POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SMART PET FEEDER

NAMA	NO. PENDAFTARAN
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JABATAN KEJURUTERAAN MEKANIKAL

JUN 2020

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Laporan ini dikemukakan kepada Jabatan Kejuruteraan Mekanikal sebagai memenuhi sebahagian syarat penganugerahan Diploma Kejuruteraan Mekanikal

JABATAN KEJURUTERAAN MEKANIKAL

JUN 2020

AKUAN KEASLIAN DAN HAK MILIK

TAJUK : SMART PET FEEDER

SESI : JUN 2020

1. Kami,
   1. MUHAMMAD AZIZUL HAKIM BIN MOHD AZAN (08DMP18F1019)
   2. NAZATUL HUSNA BINTI MAT JUHAN (08DMP18F1007)
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   Adalah pelajar tahun akhir **Diploma Kejuruteraan Mekanikal Pembungkusan, Jabatan Kejuruteraan Mekanikal, Politeknik Sultan Salahuddin Abdul Aziz Shah**, yang beralamat di **Persiaran Usahawan, 40150, Shah Alam, Selangor**. (selepas ini dirujuk sebagai 'Politeknik tersebut').

2. Kami mengakui bahawa "Projek tersebut di atas' dan harta intelek yang ada di dalamnya adalah hasil karya/reka cipta asli kami tanpa mengambil atau meniru mana-mana harga intelek daripada pihak-pihak lain.

3. Kami bersetuju melepaskan pemilikan harta intelek 'projek tersebut' kepada 'Politeknik tersebut' bagi memenuhi keperluan untuk peanugerahan **Diploma Kejuruteraan Mekanikal** kepada kami.

Diperbuat dan dengan sebenar-benarnya diakui

Oleh yang tersebut;

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Thank you,

ABSTRACT

Smart Pet Feeder is an automatic feeding machine designated for pets by using applications inside the phone device. Next, the machine is equipped with a closed camera circuit for users to monitor their pets and is designed to help in feeding process during their absence at home. Unfortunately, the busyness and limited of time at work causes lacking of care and left their pets in hunger. In addition, the machine is fabricated and designated easily in order to save users time and energy to feed their pets. In addition, the machine is designated using an existing concept innovated with the addition of an internet connection on the device. Among the innovative components of machine are used in a bottle can last for a week with electrical connections such as the Arduino UNO Rev3, and the server motor. It serves to distribute food automatically according to the timer and quantity of the food. Furthermore, the machine available at the market usually by manually functioning and most of them does not use IOT. With this Smart Pet Feeder, users can use it automatically and stop their worrying to find out about their pets. For those pet's lover, they will absolutely choose this machine for their pets at home. Consumers are also will not worried about leaving their pets for a long period of time such as going back to hometown or full-time working. Finally, it is an effective way to enhance and utilize top and local users, especially in the mechanical industry. Thus, Smart Pet Feeder is very useful in petting procedure and also upgrading the local industrial.

Keyword: Smart Pet Feeder

ABSTRAK

Smart Pet Feeder merupakan mesin memberi makanan kepada haiwan peliharaan secara automatik dengan menggunakan aplikasi di dalam alat peranti iaitu telefon. Seterusnya, mesin ini dilengkapi dengan litar kamera tertutup bagi memudahkan pengguna dapat melihat haiwan peliharaan mereka dan direka untuk memudahkan mereka memberi makanan kepada haiwan peliharaan semasa ketiadaan di rumah. Malangnya kesibukkan pengguna di tempat kerja menyebabkan mereka tiada masa untuk menjaga dan membiarkan haiwan peliharaan mereka dalam kelaparan. Selain itu, mesin ini difabrikasi dan direka bentuk supaya dapat menjimatkan masa dan tenaga pengguna untuk memberi makanan kepada haiwan peliharaan. Di samping itu, mesin ini direka dengan menggunakan konsep yang sedia namun diinovasi dengan tambahan sambungan internet pada alat peranti. Antara komponen yang diinovasikan ialah bekas makanan yang digunakan iaitu botol dapat bertahan selama seminggu dan sambungan eletrik seperti Arduino UNO Rev3, dan 'servour motor'. Ia berfungsi untuk mengagihkan makanan secara automatic mengikut masa dan kuantiti makanan yang ditetapkan. Tambahan pula, mesin yang sedia ada di pasaran berfungsi secara manual dan kebanyakkannya tidak menggunakan IOT. Dengan adanya Smart Pet Feeder ini, pengguna dapat menggunakannya secara automatik dan dapat mengurangkan kerisauan untuk memikirkan tentang haiwan peliharaan mereka. Bagi yang membela haiwan peliharaan dengan banyak, sudah pasti mereka akan cenderung untuk memilih mesin ini bagi kegunaan mereka di rumah. Pengguna juga tidak khuatir untuk meninggalkan haiwan peliharaan dalam tempoh masa yang lama. Sebagai contoh, apabila mereka balik kampung. atau urusan kerja selama seminggu. Akhir sekali, penggunaannya yang berkesan untuk meningkatkan dan memenuhi keperluan pengguna kelas atas dan tempatan, terutamanya di industri mekanikal.

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CHAPTER 1

INTRODUCTION

1.1 **RESEARCH BACKGROUND**

Nowadays most of us have pets at home. this pet should be taken care of properly. Their meal time is important because they have become part of the family. however, some people fail to pay attention to their pets because they are so busy that they cannot afford to feed them on time. This paper addresses the above problem by introducing the Smart Pet Feeder to ensure that your pet is fed on time. This Smart Pet Feeder consists of food storage, servo motors, dispensers, dining bowls and more. It also has the Arduino to control operations automatically, as well as possible to create more high-tech by adding cameras to monitor the activities of their pets.

Smart Pet Feeder has an auto-generated machine that can feed your pet according to the time and quantity specified. Using this machine, pet owners do not have to be with their pets all the time to provide food. They can also do other work outside without taking care of the pet. Pet dishes are filled in one container by setting the time and date using the Arduino UNO that has been displayed on the LCD mounted on the pet mediator.

1.2 PROBLEM STATEMENT

Being busy with your daily routine contributes to a less organized life. Therefore, people will forget about other things like taking care of pets. Animal nutrition and health should be taken care of so that they will not be a problem in the future. In addition, keeping people busy with their work so that they do not have time to take care of them can leave our pets in a bad and hungry mood. In this case, all the problems mentioned can be solved with the idea of creating this machine. It works automatically and is an easy-to-use method for all ages. It works perfectly at home and on the go. Concepts and mechanical controls via electronic systems are easy to use to improve the functionality of these devices as efficiently as possible. The set of specifications is tailored to the needs of the user or animal. Nutrition time, food quantity, and the latest engineering features are being used to create smooth functioning. In conclusion this reason can solve the problem of pet feeding.

1.3 RESEARCH OBJECTIVES

The objectives to this research are:

1.3.1 Benefits to Customer

- More personalized experience of keeping pets
- No longer need to worry about their pets during business trips or vacations.
- No longer need to purchase multiple feeder for multiple pets.
- No longer need to worry about the cross-eating between different pets.

1.3.1 Functions and Features

- Allows users to input different pet's profiles into the pet feeder via Android phones.
- Different pets can be distinguished automatically throughout the feeding procedure.
- Different types of food are specified for different pets.
- Protection mode which can prevent pets getting hurt.

1.4 RESEARCH QUESTIONS

This study will answer the following research questions:

i.   Is it possible to create a pet feeder that are high in quality?

ii.   What type of material that can be used to make pet feeder cheaper?

iii.   What are the possibilities of making a pet feeder that are easy to use?

1.5 SCOPE OF RESEARCH

The scopes and limits to this research are:

I.   Designed the cat feeder by using engineering software which is solid works.

II.   Setting the pet time to eat at least 3 times a day according to the amount of food depending on the breed and its species

III.   Automatically use programme rules and mechanical concepts

IV.   Design and dedicate this machine

1.6 SIGNIFICANCE OF RESEARCH

Although the smart pet feeder currently used in Malaysia could perform well and consumers are willing to pay a high price for it. However, some pet lovers could not afford to buy a pet feeder worth RM1000 + and moreover it requires high shipping costs due to its expensive price and high quality. Therefore, the findings of this study will bring many benefits to animal lovers who cannot afford expensive pet feeder. In addition, it will also make it easier for consumers to feed their pets during their absence at home. Moreover, it really benefits the consumers as they no longer have to worry about their pets and will never let their pets go hungry again.

