POLITEKNIK MALAYSIA

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MECHANICAL ENGINEERING DEPARTMENT

DJJ50193:

PROJECT 2

TITLE:

SAND FILTER & SEPARATOR MACHINE

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SESSION 1 2022/2023

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Praise and gratitude to Allah S.W.T for providing me with sufficient physical and mental power to complete my final year project up to completion. Here I express my infinite gratitude and thanks to my supervisor, Puan Suaiza Binti Khairi and Puan Nurus Sadiqin Binti Abdul Razak Khan, for their unwavering support, guidance, sharing of opinions and unfailing patience throughout the project's duration. Under their guidance, I have learned a lot, both practically and intellectually. Aside from that, I owe a debt of gratitude to my parents and all of my friends who have aided me in the implementation of this project by providing feedback.

Last but not least, we would like to express the appreciation for our group member that are always being support each other and give the cooperation for completing this project. Also, to all juries that have made valuable comment suggestions for this proposal which gave us an inspiration to improve our assignment. We thank all the people for their help directly and indirectly to complete our assignment.

ABSTRACT

This project is based on the tools that the construction worker used in site. The goal of this project is to decrease the amount of time students spend filtering manually or using existing sand filters during foundry workshop. It is powered by a power window motor that shakes the filter. Additionally, there are several study areas that have been defined for this product's use of an Internet of Things (IoT) messaging protocol that links apps with Arduino to provide output. All of them are designed to address issues that may develop, such as mechanical challenges or the need to issue an alert if the machine already done filtering. A weight sensor, transmitter, receiver, and Arduino are needed for the project materials in order to create a two-way communication between the user and the machine.

Keywords: Arduino, Foundry, Sand Filter, Internet of Things (IoT)

ABSTRAK

Projek ini adalah berdasarkan alat yang digunakan oleh pekerja di tapak pembinaan. Matlamat projek ini adalah untuk mengurangkan jumlah masa yang pelajar habiskan untuk menapis pasir secara manual atau menggunakan penapis pasir sedia ada semasa bengkel faundri. Ia dikuasakan oleh motor *power window* yang menggoncang penapis. Selain itu, terdapat beberapa kawasan kajian yang telah ditakrifkan untuk penggunaan produk ini bagi protokol pemesejan Internet of Things (IoT) yang memautkan aplikasi dengan Arduino untuk memberikan output. Kesemuanya direka bentuk untuk menangani isu yang mungkin berlaku, seperti cabaran mekanikal atau keperluan untuk memberikan amaran jika mesin sudah selesai melakukan penapisan. Penderia berat, pemancar, penerima dan Arduino diperlukan untuk bahan projek untuk mewujudkan komunikasi dua hala antara pengguna dan mesin.

Kata kunci: Arduino, Faundri, Penapis Pasir, Internet of Things (IoT)

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CHAPTER 1 INTRODUCTION

1.1 Introduction

A sand filter machine is the project that we want to undertake for our final year project. When we witnessed how difficult it was for contract employees to create sand filters on their own using wood, we had an idea. It has squandered both energy and time since the filter must be built before it can be utilised. Furthermore, sand filters consume a lot of energy since users must take the sand and deposit it on the filter nets. The filtered sand would then have to be taken again with a sand shovel, placed in a pram, and transported to a spot that required the fine sand. With that in mind, we devise a sand filter machine that uses engine power to extract the best characteristics of sand, so saving energy and time for contractor employees. Contractor personnel who utilise an existing sand filter do not acquire the beneficial characteristics of sand since the filter only has one layer of filter net. Furthermore, because the sand falls to the ground with no lining, filtered sand with current sand filters will mix with foreign items. Filtered sand may be fed into the wheelbarrow with the equipment we planned to build. Sand will not mix with foreign items in this manner, and it will also conserve energy.

The sand filters we aim to make will make it easier for contractors to do their jobs. When this sand filter machine is used, manpower may be saved. We added two wheels to this equipment to make it easier to manoeuvre about the building site. We used three different types of filter coating on this filter machine in order to acquire superior sand quality. The filter section is vibrated by the vibrator engine so that the sand may drop swiftly.

1.2 Background of Study

The purpose of this research is to come up with a novel design for a sand filter machine. Because of an issue, we are making a sand filter machine for small building construction and domestic usage. In addition, we want to achieve our aim through technical advancements based on current concepts. Explosive thoughts based on statements of difficulties gleaned from investigations on fine sand quality and workload applied. Many factors, including research, have influenced our decision to make this product our core endeavour. We develop and improve a product that can filter high-quality sand without combining it with foreign materials, hence lowering sand filtering burden. It would also have two purposes in one notion.

1.3 Problem Statement

The reason for the idea of building this sand filter is because we have seen students use their energy a lot just to get fine sand. They need to build a sand filter that needs to be made using used wood to filter the sand. From there, they waste energy as well as their own time. In addition, we realized that sand filtered using an existing sand filter would mix with impurities as the filtered sand fell directly to the ground for no apparent reason. There are many foreign objects on the construction site such as nails, iron, stone etc. Existing sand filters cannot be carried anywhere because there are no wheels. It is difficult for workers to bring fine sand to areas that need fine sand. This is because they have to put the sand into the trolley first and then bring the sand to the proper place.

1.4 Objectives

- Designing sand filter machines for foundry workshop use

  Sand filters in the workshop are few. Therefore, students have to wait their turn. This causes students to be slow in completing their projects. That is why we created a sand filter that uses a power window motor for foundry workshop use.

- To get fine sand by filtering the lumpy sand

  Our purpose in building the sand filter machine is to obtain better sand quality. This sand filter machine is fitted with a funnel into which fine sand will be poured. Following that, the fine machine will be placed in the wheelbarrow near the sand filter machine. In contrast to the standard sand filter, which causes the sand to fall to the ground. As a result, the sand will mix with the foreign objects. However, because the fine sand will fall into the wheelbarrow while using this sand filter machine, the fine sand will not be contaminated with foreign objects.

- To reduce workload by using motorized machine

  Using the traditional method, students need to find a limited sand filter to filter the sand. Moreover, there are many students in a class. So, they need to wait their turn to use the sand filter. That is why we built this sand filter machine to lessen the workload of students. Furthermore, the power window motor in this sand filter machine shakes the net. Students only need to place the sand on the sand filter machine's net.

- To get the required weight of sand by using load cell (Arduino)

  Added Internet of Things (IoT) elements to improve the sand filter machine. It will notify the user when the sand reaches the set limit through the Blynk application.

1.5 Scope

i. Can hold 1 to 20 kg of sand at a time.
ii. Shorten the time for students to filter sand during the foundry workshop.
iii. Reduces the chance of getting lumpy sand.
iv. Get precise desired weight by using weight sensor.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

One of the most crucial elements in the industrial world is sand material. Today's industries require sand products, or sand substances that have already undergone processing. Sand substances are known to include a range of different components, such as metal and mud. The sand filters we aim to make will make it easier for contractors to do their jobs. When this sand filter machine is used, manpower may be saved. We added two wheels to this equipment to make it easier to manoeuvre about the building site. We used three distinct types of filter coating on this filter machine in order to acquire superior sand quality. The filter section is vibrated by the vibrator engine so that the sand may drop swiftly.

Sand is often sieved by humans using their hands, which takes a lot of time. But as vibration motor technology advances, we now have some ideas on how to adapt this sieve sand machine. It may be overcome, and the job of the building contractor is made more comfortable with the advent of this sieve sand machine. It may also be applied to the production of moulds, particularly for sand casting. We can save more time, energy, and money by employing this sieve sand machine. It will indirectly raise the production standards. This piece of equipment has wheels, making it simple to transport and store. Additionally, even non-skilled individuals may utilise it easily. Additionally, it is simple to use, and local markets make it simple to find replacement components. The "Industri Kecil dan Sederhana (IKS)" and training facilities like Polytechnic and MARA Training Institutes (IKM) can therefore utilise this equipment for training reasons. Therefore, innovative technology is required to aid enhance productivity so that the human workforce may be reduced, and the cost of the process can be reduced.

2.2 History of Sand Filter Machine

Sand has long been regarded as the most significant element in human society. The majority of sediment, including sand, is composed of rock pieces that have been broken down by wind and rain (weathering). They often begin as bigger pieces (gravel), which break down when rivers move them downstream; the finer the particle, the farther it has travelled. In other terms, there are lots of big pieces of gravel on the banks at a river's head. Gravel gets finer as you move downstream, evolving into cobble, pebble, granule, and lastly sand before flowing into the ocean, where these sediments eventually deposit. Because of this, we can identify which formation, in fact, what sort of rock, the sand on riverbanks, beaches, and ocean bottoms originated from by carefully analysing its mineral content and chemical makeup.

The majority of sediments subduct to the Earth's mantle from a trench with a subducting tectonic plate after having originally generated in the ocean. However, some fragments break away from the whole and attach to the continental plate hanging on the wall, reassembling as a continent. Accretionary bodies are geological formations that arise in this manner (prisms). The majority of the Japanese islands are comprised of accretionary bodies, which are typical of the subduction zone like Japan. Rocks and formations undergo continuous formation and breakdown. Minerals undergo constant breakdown, modification, and even transformation into other minerals during this process. Some resistant minerals, however, simply endure these cycles without any mechanical or chemical alterations. These minerals exhibit signs of past geological processes. Geologists can deduce the earth's geological history by carefully examining these samples.

Figure 2.1 Traditional sand filter

Figure 2.1 above illustrates how the technique of sieving sand was used by people in times past. and gather the sand they sought. Depending on the size of the net that was employed, this operation separates the sand into varied sizes. This fine sand or product is typically used as the primary building material while constructing a house or other structure. To produce better-quality products, such as sandcasting or any other sand-based product, smooth sand is necessary.

2.3 Sand

Sand is composed of quartz. Sand that ranges in size from 4.75 mm to 0.15 mm is typically used to make concrete and plaster. Sand may be found in mines or rivers, according to study. Sand that was extracted from the mine is what is being mined. This sand is extensively employed and is often separated into two types: fine and rough sand. Typically, fine river sand and cement are combined with fine sand that includes minimal dirt. Despite its relatively lower strength, the combination yields a plastic that is easier to attach. For combining with concrete to create blocks and cement bricks, coarse sand works well. Research indicates that river sand is of high quality and does not have a lot of contaminants. It is more difficult to mix concrete when utilising river sand. As a result, the additives are also known as facilitators and are occasionally utilised to increase workability. If a mixer is not utilised, the mixture will require more cement to accomplish the same task. Sand collected from the seashore is not useful. The salt in the beach sand will induce a pelvic event on the surface of the structure.

Figure 2.2 Sand

2.4 Comparison of Plates

2.4.1 Steel Plate

Due to its lack of strength, this steel plate is typically utilised in the fabrication of artificial materials. Typically, this steel plate serves as the building structure's connecting material. This type of steel plate is challenging to form because of its strong steel characteristics. Additionally, the selling price of this steel plate is excellent for each individual piece.

