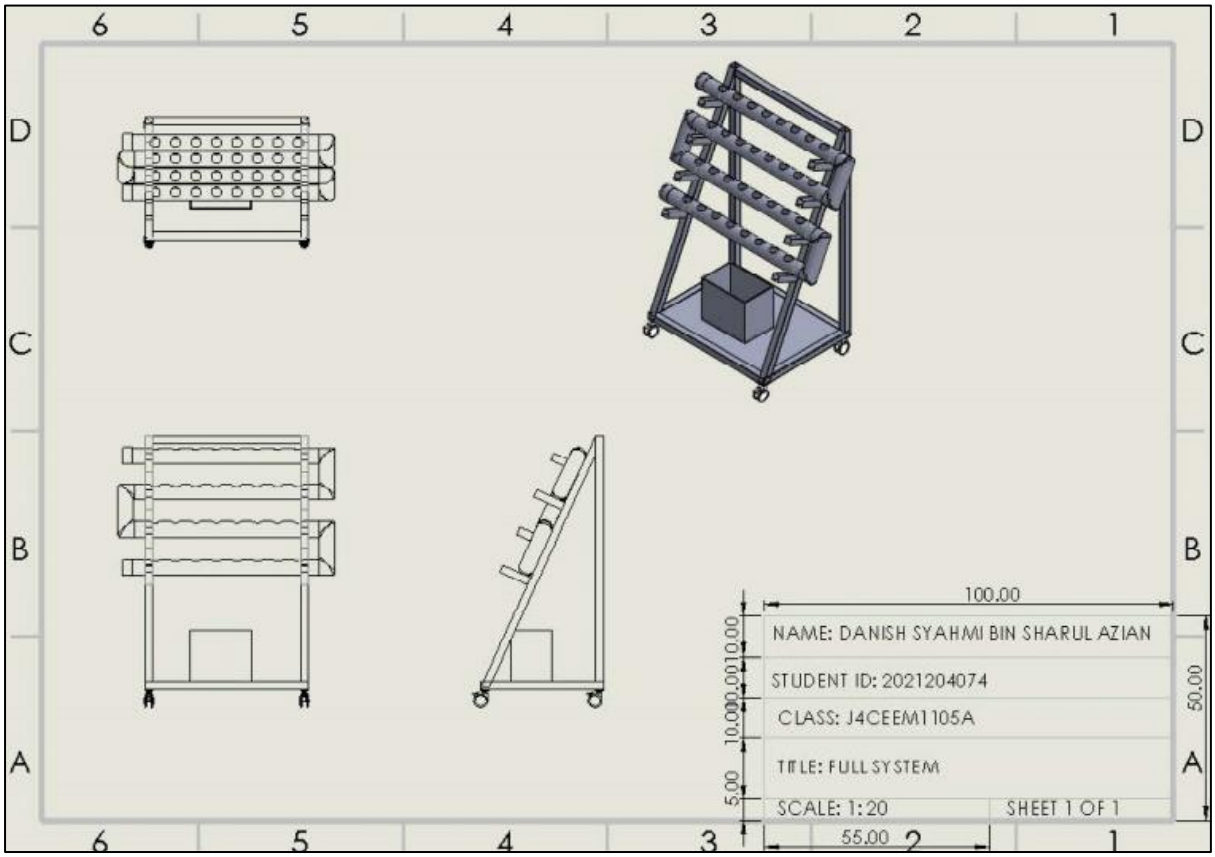
PROJECT DESCRIPTION

There are so many people living in apartments these days, especially people who live in urban areas. Most of these people neither have enough space nor have space at all in their homes to do some simple gardening. So, the objective of this project is to make a hydroponic system for indoor gardening. This project is mainly for simple vegetable planting that can grow without any soil used. This project is planned to be a small and portable one that can fit in their balcony or any space near the sunlight. This project is also supposed to be a reusable system because the only thing that is getting replaced is the fertilizer which is a nutrient-rich water solution. This solution is used to replace the soil. The system typically consists of a reservoir for the nutrient solution, a pump to circulate the solution, and a growing tray or medium for the plants. The components can be made from a variety of materials, including plastics and metals. The system can be further optimized by adding features such as lighting, temperature control, and pH monitoring. By doing this project, people living in urban areas don't need to worry about gardening anymore.

Keywords: *Hydroponic system, Indoor gardening*

PROTOTYPE

DESIGN PARAMETER



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CHAPTER 69

Design and Fabrication of Drain Garbage Collector

Mohamad Nor Irfan Bin Mohd Bakri [1] and Mohd Ghazali Mohd Hamami [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): ghazali.hamami@uitm.edu.my*

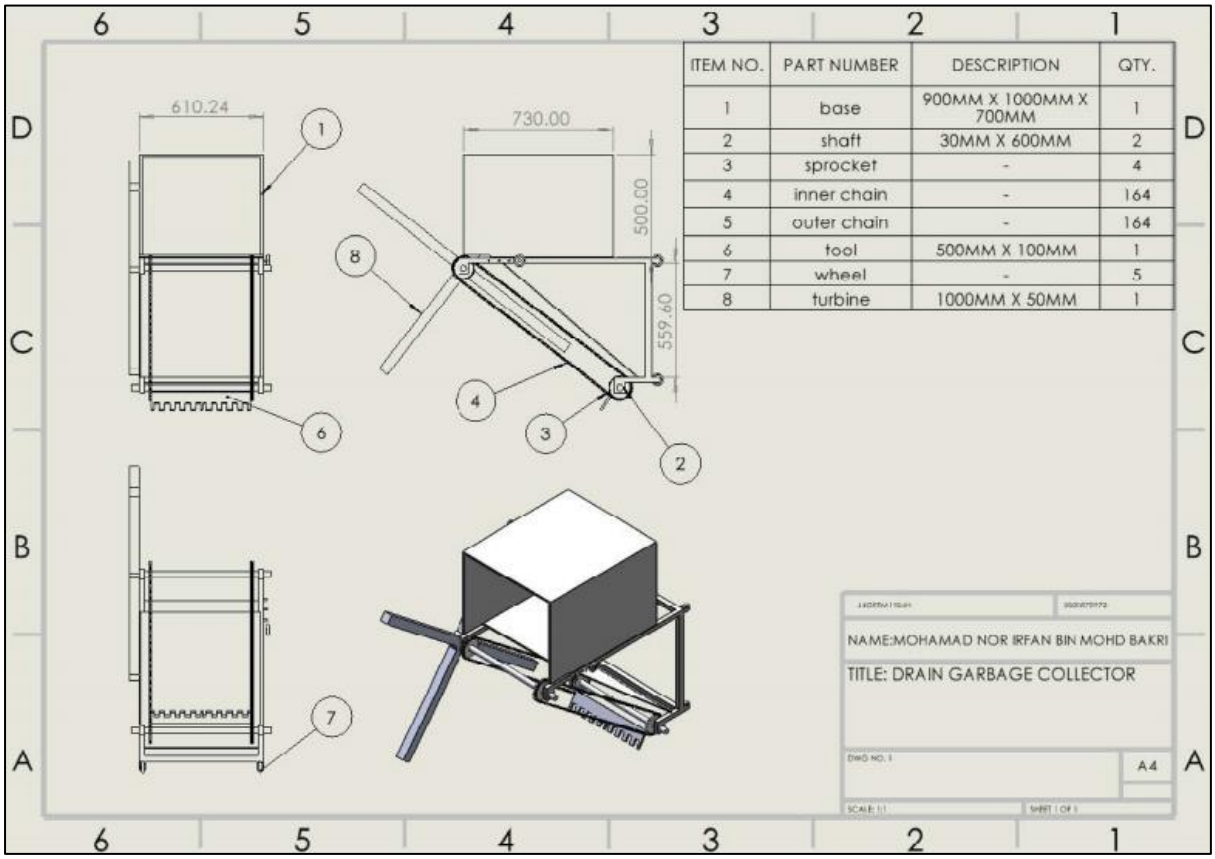
PROJECT DESCRIPTION

Malaysia has an equatorial climate with constant high temperatures and high relative humidity. The climate is influenced by the northeast and southwest monsoons. Rain-bearing winds come with the southwest monsoon from April to September though rainfalls during these periods are generally less than during the northeast monsoon. There are, in addition, two transitional periods between the monsoons (inter-monsoon) when convectional thunderstorms are common. Clogged drains coupled with excessive rainfall from heavy downpours within a short time contributed to several episodes of flash floods reported nationwide recently. Frequently, the drainage systems were overwhelmed and clogged with solid wastes such as plastic bottles, and plastic-based waste. The main cause of flood is the sewer getting clogged by rubbish, leaves, and small branches. Even though many innovations have already been created out there that block rubbish, leaves, and branches from getting clogged such as putting a net at the end of the sewer to block the substances it still needs to be done manually to carry out the from the sewer. This project design is to make the substance collectors can be done automatically and make the work easier. This can help to lessen the burden of workers to carry out the substances from the sewer. This project is hoping that can help to reduce the flood disaster from happening again in the future. Furthermore, this project was hoped that it will be recommended to aid the government in overcoming the flood natural disaster.

Keywords: *Flood issue, Drain garbage collector*

PROTOTYPE

DESIGN PARAMETER



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	base	900MM X 1000MM X 700MM	1
2	shaft	30MM X 600MM	2
3	sprocket	-	4
4	inner chain	-	164
5	outer chain	-	164
6	tool	500MM X 100MM	1
7	wheel	-	5
8	turbine	1000MM X 50MM	1

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CHAPTER 70

Development of a Fruit Washing Machine

Nurul Shaira binti Maswan [1] and Kamariah Binti Md Isa [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): kamariahisa@uitm.edu.my*

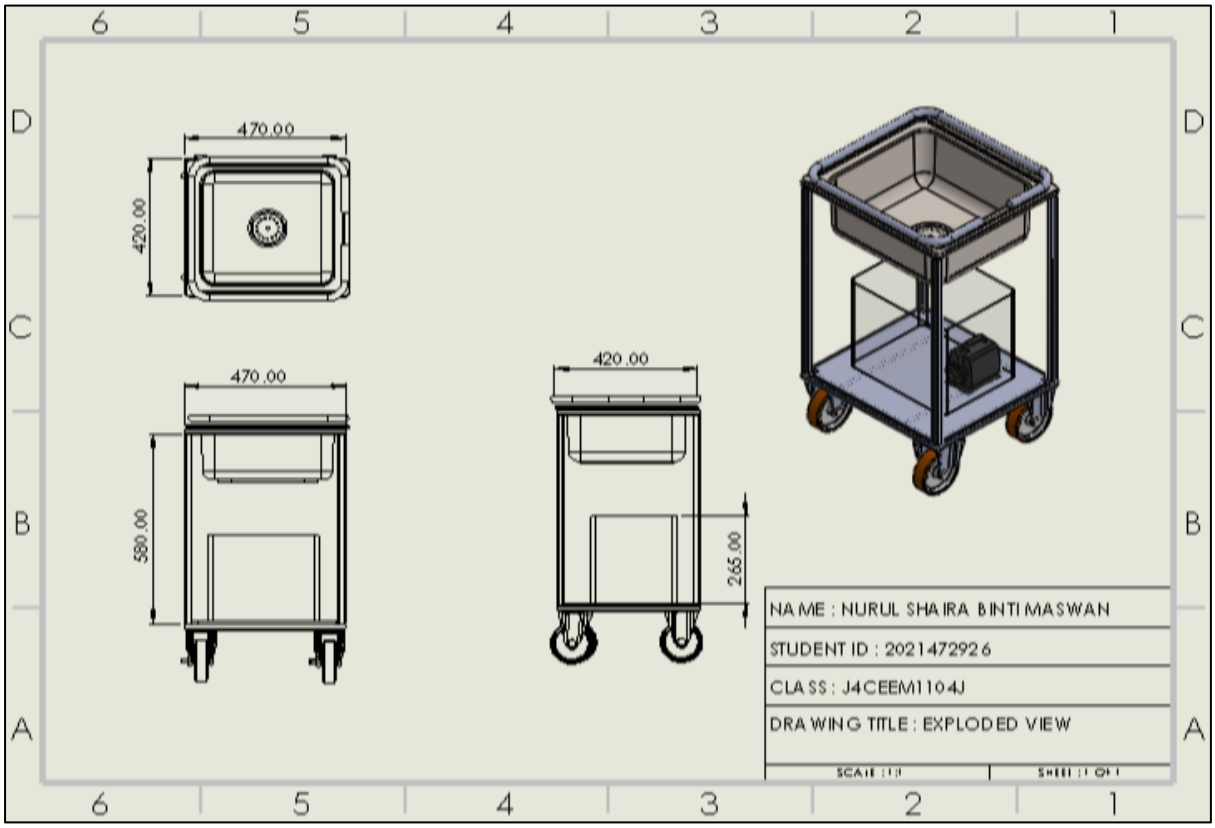
PROJECT DESCRIPTION

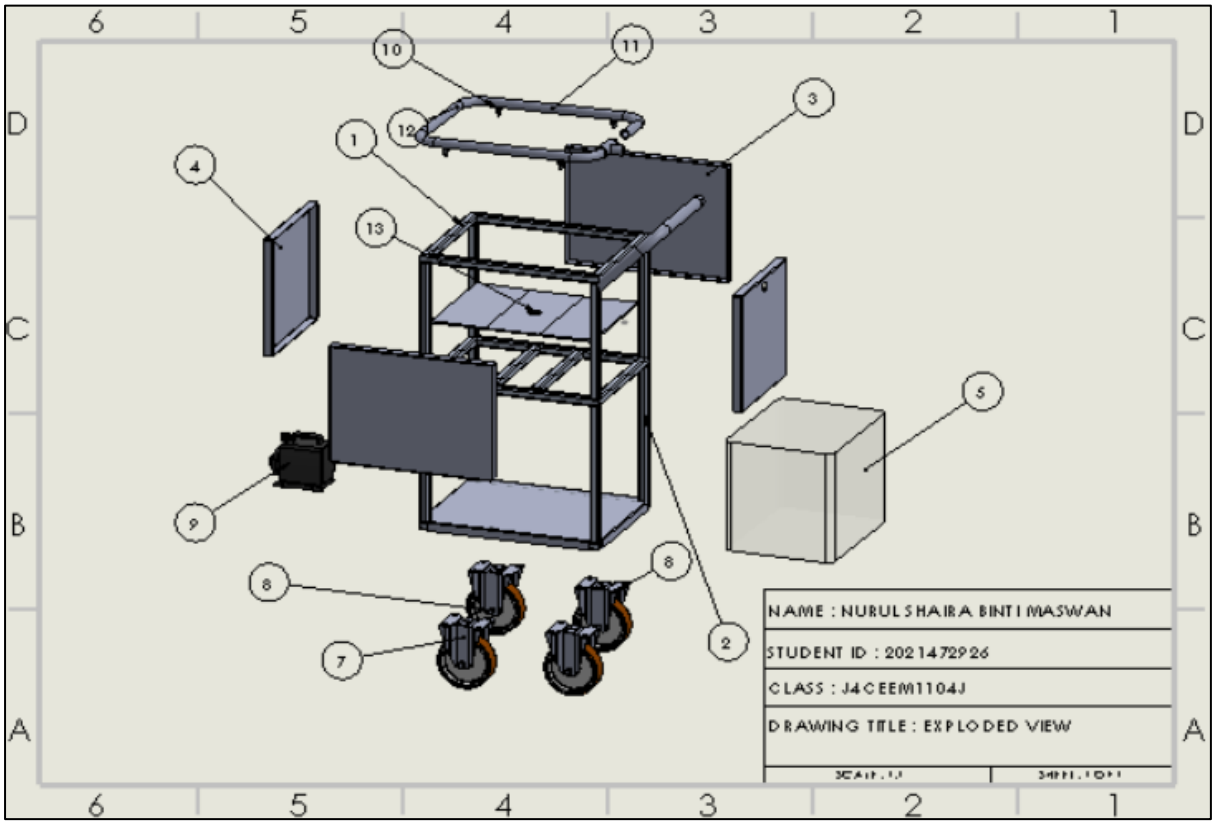
The fruit washer comprises a tank containing water into which the fruits or vegetables are fed, and equipped with means for agitating the water, but it is found that such mechanical devices often bruise and damage the fruits and vegetables to a serious extent. The damaged fruit will not be sold, resulting in a loss for the farmer. By designing and fabricating a fruit washing machine, the study aims to improve the quality of products and increase profits for small farmers. The machine is made of stainless steel to ensure quality and has a high washing capacity and efficiency. Water will be used to wash the fruits using nozzles that is installed on the top of the machine. Safety, ease of operation, maintenance, and ergonomic value have also been considered. The development process of the fruit washing machine includes designing, fabricating, and analyzing a portable mock up model washing machine. Other than that, it is expected that the time for fruit washing will reduce since the design consists of more than one water nozzle.

Keywords: *fruit washer , nozzles*

PROTOTYPE

DESIGN PARAMETER





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CHAPTER 71

Scroll Saw Machine

Amir Fauzul Ilham Bin Hazlan [1] and Haszeme Bin Abu Kasim [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): haszeme9720@uitm.edu.my*

PROJECT DESCRIPTION

This research explores the functional attributes and operational mechanics of scroll saw machines, focusing on their use in making intricate cuts in various materials. By conducting a detailed examination of the design features such as motor efficiency, blade movement, and work table configuration, alongside comparative analyses of different models from various manufacturers, this study assesses the tool's versatility and precision. The investigation reveals that adjustments in blade speed and tension significantly influence the accuracy and quality of cuts. The findings confirm the integral role of scroll saws in detailed craftsmanship across both professional and hobbyist settings, with their capacity for precise material cutting marking them as valuable tools in creative and industrial applications. Future research could explore enhancements in safety features and further refinements in cutting precision to optimize usability.