1.7 CHAPTER'S SUMMARY

In this chapter, the studies were explained about its origin of ideas and inspirations. All the objectives were made out of all the problem statements. The objective for this project along with the importance will be pet feeder that will be cheap and are easy to use it to be more convenient for consumers and even the scope of this project only focusing at the time of pet feeder are using in automatically. Thus, this smart pet feeder could be used for daily routine with a really good care for a longer lifetime.

1.8 PROJECT ORGANIZATION

- Chapter 1 is the introduction of this project. Usually it discusses project background, problem statement, the objectives and scopes.

- Chapter 2 is a literature study on cat feeder used to able understanding every components or parts in cat feeder.

- Chapter 3 is the methodology chapter where the objective of the project is determined. The required concept design is chosen based on objective. Each criteria concept design is defined by the literature study. The require materials component are determine based on the chosen concept. Furthermore, the dimension of component is defined by using measurement instrument for determining the dimension for fabricated part to allow component to assemble together. Fabrication of the cat feeder is using industrial engines.

- Chapter 4 is a chapter of result and discussion on this cat feeder. This new concept is use to analysis the efficiency of the food dispenses. In this chapter, the problem encountered is discussed. The solution manual to use the feeder is developed via the trial run on the feeder

- Chapter 5 is the conclusion and recommendation chapter of this project. The new concept and design of cat feeder is built based on the limitation of existing product. In this chapter, it included the conclusion of this project and improvement can be doing for the future invention.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter is provided description of literature review done regards to the project title of design and fabrication for cat feeder. The literature review started with the other product of cat feeder that is widely used. There are four products that are common in the production of cat feeder. With the explanation of each product, the advantages and disadvantages can be seen in those product and can help to make upgrade for another better product.

There are many different types of pet feeders on the market today attempting to solve the problem of making sure that each pet has access to a healthy amount of food throughout the day, regardless of the owner's schedule. These feeders range in price from under $10 to $500 and offer varying degrees of control to the pet owner.

The most basic pet feeder is a gravity feeder, which consists of a hopper full of food which falls into a bowl as the bowl is emptied by the pet (see Figure 1). This type of feeder is not meant to control portion sizes or access to the food.

Figure 2.1: Petmate Café Feeder

The feeder in Figure 2.1 allows the pet owner to ensure that the pet has access to food throughout the day or for a longer period of time and that the food does not go stale from exposure to the air before the pet eats it, but does nothing to control the amount of food eaten by the pet or to keep one pet from eating another's food. This feeder is designed to be a hassle free form of free feeding. The user reviews for this type of feeder are positive for the most part, with the most common complaint being that the food hopper can be knocked off by the pet, creating a mess.

The rest of the pet feeders on the market are designed to provide regular feedings to pets even when the owner is not home. The most common type is based on the same idea as a gravity feeder but goes one step further, providing specifically sized portions at preset times. These feeders are intended both for the vacationing owner and the busy owner who simply does not have time to be home to feed their pets regularly. These feeders range in price from $50 to $500. In the $50 range, there is the Petmate Le Bistro Electronic Portion-Control Automatic Pet Feeder, shown below.

Figure 2.1.2: Petmate Le Bistro Electronic Portion-Control Automatic Pet Feeder

This pet feeder holds 4.5 pounds of food and can dispense portions from ¼ cup to 2 cups up to 3 times per day. The reviews for feeders such as this are positive for the most part (Amazon.com shows an average review for this feeder to be 4 stars out of a possible 5 based on 266 user reviews). The most common complaints about this type of feeder is that the programming is very difficult and is lost when the batteries are removed, the electronic display does not work, the smallest portion of food is too large for some pets, and that the food gets jammed in the chute leaving the pet hungry.

One the other side of the price range is the Perfect Pet feeder Lux Model by Pillar Products which was introduced in July of 2007.

Figure 2.1.3: The Perfect Pet Feeder

This feeder holds up to 10 pounds of food, which it can dispense up to 6 times per day in portions as small as a few pieces of food or as large as several cups. Instead of relying on batteries, it runs on AC power from a typical wall outlet and has a battery backup in case of power outages. Among other features, it boasts a "paw safe design" which ensures that no pet will ever get to the food, easy programming, a level meter to let the owner know when the unit is low on food, and almost every component which touches food is dishwasher safe.

The drawback of this product is the price and the size. It retails for $499 and weighs about 20 pounds when empty (6). It is a major investment in both money and space. All of the reviews available are positive, but that is expected since the only source of user reviews is the Perfect Pet feeder website. At this time, there are no reports which state how many of these feeders have been purchased.

The other, less common, type of feeder on the market right now is shaped like the ERGO 8 day feeder (see Figure 4). This type of feeder ranges in price from $40 to $200. The advantage of this type of feeder over the gravity-type feeders is that there is no chute to get clogged with food, and the owner does not need to rely on the feeder itself to measure how much food will be served, since the owner places the exact amount to be fed in each compartment.

Figure 2.1.4: The ERGO 8 day feeder

The user ratings for this type of feeder are about the same as those for gravity type feeders, with the most common complaints being flimsy construction which allow the pet tear the feeder apart and to access all of the food, the use of floor space, frequent battery replacement, and the fact that, in most models, the lid rotates so that in order for the pet to eat from the back compartments it must stand on the feeder. One major advantage of this type of feeder is to the pet owner whose pet must receive medication on a schedule, since the medicine can be mixed with the food and released at a programmed time. Another advantage is that there are less moving parts and therefore fewer things to break.

It is our goal to create a new type of pet feeder which will solve both of the problems of providing food even when the owner is not home and preventing one pet from eating another pet's food. Based on the round type of feeder shown in Figure 4, our Smart Pet Feeder will hold enough food to feed an animal for several days. The bowl will rotate under the cover so that the food is always in the same location at feeding time.

The food will be revealed at the time which the owner programs and will remain available for the pet to consume at its own pace. Our feeder will, however, go one step further and actually prevent any one pet from eating a forbidden food. This will also allow the pet owner to place medication in the feeder and be sure that the pet that needs the medicine is the only one that will get it.

2.2 THE EVOLUTION OF SMART PET FEEDER CREATION

Pet food containers are important to feed them without having to put them everywhere without containers. the diagram 6.1 shows the development of a pet food feeder.
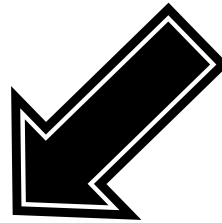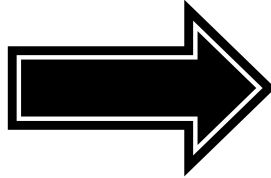
2.3 CRITERIA COMPARISON

Table 2.3 below shows the comparison of the criteria for Smart Pet Feeder available in the market.

Diagram	Characteristic	Problems	References
10.5 Automatic Pet Feeder	**-** Remote Controlling and Large LCD Control Panel, convenient for setting and programming - Dual power supply system (battery mode and rechargeable mode) with low power warning. -Flexible and Convenient Dispending: Supporting feeding 1-5 meals per day, selecting 1-12 portions for each meal.	-Use the remote -Can't use with the mobile app -Only use for one pet	Shopee.com.my
Alice Automatic Feeder	-Suitable for small cats and dogs -Brand IRIS/ALICE -Non-toxic material -Safety use -Premium quality	**-**Use manually -Cheap -Only use for one pet	Lazada.com.my

Pawple Automatic PetFeeder	-Worry free pet 'butler' -Customized convenience -User-friendly LCD display -Dishwasher-safe durability -Digital timer	-No mobile Application -No WIFI connection	Amazom.com
Rollipet Smart Pet Feeder	-can operate it from anywhere using smart phone, - it has a battery backup and has a camera	-The WIFI periodically resetting in the middle of the night -Not accessible for a long time -Only use for one pet only	Amazom.com

Table 2.3: Comparison of Criteria

2.4 METHODS OF MAKING SMART PET FEEDER

Step 1: Building the Circuit
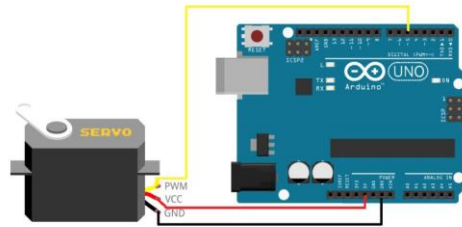
Figure 2.4.1: Simply connect the pins of servo motor to the Arduino.