Figure 2.3 Steel Plate

2.4.2 Aluminium Plate

Aluminium plates are sturdy and lightweight metal or sheet plates. Aluminium plates are non-flammable, weatherproof, and have anti-corrosion qualities. Since it is simple to produce, this kind of plate is frequently used in both industry and advertising. There are two sorts of aluminium in it: cast aluminium with electrical transmission capabilities and forged aluminium with tensile strength. In order to make aluminium that does not deliver electricity and can instead be heated to resist heat or to heat water, anodizing is typically performed on aluminium plates that are used as raw materials in the advertising or advertising industries. Aluminium also produces electric conductors that can deliver electricity effectively.

Figure 2.4 Aluminium Plate

2.4.3 Stainless Steel Plate

A stainless-steel plate is a type of plate that is frequently used in the automobile industry as a material for car bodybuilders and is also commonly used in domestic goods. One of the many benefits of stainless-steel plate is its great rust durability. Additionally, a lot of commercial firms combine, increase, or produce better-quality stainless steel. So, for our project, we will utilise this stainless steel.

Figure 2.5 Stainless Steel Plate

2.5 Comparisons of Wheel

2.5.1 Wheelbarrow wheel

To move this sand filter machine, we use wheelbarrow tyres as wheels. To handle the weight of the sand filter machine and make it easier for it to travel even in muddy conditions, we added as many as two wheelbarrow tyres. It is simple to fix wheels that have been damaged or that have leaks. Wheelbarrows are also quite simple to locate at any hardware store.

Figure 2.6 Wheelbarrow Wheel

2.5.2 Trolley wheel

The trolley's wheels are inadequately sized to support big weights. Uneven building zones cannot be traversed by the wheels. Additionally strong and breakable are the wheels.

Figure 2.7 Trolley Wheel

2.5.3 Bicycle tyre

On our sand filter machine, this tyre may also serve as a wheel. However, there are several elements that make them inappropriate to use as a wheel on our machine. One contributing problem is that this tire's size was excessively large. In addition, this tire's breadth makes it inappropriate for usage in construction zones. When utilised on a building site, the rubber on this is quite thin and easily leaks. This is due to the abundance of sharp materials, such as nails, stones, and other items, at the building site. Additionally, heavier loads cannot fit on the rim.

Figure 2.8 Bicycle Tyre

2.6 Frame

This sand filter machine is supported by a metal bar frame. We weld metal bars to make the frame and added four wheels for easy movement. The sand filter and vibrator motor are put on the metal bar frame.

Figure 2.9 Metal bar Frame

2.7 Power Window Motor

This power window motor used to shake the filter of this sand filter machine. This motor speed is 51 – 100 rpm.

Figure 2.10 Power Window Motor

2.8 Wire mesh

This sand filter machine uses the wire mesh with suitable size. The size of the wire mesh's particle hole not too big and not too small. So, the sand might be able to go through over the net.

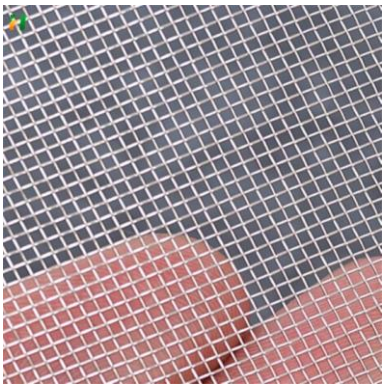


Figure 2.11 Wire Mesh

2.9 Summary

In this chapter, we talk about the history of sand, sand, and materials we will use to make our products. A careful study is made to identify the materials used to make our products appropriate into the costs we estimate. The material that we identify is affordable with the cost we spend.

CHAPTER 3 METHADOLOGY

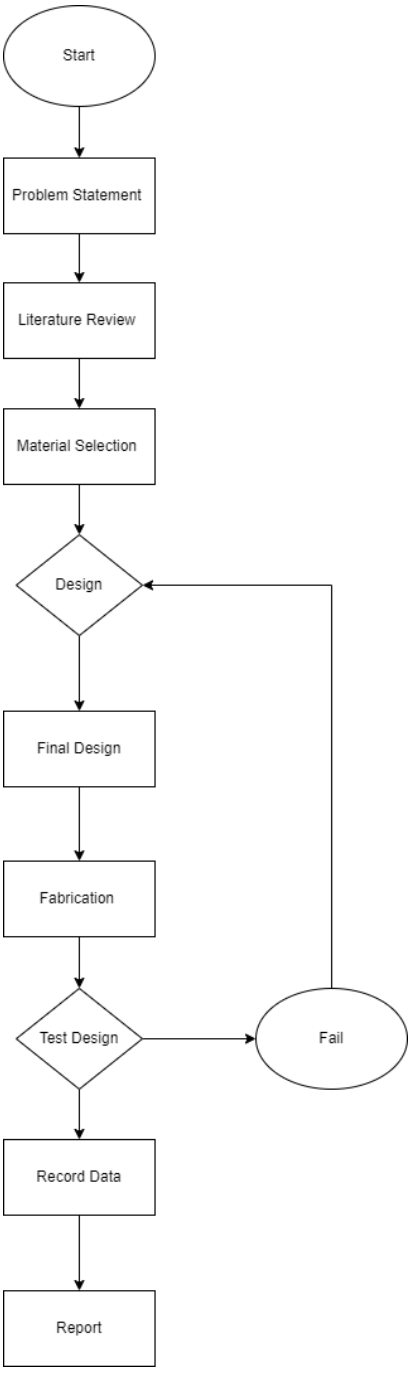
3.1 Introduction

This chapter will cover the explanation of methodology that is being used to make this a project complete and functional project. To improvise this project, many information that have been found mainly generated from this field.

Process of preparing a project that you want to make is the meaning of Methodology. One of the methods used in developing or designing a project is design method or methodology. Next, to achieve production objectives in the final project, the methodology is used to help create a creative and innovative project. Other than that, to meet the need of the user to make sand separation in a construction all aspects of the design of this machine are takes into consideration. The design that already we have created is quite easy to operate. In addition, the design of the "Modern Sand Filter" project tool is also easy to understand because it has its own basic parts. The size and balance of this project have also been considered to facilitate the learning session.

3.2 Flowchart for Project Planning

The process for the success of this project is shown in the diagram. In addition, there are also several steps to be taken as well should be followed in implementing this project. The step is as shown in figure. From the charts of this flow, the activity record for the success of this project can be done smoothly and consistently.



3.3 Design Process

The inventive process is part of the work which needs to be done to create a new project or modifications to a project or better known as process improvements. Some of the necessary steps done in the inventive process are:

I. Identifying problems.

II. Creating ideas

III. Design and selection of projects.

IV. Project planning

3.3.1 Project Selection

In the process of project selection, criteria and certain factors should be emphasized in terms of selection of materials, costs, and security. The material used must match with the product generated.

3.3.2 Project Planning

The process of forming the appropriate framework and manufacturing techniques as well need careful planning and planning because of its structural to be made in line with the product among which review the requirements appropriate equipment and materials, material selection of the economy, and quality and user-friendly. To plan a project-making process this requires a neat plan to be able to conform to what is required in addition to saving costs so there is no available a faulty execution or purchase of excessive equipment implementation of this project.

3.4 Research Design

3.4.1 First Design

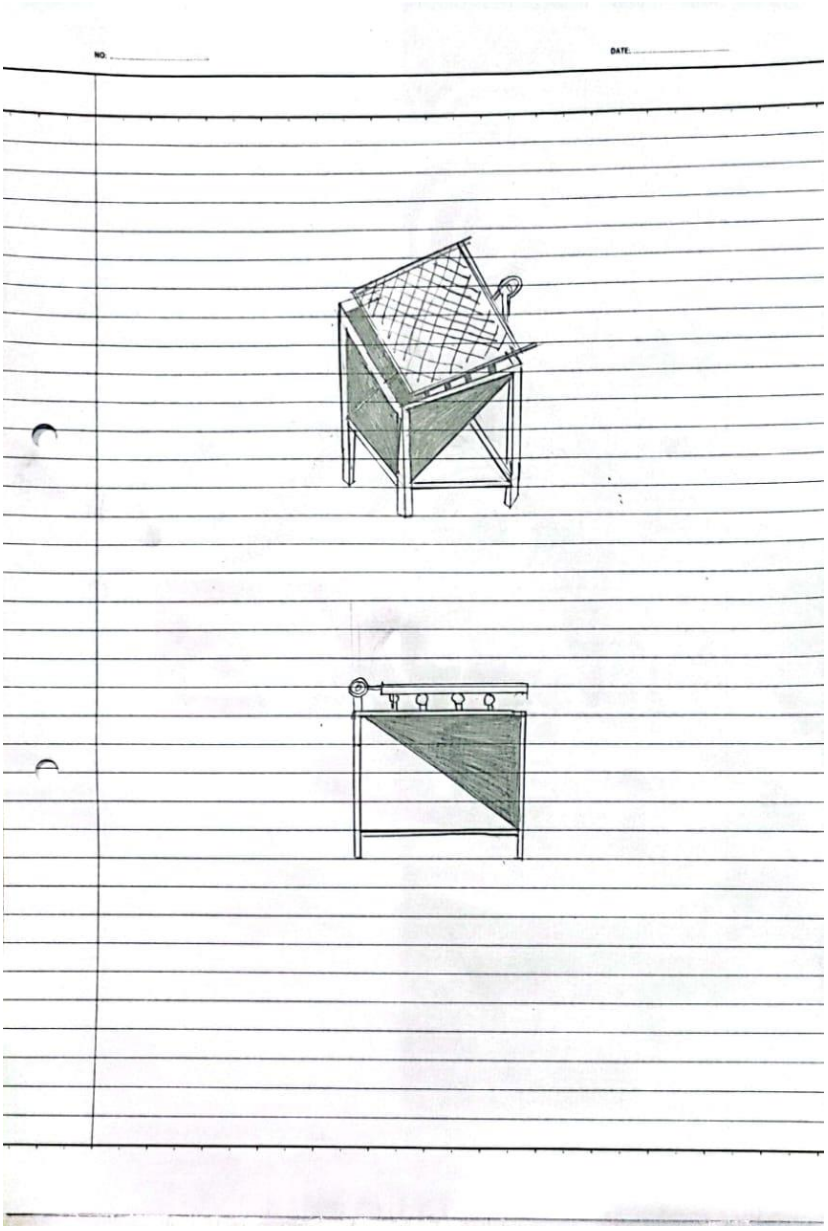


Figure 3.1 First Design

This is the first design of our project. But after having a discussion with our supervisor, this design is irrelevant to being created because it is difficult to filter for sand.