Keywords: *Scroll saw, material cutting, , blade tension,*

PROTOTYPE

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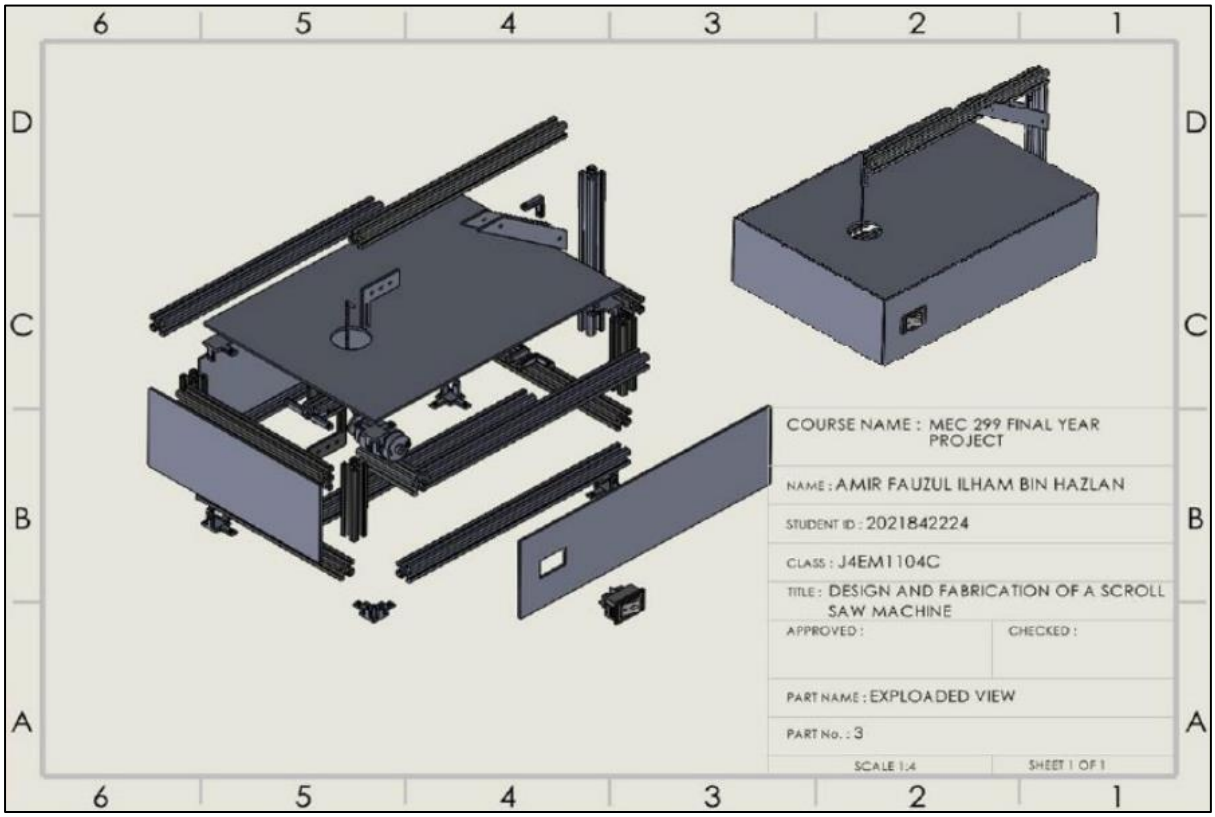
DESIGN PARAMETER



CHAPTER 72

Fruit and Vegetable Slicer

Muhammad Danish Bin Arnizam [1] and Haszeme Bin Abu Kasim [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): haszeme9720@uitm.edu.my*

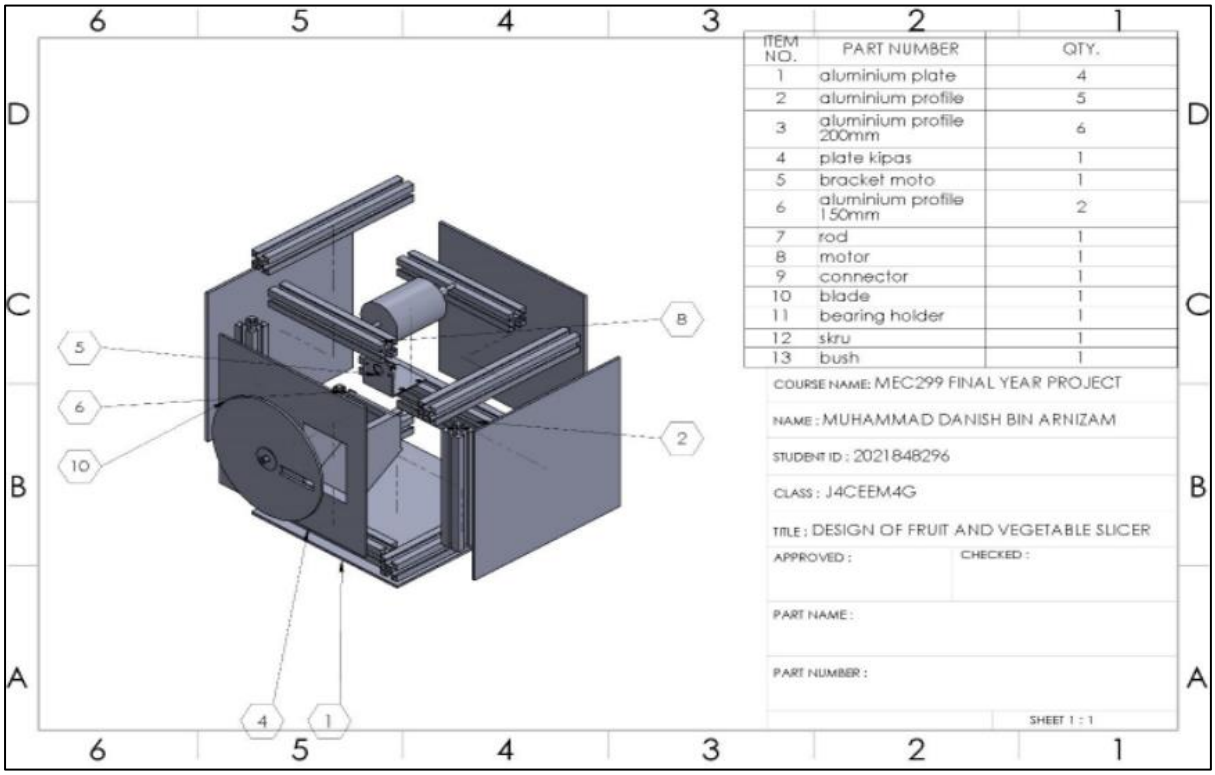
PROJECT DESCRIPTION

This study introduces an innovative fruit and vegetable slicer designed to replace traditional manual slicing methods, thereby enhancing productivity and safety in both professional and home kitchen environments. The development involved creating a device with high-speed rotating blades and an automatic feed mechanism, utilizing experimental prototyping and iterative testing to refine its functionality. Results demonstrated that the slicer significantly reduced preparation time and effort, delivering consistent and aesthetically pleasing slices. Moreover, the device was found to be cost-effective and user-friendly, appealing to a wide user base. The automatic slicer represents a substantial advancement in culinary technology, improving efficiency and reducing injury risks associated with manual slicing. It holds potential for further enhancement, such as incorporating smart technology for customizable slice settings.

Keywords: *Fruit and vegetable slicer, , kitchen safety*

PROTOTYPE

DESIGN PARAMETER



ITEM NO.	PART NUMBER	QTY.
1	aluminium plate	4
2	aluminium profile	5
3	aluminium profile 200mm	6
4	plate kipas	1
5	bracket moto	1
6	aluminium profile 150mm	2
7	rod	1
8	motor	1
9	connector	1
10	blade	1
11	bearing holder	1
12	skru	1
13	bush	1

COURSE NAME: MEC299 FINAL YEAR PROJECT

NAME : MUHAMMAD DANISH BIN ARNIZAM

STUDENT ID : 2021848296

CLASS : J4CEEM4G

TITLE : DESIGN OF FRUIT AND VEGETABLE SLICER

APPROVED : CHECKED :

PART NAME :

PART NUMBER :

SHEET 1 : 1

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CHAPTER 73

Motorized Food Stirrer for Cooking

Muhammad Irfan Syamil Bin Firdaus [1] and Haszeme Bin Abu Kasim [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): haszeme9720@uitm.edu.my*

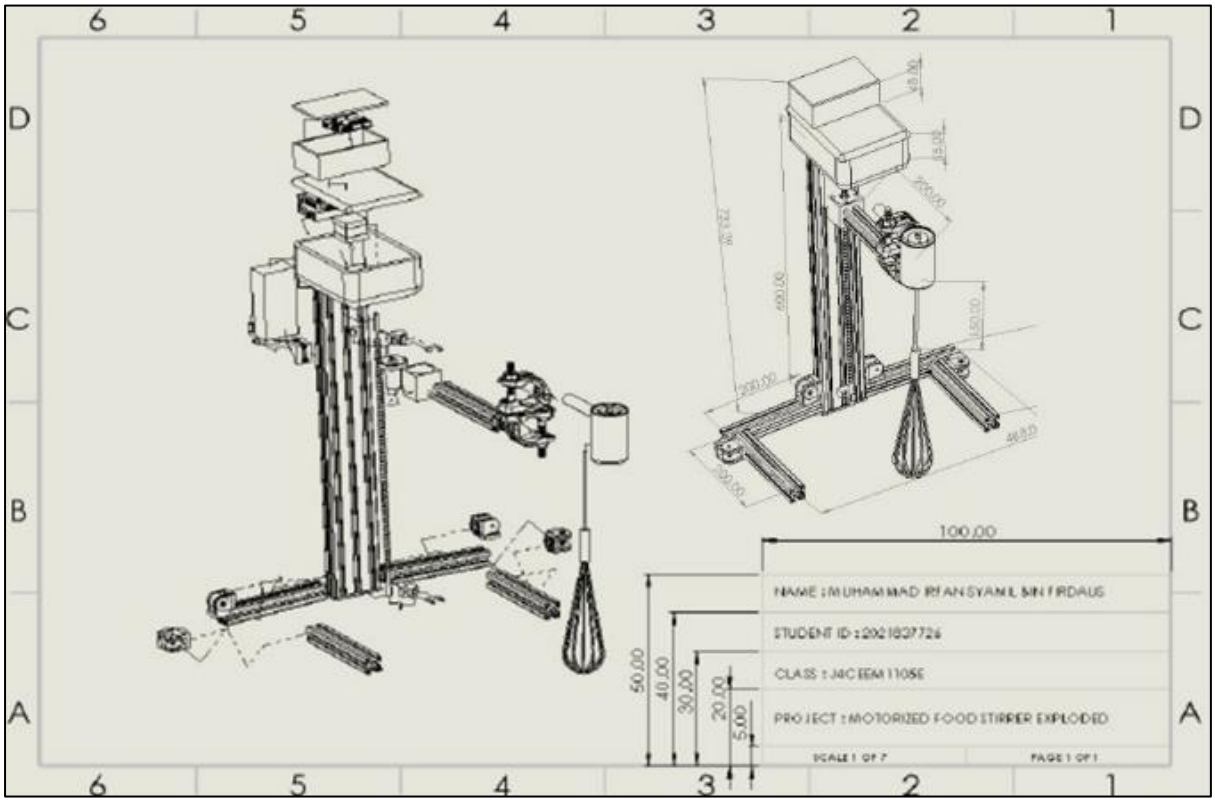
PROJECT DESCRIPTION

This study focuses on developing a motorized food stirrer to alleviate the manual labor associated with cooking, particularly benefiting the elderly, disabled individuals, and small businesses. The research involved a comparative analysis of existing products to benchmark design and functionality, followed by the experimental design incorporating manufacturing processes such as cutting, joining, and finishing. The motorized stirrer significantly enhanced cooking efficiency by automating the stirring process, allowing users to engage in other activities simultaneously, thus reducing labor and fatigue. This was particularly advantageous for small businesses, which could handle larger batches of food more efficiently. Economic analysis indicated potential cost savings by minimizing the need for additional labor. The device's design also emphasized sustainability in terms of performance, economy, and ergonomics, aiming to meet specific industry needs while ensuring safety and user-friendliness. Overall, the motorized food stirrer marks a substantial advancement in kitchen technology, promising to transform cooking practices by making them more manageable and efficient, especially in commercial settings. Future developments might focus on enhancing automation and optimizing design for broader application.

Keywords: *Motorized food stirrerr, , automated cooking*

PROTOTYPE

DESIGN PARAMETER



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CHAPTER 74

Durian and Coconut Opener Machine

Mohamad Zharfan Azami Bin Kusahiri [1] and Haszeme Bin Abu Kasim [2*]

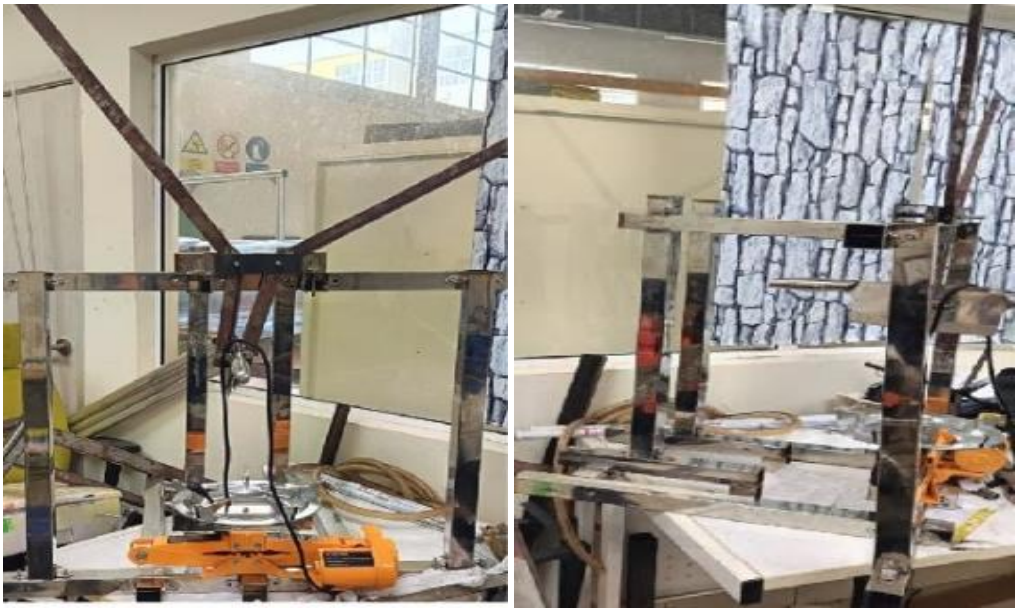
[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): haszeme9720@uitm.edu.my*

PROJECT DESCRIPTION

This research focuses on developing an innovative dehusking machine tailored for hard-shelled fruits such as durians, coconuts, and jackfruits, which are commonly used in Malaysia. Addressing economic and operational challenges, the project aims to alleviate the labor-intensive and costly processes currently endured by households and small businesses. The design methodology incorporated the use of lightweight materials and efficient, simple mechanisms, such as car jacks and separating pliers, to create an affordable and easy-to-operate machine. Initial testing revealed that the machine significantly reduces the time and labor required for dehusking, with the added benefit of being operable by individuals with minimal training. A cost analysis confirmed the machine's financial viability, presenting a cost-effective alternative to more expensive, skill-dependent machinery currently available on the market. The study concludes that the introduction of this machine could enhance productivity and reduce the environmental impact within the Malaysian food industry, providing substantial support to small businesses and households. The project not only promises to improve economic outcomes but also aims to contribute to environmental sustainability.

Keywords: *Fruit dehusking, , eco-friendly machinery,*

PROTOTYPE



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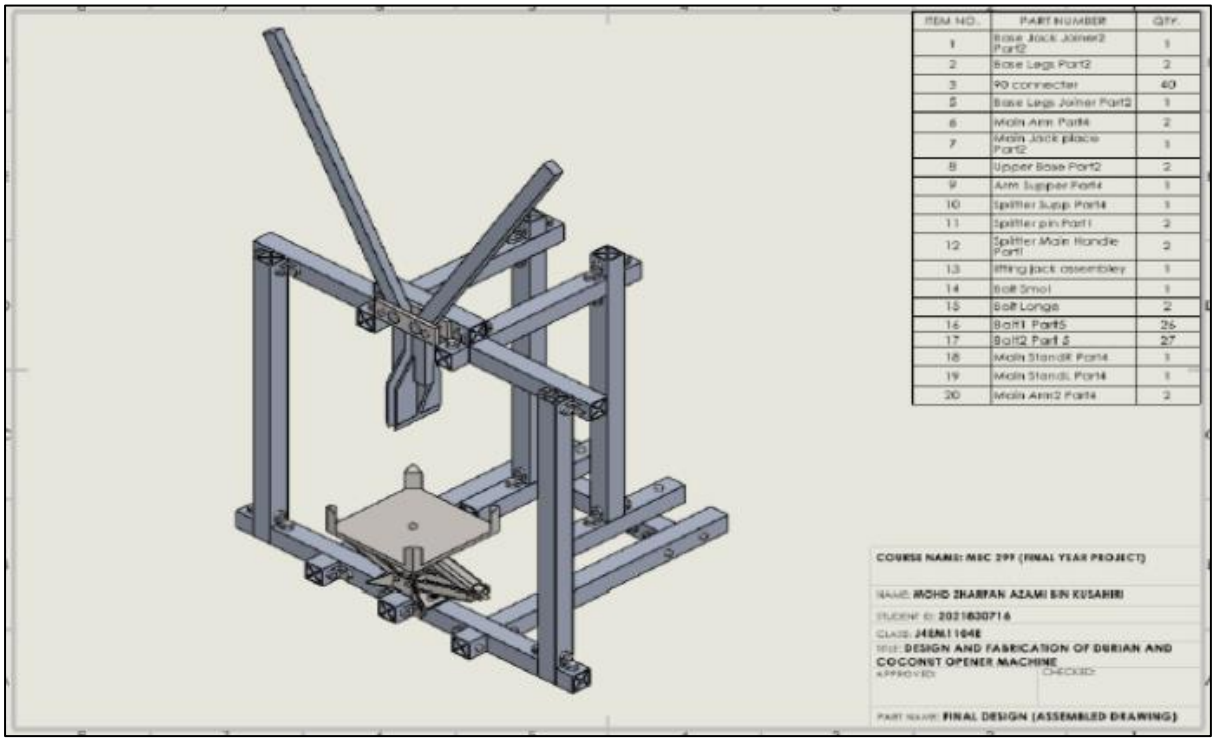

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CHAPTER 75

Design and Fabricate a Corn Thresher Machine

Amirul Mukmin bin Khairul Amri [1] and Ab Aziz bin Mohd Yusof [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): abaziz86@uitm.edu.my*

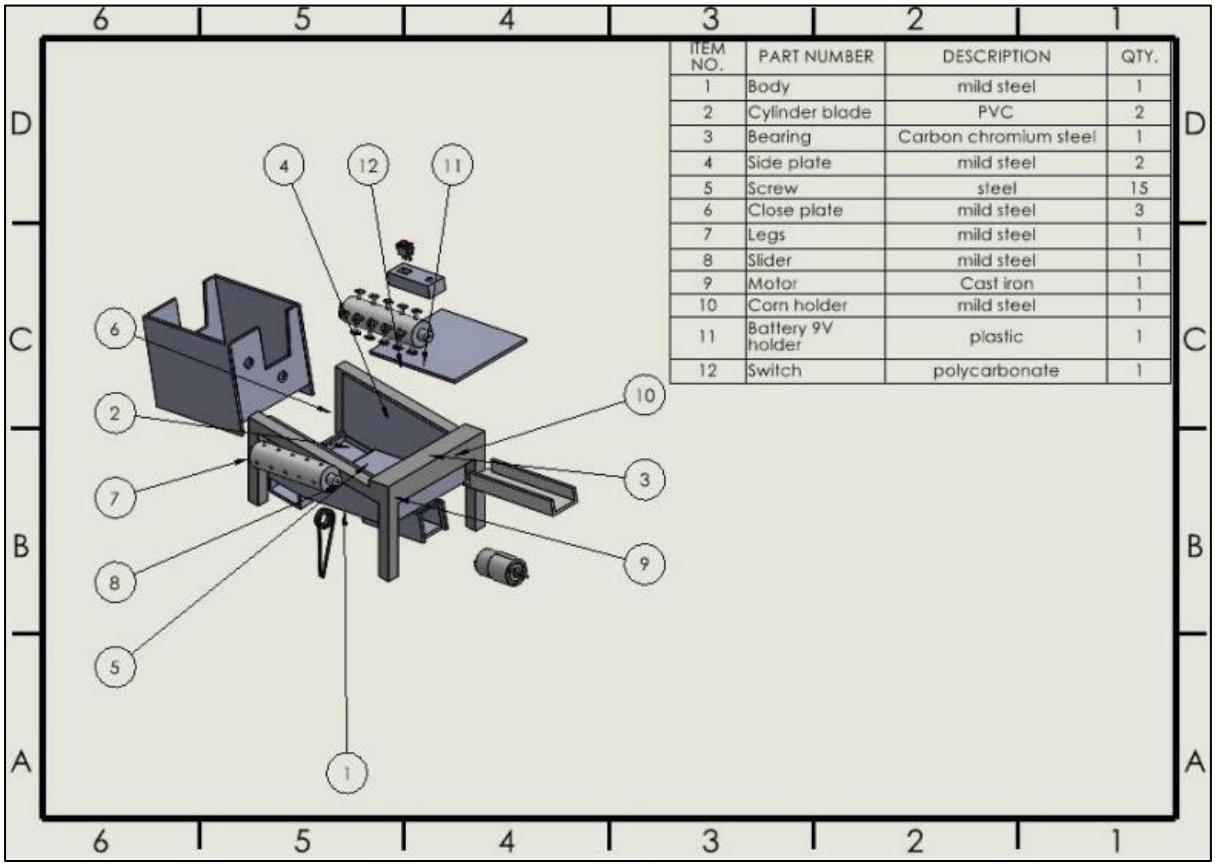
PROJECT DESCRIPTION

The machine is equipment that is created to make work easier. It is a tool that amplifies the effect of human effort. Many machines are available on the market, and they come in every size and price. The problem with machines nowadays is that they are expensive and hard to get in mini sizes. Thus, this was carried out to design and fabricate a corn thresher machine. The machine will go through a design process using Solidworks and fabricating using drilling, cutting, and grinding. The materials that will be used are cast iron and aluminium. The possible outcome should be to turn on the switch, and the motor will run the thresher blade, rotating it while shredding and separating the kernels from the corn cob in the machine itself. It is concluded that the expected mini machine will be a lot more useful for small projects and affordable for most users.