The servo motor that we're using acts as a lid to the food container. Arduino is a well know and probably the most popular microcontroller which is the brain of this machine. The servo motor will rotate at a certain angle thereby opening and closing the lid. In short, we want a connection between servo motor and Arduino. The same has been shown in the diagram.

Step 2: Programming the Arduino

The program for this machine is one of the simplest programs that you've ever come across. To program it according to your needs, you must understand the following statements. Let's say you want to feed your cat thrice a day, each time with let's say a 50 grams probably. So the lid of food container should be open for a minute (considering usual dry cat food to be dispensed 50 grams). During this minute, the food will keep falling into your cat's bowl and the lid will close once the food in bowl reaches 50 gm. This process needs to be repeated. Now, let's assume that your cat eats at 7 AM, 2 PM and 9 PM. After every 7 hours during the day and after 10 hours of night. The file contains program to feed your pet with 50 gm of standard pet food at 7 AM, 2 PM and 9 PM.

Step 3: Design of the Feeder
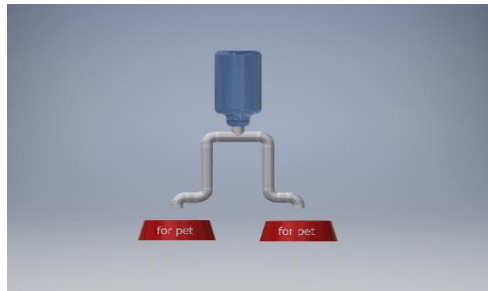
An idea for 3D printing design

Everybody has a lot of creative ideas to design the outer body of pet feeder. Well, I go with the
simplest one for the time constrains.

2.5 MATERIAL SELECTION

The process of material selection is one of the most important process in this final year project. The main factor of material selection is to discuss and finalized which materials that will be use in the project in order to avoid wasting of money and time. The material selection need to be done precisely so that the risks could be avoided.

1) Servo Motor

Figure 2.5.1: Servo Motor

A servo consists of a Motor (DC or AC), a potentiometer, gear assembly and a controlling circuit. First of all, we use gear assembly to reduce RPM and to increase torque of motor. Say at initial position of servo motor shaft, the position of the potentiometer knob is such that there is no electrical signal generated at the output port of the potentiometer. Now an electrical signal is given to another input terminal of the error detector amplifier. Now difference between these two signals, one comes from potentiometer and another comes from other source, will be processed in feedback mechanism and output will be provided in term of error signal. This error signal acts as the input for motor and motor starts rotating. Now motor shaft is connected with potentiometer and as motor rotates so the potentiometer and it will generate a signal. So as the potentiometer's angular position changes, its output feedback signal changes. After sometime the position of potentiometer reaches at a position that the output of potentiometer is same as external signal provided. At this condition, there will be no output signal from the amplifier to the motor input as there is no difference between external applied signal and the signal generated at potentiometer, and in this situation motor stops rotating**.**

2) Arduino UNO Rev 3

Figure 2.5.2: Arduino UNO Rev 3

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

The word "uno" means "one" in Italian and was chosen to mark the initial release of Arduino Software. The Uno board is the first in a series of USB-based Arduino boards it and version 1.0 of the Arduino IDE were the reference versions of Arduino, which have now evolved to newer releases. The ATmega328 on the board comes pre-programmed with a bootloader that allows uploading new code to it without the use of an external hardware programmer.

3) D-link IP Camera

Figure 2.5.3: D-link IP Camera

An Internet Protocol camera, or IP camera, is a type of digital video camera that receives control data and sends image data via an IP network. They are commonly used for surveillance but unlike analog closed-circuit television (CCTV) cameras, they require no local recording device, only a local area network. Most IP cameras are webcams, but the term IP camera or netcam usually applies only to those that can be directly accessed over a network connection, usually used for surveillance.

Some IP cameras require support of a central network video recorder (NVR) to handle the recording, video and alarm management. Others are able to operate in a decentralized manner with no NVR needed, as the camera is able to record directly to any local or remote storage media.

2.6 CHAPTER SUMMARY

As a conclusion, the four products that are listed are the product is having their own characteristics. Each product has advantages and also the weakness that can be improve to give the best for pets. Furthermore, these all product concentrate more on the bowl's function and design.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

What is methodology? A methodology is a plan-of-attack, especially when that plan-of-attack is used repeatedly. This might be obvious, but the word methodology is related to the word method. In fact, a methodology is a system of methods followed consistently. Scientists, for example, use various methodologies as they perform experiments. It might seem like the world is nothing but chaos and disorder. But actually, sometimes there is a method to this madness. And sometimes there's a methodology.

This chapter provides detailed explanation on the methodology of carrying out this project from beginning to the end. A detail related literature review was done and important information was required and explained in previous chapter. Therefore, in this chapter, rough idea of required parts and components are listed, measurements of each component is also determined accordingly. Sketches of each concept on cat feeder are done and only one of the concepts which full-fill target objectives is selected. Besides that, process of choosing materials and determination of machine for fabrication are also consists in this chapter. Lastly, this chapter also will look into the procedure of fabrication and assembly of a cat feeder.

At the first phase of the project, title of project is decided regarding discussion and consultation with project supervisor. Then, objectives and scopes of project are determined. After the determination of objectives and scopes, the project is further with searching information on literature review to strengthen the project objectives.

After searching information on literature review, documentation on chapter two is started. The literature review is used to define the rough idea of this new design of cat feeder. After the rough idea has been determined, sketching started to choose the concepts.

After the sketching, the final concept is selected based on the objectives and comparisons among each of the concepts. Then material of the concepts is verified and selected. After material have been chosen, tools and machine are determined to fabricate the cat feeder.

After the fabrication and assembly of the product, the cat feeder is used to testing the testing is document in result and discussion. Finally, this project is finished with conclusion and recommendation.

