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Development of Mammals Tank Feeders of Pallet Type Diet for Eight Days

BATRISYIA NUR SAADAH BINTI MD SHARIN
B091910042

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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Batrisyia Nur Saadah binti Md Sharin

Bachelor of Mechanical Engineering Technology (BMMV) with Honours

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BATRISYIA NUR SAADAH BINTI MD SHARIN

A thesis submitted
in fulfillment of the requirements for the degree of
Bachelor of Mechanical Engineering Technology (BMMV) with Honours

اونيۏرسيتي تيکنيکل مليسيا ملاک

Faculty of Mechanical and Manufacturing Engineering Technology

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2023

DECLARATION

I declare that this project entitled Development of Mammals Tank Feeders of Pallet Type Diet for Eight Days is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :

Name : BATRISYIA NUR SAADAH BINTI MD SHARIN

Date : 20/01/2023

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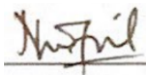
APPROVAL

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the Bachelor of Mechanical Engineering Technology (BMMV) with Honours.

Signature : 

Supervisor Name : DR. NURUL AMIRA BINTI ZAINAL

Date : 20/01/2023

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DEDICATION

In the name of Allah S.W.T, the most gracious and merciful,

I dedicate this project to my beloved parents,

Md Sharin Bin Adam & Faridah Binti Ibrahim

and family that always support me.

Not to be forgotten, my supervisor,

Dr. Nurul Amira binti Zainal

and Co. Supervisor,

Ts. Mohd Kamal bin Musa

for guiding me through this PSM.

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ABSTRACT

The summary of this paper is to recommend an appropriate tank size to supply kibbles for eight days (extended holiday season) at the same time to prove the concept, dimensions of the discharge hole are maximized, and the bottom surface of tank is inclined to avoid kibbles from getting stuck at once to provide balance diet that can ensure pets are in good health, followed by veterinary. While the owner is away or otherwise occupied, an automatic pet feeder is provided to feed pets a predetermined amount of food at predetermined times. Scope for this project is Pet Care which include Pet Studio and Pet hotel that keep animals in large numbers. This is because this place keeps the most animals compared to individual keepers, so they need a suitable pet feeder than individual caregivers. A construction of suitable tank for dry type diet and feeder for cat that is common pet in Malaysia is needed. The problem that pets owner always faces are spoil kibbles and pallets always stuck in the hole of dispenser because of improper tank shape. Furthermore, common latest feeder maximum lasts for four days only and this is not suitable for owner that want to travel more than four days. As a result, the height of tank and the stability of the tank is also taken into consideration. The method that used in this project is by conducting survey to find customer requirements followed by Axiomatic Design, House of Quality, Morphological Chart, and Pugh Method. Next, the AutoCAD 2020 software is used to design and rendering**.** Measuring process, cutting process, wiring, and coding (programming) are process that involved in this study.

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ABSTRAK

Ringkasan projek ini adalah untuk mengesyorkan saiz bekas yang sesuai untuk membekalkan kibbles selama lapan hari (musim cuti panjang) pada masa yang sama untuk membuktikan konsep, dimensi lubang pelepasan dimaksimumkan, dan permukaan bawah bekas yang cerun untuk mengelakkan kibbles daripada tersekat sekali gus untuk menyediakan diet seimbang yang boleh memastikan haiwan peliharaan berada dalam keadaan sihat, diikuti oleh veterinar. Semasa pemilik tiada atau sedang sibuk, penyuap makanan haiwan automatik yang disediakan untuk memberi haiwan peliharaan dengan jumlah makanan pada masa yang telah ditetapkan. Skop untuk projek ini ialah pusat penjagaan haiwan yang merangkumi studio haiwan dan hotel haiwan yang memelihara jumlah haiwan yang banyak. Hal ini kerana tempat ini memelihara lebih banyak haiwan berbanding dengan pemelihara individu, maka mereka memerlukan lebih banyak penyuap makanan haiwan automatik daripada pemelihara individu. Seterusnya, pembuatan bekas yang sesuai untuk diet jenis kering dan penyuap untuk kucing yang menjadi haiwan peliharaan biasa di Malaysia.Masalah yang selalu dihadapi oleh pemilik haiwan peliharaan ialah apabila kibbles rosak dan palet sentiasa tersangkut di dalam lubang keluar kerana bentuk bekas yang tidak sesuai. Tambahan pula, penyuap makanan haiwan automatik yang terkini hanya boleh memberi makan selama empat hari sahaja dan ini tidak sesuai untuk pemilik yang ingin melakukan perjalanan lebih daripada empat hari Keputusannya, ketinggian bekas dan kestabilan bekas juga diambil kira. Kaedah yang digunakan dalam projek ini adalah dengan membuat tinjauan bagi mencari keperluan pelanggan diikuti dengan Reka Bentuk Aksiomatik, House of Quality, Carta Morfologi dan kaedah Pugh. Selain itu, menggunakan AutoCAD 2020 untuk proses reka bentuk dan persembahan. Antara proses pembuatan termasuklah proses mengukur, proses pemotongan, pendawaian, dan pengkodan.