3.4.2 Second Design

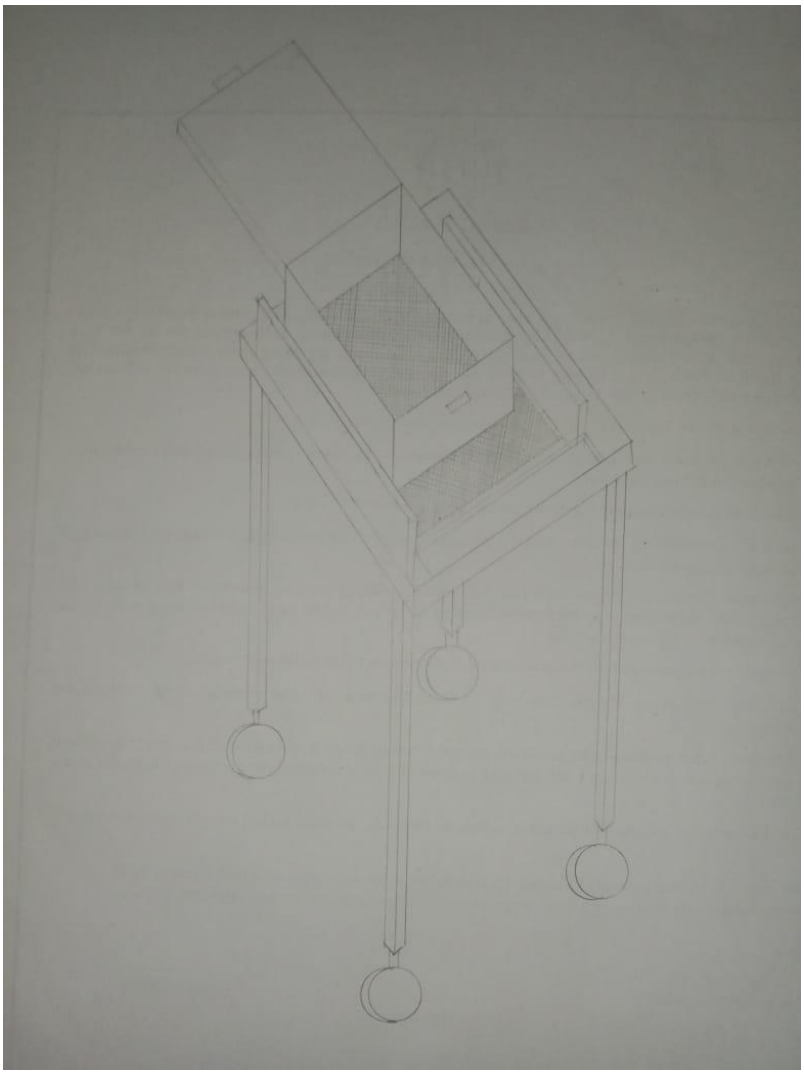
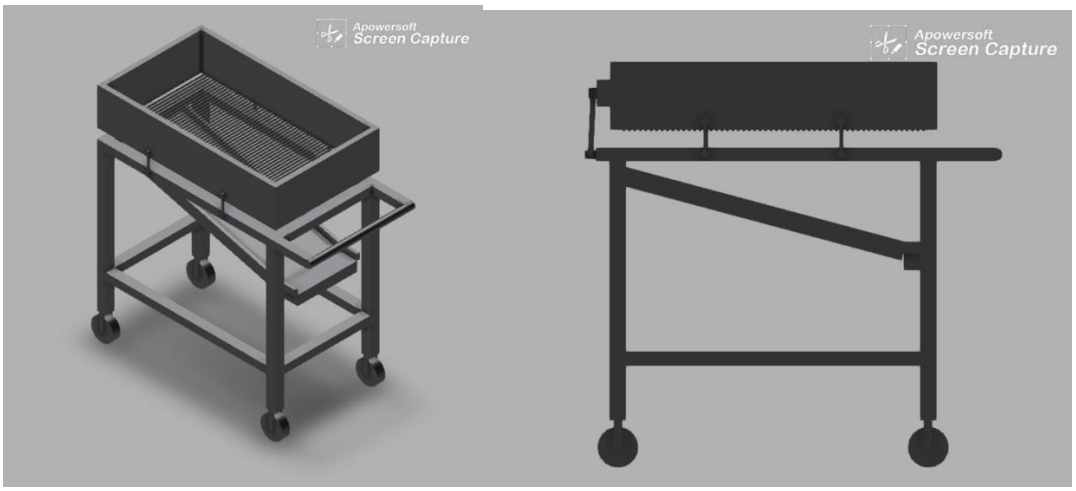


Figure 3.2 Second Design

This is the second design for our project. There have been improvements made for this second design. But once we reviewed it, we looked at it more thoroughly and all the discussions had been made, we decided to create another design for our project.

3.4.3 Third Design



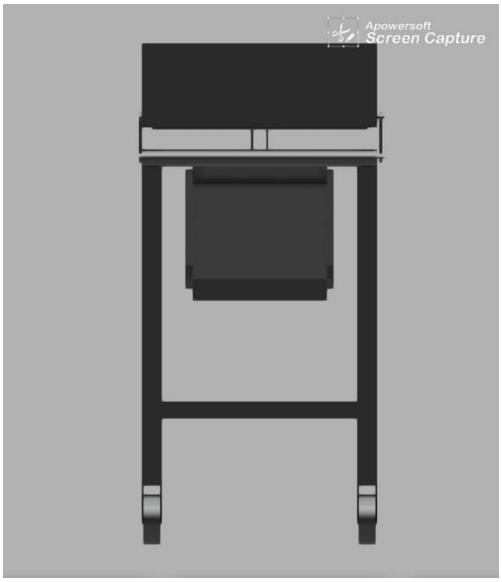


Figure 3.3 Third Design

We have decided that we will used the third design as our last design. Based on our discussion with each other and our supervisor, we make decision that we will take this design as our last design.

3.5 Block Diagram of the Project

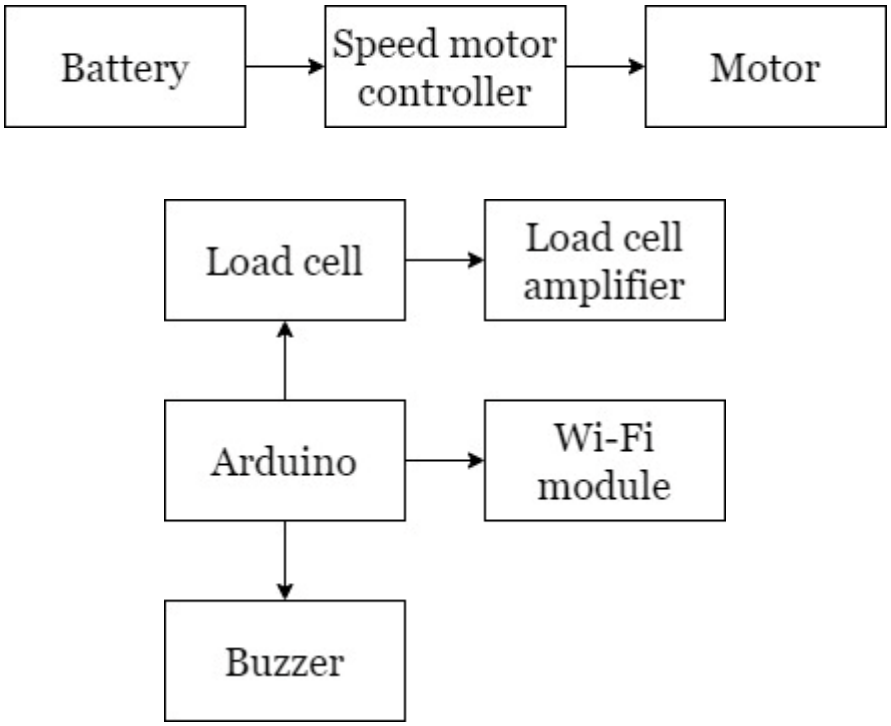


Figure 3.4 Block diagram of the Sand Filter machine

The operation of the Sand Filter machine is using the power window as power supply to start the motor. Firstly, set the desired weight using Blynk application. The limit of the sand weight is between one kilogram to 20 kilogram. Next, it is connecting to Arduino Uno as a centre of progression, it will transfer to the Wi-Fi module and the load cell. When the weight reached the limit, the buzzer will set off and a notification will be sent through the phone.

3.6 Flowchart of the Project

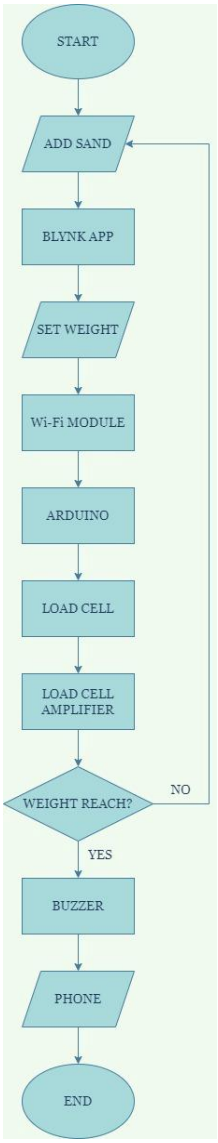


Figure 3.5 Flowchart of the Sand Filter machine

The operation of the flow chart for the machine starts with the load cell detect the weight of sand that have produced. When the produced sand do not meet the limit, a notification will be sent through the phone (Blynk application) and the user needs to add more sand to restart the operation.

3.7 Schematic Circuit

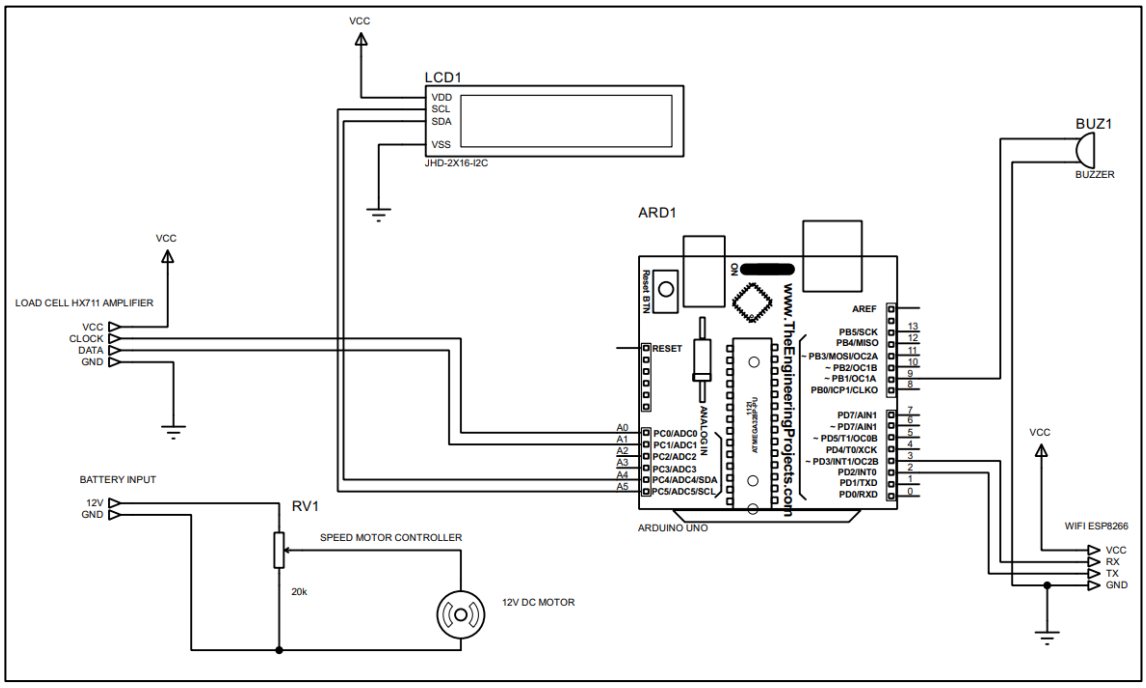


Figure 3.6 Schematic Circuit Diagram

3.8 Components for Hardware

3.8.1 Arduino Uno

Figure 3.7 Arduino Uno

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

3.8.2 ESP-01 Wi-Fi Module

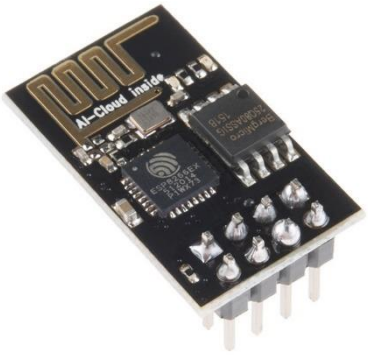


Figure 3.8 ESP-01 Wi-Fi Module

The ESP-01 Wi-Fi module is a self-contained SOC with integrated TCP/IP protocol stack that give any microcontroller access to Wi-Fi network. The ESP-01 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

3.8.3 Load Cell

Figure 3.9 Load cell

The load cell converts a force such as tension, compression, pressure, or torque into an electrical signal that can be measured and standardized. It is a force transducer. As the force applied to the load cell increases, the electrical signal changes proportionally. The most common types of load cell are pneumatic, hydraulic, and strain gauges.