3.2 FLOW CHART

```
              ┌─────────┐
              │  Start  │
              └─────────┘
                   │
                   ▼
        ┌─────────────────────┐
        │  Material Selection │
        └─────────────────────┘
                   │
                   ▼
        ┌─────────────────────┐
        │  Material Purchase  │
        └─────────────────────┘
                   │
                   ▼
        ┌─────────────────────┐
        │  Method Selection   │
        └─────────────────────┘
                   │
                   ▼
        ┌─────────────────────┐
    ┌──▶│     Fabrication     │
    │   └─────────────────────┘
    │              │
    │      ( No )  ▼   ( Yes )
    │           ╱─────╲
    └──────────◀  Test ▶
                ╲ Run ╱
                 ╲───╱
                   │
                   ▼
        ┌─────────────────────┐
        │    Analysis Data    │
        └─────────────────────┘
                   │
                   ▼
        ┌─────────────────────┐
        │   Report Writing    │
        └─────────────────────┘
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                   ▼
              ┌─────────┐
              │   End   │
              └─────────┘
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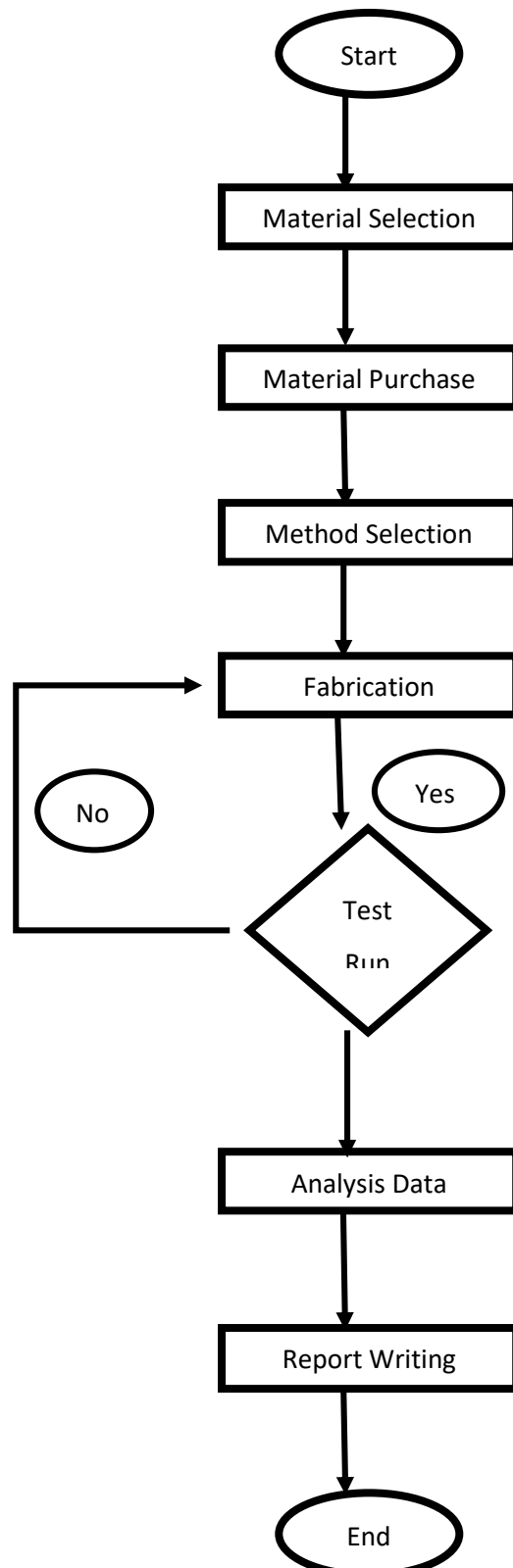
Figure 3.2.1 – Flow Chart

3.3 FLOW CHART EXPLAINATION

- **Material Selection**

The process of material selection is one of the most important process in this final year project. The main factor of material selection is to discuss and finalized which materials that will be use in the project in order to avoid wasting of money and time. The material selection need to be done precisely so that the risks could be avoided.

2) Servo Motor

Figure 3.3.1: Servo Motor

A servo consists of a Motor (DC or AC), a potentiometer, gear assembly and a controlling circuit. First of all, we use gear assembly to reduce RPM and to increase torque of motor. Say at initial position of servo motor shaft, the position of the potentiometer knob is such that there is no electrical signal generated at the output port of the potentiometer. Now an electrical signal is given to another input terminal of the error detector amplifier. Now difference between these two signals, one comes from potentiometer and another comes from other source, will be processed in feedback mechanism and output will be provided in term of error signal. This error signal acts as the input for motor and motor starts rotating. Now motor shaft is connected with potentiometer and as motor rotates so the potentiometer and it will generate a signal. So as the potentiometer's angular position changes, its output feedback signal changes. After sometime the position of potentiometer reaches at a position that the output of potentiometer is same as external signal provided. At this condition, there will be no output signal from the amplifier to the motor input as there is no difference between external applied signal and the signal generated at potentiometer, and in this situation motor stops rotating**.**

2) Arduino UNO Rev 3

Figure 3.3.2: Arduino UNO Rev 3

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

The word "uno" means "one" in Italian and was chosen to mark the initial release of Arduino Software. The Uno board is the first in a series of USB-based Arduino boards it and version 1.0 of the Arduino IDE were the reference versions of Arduino, which have now evolved to newer releases. The ATmega328 on the board comes pre-programmed with a bootloader that allows uploading new code to it without the use of an external hardware programmer.

3) D-link IP Camera

Figure 3.3.3: D-link IP Camera

An Internet Protocol camera, or IP camera, is a type of digital video camera that receives control data and sends image data via an IP network. They are commonly used for surveillance but unlike analog closed-circuit television (CCTV) cameras, they require no local recording device, only a local area network. Most IP cameras are webcams, but the term IP camera or netcam usually applies only to those that can be directly accessed over a network connection, usually used for surveillance.

Some IP cameras require support of a central network video recorder (NVR) to handle the recording, video and alarm management. Others are able to operate in a decentralized manner with no NVR needed, as the camera is able to record directly to any local or remote storage media.

- **Material Purchase**

The process of materials purchasing is crucial to collect and obtains all the materials needed. In this process a lot of research on the places and suppliers that the materials are going to be purchase is done. This step is important so that the risk of material wasting or money-loss will not happen. However, to carry out material purchasing, a well-made purchasing plan needed to be made. First, the suppliers will be contacted to make sure the availability of the materials. Then, the calculation of the amount of materials needed and also the price of the materials. After that, surveys of price must be carried out to determine the better selling prices. Then finally, the purchases could be made.

- **Method Selection**