Keywords: *Thresher*

PROTOTYPE

DESIGN PARAMETER



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Body	mild steel	1
2	Cylinder blade	PVC	2
3	Bearing	Carbon chromium steel	1
4	Side plate	mild steel	2
5	Screw	steel	15
6	Close plate	mild steel	3
7	Legs	mild steel	1
8	Slider	mild steel	1
9	Motor	Cast iron	1
10	Corn holder	mild steel	1
11	Battery 9V holder	plastic	1
12	Switch	polycarbonate	1

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CHAPTER 76

Design and Fabricate of Automatic Rechargeable Screwdriver

Yusuff Badrisyah bin Mohd Din [1] and Ab Aziz bin Mohd Yusof [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): abaziz86@uitm.edu.my*

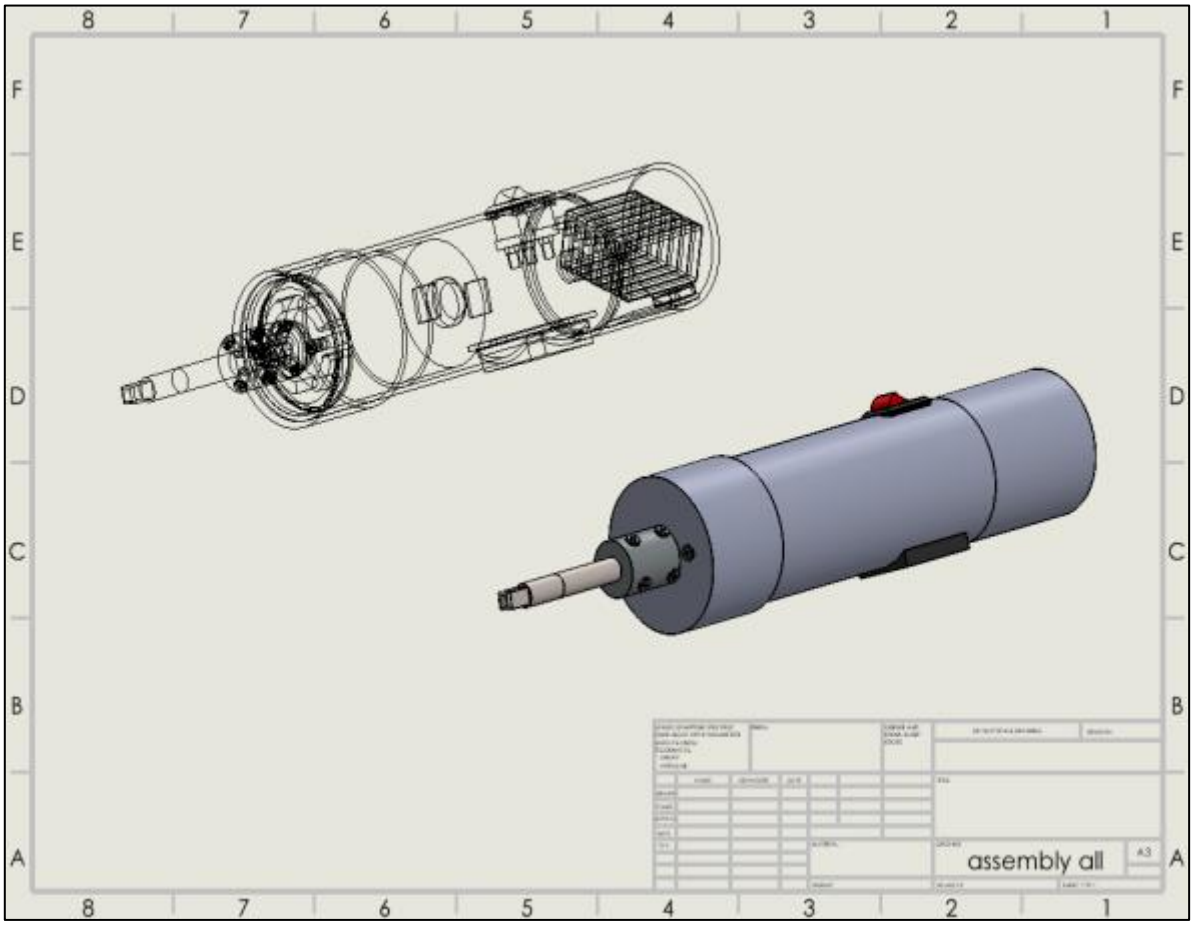
PROJECT DESCRIPTION

This project presents the fabrication and concept of an automatic rechargeable screwdriver that will help many people with their problems to assemble and disassembling things like cupboards, tables, chairs etc. Using the method of rotational motion with a DC rotary motor, the screws can be driven to tighten or loosen according to users' command. This project also discusses the sustainability of the product where. The product's material mainly focuses on cheap but usable items and also recyclable and reusable items. The product also aims for accessibility to all generations of age, from young people to teenagers, adults, and senior citizens, who are welcome to use this product. In conclusion, the authors discuss the pros and cons of this product for sustainability and primary usage and also the flexibility of the product, as the tip can be changed according to the size of the screws. This project targets the product can function fully and ease users to tighten and loosen screws with just a flip of a switch.

Keywords: *Rechargeable, Screwdriver*

PROTOTYPE

DESIGN PARAMETER



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CHAPTER 77

Design and Fabricate Pocket Allen Key Machine

Raja Amirul Syauqat bin Raja Sazrin [1] and Ab Aziz bin Mohd Yusof [2*]

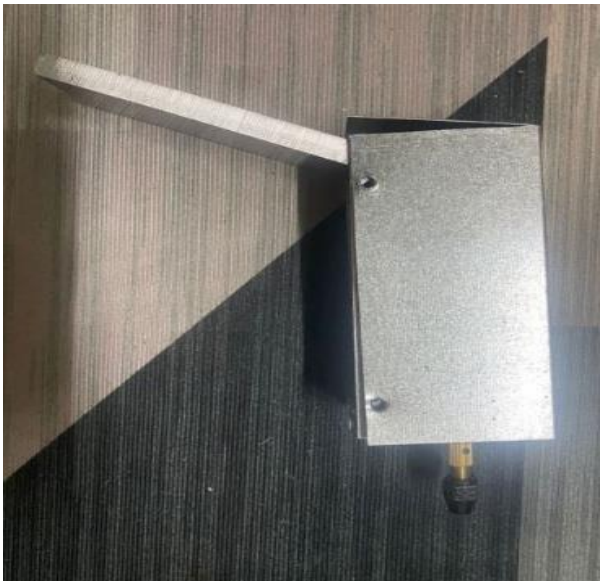
[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): abaziz86@uitm.edu.my*

PROJECT DESCRIPTION

The objective of this research is to fabricate a prototype of a pocket Allen key machine. A single DC motor can transmit the power needed to complete the assembly of an IKEA product. The pocket Allen key machine has a big potential in today's market due to the high number of people buying IKEA products. The furniture built by this famous company often uses a hexagonal-head fastener to help lessen the possibility of buyers defecting their furniture. Therefore, this project focuses on helping them assemble the parts quickly, plus lowering the risk of damaging IKEA's products. The pocket Allen key machine provides the community with a new product to choose from rather than having the only option of buying a cordless drill. The fabrication process includes measuring, cutting, and drilling. This pocket Allen key machine is made of easily recycled plastic. We want to raise the community's awareness towards this lovely earth. To raise the standard, this project aims to help lower the earth's temperature. A DC motor operates it to rotate the chuck and Allen key. The motor will be shown to be powered by a device to prevent the furniture from the assembly process. Some recommendations can be added as an initiative, such as a three-way switch to control the direction of the rotation.

Keywords: *Allen Key, Machine*

PROTOTYPE



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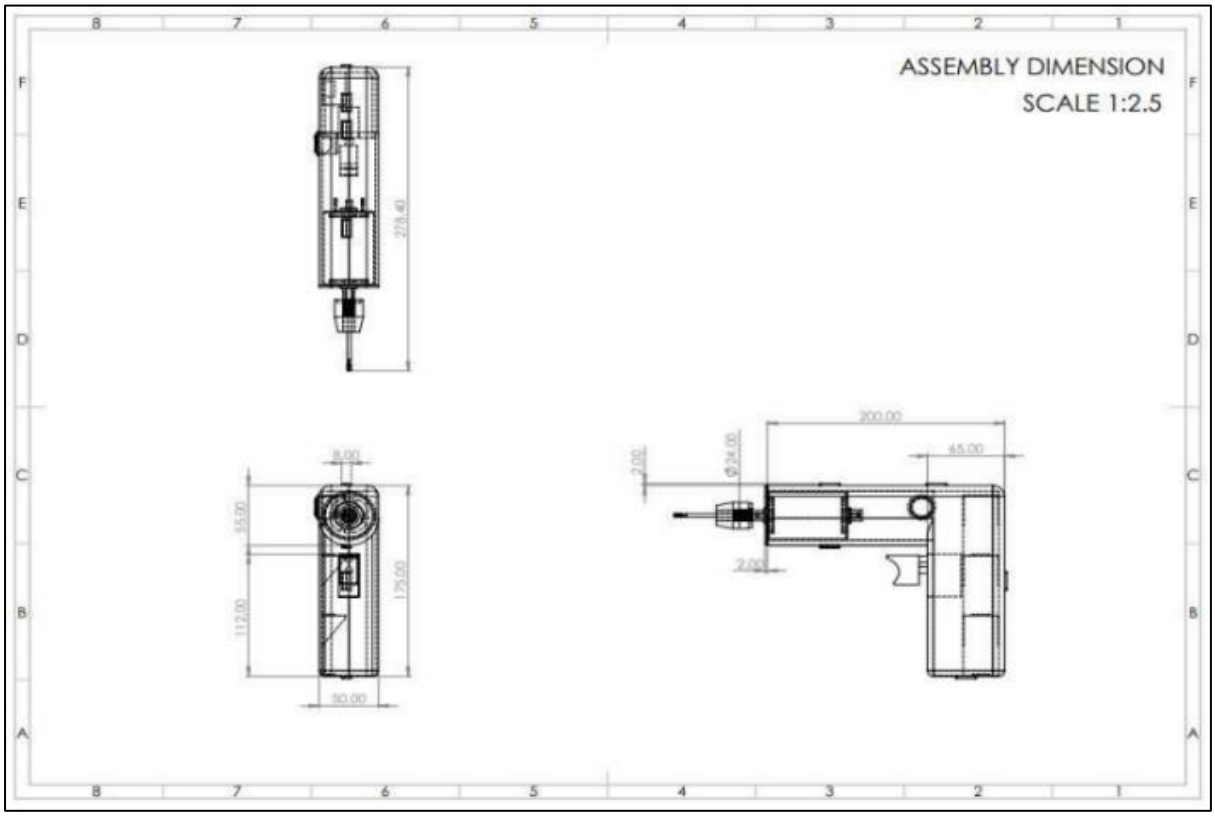

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CHAPTER 78

Design and Fabrication of Revolving Base Conveyor Belt

Aman bin Ahmad Fadli [1] and Ab Aziz bin Mohd Yusof [2*]

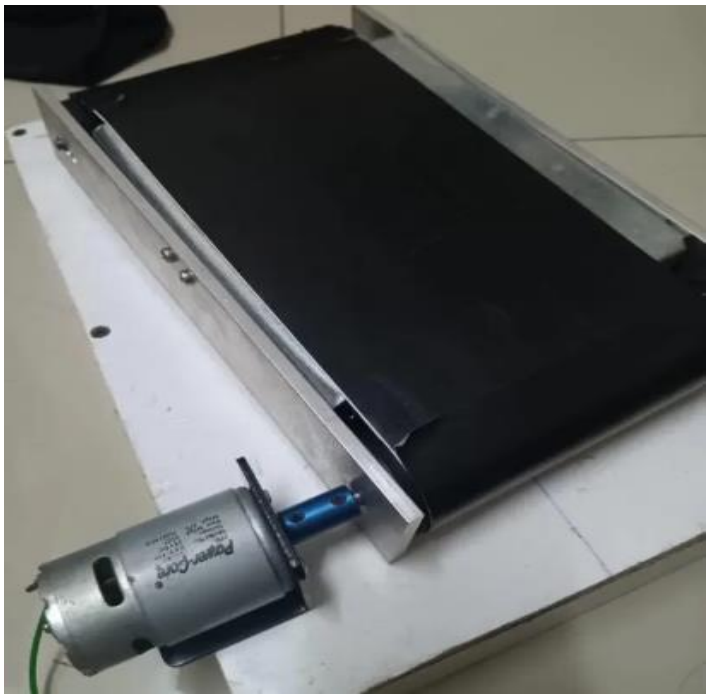
[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): abaziz86@uitm.edu.my*

PROJECT DESCRIPTION

Many small-scale industries rely on manual labour to transport raw materials within their facilities. However, some industries utilise fixed-position equipment such as cranes, hoists, small industrial trucks, and conveyors. Traditional conveyor belts are designed for linear material movement, which can be limiting when materials need to be transported in multiple directions or when space is restricted. However, this prototype is considered to have the objective of designing and fabricating a revolving base conveyor belt. The prototype will go through multiple processes, such as 3D modelling using SOLIDWORKS and fabrication, while utilising manufacturing processes such as drilling, cutting, grinding, and milling. This prototype's expected outcome is to promptly demonstrate a way of transporting items in multiple directions. In conclusion, the prototype will be able to solve problems with restricted space, such as in a warehouse.

Keywords: *Revolving base, Conveyor belt*

PROTOTYPE



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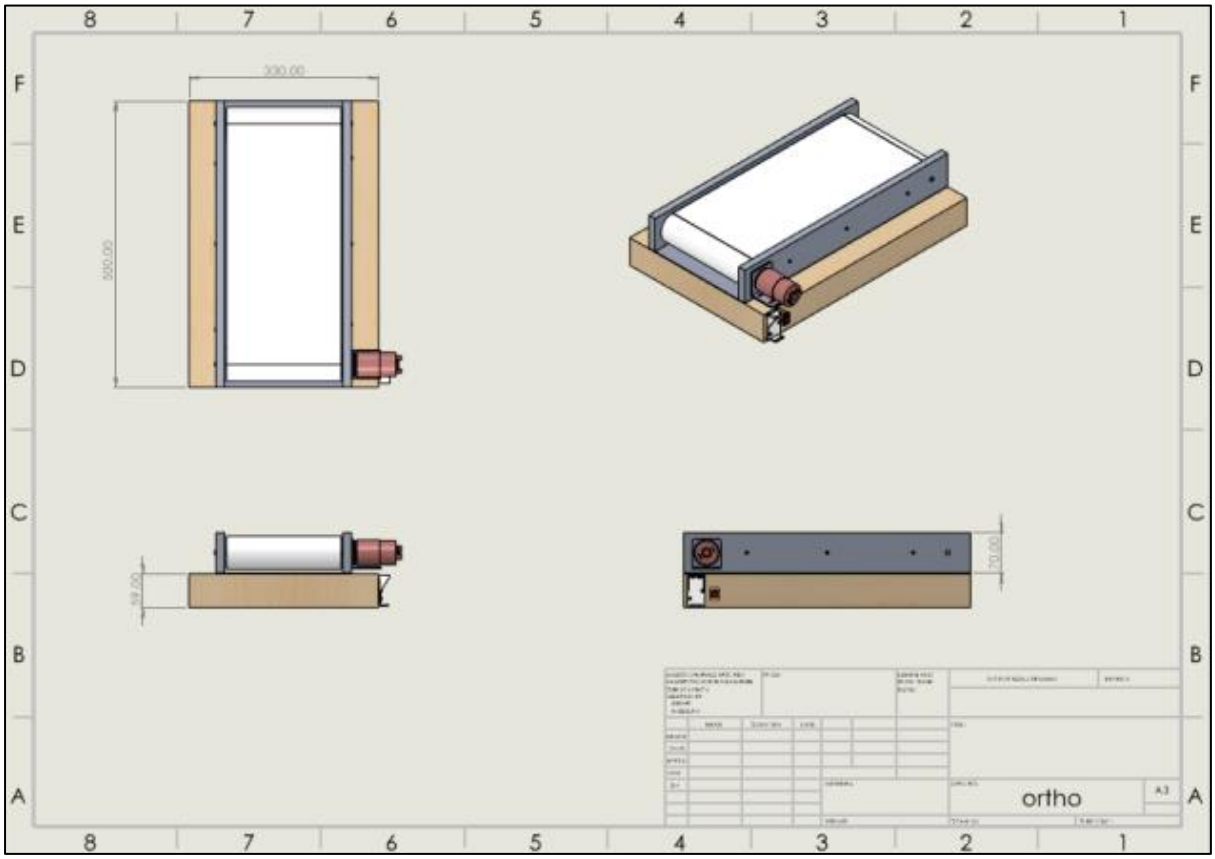

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CHAPTER 79

Design and Fabrication of Multipurpose Cleaner

Aiman Hakim bin Zauri [1] and Ab Aziz bin Mohd Yusof [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): abaziz86@uitm.edu.my*