3.8.4 Load Cell Amplifier

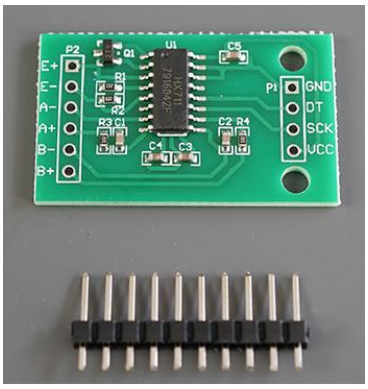


Figure 4.0 Load Cell Amplifier

The HX711 amplifier is a breakout board that allows you to easily read load cells to measure weight.

3.8.5 Liquid-Crystal Display (LCD)

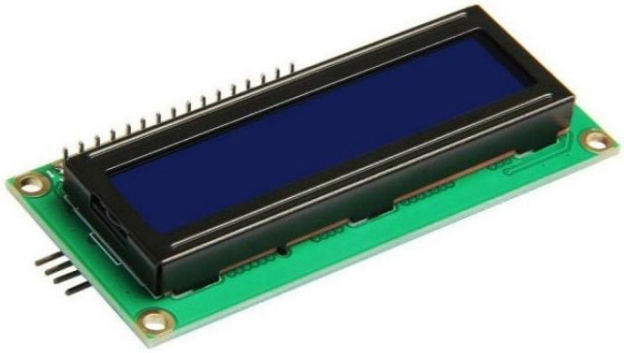


Figure 4.1 I2C 1602 Serial LCD

The LCD (Liquid Crystal Display) is a type of display that uses the liquid crystals for its operation.

3.8.6 Buzzer

Figure 4.2 Buzzer

A buzzer is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric.

3.8.7 12-Volt Battery

Figure 4.3 12-Volt Battery

Provide an electric current to the electric-powered starting motor, which in turn starts the chemically powered internal combustion engine.

3.8.8 Speed Motor Controller

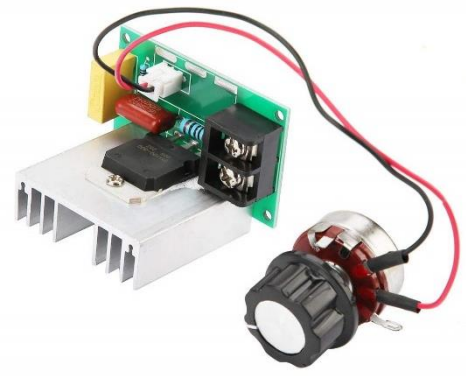


Figure 4.4 Speed Motor Controller

Speed control of a motor is either done manually by the operator or by means of an automatic control device.

3.8.9 Switch

Figure 4.5 Switch

The switch is an electrical component that can disconnect or connect the conducting path in an electrical circuit, interrupting the electric current or diverting it from one conductor to another.

3.8.10 Soldering Iron

Figure 4.6 Soldering Iron

A soldering iron is a hand tool that used in the soldering process. It supplies heat to melt solder so that it can flow into the joint between two work piece.

3.8.11 Solder

Figure 4.7 Solder

Solder is a fusible metal alloy used to create a permanent bond between metal workpieces. Solder is melted in order to wet the parts of the joint, where it adheres to and connects the pieces after cooling.

3.8.12 Jumper Wires

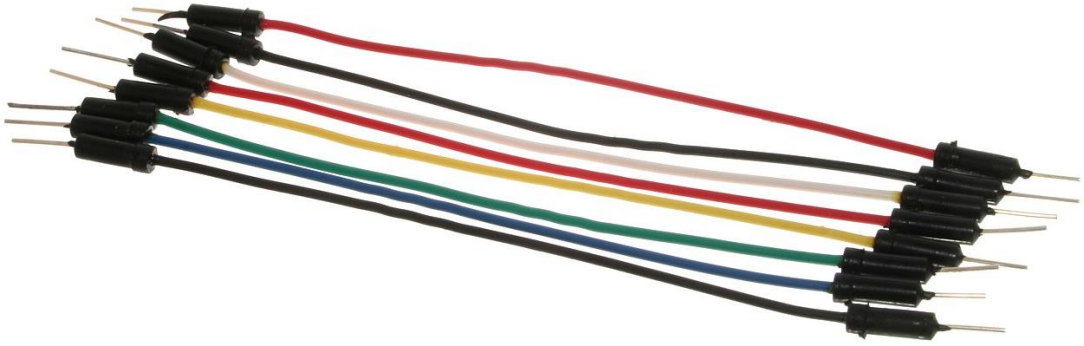


Figure 4.8 Jumper Wires

Jumper wires is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

3.8.13 Junction Box

Figure 4.9 Junction Box

A junction box is an electrical enclosure that houses one or more wiring connections. The box protects the connections, which usually contain vulnerable points such as wire splices, from environmental conditions and accidental contact.

CHAPTER 4 ANALYSIS AND RESULT

4.1 Introduction

When a product is made, it must be able to assist the customers or users while maintaining its own unique qualities and functions. For instance, a product's design must include elements such as shape, colour, and design that appeal to customers or users.

The questionnaire was developed to learn the opinions and views of the consumer of respondents who can contribute for a positive impact on the product that was produced in order to ensure the product that uses a sand filter machine as the main material is good and suitable for making a sand filter machine.

4.2 Data Collection Method

Collecting Data and information the level of data collection and information at one stage is important in producing a perfect report. The failure to obtain vital information that will further strengthen the desired outcomes will indicate the weakness of the project being undertaken to obtain unsatisfactory results. Therefore, the process of collecting this information or important data needs to be done continuously throughout the course of this study to ensure that the latest information is obtained and re-use this final report.

In the initial stages, we made research to choose the appropriate title and place of study to be conducted. Once the title and place of research have been agreed upon, discussions to identify the objective objectives and scope of the study are carried out. Additionally, issues related to the problem of getting fine sand do the construction site.

In the next stage, initially activities were conducted on the search of data and gathering relevant information in order to further strengthen our stand and identify real problems that occurred. Collected data can be divided into two types, namely primary data and secondary data. Primary data is about searching data from observations, interviews of various parties, visits in construction areas and so on. While secondary data is data search from reports, internet sources, books on sand filters.

We also have discussions with our supervisors for improvement and discussion on the information obtained.

4.2.1 Observation

In addition to the ways previously mentioned, we also collect data by having the field analysis and observe the research region. Some details regarding the efficiency of the sand filters now in use by student. Through observation, we were able to pinpoint the issues that arise during the acquisition of fine sand as well as the respondents' comments made along the way.

Figure 5.0 Mechanical Engineering Department Foundry Workshop

4.2.2 Survey

We created a survey that was distributed at Politeknik Sultan Salahuddin Abdul Aziz Shah foundry workshop via Google Forms. 30 students responded to our questionnaire so we could determine the scope and potential application of our product in the workshop, furthering expanding the potential of our products for commercial use.

The questions from this survey are divided into 2 section, which is section A is about the respondent's background and section B, knowledge about sand filter.

4.2.2.1 Response

Section A (respondent's background)

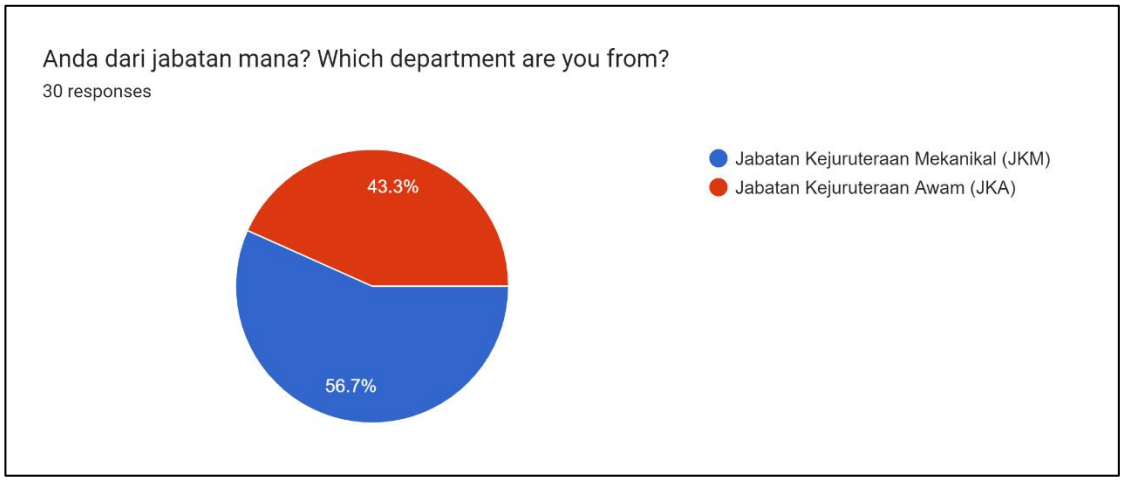


Figure 5.1 Respondent's Department

Figure 5.1 shows the department of respondents. 56.7% are from Mechanical Engineering Department (JKM), which is 17 students. Meanwhile 43.3% are from Civil Engineering Department (JKA), which is 13 students.

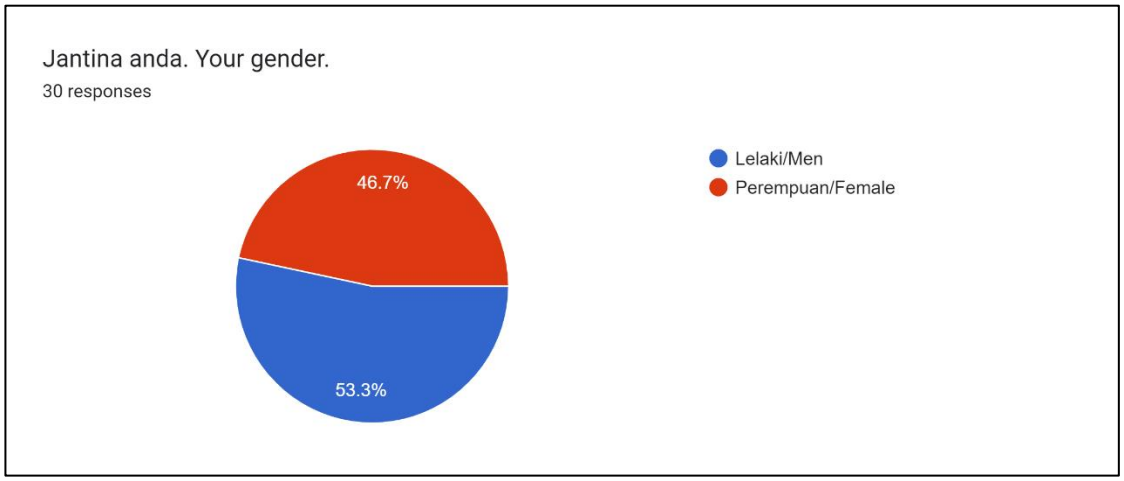


Figure 5.2 Respondent's Gender

Figure 5.2 shows gender of respondents. There were 53.3% of respondents is come from men that is 16, while 46.7% of respondents come from women that is 14.