This method selection process is important so that the method choose is accurate and suitable for the product. This method selection will avoid money-lost and time taking processes. Hence, it is important to carry out this method selection process. There are two methods that could be carried out:

1) Manually
2) Automatically

Does the method work

A lot of discussions, researches and experiments were carried out to find the most suitable method to carry out this smart pet feeder. Hence, it is decided to use it automatically. This is because, this method used automatically is easier to use by simply pressing the button inside the user's smartphone.

- **Test Run**

Test run is carried out to determine the strength and end result of the product.

- **Analysis Data**

  The process of evaluating data using analytical and logical reasoning to examine each component of data provided. This form of analysis is just one of the many steps tha

  t must be completed when conducting a research experiment. Data from the test run is gathered, reviewed and the analysed to form findings, discussions and conclusion. In this project the data collection is collected from the tensile strength of the material we created.

- **Report Writing**

  Report writing is one of the most crucial step in every project invented. It is important to make a report based on the project, test run and analysis so that future improvements nor expansion of knowledge could be done. Our report writing is based on the analysis and findings that we collected throughout this whole process of completing this project.

3.4 PRODUCT DESIGN

Figure 3.4.1 - Design

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	copling 5 cm	Pvc plumbing
2	2	copling 20cm	pvc plumbing
3	1	tee	pvc plumbing
4	6	elbow 90 degree	pvc plumbing
5	1	bottle	plastic 9.5 litter
6	2	plate for pet	plastic

FRONT
SCALE 1 / 4

DRAWN asus	10/4/2020			
CHECKED		TITLE		
QA				
MFG		smart pet feeder		
APPROVED				
		SIZE A4	DWG NO	REV
		SCALE 1 / 4	Assembly fyp gempaks drawing	
			SHEET 1 OF 1	
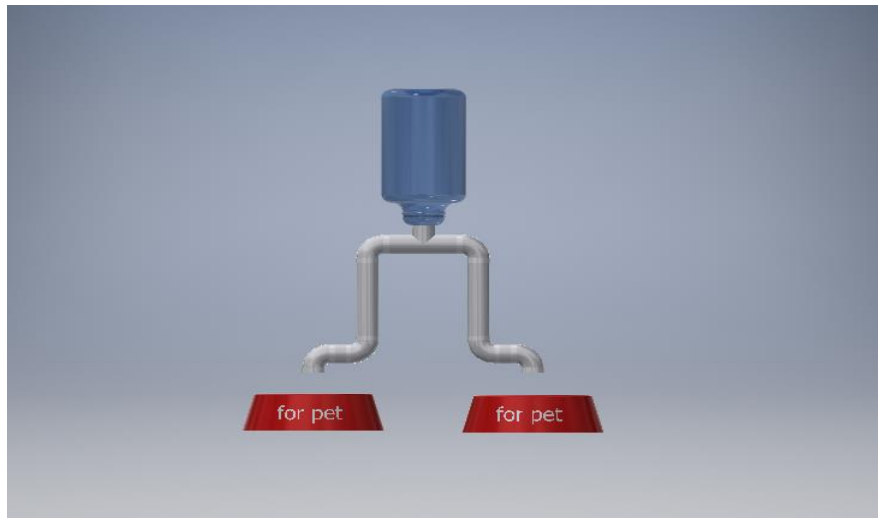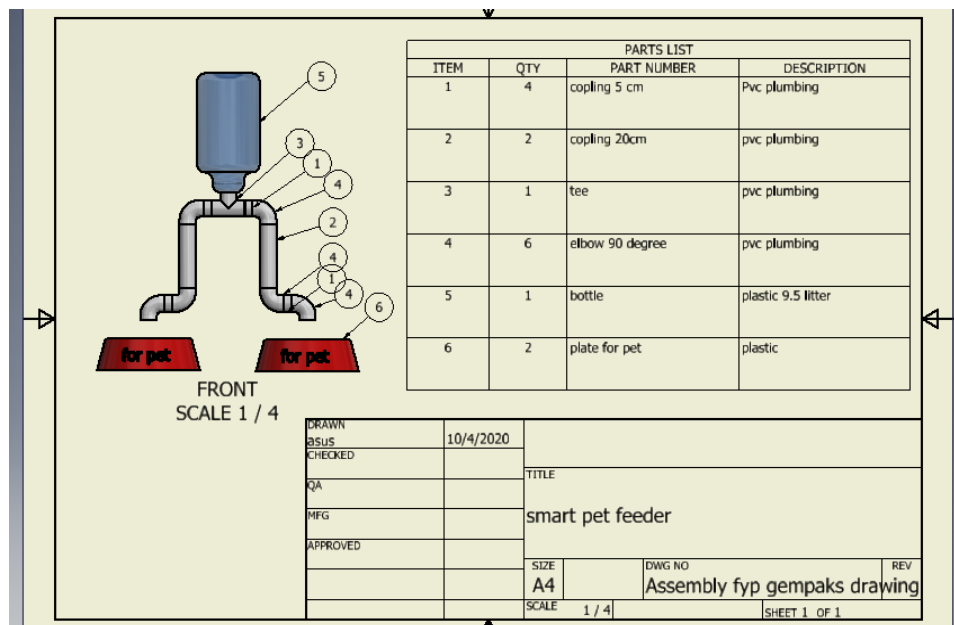
Figure 3.4.2: Design description

3.5 METHODOLOGY PHASE

To implement a project, it requires a method or procedure that specifically to implement the production process of a project. This process involves from the beginning got the project title.

Phase 1: Data analysis

Problem identification → Research planning → Information collected on a methodology → Function understanding

Research planning → Collected the respond from users → Function understanding

Phase 2: System design

Brainstorming on a new function

Function proposal ← Designing ← Function purpose desicion making

Economical cost comparison

Phase 3: Education

Project development → Project testing → Project correction → Project finishing

3.6 BUDGET CALCULATION

No	Materials / Equipment	Amount	Price
1.	Servo Motor	1 unit	RM 170
2.	Arduino Uno REV 3	1 unit	RM 200
3.	D-link IP Camera	1 unit	RM 180
4.	Wooden plate	1 box	RM 10
5.	Bottle	1 unit	RM 5
6.	PVC flexible coupling pipe	2 pcs	RM 10
7.	PVC Tee Pipe	2 pcs	RM 16
8.	Plate for Pet	2 unit	RM 5
9.	Breadboard	1 unit	RM 45
10.	Pet food	1kg	RM 20
		Total	RM 661

Table 3.6: Budget Calculation

3.7 PROJECT ACTIVITY

project Activity	weeks													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Briefing and Project Planning	🟩													
	🟥													
Project Design		🟩												
		🟥												
Material Selection			🟩											
			🟥											
Materials Purchase				🟩										
				🟥										
Method Selection					🟩									
					🟥									
Fabrication						🟩	🟩	🟩						
						🟥	🟥	🟥						
Test Run									🟩					
									🟥					
Analysis Data										🟩				
										🟥				

Activity														
Report Writing											🟩		🟩	
											🟥			
Video and Slide making												🟩		
												🟥		
PITEX preparations													🟩	
													🟥	
PITEX presentation														🟩
														🟥

Table 3.7.1: Project Activity

🟩 Planning

🟥 Actual

3.8 CHAPTER SUMMARY

In the initial stage, the study design, data collection methods, research instruments, data sampling techniques and data analysis methods are made systematically in the methodological study to know the facts and information to support the research instrument and describe more clearly in this study.

After the data analysis is done, it is important to make a conclusion or conclusion on the results and hypotheses that is whether the trap is effective or not.

CHAPTER 4

FINDINGS AND ANALYSIS

4.1 INTRODUCTION

In this chapter, the results of the analysis and findings of the study that has been done to achieve the objectives of the SMART PET FEEDER project will be explained.

4.2 QUESTIONNAIRE

Questionnaires were given to animal lovers among PSA students and employees. Among the items contained in the questionnaire are as follows:

1. Opinion on SMART PET FEEDER
2. Does SMART PET FEEDER help?
3. Suitable for marketing?
4. Is SMART PET FEEDER safe when used at home?
5. Are all ages suitable for use?

Before the questionnaire is asked, we first explain what a SMART PET FEEDER is and how it works.

➢ SMART PET FEEDER is an automatic animal feed machine that has ARDUINO UNO to make it easier to feed pets without thinking about our often busy time and a lot of work.