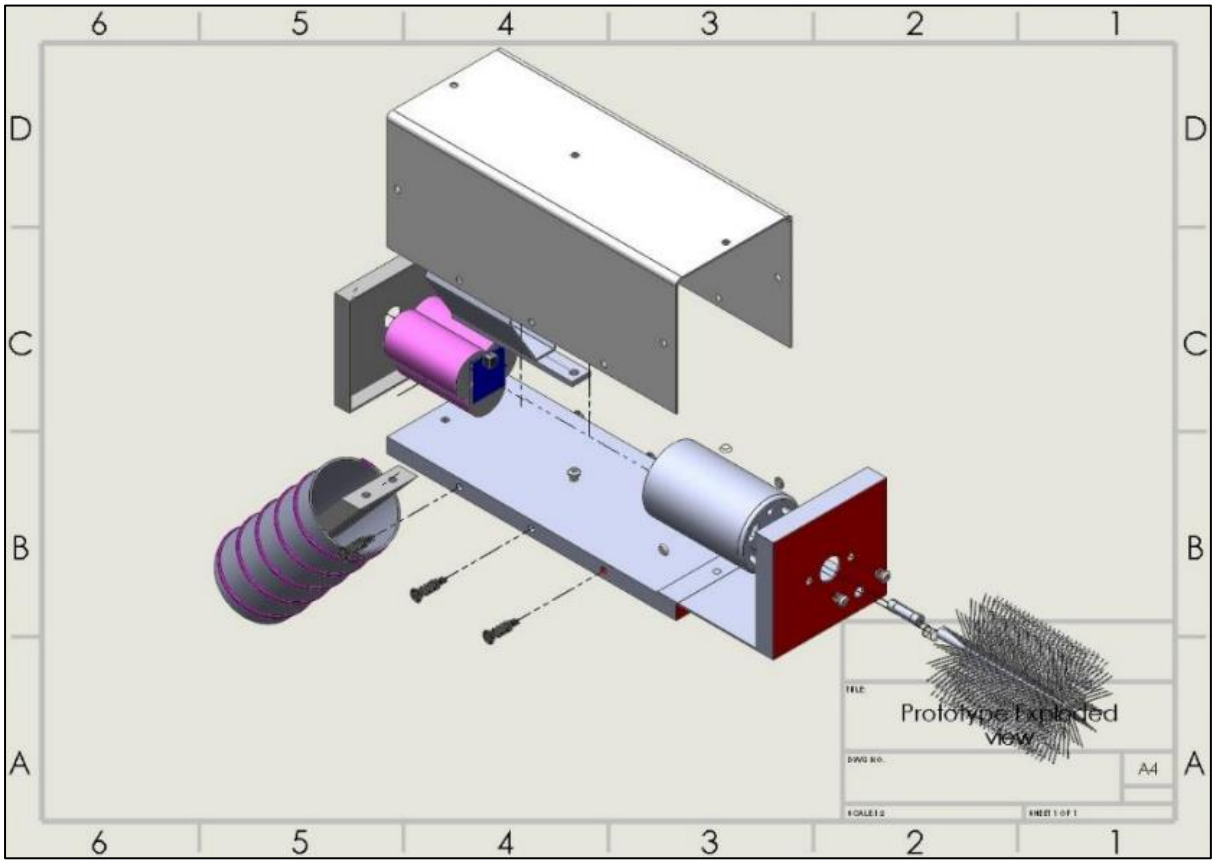
PROJECT DESCRIPTION

A small, portable mini-machine concept that cleanses any thick dirt such as stains, moss, dust and so on. People nowadays are busy with hectic work and have limited time and energy to care for hygiene. When people feel exhausted, they will procrastinate. So, I came up with this portable multipurpose cleaner. The objectives are to Design and fabricate a Multipurpose Portable cleaner. The designs are established using Solidworks software while the fabrications undergo several mechanical steps. The fabrication process took about 11 weeks and was done at the UiTM Pasir Gudang workshop every Sunday to Thursday from 12 p.m. to 6 p.m. Fabrication processes include bending, cutting, drilling, and tapping. This portable multipurpose cleaner also has a brush and coupler to assemble both with the cleaner. It also has an LED light to assist in slightly dark or less light-exposed places.

Keywords: *Multipurpose Cleaner, Mini Machine*

PROTOTYPE

DESIGN PARAMETER



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CHAPTER 80

Semi-Auto Screen-Printing Machine

Syirin Iffah Iwanjunaedhy [1] and Azizul Hakim Samsudin [2*]

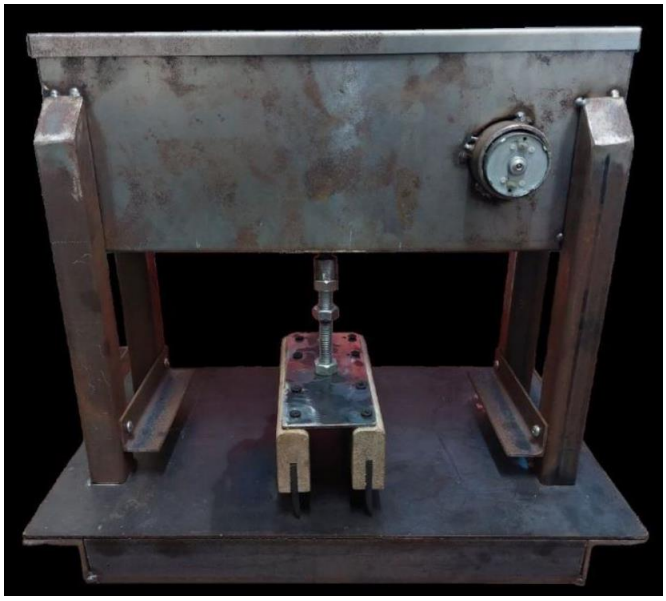
[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): azizulhakim@uitm.edu.my*

PROJECT DESCRIPTION

The semi-autonomous screen-printing machine prints any desired screen-printed item on paper or clothing in a semi-automated manner. Another problem that arose in this field of screen printing was the hand production of screen-printed objects, which slowed down the process. This happened because it takes a long time to produce screen-printed goods because human labour is needed. The extrude boss and extrude cut techniques are mostly used in the construction of this machine, and the crank and slider calculation is employed. The generation and selection of the ideas of the design will be based on Morphological approach and Pugh method. Other than that, the final selection of the design concept will undergo a simulation process (analysis on the stress, strain and deformation) using SolidWorks software. Based on the simulation results, the highest stresses experience by the design is appears on the crank and slider mechanism. Despite that, the value of stresses shows insignificant to the product and does not gave higher impact to it. In conclusion, despite its partial automation, this device facilitates the ink sliding process without requiring human labour, which speeds up the manufacture of screen-printed goods.

Keywords: *Screen Printing*

PROTOTYPE



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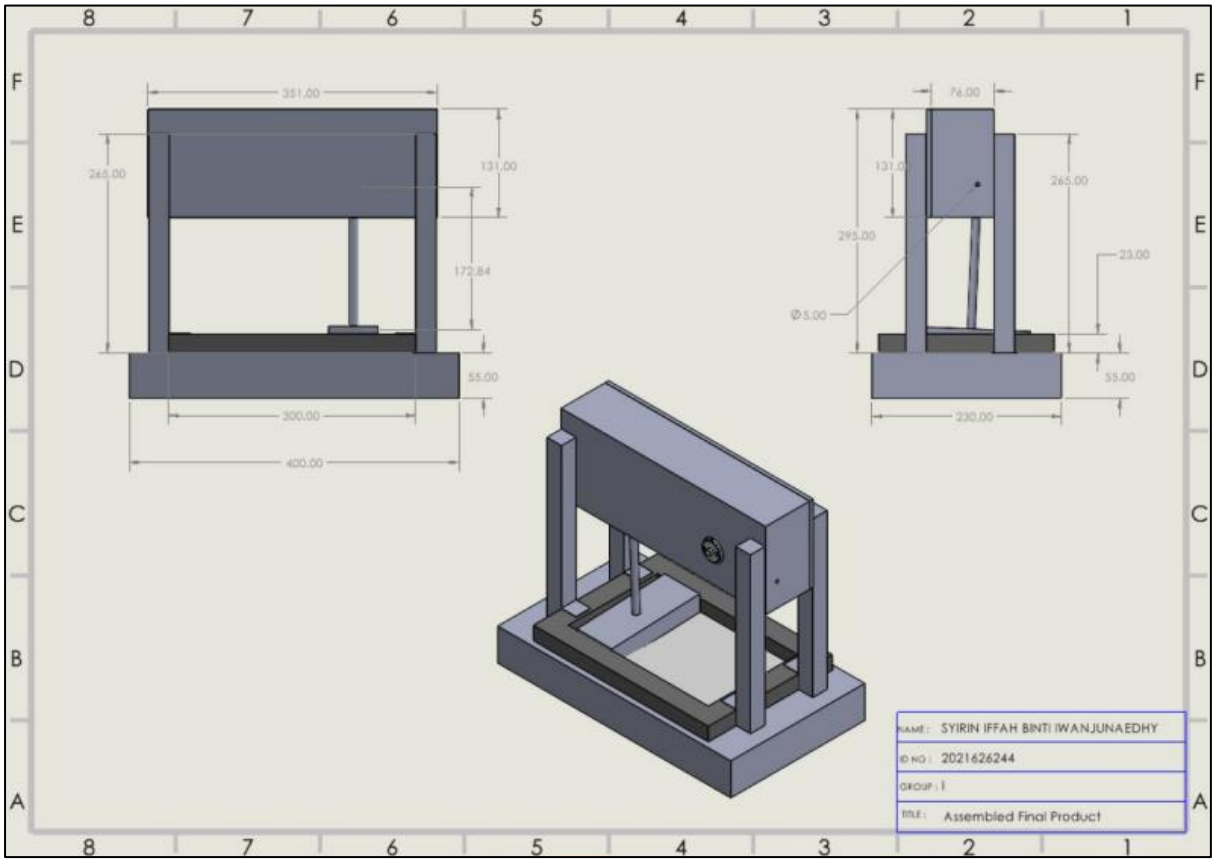

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CHAPTER 81

Development of an Educational 5-Speed Gearbox Mechanism

Muhammad Khairulamri Abd Rahman [1], Norhisyam Jenal [2*] and Siti Aishah Taib [3]

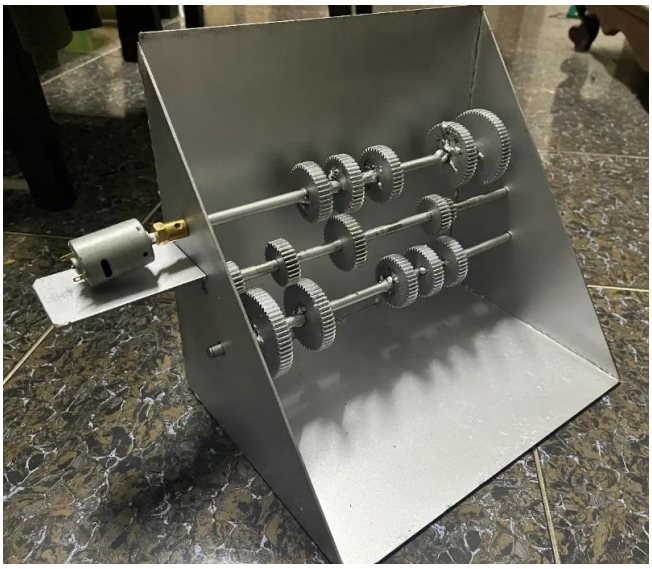
[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
[3]Academy of Language Studies, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim
**Corresponding author (e-mail): hisyam0324@uitm.edu.my*

PROJECT DESCRIPTION

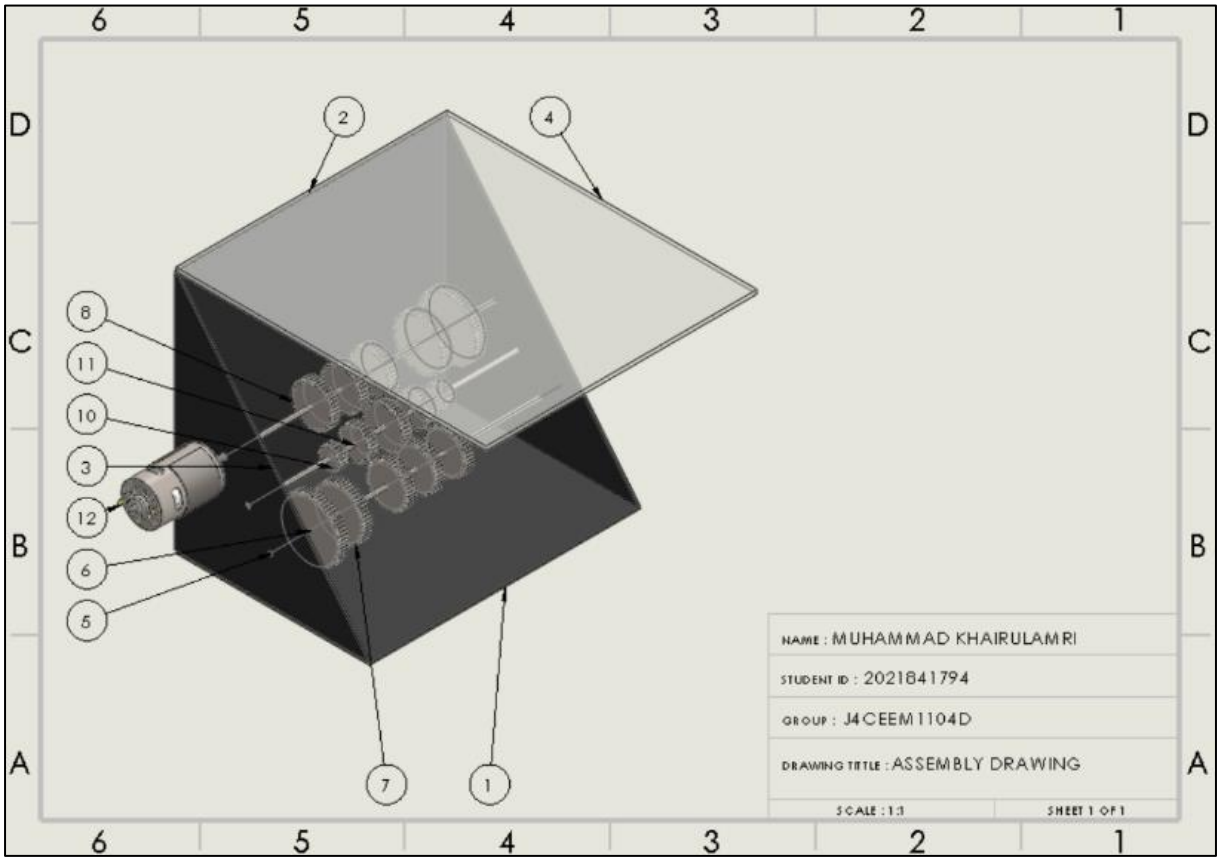
A gearbox in a car functions as a converter of power from the engine to the wheels through a series of gears. The change of gear ratios controls the amount of torque and the rotational speed of the shaft. Due to the enclosed nature, the process of gear change is not visible to others. This project focuses on the design and development of an educational gearbox mechanism. This product provides a visible gear setup that allows the students to see the gear-changing process. This product was designed using SolidWorks, and the fabrication processes such as cutting, welding, and drilling were done in-house using components available in the market. The prototype was successfully fabricated, and an electrical motor was used to run the process. This product is expected to become a useful teaching aid for teachers and students who are learning the mechanism of gear transmission.

Keywords: *Gearbox, Educational*

PROTOTYPE



DESIGN PARAMETER



e-ISBN: 978-967-0033-32-7

CHAPTER 82

Development of a Prototype Miniature Saw Machine

Muhammad Haqeem Mohd Razali [1], Norhisyam Jenal [2*] and Siti Aishah Taib [3]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
[3]Academy of Language Studies, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim
**Corresponding author (e-mail): hisyam0324@uitm.edu.my*

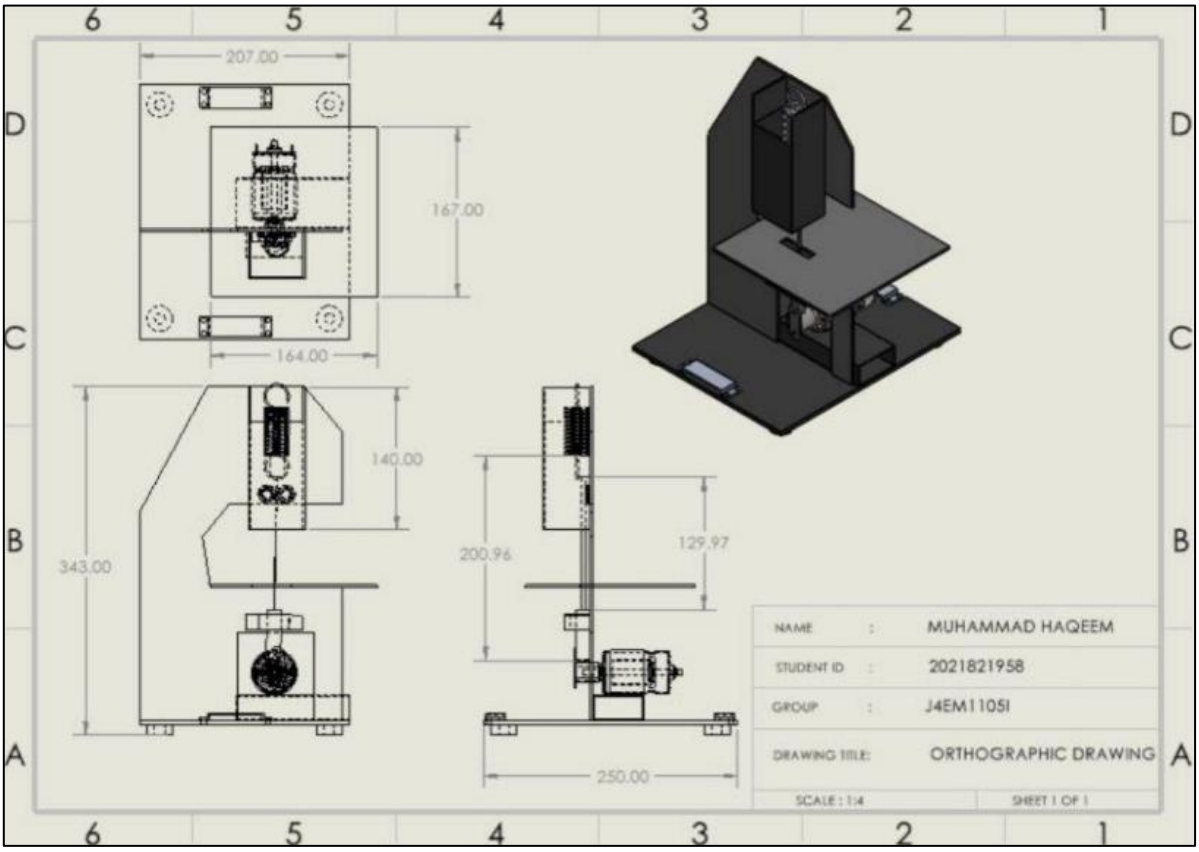
PROJECT DESCRIPTION

Cutting tools such as saws are widely used in the industry to effectively cut rods, plates, and pipes made of metal, wood, and plastic to the right size. Small industries are not capable of using automated saw machines due to the cost and the scale of the product, thus still utilizing human labor to cut materials using manual saws. The manual sawing process requires a lot of physical work and time. Converting the manual saws into affordable semi-automated saws would minimize the workload and time consumption. The objective of this project is to design and develop a prototype miniature saw machine. The technical drawing of the product was drawn using SolidWorks. The production processes involved include cutting, drilling, welding, grinding, and polishing. The product requires an electrical supply and is suitable for thin and low-density materials. The product is beneficial for students and small industries that require a simple cutting process during production.