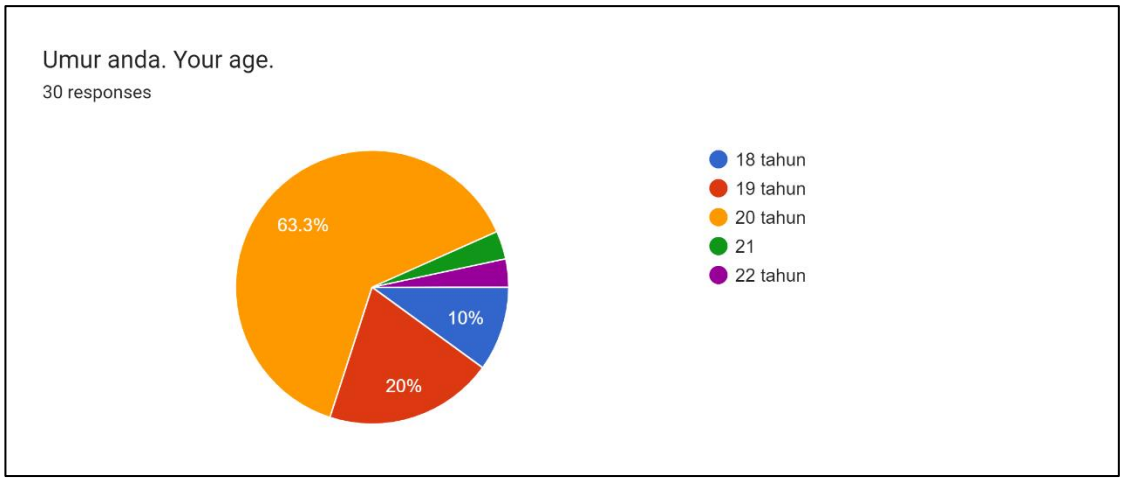


Figure 5.3 Respondent's Age

Figure 5.3 shows respondent's age. Most of the respondents are 20 years old. Followed by 19 years old. There is also respondent who are ages 21 and 22 years old. Probably doing intern or degree at Politeknik Sultan Salahuddin Abdul Aziz Shah.

Section B (knowledge about sand filter)

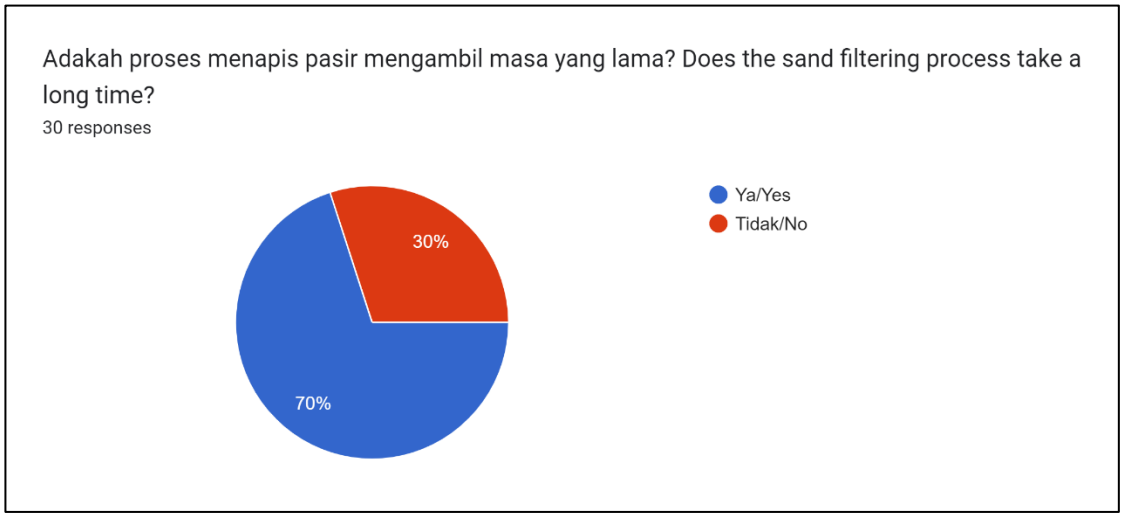


Figure 5.4 Respondents' Views on the Sand Filtering Process

Figure 5.4 shows respondents' views on the sand filtering process. 70% agree that sand filtering process took a lot of time while 30% disagree. This may be due to fitness factors or a sense of time that makes a person feel like doing one thing only for a brief moment.

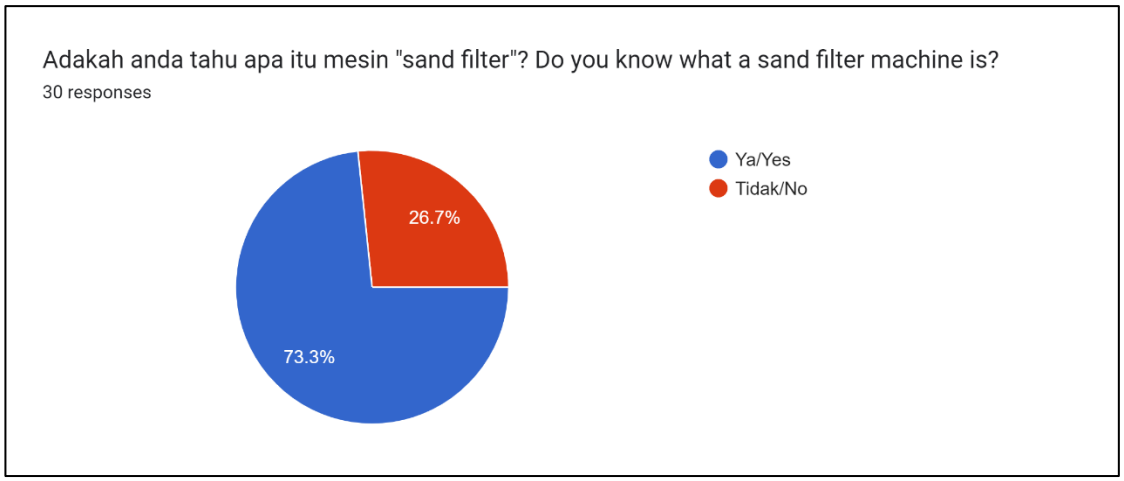


Figure 5.5 Respondents' Knowledge About Sand Filter Machine

Figure 5.5 shows respondents' knowledge about sand filter machine. 73.3% knows about sand filter machine while 26.7% do not. This may be due to lack of awareness or the absence of a sand filter machine in the foundry workshop.

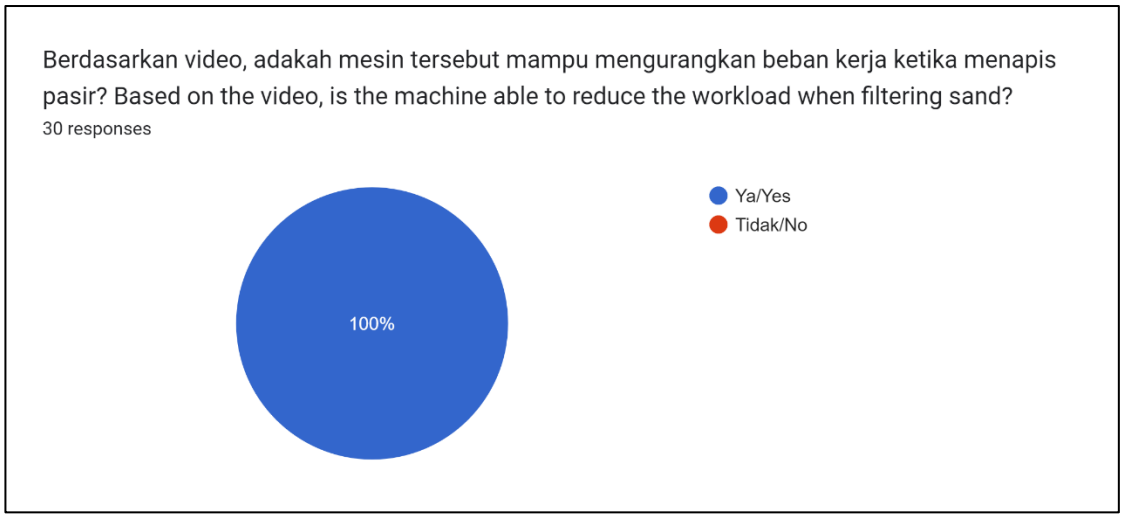


Figure 5.6 Respondent's Views After Watching the Video of How Our Sand Filter Machine Works

Figure 5.6 shows respondents' views after watching the video of how our sand filter machine works. All 30 respondents agreed that the sand filter machine is able to reduce the workload when filtering sand. This is because we use a semiautomatic method. Users only need to put sand in the filter, then turn on the motor to shake the filter.

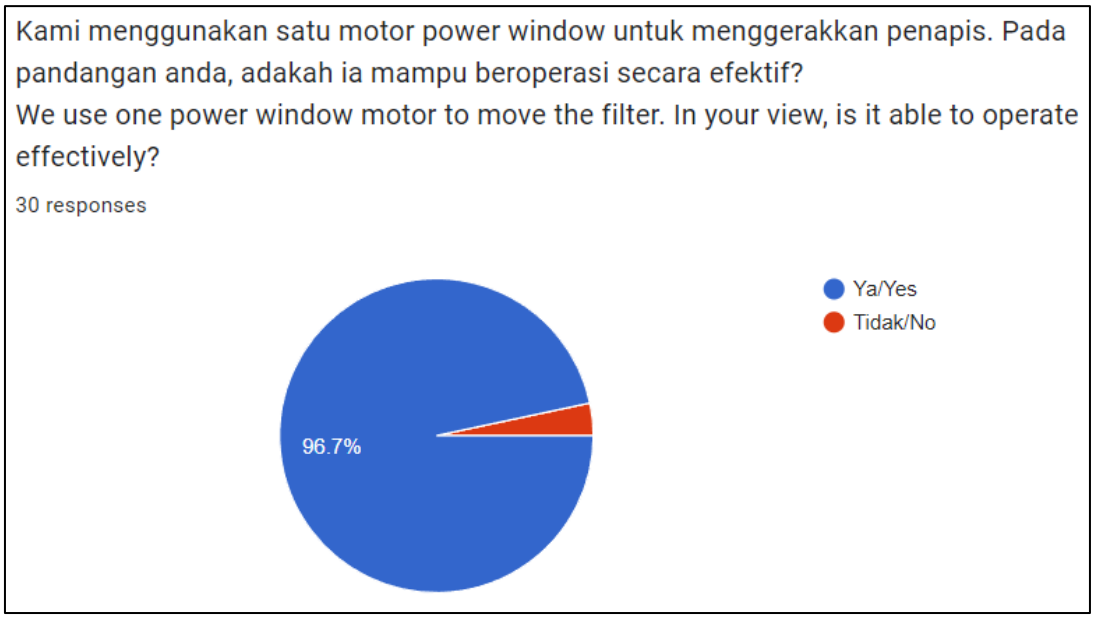


Figure 5.7 Respondents' Views on the Effectiveness of One Power Window Motor

Figure 5.7 shows respondents' views on the effectiveness of one power window motor used for the project. 96.7%, which 29 respondents agree one is enough while 3.3%, which is one respondent said one is not enough. This is because the load will damage the motor in a brief period of time.