```
                    ┌──────────────┐
                    │    START     │
                    └──────────────┘
                            │
                            ▼
┌──────────────┐   ┌──────────────────┐   ┌──────────────┐
│  MANUALLY    │◀──│     ON THE       │──▶│  Automatic   │
└──────────────┘   │ APPLICATION THAT │   └──────────────┘
                   │   INSTALL IN     │
                   │   SMARTPHONE     │
                   └──────────────────┘
                            │
                            ▼
                   ┌──────────────────┐
                   │   SERVO MOTOR    │
                   │(to flow the food │
                   │ into the plate)  │
                   └──────────────────┘
```
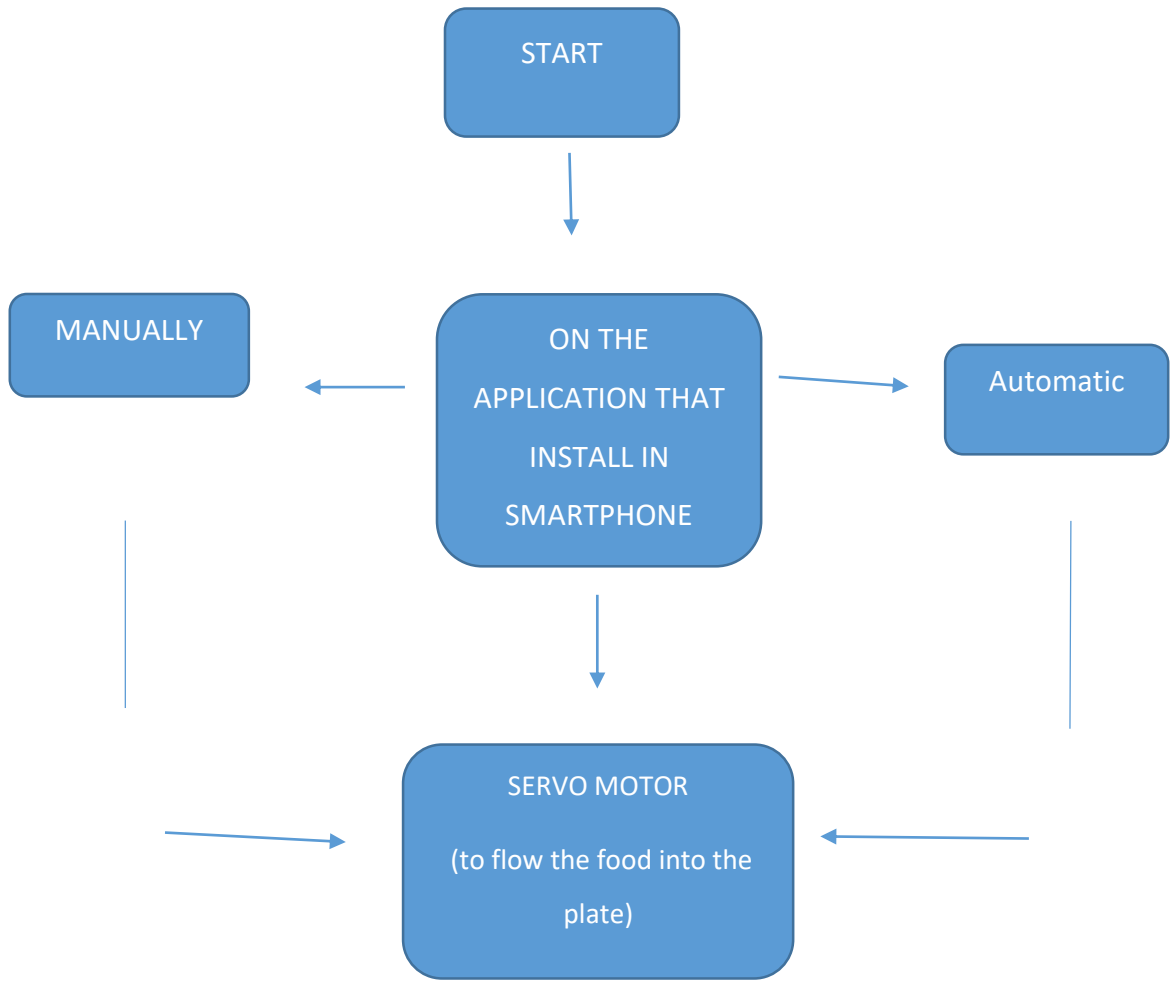
SMART PET FEEDER FLOW CHART

4.3 QUESTIONNAIRE ANALYSIS

➢ The results of this questionnaire were 15 respondents who answered. There are many excellent answers that show this project is very useful for pet lovers.
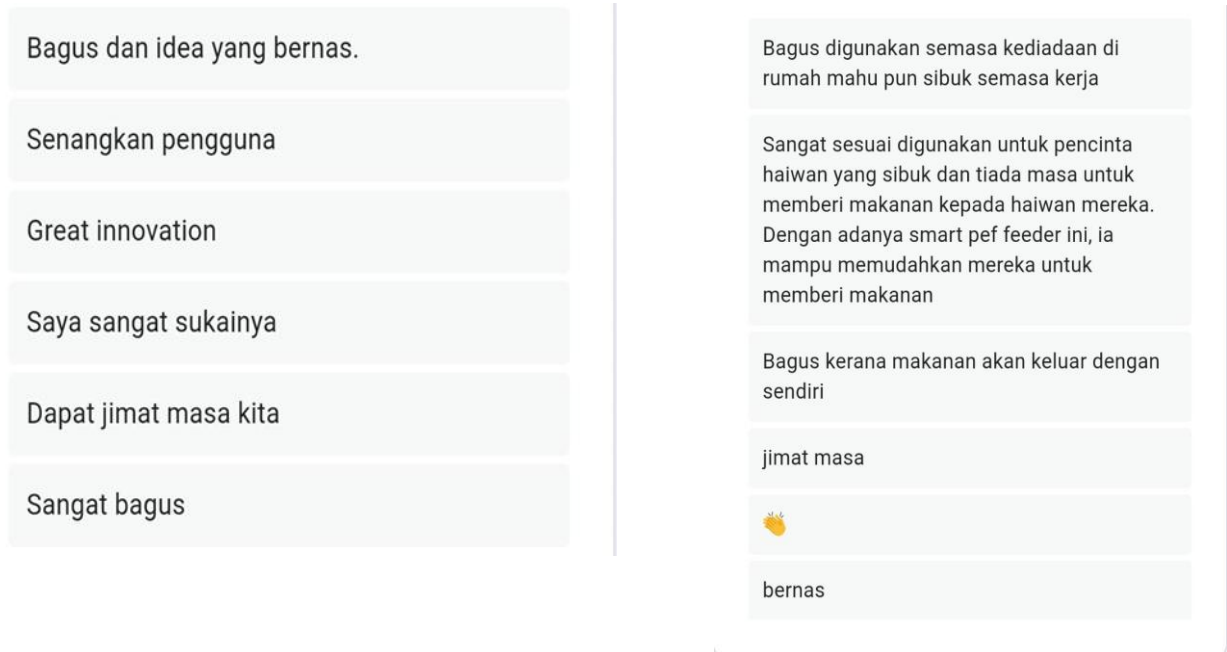

Bagus dan idea yang bernas.		Bagus digunakan semasa kediadaan di rumah mahu pun sibuk semasa kerja
Senangkan pengguna		Sangat sesuai digunakan untuk pencinta haiwan yang sibuk dan tiada masa untuk memberi makanan kepada haiwan mereka. Dengan adanya smart pef feeder ini, ia mampu memudahkan mereka untuk memberi makanan
Great innovation		
Saya sangat sukainya		Bagus kerana makanan akan keluar dengan sendiri
Dapat jimat masa kita		jimat masa
Sangat bagus		👏
		bernas

Figure 4.3.1: Questionnaire

Figure 4.3.1 shows that they are very satisfied with the production of SMART PET FEEDER. In addition, there are also those who give respondents directly where it states that it is easier for a person to do work during his absence at home because he is still able to feed pets. Secondly, he stated that it is able to give pleasure to the group of workers who have pets at home.

4.3.2 DO SMART PET FEEDER HELP PET LOVERS?

Adakah ia sangat membantu bagi anda ?
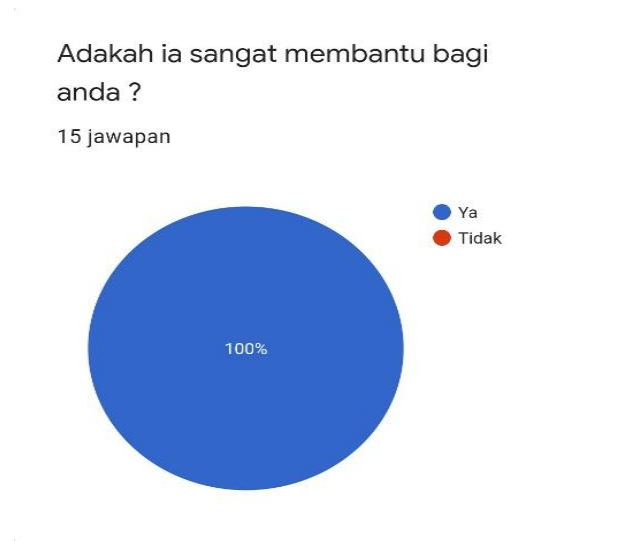
15 jawapan

- Ya
- Tidak

100%

Figure 4.3.2

Figure 4.3.2 shows a pie chart where 100% answered yes SMART PET FEEDER is very helpful for them because, this SMART PET FEEDER has apps that have been set to monitor the food quantity of pet food. The apps used are BYLINK. These apps need strong internet to work properly.
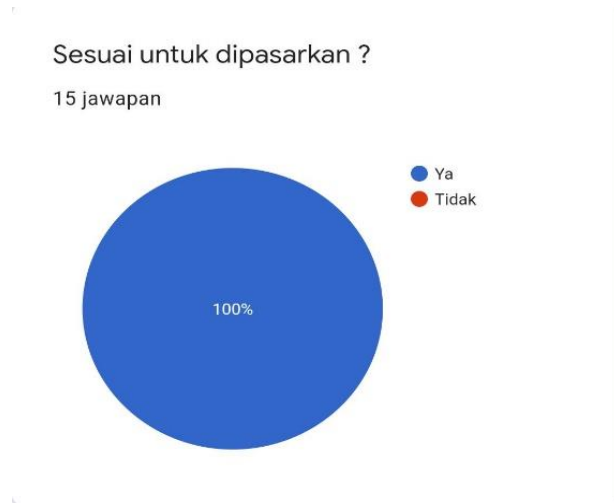
4.3.3 SUITABLE FOR MARKETING?

Sesuai untuk dipasarkan ?

15 jawapan

- Ya
- Tidak

100%

3) SESUAI UNTUK DIPASARKAN ?
-sangat sesuai untuk dipasarkan kerana memenuhi kehendak pelanggan.

Figure 4.3.3.1.   **Figure: 4.3.3.2.**

   Figure 4.3.3.i shows that 100% of the respondents stated that this SMART PET FEEDER is suitable to be marketed in the market. This is because, the design formed can attract the public, especially animal lovers from the PSA staff and it. Figure 4.3.3.ii one of the respondents has stated that SMART PET FEEDER meets the needs of users. Therefore, this SMART PET FEEDER can be comparable to existing products on the market.

4.3.4 Is SMART PET FEEDER safe when used at home?

Adakah SMART PET FEEDER
mempunyai keselamatan jika
digunakan di rumah?

15 jawapan

● Ya
● Tidak

100%

4) ADAKAH SMART PET FEEDER INI
MEMPUNYAI KESELAMATAN JIKA
DIGUNAKAN DI RUMAH ANDA ?
-Smart pet feeder ni mempunyai
sistem keselamatan yang terbaik.Hal
ini kerana,cctv tersebut mampu
memantau pergerakan haiwan
peliharaan semasa ketiadaan kita d
rumah

Figure 4.3.4.1.   **Figure 4.3.4.2.**

Figure 4.3.4 is a pa chart showing 100% of respondents marking yes. This proves that this
SMART PET FEEDER has high security for home use. Figure 4.3.4.ii is one of the respondents
who stated that this SMART PET FEEDER is safe when used at home because it has CCTV. The
CCTV we use is a sophisticated CCTV that has a 720p HD camera.

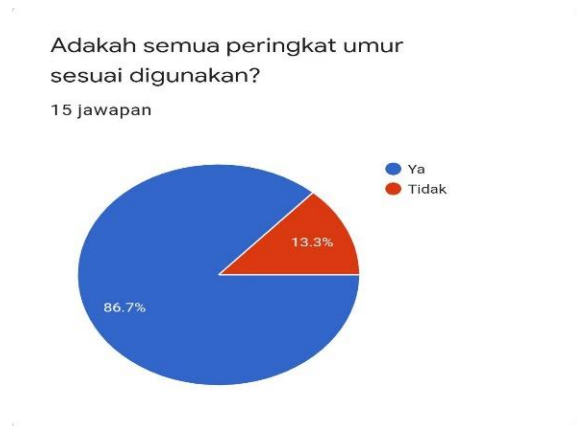### 4.3.5 Are all ages suitable for use?

Figure 4.3.5.1.

Figure 4.3.5.2.

Figure 4.3.5.i is a pie chart showing 86.7% answered yes, SMART PET FEEDER is suitable for all ages, which is 13 people. While two (2) respondents answered is not suitable for use by all ages. Figure 4.3.5.ii one of the respondents has stated that SMART PET FEEDER is suitable for use by all ages because it is easy to use.

4.4 ANALYSIS OF APPLICATIONS USED (BYLINK & MYDYLINK)

4.4.1 BYLINK

4.4.1 BYLINK

BYLINK is a platform for Mobile OS applications (IOS and Android) aimed at controlling Arduino modules. Table 4.4 and Figure 4.4 explain in more detail about the applications used.

| No.	Symbol	Explanation
1.	FEED TIME 1	To set food out the first time
2.	FEED TIME 2	To prescribe food at a second time
3.	DEC	Timing motor movement is faster
4.	INC	Timing of motor movement is slower
5.	PRESS ME	To be used manually for food out without setting a time.