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LIST OF SYMBOLS AND ABBREVIATIONS

IoT	-	Internet of Things
RFID	-	Radio Frequency Identification
RF	-	Radio Frequency
Wi-Fi	-	Wireless Fidelity
HD	-	High Definition
LF	-	Low Frequency
HF	-	High Frequency
UHF	-	Ultra High Frequency
VR	-	Variable Reluctance
PM	-	Permanent Magnet
HOQ	-	House of Quality
QFD	-	Quality Function Deployment
Acs	-	Air Conditioner
IDE	-	Integrated Development Environment
UNO	-	Universal Network Objects
int	-	Initial/Integer
var	-	Variable
val	-	Value
USB	-	Universal Serial Bus
UART	-	Universal Asynchronous Receiver/Transmitter
USART	-	Universal Serial Asynchronous Receiver/Transmitter
RM	-	Ringgit Malaysia
m	-	Meter
cm	-	Centimeter
cm3	-	Cubic Centimeter
Inch	-	Inches
mm	-	Milimeter
mm3	-	Cubic millimeter

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kHz	-	Kilohertz
MHz	-	Megahertz
V	-	Volume
π	-	Pi
d	-	Diameter
h	-	Height
tan	-	Tangent
Θ	-	Theta
°	-	Degree
%	-	Percent
S	-	Same
△	-	Weak Scale in HOQ
○	-	Medium Scale in HOQ
⊙	-	Strong Scale in HOQ
+	-	Positive
++	-	Strong Positive
-	-	Negative
--	-	Strong Negative
0	-	No effect
+1	-	More than baseline/Datum
-1	-	Less than baseline/Datum
0	-	Same as Datum
▲	-	Maximum Target
◇	-	Actual Target
▼	-	Minimum Target

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CHAPTER 1

INTRODUCTION

1.1 Background

Most people now have pets at home. This pet must be properly cared for. Their mealtime is essential because they have become family members. Some people, on the other hand, fail to pay attention to their pets because they are too busy to feed them on time. The study to construct conceptual design for tank Smart Pet Feeder is introduced in this paper to handle the following problem and ensure that the pet is fed on time. This conceptual design feeder is consisting with parameters such as shape, size and how the dispenser work. Application of wireless system also needed to control dispenser part with variation of type. The Smart Pet Feeder includes an auto-generated mechanism that can feed their pet at the chosen time and specific quantity. Pet owners do not have to be with their pets all the time to feed them using this device. Owners can even work outside without having to worry about the pet. *(Trautner, 2017)*

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1.2 Problem Statement

Being preoccupied with our everyday routine leads to a life that is less ordered. As a result, people will neglect other responsibilities, such as pet care. Animal health should be taken care of so that future issues do not arise. In Malaysia, there is 11 public holidays that do not include with working leave which is employees who have worked for 1 until 2 years receive 8 days per year, those who have worked for 2 to 5 years receive 12 days per year, and those who have worked for more than 5 years receive 16 days per year. Most of the time,

pets are unable to accompany their owners on vacations due to a variety of factors, including a lack of space in the car, inability to enter the hotel, and so on. Furthermore, keeping people preoccupied with their work to the point that they don't have time to care for the pets can result in pets being unhappy and hungry. In this situation, the plan to study about this design can solve all the concerns described. *(Jennifer, 2021)*

To pour an accurate amount of kibble, the pet feeder must have a detector or timer that can pour the food at the perfect period. Furthermore, the information gathered by each sensor from the wireless system is processed and displayed on a smartphone app. This is common wireless system that many users use which is Arduino, IoT and many others. Thus, pet owners may access all information about their pet's food, as well as defecation timing, duration, and frequency for pet to eat. Additionally, this application can solve the problem that users always face. *(Yixing, 2020)*

Besides, many feeders have the same and main objective that is long due issue, but standard and latest pet feeder only can supply food in just four days only. Thus, the tank and the shape of the feeder must be considered and was the important issue that should be solve. This paper aim is to supply kibble and pallet type diet for more than a week so that the pet owner can travel or have a long holiday and vacation without to worry about the pet when they send to an animal care center.