Figure 5.8 Respondents' Views If Sand Filter Machines Are Placed in Foundry Workshops

Figure 5.8 shows that all 30 respondents agree that a sand filter machine should be placed in the foundry workshop to reduce the workload and save students time filtering sand.

4.4 Data Analysis

We analyse the data we have collected once we have effectively gathered as much as possible. We conducted a poll on the Google Forms to gather information and opinions from the general public. For respondents, certain questions have answers. The utilisation of our sand filters in the future is one of the uncertainties we are worried about. When our items were marketed in the future, the majority of those who responded to our study appeared to agree. In order for our products to be used in the future, we should increase their efficacy in this regard. Upon data analysis, other issues were also discovered. The lecturer/panel given feedback and ideas. After the presentation is over, the data will be reviewed, and recommendations and critiques will be made to enhance the areas that need improvement.

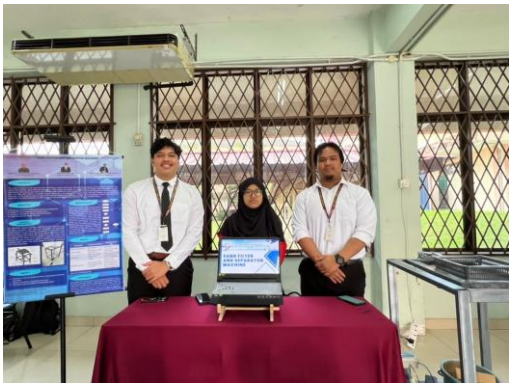


Figure 5.9 Presenting during PITEC JKM

4.5 Progression Work

4.5.1 Design Process

The design of this product was sketched using Autodesk Fusion 360 after getting agreement from team members and supervisors.

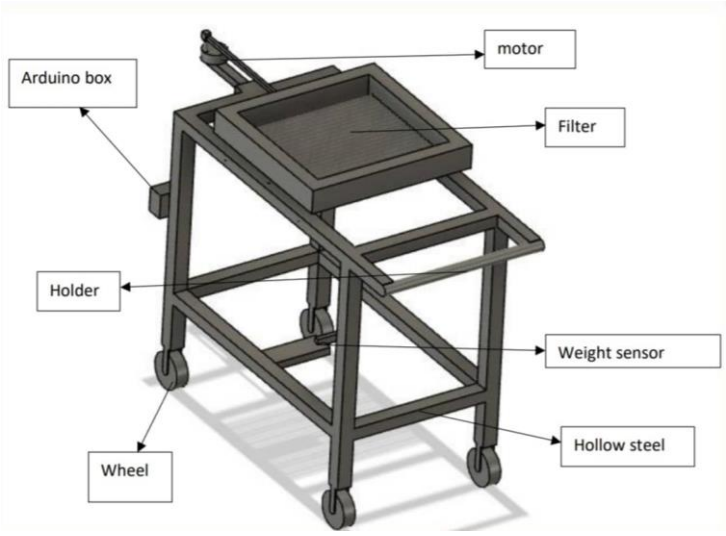


Figure 6.0 Design Using Autodesk Fusion 360

4.5.2 Buying hollow steel

Figure 6.1 Hollow Steel

The first material that we have to buy is hollow steel. We bought it at hardware shop at Batu Tiga. We used hollow steel to make frame for our product because of lightness and cheaper than other type of steel.

4.5.3 Cutting Process Base on Measurement

Figure 6.2 Measuring the Hollow Steel

Figure 6.3 Cutting the Hollow Steel

In cutting process, we cut the steel according to the measurement that has been determine. We use the metal cutting machine to cut the steel.

4.5.4 Welding Process

Figure 6.4 Welding Process

After we cut the steel, we do welding process to build the frame for sand filter machine. We combine the part by part according to our design and we weld it.

4.5.5 Putting Motor System

Wiring is done to ensure that the motor will function as intended. The motor is then mounted to the sand filter device.

4.5.6 Spraying

Figure 6.5 Spraying

We used silver coloured spray paint to paint our product to make it look interesting.

4.6 Summary

In order to finish our project, we have gathered data using a variety of ways for this chapter. For the project to succeed, the data and information gathered must be accurate and correct. We receive a lot of information and recommendations for this chapter from numerous sources. With that, we can keep working on our projects. The availability of data, information, and suggestions from numerous sources can aid in the improvement of our project.

CHAPTER 5 DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter describes a project that was successfully finished in roughly six months, or one semester. In addition, there were several issues we encountered during the installation and testing of the product. As a result, there are some recommendations for future improvements for the product that will benefit the users. The choice made in this chapter is based on the conclusion reached after conducting study and having a debate in the previous chapter. In addition, this chapter also covers related topics that are connected to the objective and the recommendations made based on the research. The conclusion for the research has been reached at this point.

Politeknik Sultan Salahuddin Abdul Aziz Shah students tested this product. When the product was tested, the product must achieve a good result. The products successfully achieve the objectives that have been set. Among them is, the product can reduce workload by using motorized machine for foundry workshop use.

5.2 Discussion

From the beginning of the project, many problems have been faced. Choosing the suitable motor is the first problem. Initially a DC motor was chosen as the main motor for this project, but the power of the DC motor is not enough to shake the filter. After asking more knowledgeable people, he suggested using a power window motor.

Secondly, placement for junction box. Due to the lack of space at the top of the frame and insufficient time to weld a new part at the top, the junction box had to be placed at the bottom of the frame where it was exposed to sand and made it difficult for the user to turn on the machine and see the LCD.

Lastly, the problem faced is about the funnel. During the design process, the funnel was designed together with the frame to ensure the sand gathers in the container, but due to lack of time and lack of capital, the funnel could not be installed on the machine frame.

5.3 Conclusion

Based on the result of research in creating and finishing this project, the project achieved all desired objectives, which is to design a sand filter machines for foundry workshop use, to get fine sand by filtering the lumpy sand, to reduce workload by using motorized machine and to get the required weight of sand by using Internet of Things (IoT) element (weight sensor).

Besides that, this project is innovative, and the size is suitable for workshop surrounding. This sand filter machines also user friendly, even the users who have no experience using sand filter machine stated that this product are easy to operate.

Lastly, we hope this project can be fully utilized, accepted and can be applied and suitable with technological development nowadays. We also hope that this product will give the best result to the users, and it can fulfil the requirement of all users.

5.4 Recommendation

In this project, Sand Filter and Separator Machine, it effectively reduces the student's workload when doing the foundry workshop. Thus, saving students' time and energy while guaranteeing fine sand without impurities or lumpy sand mixed in. Although the size is larger than necessary, this machine can be modified to obtain a suitable size depending on the suitability of the place of use. Furthermore, this machine does not have an automatic stop feature when it finishes filtering sand. It only gives notifications on the user's phone. Thus, this machine should be improved in the future.

REFERENCES

[1] Sieve Analysis (March 10, 2018) from https://www.retsch.com/news/details/news_details/sieve-analysis

[2] Arduino Uno (December 2022) from https://en.wikipedia.org/wiki/Arduino_Uno

[3] Load cell (September 2022) from https://en.wikipedia.org/wiki/Load_cell

[4] International Journal for Research in Applied Science and Engineering Technology (iJRASET) (March 2021). Design and Fabrication of Automated Sand Filter and Waste Separator Machine.

[5] Alina Carmen Cojocaru, M. Ram Murty (28 Feb 2006), An Introduction to Sieve Methods and Their Applications, London Mathematical Society Student Texts, CAMBRIDGE UNIVERSITY PRESS, 0521848164.

[6] Geankoplis, C.J. (2009) Principle of Transport Processes and Separation Processes. First edition. Pearson Education South Asia PTE. LTD.