Keywords: *Miniature, Saw*

PROTOTYPE

DESIGN PARAMETER



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CHAPTER 83

Design and Fabrication of Portable Table Saw Machine

Muhammad Syahmiredza Bin Rosli [1] and Hazim Sharudin [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): hazim@uitm.edu.my*

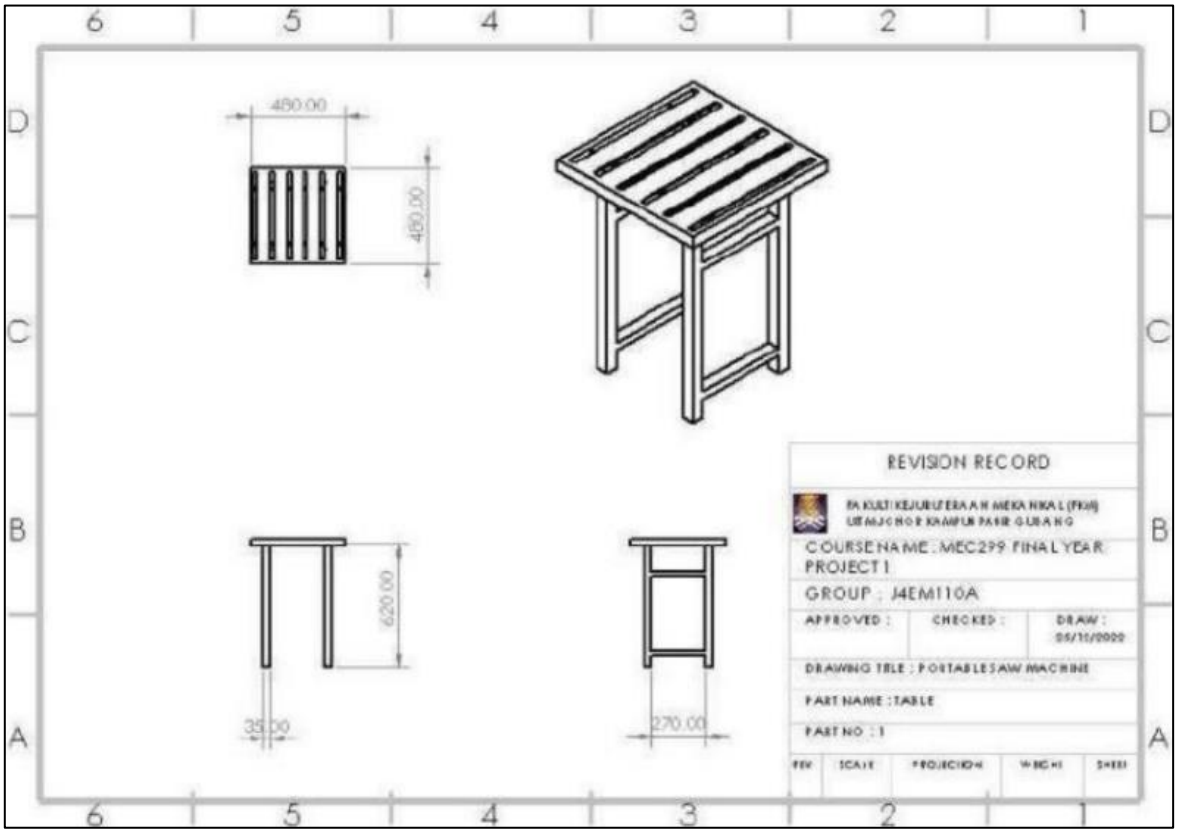
PROJECT DESCRIPTION

In today's era, machines have been developed to assist humans in completing tasks more efficiently, yet there is still room for improvement to enhance their effectiveness. However, many machines are designed for large industries, are heavy, and not easily manageable, such as modern-day table saws. Consequently, this project aims to address these limitations by designing and fabricating a portable table saw machine that resolves the issues associated with existing models. The portable table saw will prioritize user-friendliness, being lighter and more compact compared to conventional table saws, making it suitable for household usage and ensuring safety. The fabrication process will involve utilizing cutting machines to achieve the desired dimensions for the parts, followed by welding the components together and grinding the surface to ensure smoothness and safety. By undertaking this project, it seeks to demonstrate the application of acquired skills in fabricating a portable table saw. Ultimately, this project aims to make work easier for individuals and provide an efficient machine with notable improvements over existing models.

Keywords: *Portable, Table Saw Machine*

PROTOTYPE

DESIGN PARAMETER



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CHAPTER 84

Compactable Multipurpose Table Rack

Muhammad Amsyar Aiman Bin Rothman [1] and Mohd Ghazali Mohd Hamami [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): ghazali.hamami@uitm.edu.my*

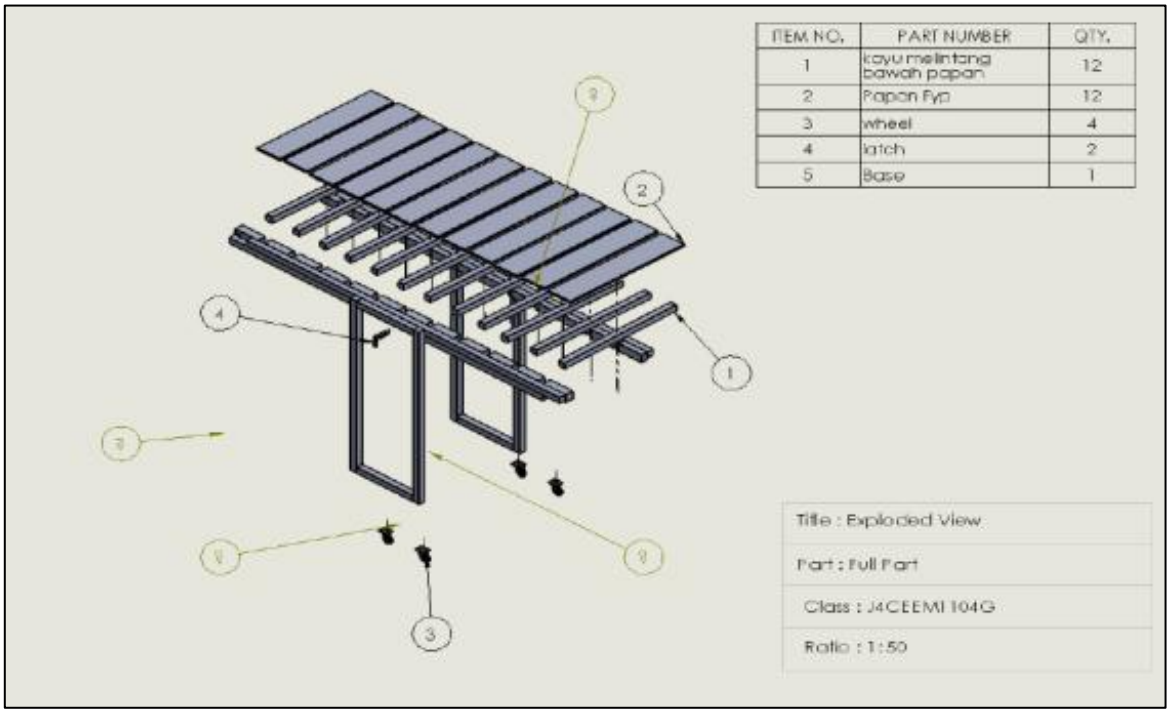
PROJECT DESCRIPTION

There are so many designs of tables nowadays. In terms of its functionality, most of the table is still stuck in a one-dimensional type of function. This project targeted to make tables more useful by not just being a table only but it also can function as a rack. The design and their base also need to be considered not too large nor not too small thus can balance between functionality and space needed. The proposed compactable multipurpose table rack can solve the limited home available space living issue. This problem becomes worse when only apartments and condominiums are the only remaining choices to buy due to the exponential increase in landed house prices. The objective of this project is to solve the limited available space living of small houses by optimizing the needed space for furniture. The compactable multipurpose table rack fabrication process is bending, cutting, welding, and other workshop processes. The basic material for this project is steel and wood. This project is less in cost, can stand more load, does not easily bend, and is very stable. In conclusion, this compactable multipurpose table rack will make everyone's quality of life better and with the good aesthetic design embedded in it.

Keywords: *Compactable, Multipurpose, Table rack*

PROTOTYPE

DESIGN PARAMETER



e-ISBN: 978-967-0033-32-7

CHAPTER 85

Development of an Automatic Easy Cutter

Razatul Aleesya binti Azrulnizam [1] and Mohd Ghazali Mohd Hamami [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): ghazali.hamami@uitm.edu.my*

PROJECT DESCRIPTION

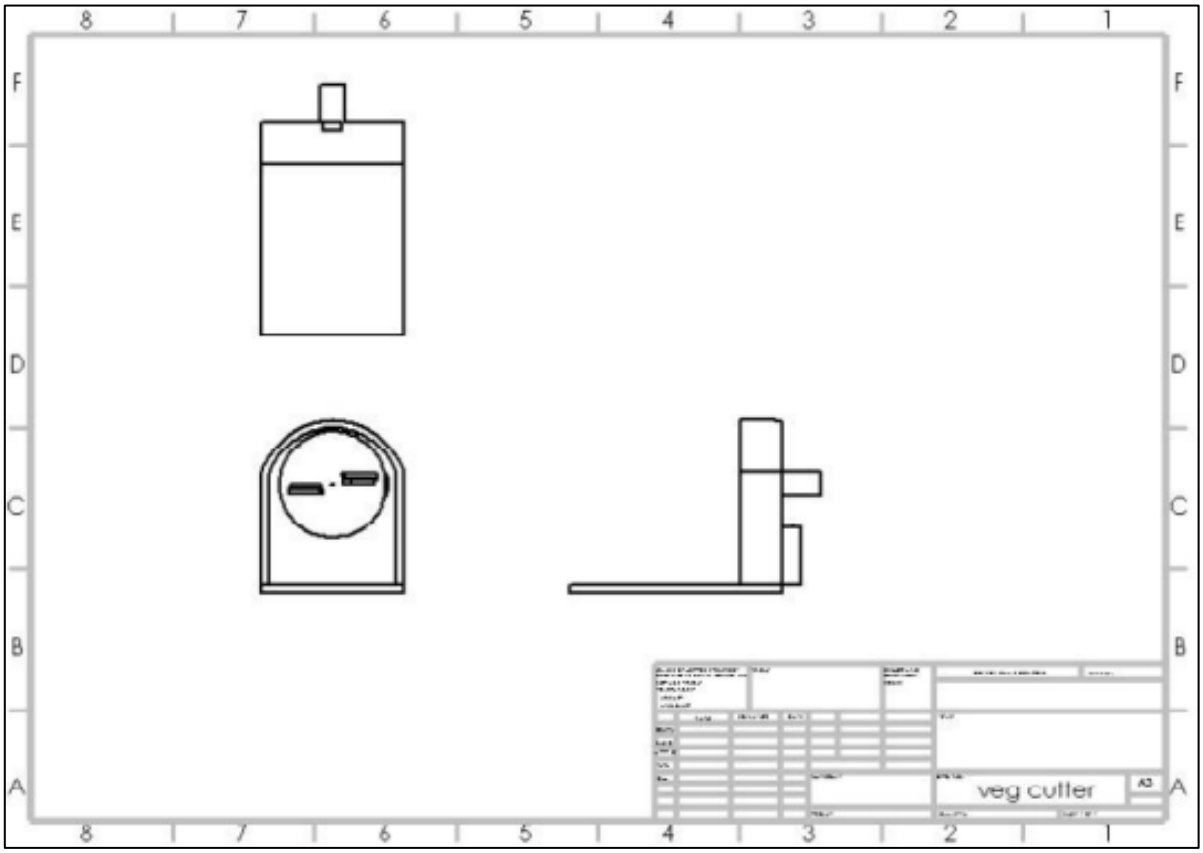
One of the important utensils in the kitchen is a cutter. The main function of the cutter is to cut vegetables or fruit from their original size to the intended size. The cutters that are available in the market mostly are manually operated and demand more energy especially when the material volume is large. Some of the available easy cutters in the market operate on the concept of rotating grind powered by AC motor. Even though this technology has the advantage over manually operated cutters, it also has disadvantages due to its expensive to buy and energy demand is high. Output to the literature review, the current food-cutting cutter also has several limitations such as contamination (hygiene matter), extensive labor, and time-consuming due to manual processing. To overcome this problem the study proposed the usage of the substantial rack and pinion power as its main automation. The mechanism of the proposed easy cutter consists of a rigidly mounted steel plate for high pressure that is installed on a container that has cutting blades at its bottom. The proposed design is able to cut all kinds of vegetables or fruits, be easy to use, and have low investment costs required.

Keywords: *Automatic Easy Cutter, Design and fabrication*

PROTOTYPE

e-ISBN: 978-967-0033-32-7

DESIGN PARAMETER



e-ISBN: 978-967-0033-32-7

CHAPTER 86

Design and Fabrication of a Plastic Waste Crusher

Muhammad Amsyar Faheem bin M. Suaree [1] and Kamariah Binti Md Isa [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): kamariahisa@uitm.edu.my*

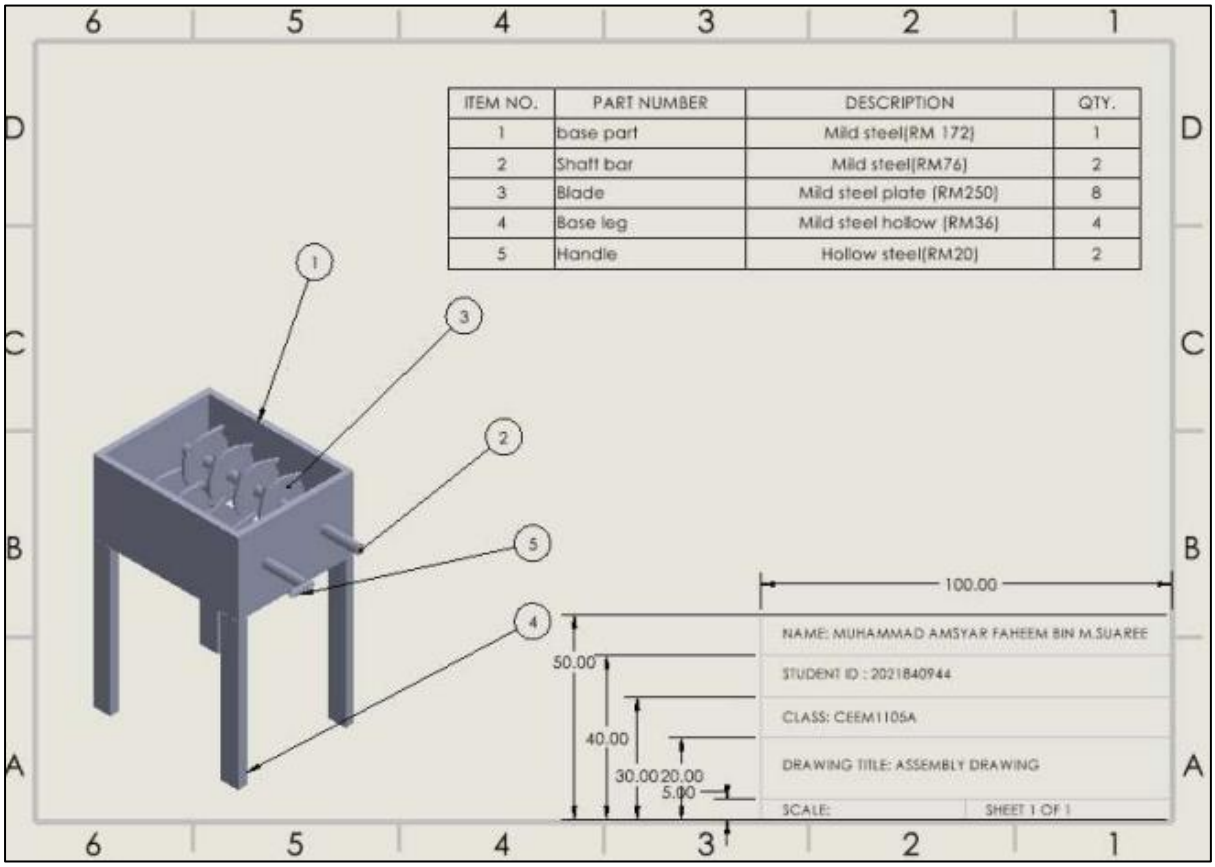
PROJECT DESCRIPTION

As many can imagine, crashing plastic is tiring and takes a lot of time. A plastic waste crusher is a machine that can helps in the process of crushing plastic waste. The crusher could crush several items such as plastic bottles where the main material for this object is plastic. In this project, a plastic waste crasher that can save more cost is proposed. The plastic waste crasher uses a spinning handle, and the user can put the plastic waste in the crashing chamber. When the spinning handle is rotated, the the plastic will be crushed into a tiny volume were . This helps in reducing the volume of plastic waste. This design required very little force to crush the plastic waste. The method of making this machine is using a lot of machining processes such as joining and welding to produce a good and strong product. In conclusion, this product will bring such a huge effect to the community and environment where it will make it easier for humans to crush the plastic waste and save the environment from plastic waste pollution.

Keywords: *plastic crusher , spindles*

PROTOTYPE

DESIGN PARAMETER



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CHAPTER 87

Design, Analysis and Fabrication of Automatic Pet Feeder

Britanny J. Meringai [1] and R. M. Aslam Raja Arif [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): rajaaslam@uitm.edu.my*

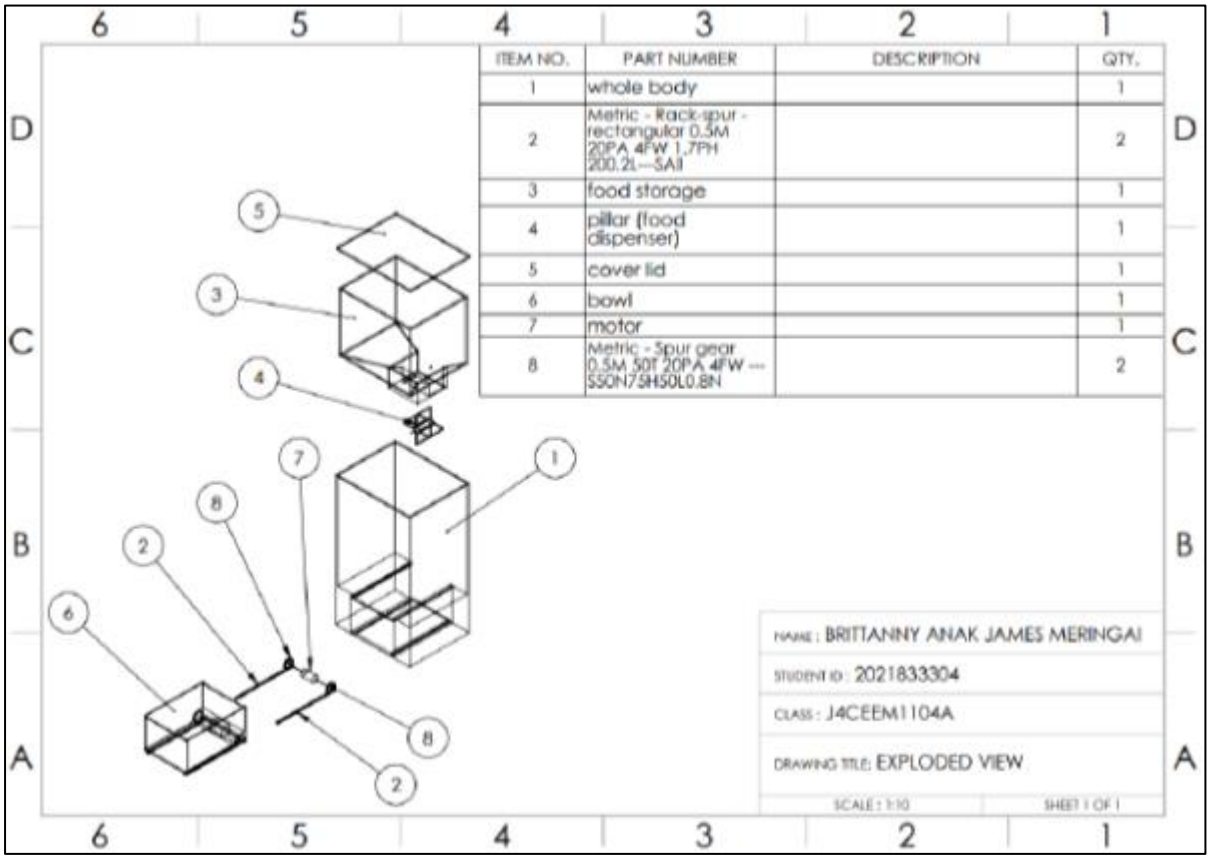
PROJECT DESCRIPTION

This project presents an innovation on the development and deployment of an automatic pet feeder system designed to provide pets with regular and consistent feeding schedules without the need for continuous human intervention. The primary objective is to enhance the quality of life for pet owners by relieving them of the responsibility of feeding their animals at predetermined intervals. The automatic pet feeder comprises a food container and a precision-engineered mechanism for dispensing the required quantity of food at specified intervals. Integrated sensors detect remaining food within the container, enabling the feeder to adjust its position to maintain cleanliness. Successful implementation requires the integration of various hardware elements, including motors, sensors, and microcontrollers, to ensure precise programming and reliable operation. The ultimate goal is to deliver an advanced and dependable automatic pet feeder that streamlines feeding routines and promotes the well-being of both pets and their owners. By providing consistent access to nutrition, the system addresses pets' nutritional needs while reducing the burden on owners. This abstract highlights the significant impact of automated pet feeding technology in revolutionizing pet care practices, fostering stronger bonds between pets and owners, and ultimately leading to happier and healthier pet households.