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1.2.1 Tank Size

Automatic pet feeder is the generous idea ever and this show that the world is modest with technologies. There are many technologies that today people use such as automatic pet feeder but there is many issues and problem that pets lover face even the technologies are already as sophisticated as possible which is health of the pets affected due to suffer from excessive obesity. Thus, the size of the tank play an important role. The bigger the better but

with ideal dimensions to stabilize the tank. This tank also suits for long holiday or long vacation. *(Jie, 2021)*

1.2.2 Kibbles Stuck

This is also main issue that must be optimize and improve because shape of tank affected the excess amount of food that leave in the container or tank. Due to this issue percent of the pet's food wasted keep rising at once it was wasting the money to buy pets food often in the short time. Another part is the pet's owner must take the excess food manually to avoid it from expired in the container. So, it was not easy and troublesome sometime. Then, the shape of the tank must be perfect for the food to fall easily into pet's bowl. *(Nadia, 2013)*

1.2.3 Unhealthy Pet

Depending on the size of the pet, different amounts of food and nutrients will be required. Nowadays, even when the pets eat it, majority of the pets will get obesity and stomachache. Pets is sensitive creature so pet's lover should care their pets as best as they could. Due to this problem, percent of the pet's death continue to increase. With appropriate dimensions of the smart feeder, the food will be fine. *(Johnston, 2000)*

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With engineering concept, it improves the utility of the product as effective and efficient as possible. To ensure smooth operation, nutrition time, food amount, and the most up-to-date engineering characteristics are applied. This would benefit not only the pet, but also the owners, as they would spend less time maintaining this pet feeder. Finally, all these problems may be able to solve by recommended pet feeding tank.

1.3 Research Objective

Based on the project background and problem statement has been stated above, specifically, the research of this project is organized and represented to achieve the objectives are as follows:

a) To recommend an appropriate tank size to supply kibbles for eight days (Extended holiday season).

b) To prove the concept, the dimensions of the discharge hole are maximized, and the bottom surface of the tank is inclined to avoid kibbles from getting stuck.

c) To provide a balance diet that can ensure pets are in good health, followed by veterinary.

1.4 Scope of Research

The scope of this research are as follows:

- Pet feeder for mammalia (cat) that is common mammals pet in Malaysia.
- Construct tank that suitable for dry type diet which is kibble and pallet
- Investigation at animal care center such as pet hotel, pet house and pet studio at Negeri Sembilan, Melaka, Johor and Kuala Lumpur through survey.

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

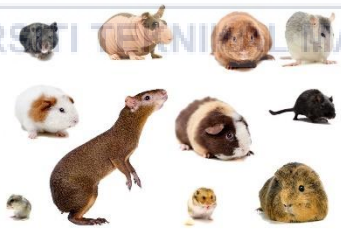
The primary purpose of this project is to serve as a convenient tank for providing food to pets. In this chapter it will revise about classification of mammal's pet, automatic pet feeder redesign, pet diet, product selection, tank, dispenser mechanism and design specification. The mammals are a lovely creature that can be both calming to own and entertaining to watch like cat. However, as a species, we all have other concerns and important tasks to attend to, which may cause pets owner to forget to feed the pets or just lack the time to do so. Because of this the owners cannot focus on daily life due to sleepy and daytime drowsiness. So, they can bring the pets to animal care center. The Automatic Pet Feeder is very function when the owner of the pets went to trip or holiday. This investigation and research allow the pet's lover to feed the pet enough food without worrying the time at once the pet's owner will have a freedom and relaxing day on their vacation.

Most of the time, pets are unable to accompany their owners on vacations due to a variety of factors, including a lack of space in the car, inability to enter the hotel, and so on. Every pet also has their own way to live such as there is pet that have high immune and there are certain pets that have low immune which can category by health issue and different pets have a different type of food like when they eat? What type of food that they eat? Dry or wet? With this investigation, the owner can set the suitable amount of food for their pet with accurate time without the occurrence of food waste. So, in this chapter will explain about each existing product from old to latest. *(Ministry of Manpower, 2022)*

2.2 Classification of Mammals Pet

Mammals have been classified into orders depending on their characteristics and features. Scientists are still attempting to determine the relationship between various species. All mammals share three characteristics not seen in other animals. They have three middle ear bones, hair, and milk yield for their young. Mammalian species number around 5,000. Mammals have been classified into around 26 orders based on their traits and structure. Prototheria, Metatheria, and Eutherian are the three subclasses of mammals. The Prototheria subclass has only one order, Monotremes. Monotremes are so unlike to other mammals that experts believe they are descended from a separate reptile origin. This group includes the duck-billed platypus. Metatheria is a subclass of marsupials. Eutherian is the largest subclass of mammals, with 19 orders. But there are only certain mammals that can we pet like stated in the Table 1. *(Hamsphire PBS, 2022)*

Table 2.1: Taxonomy of mammal's pet

Taxonomy	Example	Sample Trait
Rodentia	 **Figure 2.1: Rodents**	• Rodents is under Eutherian class of mammals. • Porcupines, gophers, mice, and squirrels are among the rodent species. • They have teeth designed specifically for gnawing. Their top and lower incisors are sharp and chisel-like,

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