6.	On / Off reference	Notify apps are connected to SMART PET FEEDER or not (red exclamation mark not connected, no red exclamation mark already connected)
7.	Level	Indicates the number of timing of motor movement

Table 4.4: BLYNK explanation
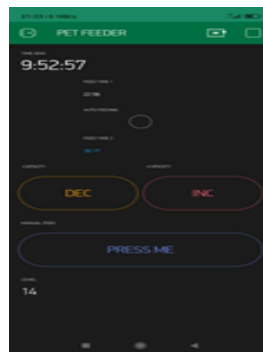
Figure 4.4: BYLINK application

4.4.2 MYDLINK

MYDLINK is a brand for a product, among the MYDLINK products are such as CLOUD CAMERA, CLOUD ROUTERS and CLOUD STORAGE. We use this MYDLINK for our CCTV.
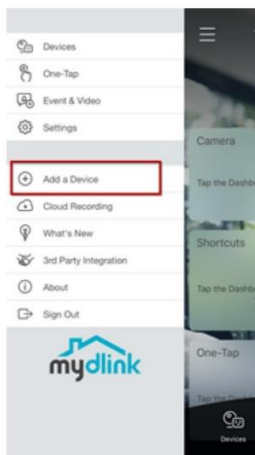
Step 1: Launch the mydlink app. Then tap Sign In.

Step 2: To log in to your account, enter your account and password. Then, tap Sign In to continue.
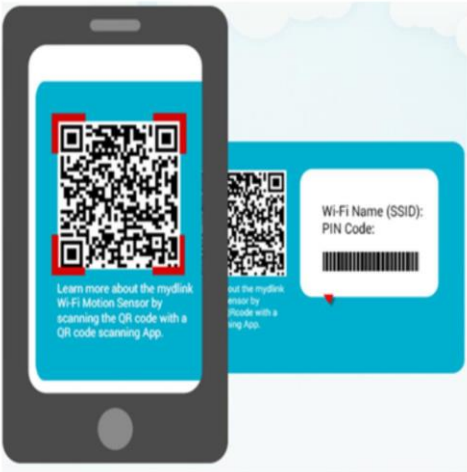
Step 3: Tap to toggle the ☰. Then tap Add a Device.

Step 4: Tap **Yes.**

Step 5: To scan a QR code, use the code on the label attached to the bottom of your device.

Step 6: Plug-in the power adapter and wait until the LED flashes orange, then tap Next.
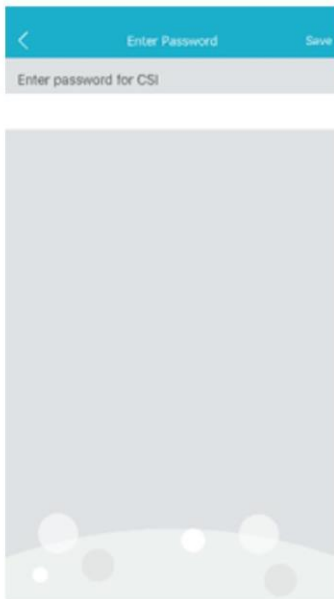

Step 7: Tap Choose Wi-Fi to setup network.
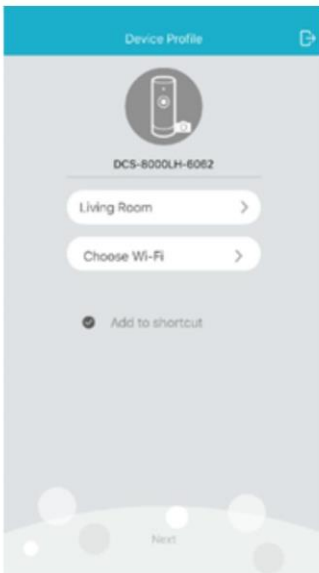
Step 8: Choose a Wi-Fi SSID to connect to your network.

Step 9: Enter the Wi-Fi password. Then tap Save.

Step 10: Tap Next.

Step 11: Wait to setup Wi-Fi for the device.

Step 12: Finish.
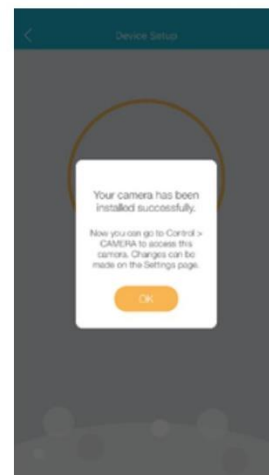
4.4.3 ADVANTAGES AND DISADVANTAGES OF APPLICATIONS USED

Applications	Advantages	Diasdvantages
BYLINK	- It is very easy to organize and can be done in less than 5 minutes. - Able to control remotely.	Requires strong internet
MYDLINK	Makes it easy for users to adjust the camera remotely.	Requires strong internet

Table 4.4.3: Advantages and Disadvantages of Applications used

Figure 4.4.3.1.: MYDLINK   Figure 4.4.3.2: BLYNK

4.5 MAINTENANCE AND REPAIR

Maintenance and repairs are important to carry out so that any errors or damage can be identified. Next, repair work can be carried out.

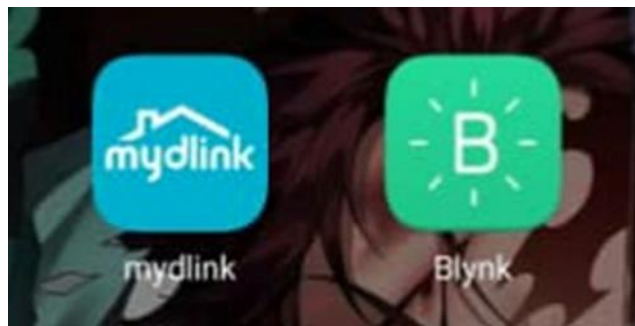| NO.	Reason	How to solve
1.	Servo Motor does not connect to BYLINK	Using high speed internet.

Table 4.5: maintenance and repair

Table 4.6 is a table that shows the causes of symptoms and ways to overcome them. This shows that maintenance and overhaul is very important to achieve project objectives.

4.6 ANALYSIS OF ANALYSIS AND RESULTS

After completing this project, we have conducted tests to determine the extent to which this project is functional and capable. Based on that, there are problems that have been identified.

Problem	Solution
The holes that have been drilled are too small which causes the food to drop too little and not as much.	. Enlarge the holes so that the quantity of food can go down regularly and equally

Table 4.6: Analysis and Result

4.7 CHAPTER'S SUMMARY

As a conclusion for this chapter, the analysis and findings have been made. This Smart Pet Feeder has a lot of advantages however there are every cons to pros. Hence, the challenges are taken as a room for improvements and more developments for future generation and well as to enhance their knowledge on the project we carried out. Test run is carried out to determine the fullest potential of pet feeder and it is proven that smart pet feeder easy to use.

CHAPTER 5

DISCUSSION, CONCLUSION, RECOMMENDATION

5.1 INTRODUCTION

This chapter explains about discussion , conclusion and recommendataion all together for the project . From the data from the test run of the project, the analysis have been done. Hence, the discussion from all the results of test run and analysis will be explain in this chapter. Then , the conclusion will be made based on the discussion and upgrade plan that have been made.

5.2 DISCUSSION

In planning an activity and work related to the project carried out, A group discussion to reach the best consensus has been made to ensure that the activity goes smoothly as planned and organized. Each week there will be a meeting with the project supervisor to discuss the latest developments related to the report as well as the progress of the planned project. 55 In addition, all the problems encountered such as project malfunction, problems to obtain information related to the project and so on are also voiced to get the best views and solutions from the views of our supervisors. All planning is done carefully. With this, the issues and developments of this project can be shared. All doubts and problems regarding the project are discussed at this time until a solution is reached by mutual agreement.

5.3 PROBLEMS FACED AND SOLUTIONS

No matter how good a person is or how perfect a person is, he will not run away from making mistakes and facing problems. Problem is a test to assess the extent of a person's patience and perseverance in facing the test. Similarly, when carrying out this project, there are some problems including from the aspect of making cording, design and choosing the appropriate electronic components to use.