Keywords: *Automatic pet feeder, Pet care*

PROTOTYPE

DESIGN PARAMETER



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CHAPTER 88

Design, Analysis and Fabrication of a Portable and Low- Cost Water Filter

Muhammad Danish Fahthullah Mohamad Zaidy [1], Norjasween Abdul Malik [2] and Nurrul Amilin Zainal Abidin [3*]

[1,2,3]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): nurrul0230@uitm.edu.my*

PROJECT DESCRIPTION

Water filters play a crucial role in safeguarding human health by removing harmful contaminants from drinking water. Clean water is essential for hydration, proper bodily functions, and overall well-being. Water filters help to eliminate pollutants such as bacteria, viruses, heavy metals, and chemicals, which can cause various illnesses and health problems if consumed. By providing access to clean and safe drinking water, filters reduce the risk of waterborne diseases, improving public health outcomes and enhancing quality of life. However, existing commercially available water filtration systems often come with high cost, making them unattainable for persons and families with limited financial resources. Thus, this project aims to design, analyze and fabricate a portable and low-cost water filtration system. By using various components such as UV lights, DC Motor, coolant system, and employing design principles, the prototype water filter has demonstrated promising outcomes, delivering clean water suitable for both cooking and drinking purposes. The water filter is also equipped with a cold function, activated by switching on the red switch. The heatsink, connected to the tank, enhanced the cooling process, ensuring the water is extra cold upon dispensing. Results from product testing showed that the water filter can produce a full 3 liters tank in 3 minutes. In conclusion, the objectives of the study are archived and the development of a portable and low-cost water filtration system represents a significant advancement in addressing the critical need for clean and safe drinking water, particularly for individuals and families with limited financial resources.

Keywords: *low-cost water filter, drinking water*

PROTOTYPE

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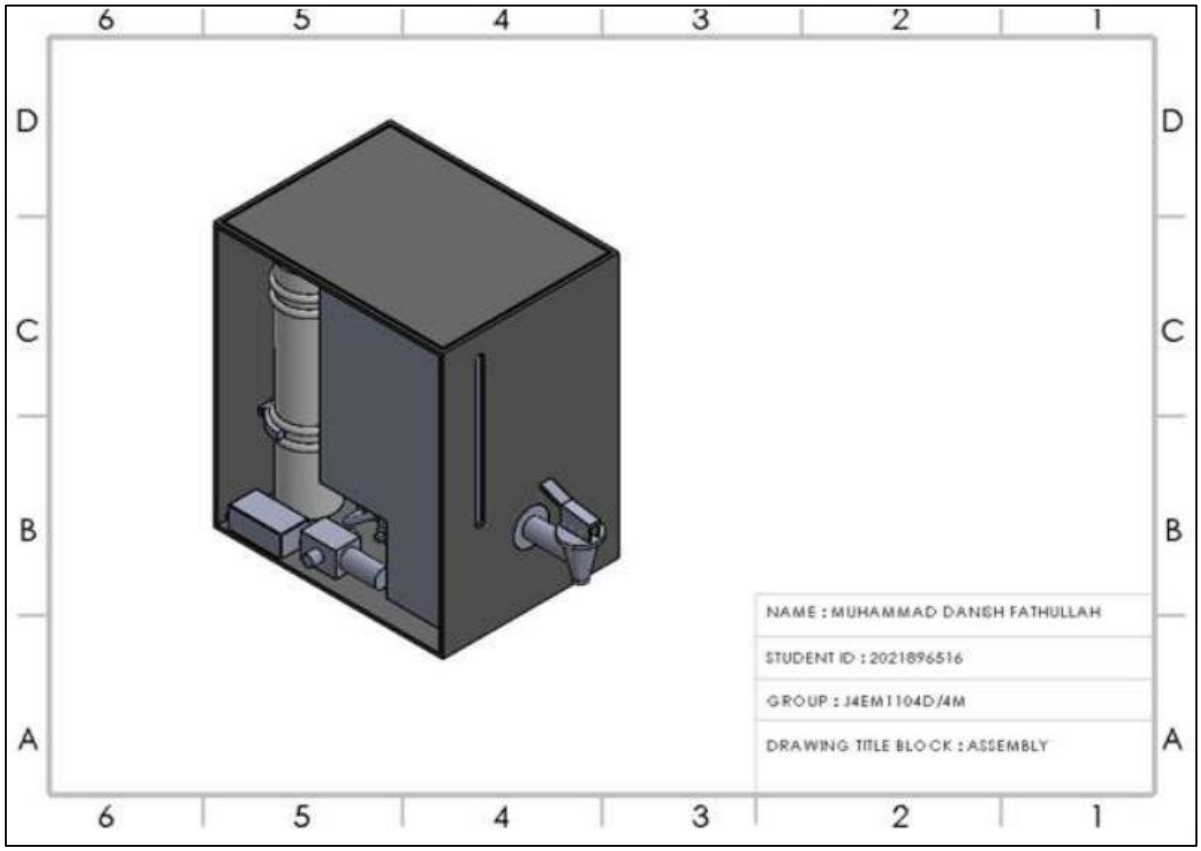
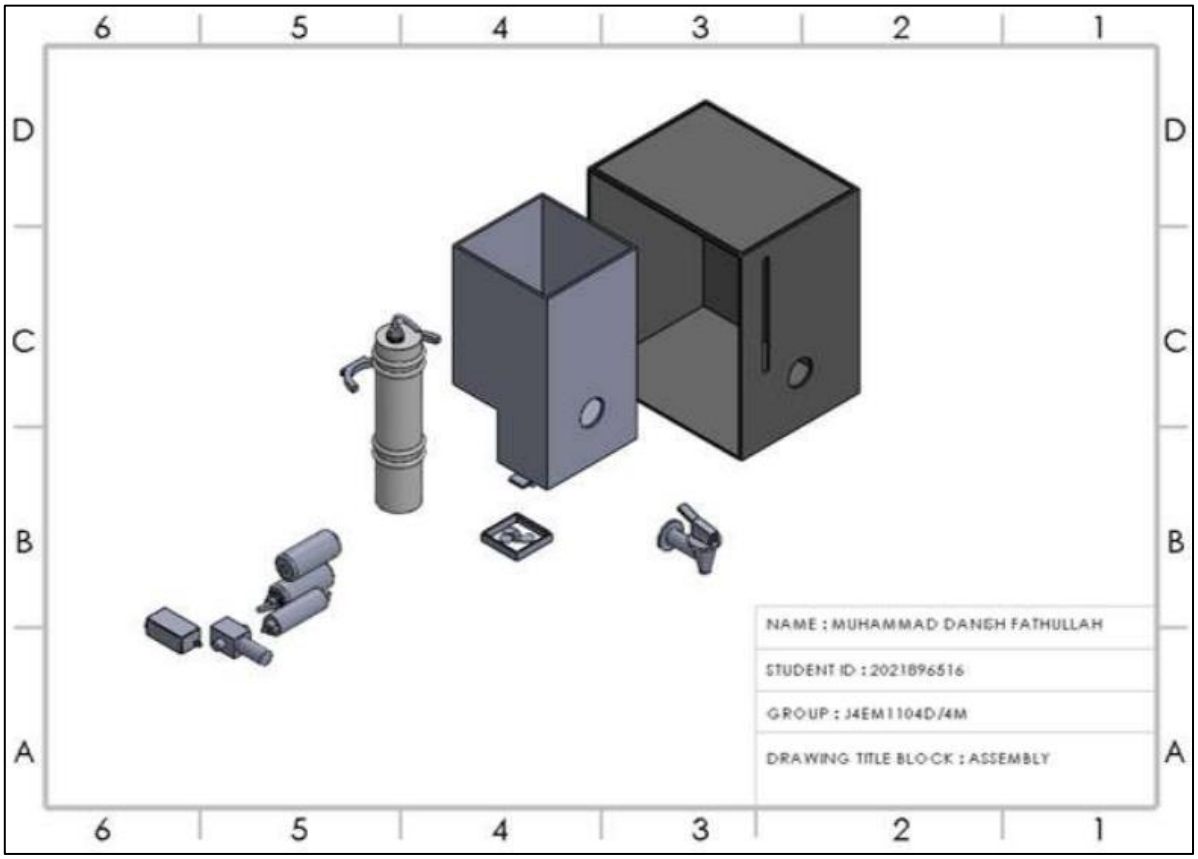




Prototype Design Collection Series 3
e-ISBN: 978-967-0033-32-7

CHAPTER 89

Design and Analysis of Automatic Self Folding Table

Muhammad Faris Naqiuddin Jusli [1] and Suhadiyana. Hanapi [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): suhadiyana@uitm.edu.my*

PROJECT DESCRIPTION

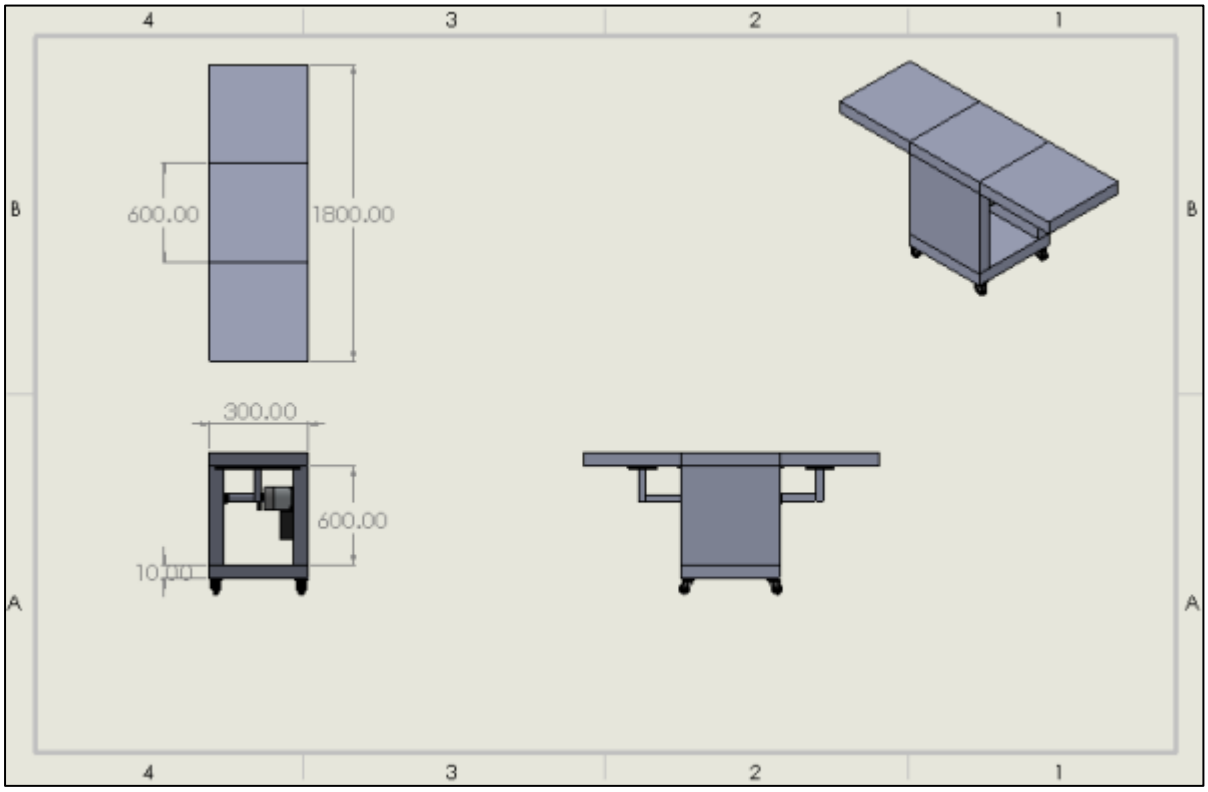
Nowadays, some people prefer the simple and practical things in their life. Tables are a staple in any room. Most of these tables are large, heavy devices. A user may not always be able to safely open or close the table, whether it be due to their age or a physical impairment. This project creates a design and prototype for a self-folding table that can automatically open and close itself to provide greater accessibility and independence for any user that wishes to set the table up or put it away. The design utilizes dual two bar mechanisms to fold the two halves of the table. The automatic self-folding table is design to be a table that are much more efficient than ordinary folding table. As such, the table is much more space efficient as it can be folded automatically. It's also ease the user as the product was design to be able to fold by itself with a touch of a button without any needs for manpower. The objective of this table is to create an affordable alternative solution for people that has small space in their house and also to reduce the requirement for manpower in restaurants industry.

Keywords: *Self Folding Table, Automatic*

PROTOTYPE

e-ISBN: 978-967-0033-32-7

DESIGN PARAMETER



e-ISBN: 978-967-0033-32-7

CHAPTER 90

Design and Fabrication of Semi-Automatic Lemang Cooker

Muhammad Norhakimi Bin Khairul Jamali [1] and Muhamad Faris Syafiq Bin Khalid [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): mfarissyafiq@uitm.edu.my*

PROJECT DESCRIPTION

Machines are a tool to help people in their daily lives. Machines make work a lot easier in terms of time, human energy, etc. This is applied to every human's daily life including industrial cooking and home cooking. For example, lemang. Lemang is a traditional dish that is cooked in a hollowed bamboo stick on the fire. The problem with lemang preparation is to cook it. One of the problems is uneven combustion because it is hard to control fire and lemang rotation at the same time. To solve these problems a semiautomatic lemang cooker has been designed and fabricated. The design and fabrication of the semi-automatic lemang cooker provides a valuable contribution to traditional cooking practices, by combining traditional methods with modern automation to enhance cooking time, evenly cooking and user friendliness. The project goes through a design process using Solidworks and fabricates using drilling, cutting, grinding, and welding process. The materials that will be used are cast iron, aluminium, can, chain etc. The outcome to this project is to design the semi-automatic lemang cooker using solidworks and to fabricate the semi-automatic lemang cooker as a proof of concept. It is concluded the expected result for this project is to cook lemang evenly, user friendly and saves space.

Keywords: *Lemang, Semi-auto*

PROTOTYPE

e-ISBN: 978-967-0033-32-7

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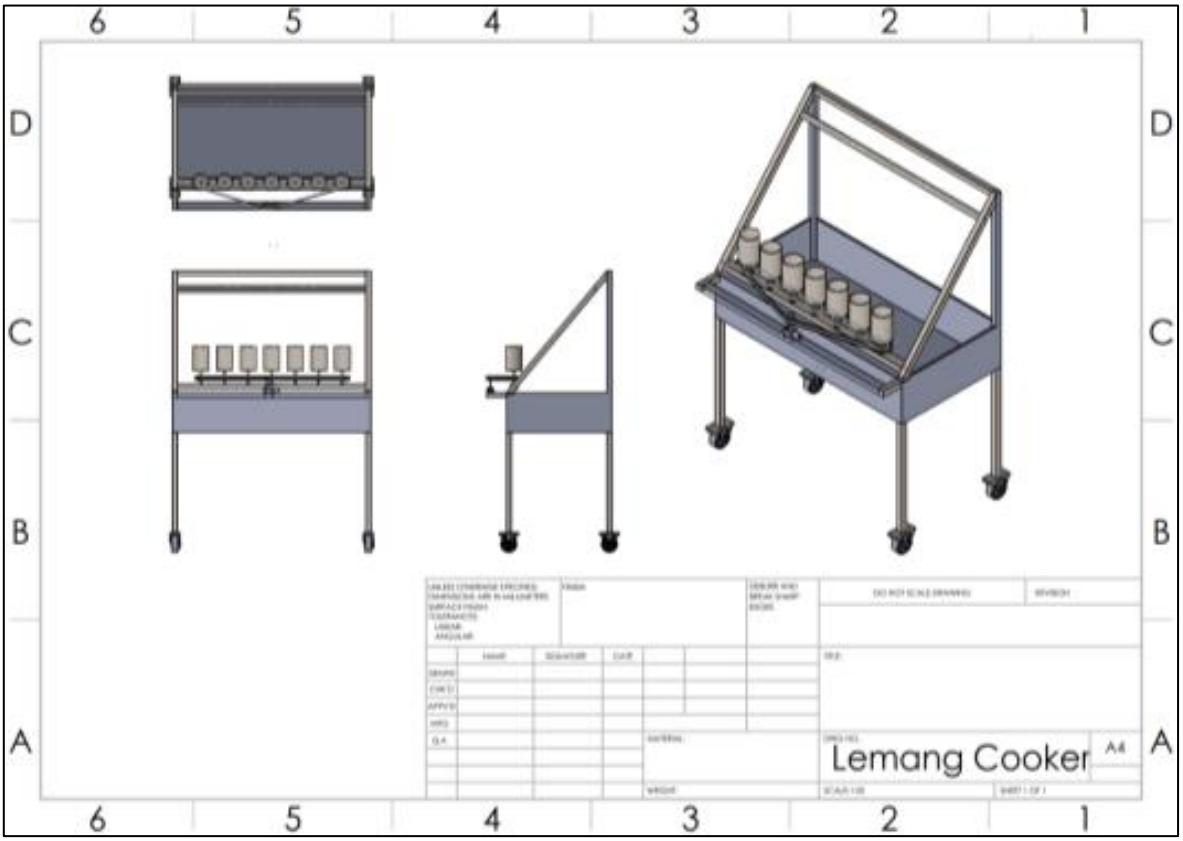

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CHAPTER 91

Automatic Pot / Wok Stirring Machine

Nurul Fatihah Binti Muhamad Miftahuddin [1] and Ahmad Faidzal Khodori [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): ahmad4727@uitm.edu.my*