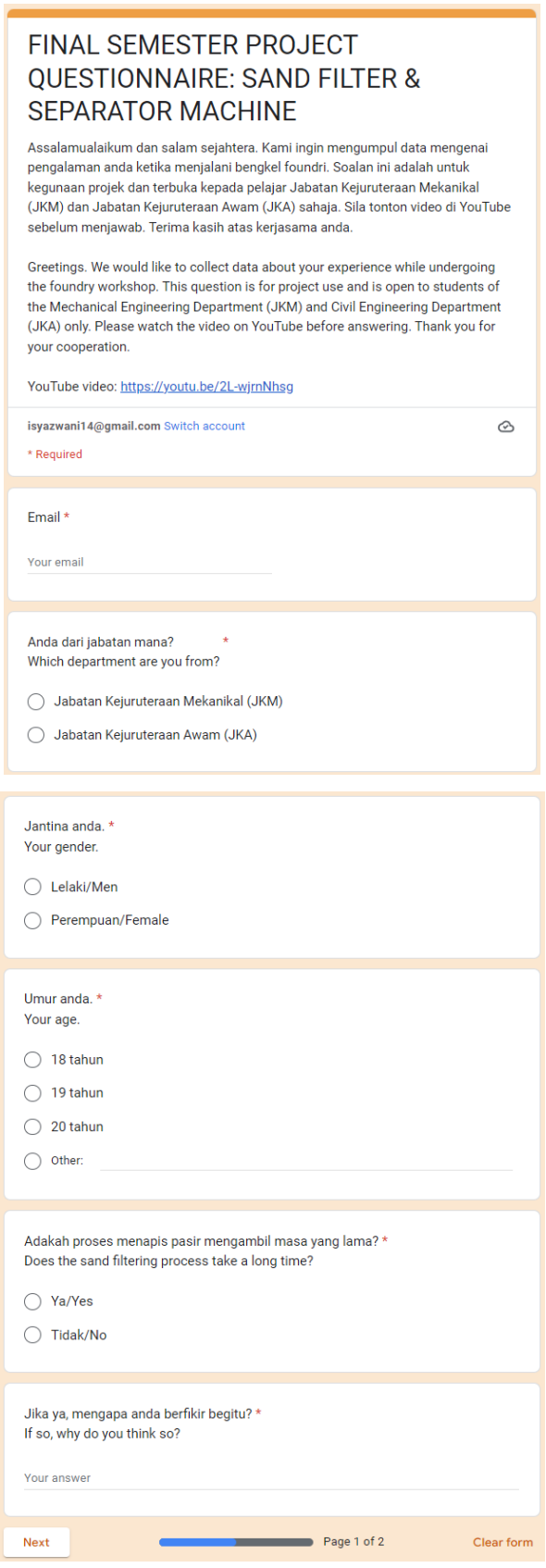
APPENDICES

Appendix A: Project Cost

No	Item	Unit price	Quantity	Total
1.	12-Volt Battery	1 x RM 32.00	1	RM 32.00
2.	20kg Load Cell + HX711 Load Cell Amplifier	1 x RM 8.70	1	RM 8.70
3.	Arduino Uno	1 x RM 42.90	1	RM 42.90
4.	Buzzer	1 x RM 2.40	1	RM 2.40
5.	ESP01 Wi-Fi Module	1 x RM 14.90	1	RM 14.90
6.	Hollow Steel 40mm x 40mm x 1.2mm x 6m	1 x RM 38.00	5	RM 190.00
7.	I2C Liquid Crystal Displays (LCD)	1 x RM 8.50	1	RM 8.50
8.	Jumper Wires 20cm 40 pieces	1 x RM 3.70	1	RM 3.70
9.	Junction Box 110mm x 110mm x 60mm	1 x RM 2.60	1	RM 2.60
10.	Motor Speed Controller	1 x RM 11.50	1	RM 11.50
11.	Power Window Motor	1 x RM 30.00	1	RM 30.00
12.	Solder 50g	1 x RM 8.90	1	RM 8.90
13.	Soldering Iron	1 x RM 34.90	1	RM 34.90
14.	Spray	1 x RM 12.00	1	RM 12.00
15.	Steel Plate 2.5mm x 200mm x 200mm	1 x RM 6.00	1	RM 6.00
16.	Switch	1 x RM 1.00	1	RM 1.00
17.	Wheel	1 x RM 4.00	5	RM 20.00
18.	Wire Mesh	1 x RM 10.00	1	RM 10.00
TOTAL COST				**RM 440.00**

Table 1 Project Cost

Appendix B: Google Forms



FINAL SEMESTER PROJECT QUESTIONNAIRE: SAND FILTER & SEPARATOR MACHINE

Assalamualaikum dan salam sejahtera. Kami ingin mengumpul data mengenai pengalaman anda ketika menjalani bengkel foundri. Soalan ini adalah untuk kegunaan projek dan terbuka kepada pelajar Jabatan Kejuruteraan Mekanikal (JKM) dan Jabatan Kejuruteraan Awam (JKA) sahaja. Sila tonton video di YouTube sebelum menjawab. Terima kasih atas kerjasama anda.

Greetings. We would like to collect data about your experience while undergoing the foundry workshop. This question is for project use and is open to students of the Mechanical Engineering Department (JKM) and Civil Engineering Department (JKA) only. Please watch the video on YouTube before answering. Thank you for your cooperation.

YouTube video: https://youtu.be/2L-wjrnNhsg

isyazwani14@gmail.com Switch account

* Required

Email *

Your email

Anda dari jabatan mana? *
Which department are you from?

- Jabatan Kejuruteraan Mekanikal (JKM)
- Jabatan Kejuruteraan Awam (JKA)

Jantina anda. *
Your gender.

- Lelaki/Men
- Perempuan/Female

Umur anda. *
Your age.

- 18 tahun
- 19 tahun
- 20 tahun
- Other:

Adakah proses menapis pasir mengambil masa yang lama? *
Does the sand filtering process take a long time?

- Ya/Yes
- Tidak/No

Jika ya, mengapa anda berfikir begitu? *
If so, why do you think so?

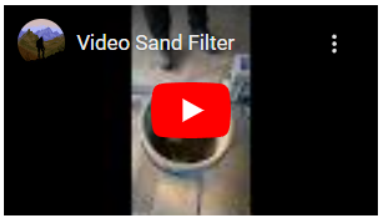
Your answer

Next Page 1 of 2 Clear form

Pengetahuan tentang mesin "Sand Filter"

Knowledge of Sand Filter machine

Tonton video untuk menjawab soalan seterusnya.
Watch the video to answer the next question.



Adakah anda tahu apa itu mesin "sand filter"? *
Do you know what a sand filter machine is?

- ◯ Ya/Yes
- ◯ Tidak/No

Berdasarkan video, adakah mesin tersebut mampu mengurangkan beban kerja ketika menapis pasir? *
Based on the video, is the machine able to reduce the workload when filtering sand?

- ◯ Ya/Yes
- ◯ Tidak/No

Kami menggunakan satu motor power window untuk menggerakkan penapis. Pada pandangan anda, adakah ia mampu beroperasi secara efektif? *
We use one power window motor to move the filter. In your view, is it able to operate effectively?

- ◯ Ya/Yes
- ◯ Tidak/No

Adakah anda bersetuju jika kami meletakkan mesin ini di bengkel foundri? *
Do you agree if we put this machine in foundry workshop?

- ◯ Setuju/Agree
- ◯ Tidak setuju/Disagree

Send me a copy of my responses.

Back | Submit | Page 2 of 2 | Clear form

Never submit passwords through Google Forms.

Appendix C: Load Cell Coding

LOadCellCoding §

```
#include <SoftwareSerial.h>
#include "HX711.h"
#include <Wire.h>  // Comes with Arduino IDE
#include <LiquidCrystal_I2C.h>

#define Buzz 9

// HX711.DOUT  - pin #A1
// HX711.PD_SCK - pin #A0

HX711 scale(A1, A0);    // parameter "gain" is ommited; the default value 128 is used by the library

 SoftwareSerial ss(2,3); //(RX,TX)

 LiquidCrystal_I2C lcd(0x3F, 16, 2);
String Temp1x="";
String PHx="";
String Temp2x="";
String Temp1y="";
String PHy="";
String Temp2y="";
String Temp3y="";
String Temp3x="";
String Temp4y="";
String Temp4x="";

int Maxx=5;

int Maxy=45;
int Mode=0;
int DataIn=0;


float AvWeight=0;
int DispCount=0;
int Counter=0;
float Average=0;
int TimeStart=0;
float dtergent=0;
int RQScount;
int countERROR;
int countPHONE;
```

LOadCellCoding §

```
int countOK;
int commaPosition;
int index = 0;
float WEIGHT;
float RAWWEIGHT;
float WEIGHT2;
float RAWWEIGHT2;
float WEIGHT3;
float RAWWEIGHT3;
float HIGHx;
float BMI;
float REF=8179525;
float REF2=16202072;
float REF3=978670.00;
float MAX=150;
int MODE=0;
float TargetTime=0;
float MaxKg=6.0;
int MaxDtergentT=10;
float DTnow=0;
int Status=0;
int Alm1=0;
int Alm2=0;
int Alm3=0;

int TWifi=0;


float Sens1;
int Sens1Pin = 0;



void setup() {
  // initialize serial:
  pinMode(Buzz,OUTPUT);
 Serial.begin(9600);
ss.begin(9600);
 lcd.begin();
 lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Please wait..."); // You can make spaces using well... spaces
```

LOadCellCoding §

```
//--------------------------------------------------------------------------------
 Serial.println("HX711 1startup");

 Serial.println("Before setting up the scale1:");
 Serial.print("read: \t\t");
 Serial.println(scale.read());      // print a raw reading from the ADC

 Serial.print("read average: \t\t");
 Serial.println(scale.read_average(20));   // print the average of 20 readings from the ADC

 Serial.print("get value: \t\t");
 Serial.println(scale.get_value(5));   // print the average of 5 readings from the ADC minus the tare weight (not set yet)

 Serial.print("get units: \t\t");
 Serial.println(scale.get_units(5), 1);  // print the average of 5 readings from the ADC minus tare weight (not set) divided
          // by the SCALE parameter (not set yet)

 scale.set_scale(2280.f);                      // this value is obtained by calibrating the scale with known weights; see the README for details
 scale.tare();               // reset the scale to 0

 Serial.println("After setting up the scale:");

 Serial.print("read: \t\t");
 Serial.println(scale.read());                 // print a raw reading from the ADC

 Serial.print("read average: \t\t");
 Serial.println(scale.read_average(20));       // print the average of 20 readings from the ADC

 Serial.print("get value: \t\t");
 Serial.println(scale.get_value(5));   // print the average of 5 readings from the ADC minus the tare weight, set with tare()

 Serial.print("get units: \t\t");
 Serial.println(scale.get_units(5), 1);        // print the average of 5 readings from the ADC minus tare weight, divided
          // by the SCALE parameter set with set_scale

 Serial.println("Readings:");
 delay(2000);



 Serial.println("CONTROLLER READY...");

```

LOadCellCoding §

```
  delay(2000);
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Ready...");
  digitalWrite(Buzz,HIGH);
  delay(100);
  digitalWrite(Buzz,LOW);
  delay(100);
    digitalWrite(Buzz,HIGH);
  delay(100);
  digitalWrite(Buzz,LOW);
  delay(100);
   delay(2000);

}

void loop() {









 //------------------------------



  RAWWEIGHT = (scale.read_average(20));
  Serial.print("Sensor Readings:");
  Serial.println(RAWWEIGHT);
  WEIGHT=(RAWWEIGHT - 8500000);
  WEIGHT=WEIGHT/1000;
  WEIGHT=WEIGHT*0.1324256;
  WEIGHT=WEIGHT*0.16326530612;

if (WEIGHT<0){
  WEIGHT=0;
}

```

LOadCellCoding §

```
TWifi++;
if (TWifi>3){
  ss.print("*");
  ss.print(WEIGHT,1);
   ss.println("#");
  TWifi=0;
}

  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("LOAD(KG):");
  lcd.print(WEIGHT,1);
  lcd.setCursor(0, 1);
  lcd.print("SET (KG):");
  lcd.print(Maxx,1);

  if (WEIGHT>Maxx){
    if (Alml==0){
    Alml=1;
    ss.println("X");
    }
  }

  if (Alml==0){
delay(1000);
  }
    if (Alml==1){
      digitalWrite(Buzz,HIGH);
delay(500);
digitalWrite(Buzz,LOW);
delay(500);
  }
}



void serialEvent() {
  while (Serial.available()) {
    char inChar1 = (char)Serial.read();
     if (inChar1 == '!') {
      Alml=1;
```

LOadCellCoding §

```
    }
    if (inChar1 == '@') {
      Alml=0;

    }
  if (inChar1 == '*') {
      DataIn++;

    }


    while (DataIn > 0){
        while (Serial.available()) {
    // get the new byte:
    char inChar = (char)Serial.read();
    if (inChar == '*') {
      DataIn++;

    }
    if (inChar != '*' && inChar != '#' && DataIn==1) {
      Temp1x+=inChar;

    }
    if (inChar != '*' && inChar != '#' && DataIn==2) {
      Temp2x+=inChar;

    }
    if (inChar != '*' && inChar != '#' && DataIn==3) {
      Temp3x+=inChar;

    }
     if (inChar != '*' && inChar != '#' && DataIn==4) {
      Temp4x+=inChar;

    }


    if (inChar == '#') {
      DataIn=0;
     Temply=Temp1x;   PHy=PHx;      Temp2y=Temp2x;  Temp3y=Temp3x;  Temp4y=Temp4x;
     Temp1x="";
     PHx="";   Temp2x=""; Temp3x="";
     Maxx=Temply.toInt();
     Maxy=Temp2y.toInt();

    }
        }

    }
  }
}
```