5.3.1 PROBLEMS OF COORDING

Cording is the key aspect we need to create. This is because, we want to make a difference in the project that is there is IOT on the project. But we lack knowledge of cording. So, for the solution, we hired people to make our project cording. The cost to make the re-cording is RM550, but we have another maker, CCTV and it costs RM150. The total cost for cording is RM700. This way, our project can go smoothly.

5.3.2 DESIGN PROBLEMS

Initially, we were ready for the mechanical part. Figure 5.2.2.1 shows the completed mechanical parts. But, after we talked to the more knowledgeable, he told us that our design was too big and most likely the food could not go down well. Therefore, we have changed the design to the recommended one. Figure 5.2.2.2 is the design we have corrected.

Figure 5.3.2.1.   **Figure 5.3.2.2.**

5.3.3 PROBLEMS OF CHOOSING ELECTRONIC COMPONENTS

In this project, there are electronic components required. We have done a search for what components need to be used on our project. However, we are confused as to whether the components we have wanted to use are correct or incorrect. So we had a discussion with the supervisor about the components we wanted to use.

5.3.4 OTHER PROBLEMS

During the process of designing a project, many aspects need to be taken and emphasized so that the product produced is able to achieve the desired purpose and satisfy the tastes of consumers. For example, in the production of this final project product, "SMART PET FEEDER", many aspects need to be taken into account. Among them are:

    a) Reasonable price
    b) Products that are useful to consumers
    c)   Quality
    d) Manufacturing costs
    e) The process involved

In addition, there are also several factors that need to be taken into account and emphasized so as not to experience any problems in operating the tool. The features that need to be specified are as follows

    a) Non-complicated handling method.
    b) Easy to use and facilitate barrier transfer work.

CONCLUSION

This project brought together several components and idea to achieve a common goal that is design an automated pet feeder using Arduino UNO. the key components of the project include a servo motor sensor which will be programmed to serve the food as soon as the pet comes. It relieves the owner from having to feed his pet multiple times a day. The proposed project senses the presence of the pet using the WIFI which is the consumers can watch their pets through the smartphone and serves accordingly. The owner does not have to worry about making plans or feeding his pet because of this smart pet feeder. This automatic pet feeder serves as a helping hand as it works efficiently in the absence of the own.

Through this project, it helps to develop creativity in crating projects and modify existing projects to be more energy efficient with new fabrication methods. This smart pet feeder innovation makes it easy for consumers to feed their pets and will not leave their pets hungry again. The effectiveness of the project used while feeding pets requires CCTV to make it easier for users to see their pets inside the mobile device. This indicates that the project has the potential to be extended to external agencies to expand its use. It is recommended that the promotion to be carried out for commercialization purpose.
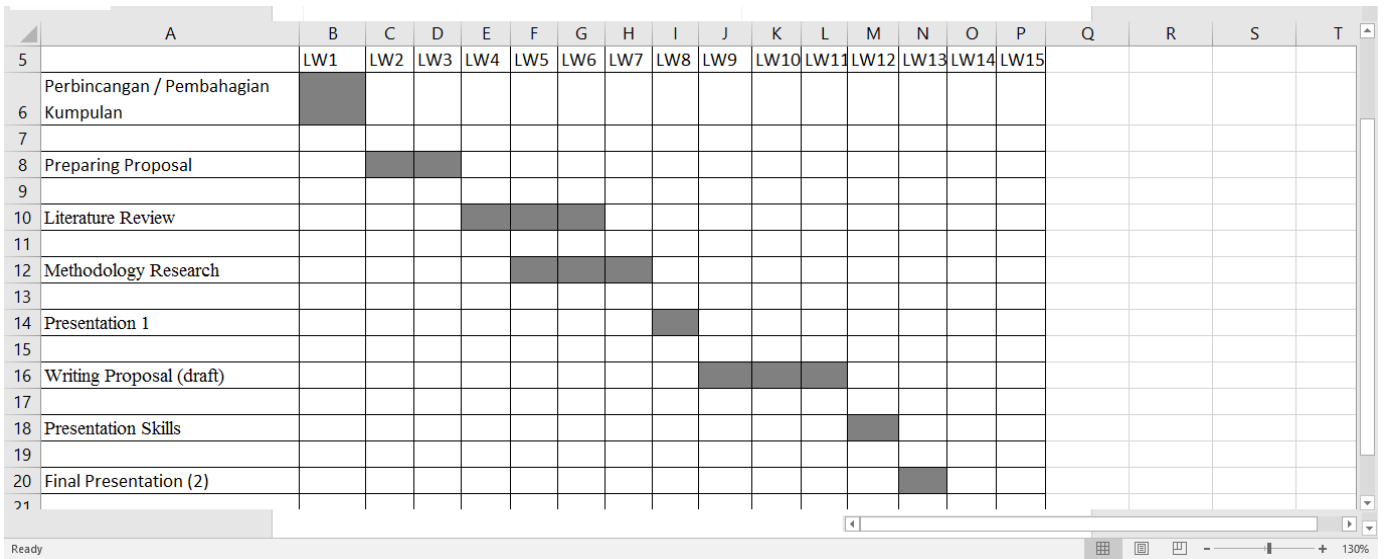
RECOMMENDATIONS

After completing the SMART PET FEEDER, we were able to formulate and quote some of our suggestions and views after seeing and knowing the results. Among the following suggestions are:

a) Understand in more detail and in depth about the field of the project to be done.
b) Obtain views from those who are more knowledgeable and experienced before starting the project work.

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APPENDICES

	LW1	LW2	LW3	LW4	LW5	LW6	LW7	LW8	LW9	LW10	LW11	LW12	LW13	LW14	LW15
Perbincangan / Pembahagian Kumpulan	▓														
Preparing Proposal		▓	▓												
Literature Review				▓	▓	▓									
Methodology Research					▓	▓	▓								
Presentation 1								▓							
Writing Proposal (draft)										▓	▓	▓			
Presentation Skills												▓			
Final Presentation (2)													▓		

Appendix 1: Gant Chart Project 1

DJJ6143 Project 2 Planning (Session - June 2020)

	Topic	Week												
		LW1	LW2	LW3	LW4	LW5	LW6	LW7	LW8	LW9	LW10	LW11	LW12	LW13
1	Project Brainstorming	■												
2	Project Fabrication & Assembly		■	■	■	■	■	■	■	■	■	■		
3	Project Progress Presentation							■	■					
4	Complete Project and Testing							■	■					
5	Complete Draft Report											■	■	
6	Final Project Presentation													■
7	Final Report Submission													

Appendix 2: Gant Chart Project 2