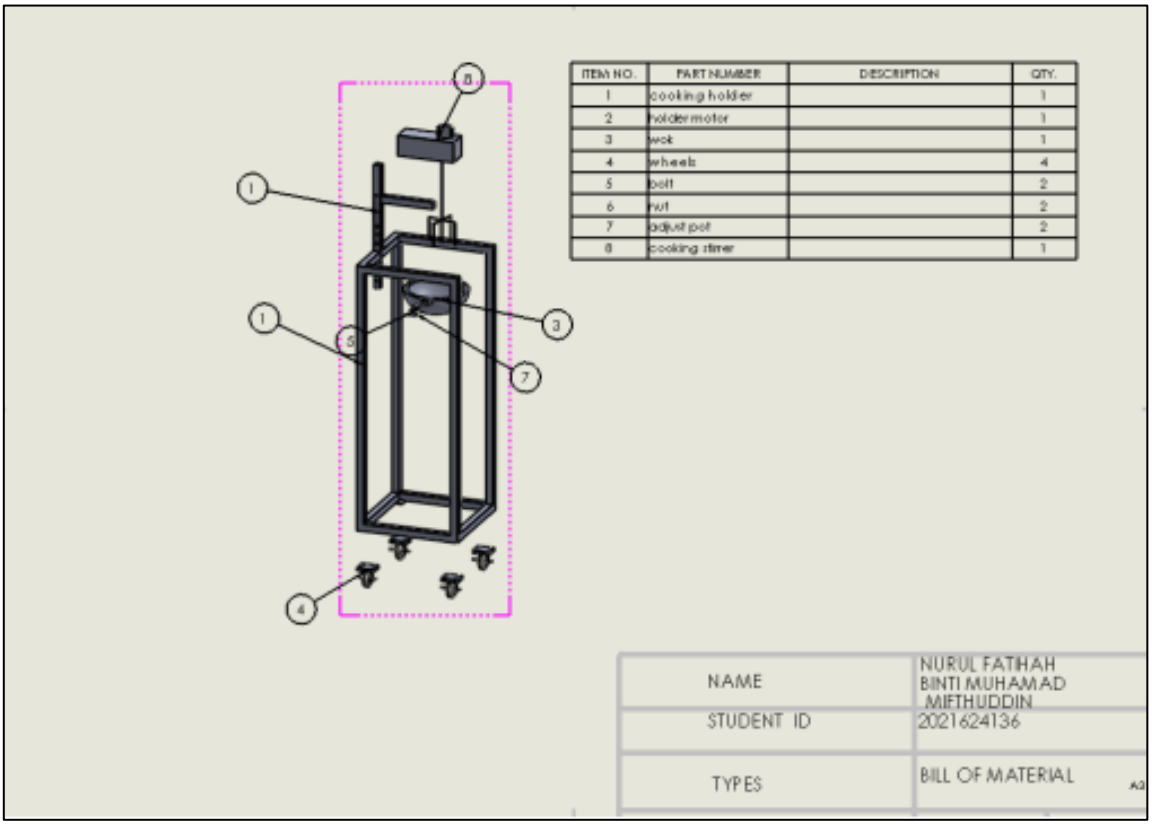
PROJECT DESCRIPTION

This project focuses on the development of a stirrer cooking machine, designed to simplify and automate the cooking process while reducing labor costs. Based on engineering calculations and analyses, the product is partially complete and ready to proceed to the fabrication phase. By assembling the resources and components that have been prepared, the project can be finalized without significant issues. The manufacturing process will verify whether the product meets the specified design requirements. The project is expected to be fully completed by the next semester, achieving all objectives. The stirrer cooking machine is intended to streamline cooking by automating tasks. Users simply select a recipe, prepare the ingredients, and the machine will stir and cook the meal, adding ingredients step by step and alerting the user when the food is ready. The machine comes pre-loaded with recipes, and the quantity of ingredients is automatically adjusted according to the recipe, making cooking faster, easier, and more efficient.

Keywords: *Wok, Stirring*

PROTOTYPE

DESIGN PARAMETER



e-ISBN: 978-967-0033-32-7

CHAPTER 92

Semi-automated Ingredients Mixer Machine

Aiman Shafiq Bin Zainudin [1], Mohd Noor Halmy Ab Latif [2*] and Norshadila Ahmad Badela [3]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
[3]Jabatan Teknologi Maklumat & Komunikasi, Politeknik Ungku Omar,
Jalan Raja Musa Mahadi 31400, Ipoh, Perak.
**Corresponding author (e-mail): halmy@uitm.edu.my*

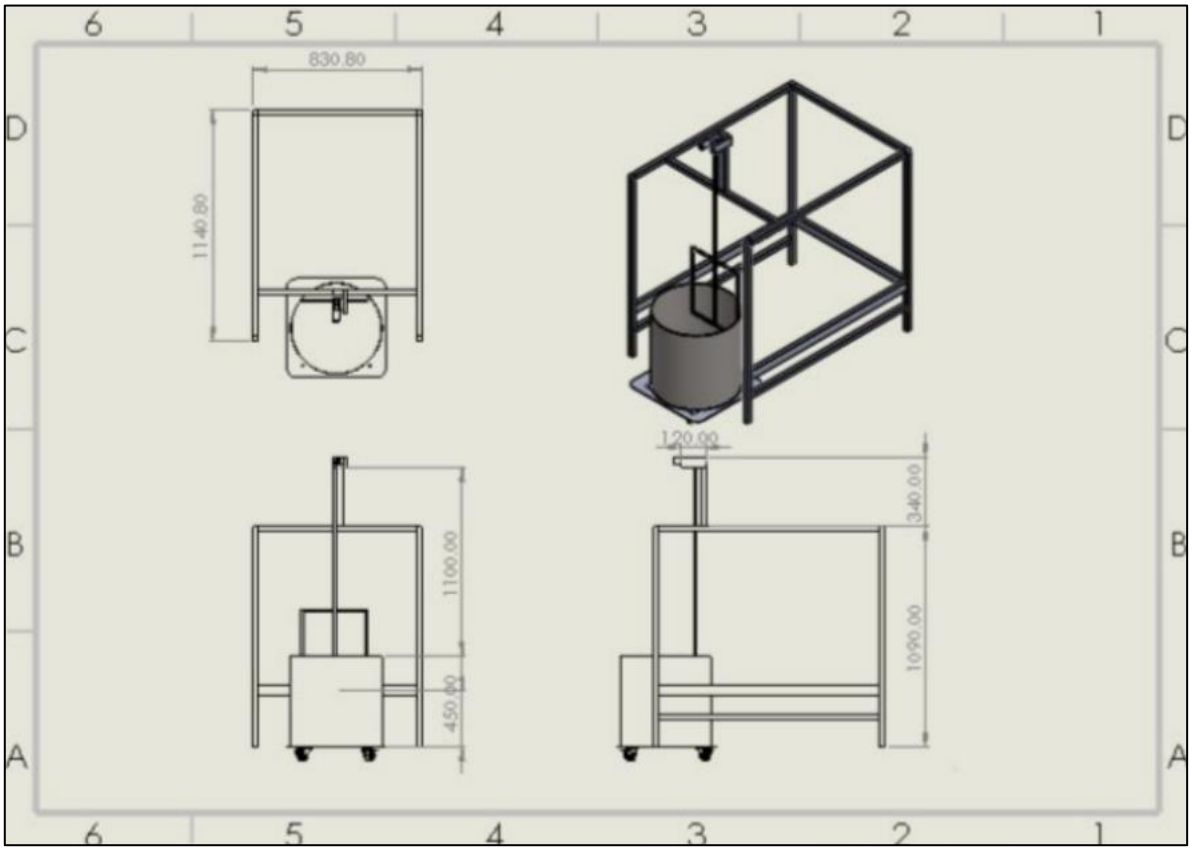
PROJECT DESCRIPTION

In the manufacturing process at Jalen Sdn. Bhd. factory, manual mixing of ingredients in a mixing bowl has led to production delays and high energy consumption. To address these issues, an Automated Ingredient Mixer Machine was developed to streamline the mixing process and reduce energy consumption. The machine was constructed using mild and stainless steel, assembled using arc welding, screws, bolts, and nuts. Design and analysis were conducted using Solidworks. A 1hp 220v motor was employed to drive the mixer. Tests showed that the machine completed the mixing process in 30 minutes, compared to 40 minutes for manual mixing. This reduction in processing time led to increased production efficiency. Additionally, the machine reduced the amount of energy consumed by the operator. Overall, the presence of the automated ingredients mixer machine has improved production processes, resulting in more efficient operations with reduced processing time and energy consumption.

Keywords: *Ingredient, Mixer*

PROTOTYPE

DESIGN PARAMETER



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CHAPTER 93

Semi-automated Ingredient Dispenser Machine

Mohamad Firdaus Danish Hazimi Bin Fahrurrazi [1], Mohd Noor Halmy Ab Latif [2*] and Norshadila Ahmad Badela [3]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
[3]Jabatan Teknologi Maklumat & Komunikasi, Politeknik Ungku Omar,
Jalan Raja Musa Mahadi 31400, Ipoh, Perak.
**Corresponding author (e-mail): halmy@uitm.edu.my*

PROJECT DESCRIPTION

Dispensing granular ingredients with precision and efficiency is a challenging task, often prone to errors and requiring significant manual effort. This paper presents the development of a semi-automated ingredient dispenser machine designed to minimize errors and reduce the need for manual intervention. The development process began with the design and analysis of the machine using Solidworks. The fabrication process involved precise measurements using a steel ruler and measuring tape, cutting using a vertical band saw and portable jig saw, and assembly using arc welding, bolts, and nuts. The machine's control system was programmed using Arduino to ensure accurate dispensing. Experimental results showed that the machine was able to measure and dispense ingredients with a maximum error of 1%, significantly reducing the margin of error compared to manual dispensing. While complete elimination of manpower was not achieved, the machine reduced the need for operators to just one, thereby improving efficiency and reducing labor costs. Future improvements could focus on further reducing the percentage of error and minimizing the need for manual intervention, ultimately enhancing the machine's usability and efficiency in dispensing granular ingredients.

Keywords: *Ingredient, Dispenser*

PROTOTYPE

e-ISBN: 978-967-0033-32-7

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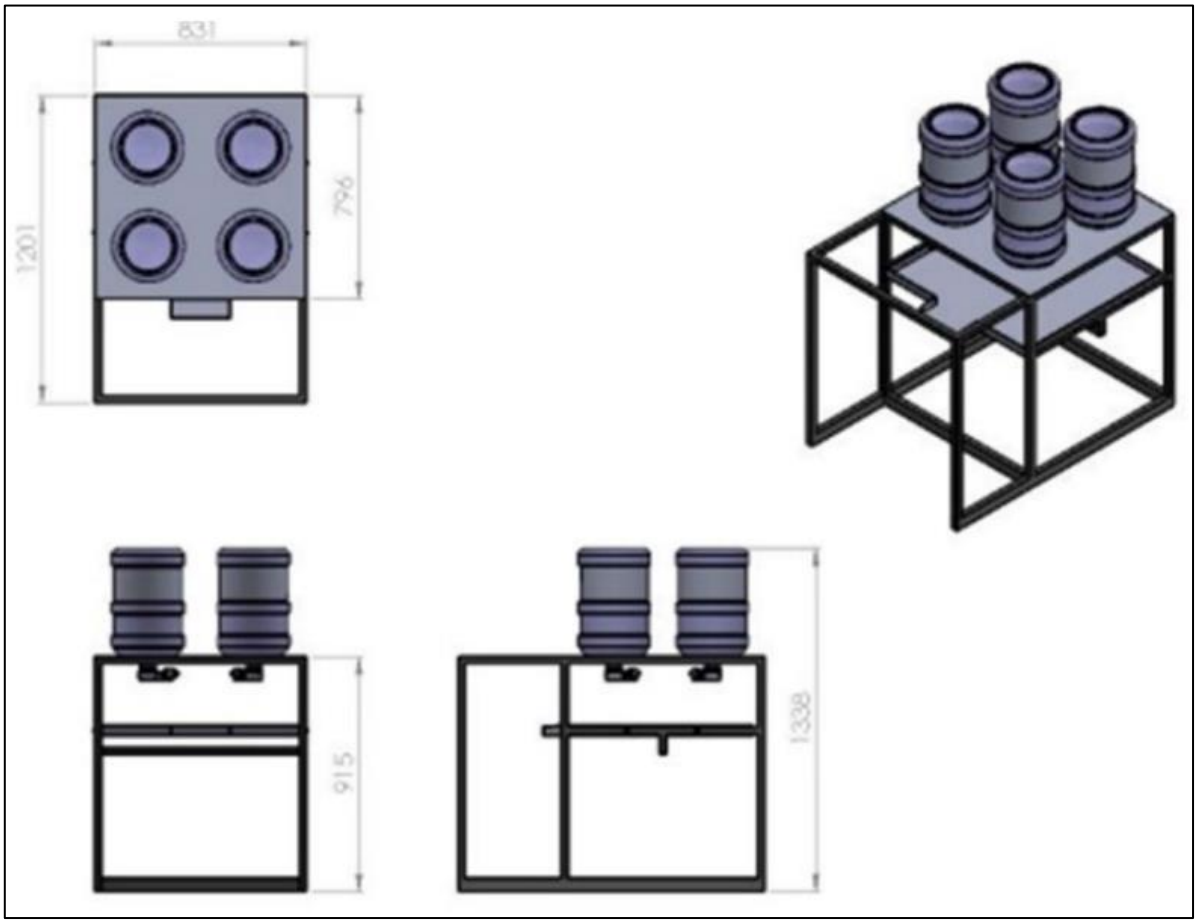


e-ISBN: 978-967-0033-32-7

CHAPTER 94

Development and Construction of an RFID-Based Automatic Pet Feeder

Muhammad Nasir Bin Azman [1] and Hazim Sharudin [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): hazim@uitm.edu.my*

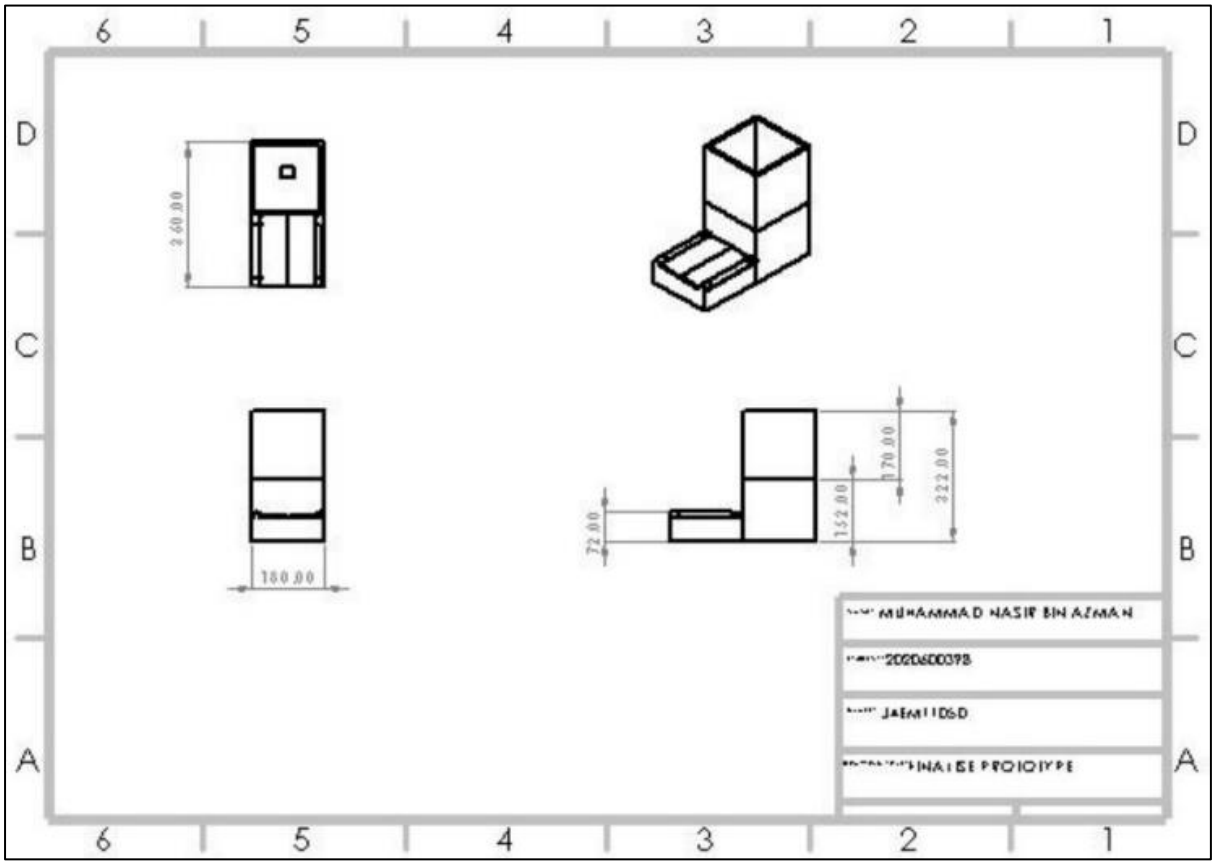
PROJECT DESCRIPTION

Statistics indicate that there were over 800 million pet owners worldwide in 2018 alone. However, pets should not pose a burden to their owners but rather serve as companions. While feeding may not always be a stressful task for pet owners on a daily basis, existing pet feeders on the market have failed to address various issues such as overeating, obesity, and providing unhealthy food options. Moreover, another concern arises from pets consuming food intended for other animals, which may contain medication. To tackle these challenges, this project focuses on examining current pet feeder technologies, particularly those utilizing Radio Frequency Identification (RFID) technology. The objective is to construct an automatic pet feeder incorporating RFID technology to address these issues. The construction of this feeder involves several key components. Firstly, the hardware design includes mechanical parts for opening and closing the food container, as well as a servo for dispensing food. Additionally, the circuit diagram encompasses a microcontroller interfaced with other components to control food dispersion upon receiving signals from the RFID system. In summary, through the development of this innovative pet feeder, the aim is to alleviate challenges faced by pet owners and achieve the project's objectives..

Keywords: *Radio Frequency Identification, Pet Feeding*

PROTOTYPE

DESIGN PARAMETER



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CHAPTER 95

Design and Fabrication of the Smart Trash Can

Muhammad Iskandar Shah Bin Zainal [1] and Hazim Sharudin [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): hazim@uitm.edu.my*

PROJECT DESCRIPTION

In recent times, mechanical engineering principles have found widespread application due to their ability to enhance human comfort and convenience. With the onset of the coronavirus crisis, adherence to government-mandated Standard Operating Procedures (SOPs) became imperative, including maintaining social distancing in public spaces and minimizing physical contact with objects. In response to these requirements, the emergence of smart trash cans has proven to be particularly beneficial as they mitigate the need for direct contact with the trash can lid. By incorporating sensors, smart trash cans can automatically open their lids, eliminating the necessity for individuals to physically interact with them. This innovative solution significantly reduces the risk of coronavirus transmission between individuals, aligning with public health guidelines and fostering a safer environment for all. In essence, the adoption of smart trash cans exemplifies the fusion of mechanical engineering with public health measures, offering practical solutions to contemporary challenges.