Appendix D: Wi-Fi Module Coding

Blynk2_0_ESP8266

```
//iotprj8
// Template ID, Device Name and Auth Token are provided by the Blynk.Cloud
// See the Device Info tab, or Template settings
#define BLYNK_TEMPLATE_ID           "TMPLR5bOilJe"
#define BLYNK_DEVICE_NAME           "Quickstart Device"
#define BLYNK_AUTH_TOKEN            "CFBJ5uVNDVxetmlQrRUGw3HAUZRyHRXS"


// Comment this out to disable prints and save space
#define BLYNK_PRINT Serial


#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

char auth[] = BLYNK_AUTH_TOKEN;

// Your WiFi credentials.
// Set password to "" for open networks.
char ssid[] = "SANDFILTER";
char pass[] = "12345678";


int Rly1=0, Rly2=0, Rly3=0, Rly4=0, Rly5=0, Rly6=0,  Rly7=0,  Rly8=0;
int Val1=90, Val2=0, Val3=0, Val4=0, Val5=0, Val6=0,  Val7=0,  Val8=0;
String Temp1x="";
String PHx="";
String Temp2x="";
String Temp1y="";
String PHy="";
String Temp2y="";
String Temp3y="";
String Temp3x="";
String Temp4y="";
String Temp4x="";
String Temp5y="";
String Temp5x="";
String Temp6y="";
String Temp6x="";
String Temp7y="";
String Temp7x="";
String Temp8y="";
String Temp8x="";
String Temp9y="";
String Temp9x="";
String Temp10y="";
String Temp10x="";
int DataIn=0;
int Max=5;

BlynkTimer timer;


int pos=0;
bool led_set[2];
long timer_start_set[2] = {0xFFFF, 0xFFFF};
long timer_stop_set[2] = {0xFFFF, 0xFFFF};
unsigned char weekday_set[2];

long rtc_sec;
unsigned char day_of_week;

bool led_status[2];
bool update_blynk_status[2];
bool led_timer_on_set[2];

// This function is called every time the Virtual Pin 0 state changes


// This function is called every time the device is connected to the Blynk.Cloud
BLYNK_CONNECTED()
{
  // Change Web Link Button message to "Congratulations!"
 // Blynk.setProperty(V3, "offImageUrl", "https://static-image.nyc3.cdn.digitaloceanspaces.com/general/fte/congratulations.png");
 // Blynk.setProperty(V3, "onImageUrl",  "https://static-image.nyc3.cdn.digitaloceanspaces.com/general/fte/congratulations_pressed.png");
 // Blynk.setProperty(V3, "url", "https://docs.blynk.io/en/getting-started/what-do-i-need-to-blynk/how-quickstart-device-was-made");
}

// This function sends Arduino's uptime every second to Virtual Pin 2.
void myTimerEvent()
{
  // You can send any value at any time.
  // Please don't send more that 10 values per second.
 // Blynk.virtualWrite(V2, millis() / 1000);
     Blynk.syncVirtual(V1);


     Serial.print("*");
    Serial.print(Max);
        Serial.println("#");
}

BLYNK_WRITE(V10)
{
  Rly1 = param.asInt(); // assigning incoming value from pin V1 to a variable

  if (Rly1==1){
     Serial.println("!");
  //  Blynk.logEvent("manual", String("MESSAGE"));
  }
   if (Rly1==0){
     Serial.println("@");
  //  Blynk.logEvent("manual", String("MESSAGE"));
```

```
  }

  // process received value
}


BLYNK_WRITE(V1)
{
  Max=param.asInt(); // assigning incoming value from pin V1 to a variable

  // process received value
}
BLYNK_WRITE(V11)
{
  Rly2 = param.asInt(); // assigning incoming value from pin V1 to a variable

  if (Rly2==1){
     Serial.println("#");
  //  Blynk.logEvent("manual", String("MESSAGE"));
  }
   if (Rly2==0){
     Serial.println("$");
  //  Blynk.logEvent("manual", String("MESSAGE"));
  }
  // process received value
}


BLYNK_WRITE(V12)
{
  Rly3 = param.asInt(); // assigning incoming value from pin V1 to a variable

  if (Rly3==1){
     Serial.println("&");
  //  Blynk.logEvent("manual", String("MESSAGE"));
  }
   if (Rly3==0){
     Serial.println("^");
  //  Blynk.logEvent("manual", String("MESSAGE"));
  }

  // process received value
}

BLYNK_WRITE(V13)
{
  Rly4 = param.asInt(); // assigning incoming value from pin V1 to a variable

  if (Rly4==1){
     Serial.println("&");
  //  Blynk.logEvent("manual", String("MESSAGE"));
  }
   if (Rly4==0){
     Serial.println("^");
  //  Blynk.logEvent("manual", String("MESSAGE"));
  }
  // process received value
}


BLYNK_WRITE(V5)
{
  Rly5 = param.asInt(); // assigning incoming value from pin V1 to a variable

  if (Rly5==1){

  }

  // process received value
}
BLYNK_WRITE(V6)
{
  Rly6 = param.asInt(); // assigning incoming value from pin V1 to a variable

  if (Rly6==1){

  }

  // process received value
}




BLYNK_WRITE(V9)
{
  unsigned char week_day;

  TimeInputParam t(param);

  if (t.hasStartTime() && t.hasStopTime() )
  {
    timer_start_set[0] = (t.getStartHour() * 60 * 60) + (t.getStartMinute() * 60) + t.getStartSecond();
    timer_stop_set[0] = (t.getStopHour() * 60 * 60) + (t.getStopMinute() * 60) + t.getStopSecond();

    Serial.println(String("Start Time: ") +
                   t.getStartHour() + ":" +
                   t.getStartMinute() + ":" +
                   t.getStartSecond());

```

```
    Serial.println(String("Stop Time: ") +
                   t.getStopHour() + ":" +
                   t.getStopMinute() + ":" +
                   t.getStopSecond());

    for (int i = 1; i <= 7; i++)
    {
      if (t.isWeekdaySelected(i))
      {
        week_day |= (0x01 << (i-1));
        Serial.println(String("Day ") + i + " is selected");
      }
      else
      {
        week_day &= (~(0x01 << (i-1)));
      }
    }

    weekday_set[0] = week_day;
  }
  else
  {
    timer_start_set[0] = 0xFFFF;
    timer_stop_set[0] = 0xFFFF;
  }
}

// ################################################################################################################

void setup()
{
  // Debug console

  Serial.begin(9600);

  Blynk.begin(auth, ssid, pass);
  // You can also specify server:
  //Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);
  //Blynk.begin(auth, ssid, pass, IPAddress(192,168,1,100), 8080);

  // Setup a function to be called every second
  timer.setInterval(1000L, myTimerEvent);


  pos=0;
}

void loop()
{
  Blynk.run();
  timer.run();
  //--------------------------------------------------
   while (Serial.available()) {
    // get the new byte:
    char inChar1 = (char)Serial.read();
  if (inChar1 == '*') {
      DataIn++;

    }

     if (inChar1 == 'Y') {



    }

if (inChar1 == 'X'){
 Blynk.virtualWrite(V10, "1");
}

    while (DataIn > 0){
        while (Serial.available()) {
    // get the new byte:
    char inChar = (char)Serial.read();
    if (inChar == '*') {
      DataIn++;

    }
    if (inChar != '*' && inChar != '#' && DataIn==1) {
      Temp1x+=inChar;

    }
    if (inChar != '*' && inChar != '#' && DataIn==2) {
      Temp2x+=inChar;

    }
    if (inChar != '*' && inChar != '#' && DataIn==3) {
      Temp3x+=inChar;

    }
     if (inChar != '*' && inChar != '#' && DataIn==4) {
      Temp4x+=inChar;

    }
      if (inChar != '*' && inChar != '#' && DataIn==5) {
      Temp5x+=inChar;

    }
      if (inChar != '*' && inChar != '#' && DataIn==6) {
      Temp6x+=inChar;

```

```
  }
    if (inChar != '*' && inChar != '#' && DataIn==7) {
    Temp7x+=inChar;

  }
    if (inChar != '*' && inChar != '#' && DataIn==8) {
    Temp8x+=inChar;

  }
    if (inChar != '*' && inChar != '#' && DataIn==9) {
    Temp9x+=inChar;

  }
    if (inChar != '*' && inChar != '#' && DataIn==10) {
    Temp10x+=inChar;

  }


  if (inChar == '#') {
    DataIn=0;
   Temp1y=Temp1x;   PHy=PHx;      Temp2y=Temp2x;  Temp3y=Temp3x;  Temp4y=Temp4x;
   Temp5y=Temp5x;
   Temp6y=Temp6x;
   Temp7y=Temp7x;
   Temp8y=Temp8x;
   Temp9y=Temp9x;
   Temp10y=Temp10x;
   Temp1x="";
   PHx="";   Temp2x="";
   Temp3x="";
   Temp4x="";
   Temp5x="";
   Temp6x="";
   Temp7x="";
   Temp8x="";
   Temp9x="";
   Temp10x="";
   Blynk.virtualWrite(V0, Temp1y);



  }
      }

  }
```

Appendix E: Gantt Chart Project 1

GANTT CHART PROJECT 1 DJJ40182 (SESSION 2 2021/2022)

WEEK / ACTIVITIES		1	2	3	4	5	6	7	8	9	10	11	12	13	14
SUPERVISOR SELECTION	PLAN														
	ACTUAL														
IDEA AND PROJECT SEARCH	PLAN														
	ACTUAL														
PROPOSAL DEVELOPMENT	PLAN														
	ACTUAL														
TITLE SELECTION	PLAN														
	ACTUAL														
PROPOSAL PRESENTATION	PLAN														
	ACTUAL														
METHODOLOGY RESEARCH/ SURVEY ON PRESENT INDUSTRY (FEASIBILITY)	PLAN														
	ACTUAL														
FINAL PRESENTATION	PLAN														
	ACTUAL														

PLAN	
ACTUAL	

Appendix F: Gantt Chart Project 2

POLITEKNIK MALAYSIA
SULTAN SALAHUDDIN ABDUL AZIZ SHAH

GANTT CHART

SESION : 1:2022/2023
DEPARTMENT : MECHANICAL ENGINEERING
CODE/COURSE : DJJ50193 PROJECT 2

	WEEK/ PROJECT ACTIVITY	STATUS	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
1	Project briefing, iSOLMS briefing	P															
		A															
2	design thinking / Arduino workshop	P															
		A															
3	Technical writing workshop	P															
		A															
4	Project Planning	P															
	project requirement																
	project plan																
	project scope and limitation																
	project methodology																
		A															
5	Project Development	P															
	project development details																
	project techniques and tools																
		A															
6	validity and reliability measurement	P															
	project results and analysis																
		A															
7	Project report writing	P															
		A															
8	Technical Paper review by supervisor	P															
		A															
9	Project Inventory Form submission	P															
	Poster review by supervisor																
		A															
10	PITEC JKM (Project Exhibition and Presentation)	P															
	Logbook and report submission																
		A															
11	PITEC 3 PSA (Project Exhibition and Presentation)	P															
		A															

Planning
Actual

Table 2 Gantt Chart