Keywords: *Smart Trash Can, Trash*

PROTOTYPE

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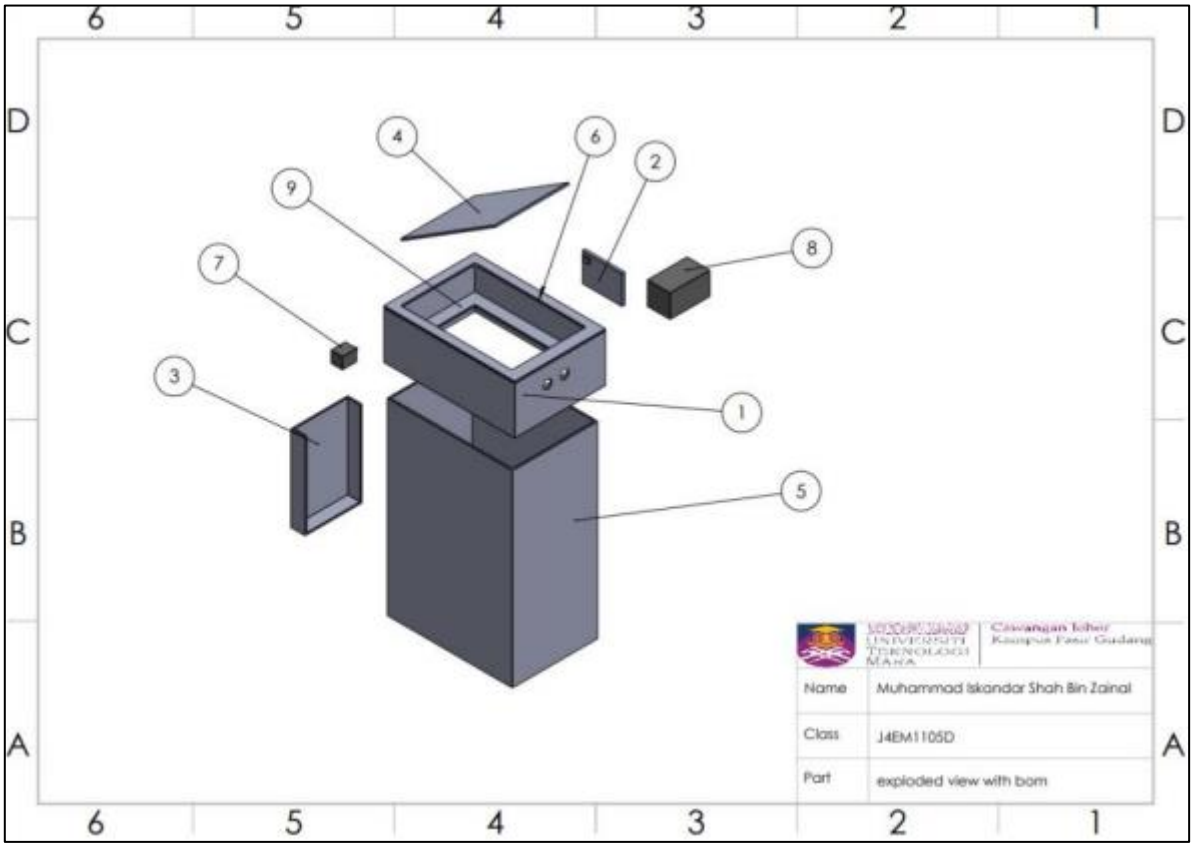
DESIGN PARAMETER



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CHAPTER 96

Design and Manufacture of an Automated Drainage Cleaning System with Anti-Drift Capability

Amir Redzuan Bin Muhammed Hakiman [1] and Hazim Sharudin [2*]

[1,2]Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.
**Corresponding author (e-mail): hazim@uitm.edu.my*

PROJECT DESCRIPTION

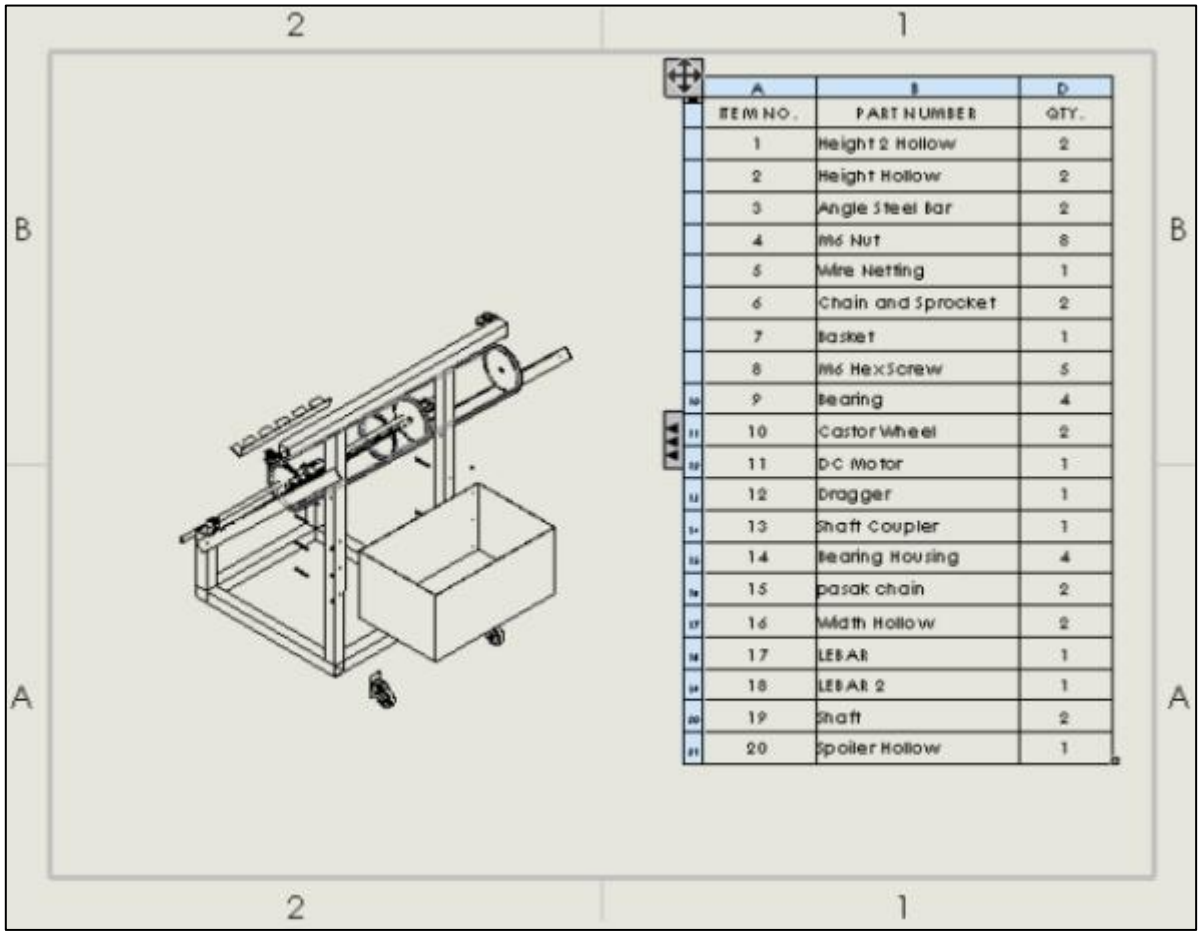
The issue of drainage system maintenance is crucial in preventing pollution and mitigating the risk of heavy floods. Traditional manual cleaning methods are often insufficient due to continuous littering and lack of awareness regarding proper waste disposal. An automated drainage cleaning system offers a solution by efficiently managing drainage maintenance without requiring human intervention. The primary goal is to minimize manpower requirements while effectively addressing the accumulation of debris in drains. Moreover, this system not only reduces the risk of workers contracting diseases associated with drain water but also enhances the efficiency of debris removal during heavy rain periods. It incorporates a vertical filter frame that allows water to pass through while trapping solid debris. A motorized shaft, connected to a chain mechanism, raises a metal teeth jaw dragger attached to the frame, lifting accumulated debris and depositing it into a designated litter box. This process repeats at predetermined intervals, ensuring consistent drainage maintenance. The implementation of this project aims to achieve its objectives seamlessly, contributing significantly to environmental cleanliness and drainage system efficiency.

Keywords: *Drainage Cleaning system, Anti-Drift Capability*

PROTOTYPE

e-ISBN: 978-967-0033-32-7

DESIGN PARAMETER



ITEM NO.	PART NUMBER	QTY.
1	Height 2 Hollow	2
2	Height Hollow	2
3	Angle Steel Bar	2
4	M6 Nut	8
5	Wire Netting	1
6	Chain and Sprocket	2
7	Basket	1
8	M6 HexScrew	5
9	Bearing	4
10	Castor Wheel	2
11	DC Motor	1
12	Dragger	1
13	Shaft Coupler	1
14	Bearing Housing	4
15	pasak chain	2
16	Width Hollow	2
17	LEBAR	1
18	LEBAR 2	1
19	Shaft	2
20	Spoiler Hollow	1

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CHAPTER 97

Automatic Potato Peeler

Suresh Nair Baskaran [1] and Azizul Hakim Samsudin [2*]

[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): azizulhakim@uitm.edu.my*

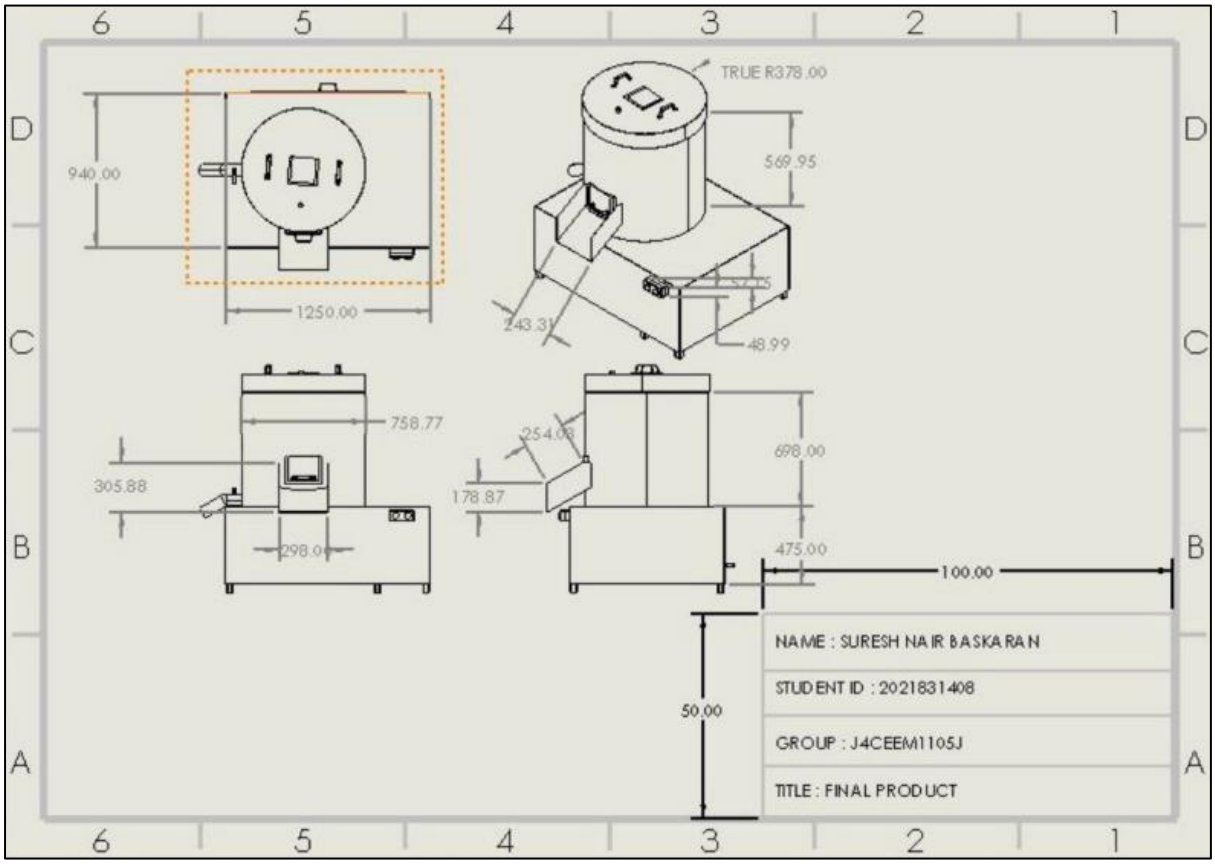
PROJECT DESCRIPTION

An automatic potato peeler is a device that can peel potatoes quickly and efficiently. The blade will rotate automatically and peel off the skin in a matter of seconds. The objective of this experiment is to design an automatic potato peeler for medium scale user. The problem statement of this project are takes up so much time and effort, peeling manually can be messy, using a knife or vegetable peeler to peel potatoes can also be dangerous. The generation and selection of the ideas of the design will be based on Morphological approach and Pugh method. Other than that, the final selection of the design concept will undergo a simulation process (analysis on the stress, strain and deformation) using SolidWorks software. Based on the simulation results, the highest stresses experience by the design is appears overall on the side wall that make it contact with the potato. Despite that, the value of stresses shows insignificant to the product and does not gave higher impact to it. The final product was able to be operated with minor modification. Therefore, it can be concluded that this study has achieved its objective.

Keywords: *Peeler,*

PROTOTYPE

DESIGN PARAMETER



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CHAPTER 98

Development and Construction of IoT-enabled Smart Farming System

Aiman Muqhriz Bin Usuloudin [1] and Hazim Sharudin [2*]

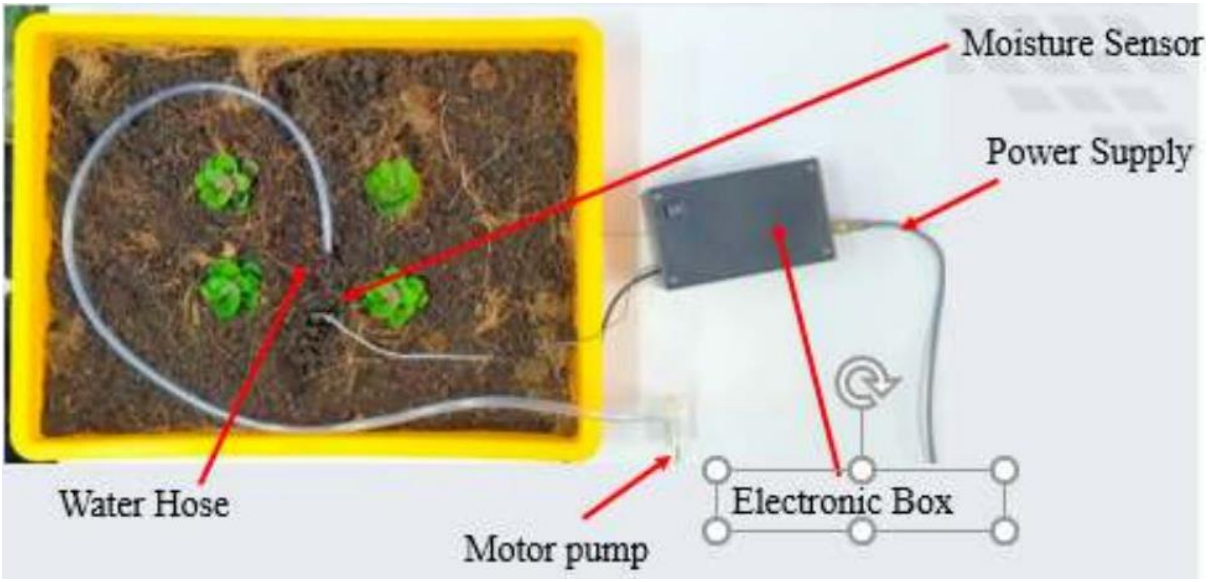
[1,2]*Mechanical Engineering Studies, College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): hazim@uitm.edu.my*

PROJECT DESCRIPTION

This project aims to enable farmers to monitor their farms remotely from anywhere, addressing challenges such as maintaining oversight of temperature, humidity, and soil pH, especially in regions like Malaysia where persistent hot weather poses additional difficulties. By utilizing sensors including temperature, pH, and soil humidity sensors, the system will gather essential data and transmit it to farmers' phones via the Arduino Internet of Things (IoT) Cloud. With this information at hand, farmers can conveniently activate the water sprinkler system from their phones, ensuring optimal plant growth. Employing a closed-loop system enhances resilience against external disturbances. Ultimately, this initiative seeks to enhance farmers' efficiency in farm management and improve the quality of their produce.

Keywords: *Smart Farming System, Water Sprinkler System*

PROTOTYPE



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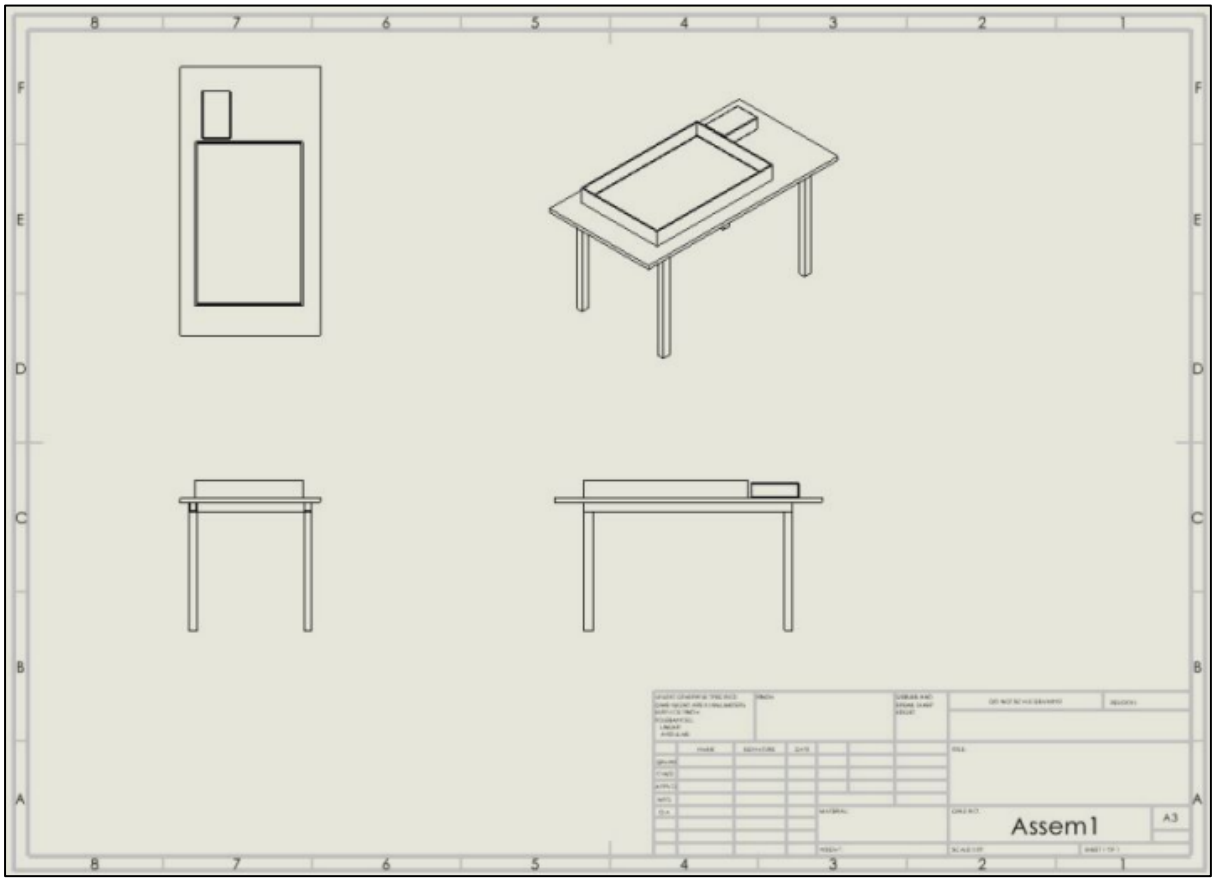

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