Faculty of Electrical and Electronic Engineering Technology

SOLAR POWERED AUTOMATIC CAT FEEDER

FATIN NATASHA BINTI MOHAMED HARIP

Bachelor of Electrical Engineering Technology with Honours

2023

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A project report submitted in partial fulfillment of the requirements for the degree of Bachelor of Electrical Engineering Technology with Honours

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI TEKNOLOGI KEJUTERAAN ELEKTRIK DAN ELEKTRONIK

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : SOLAR POWERED AUTOMATIC CAT FEEDER

Sesi Pengajian : SEM 1 2022/2023

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DECLARATION

I declare that this project report entitled “Solar Powered Automatic Cat Feeder” 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	:	NATASHAHARIP
Student Name	:	FATIN NATASHA BINTI MOHAMED HARIP
Date	:	04/01/2023

APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electrical Engineering Technology with Honors.

Signature :

Supervisor Name : DR AZHAN BIN AB RAHMAN

Date : 04/01/2023

DEDICATION

Alhamdullilah and Thanks to Allah s.w.t for bestow me a chance to complete my final project with ease and according to time provide by supervisor and faculty

To my dedicated and beloved parents, thank you for the love, encouragement, affection and doa' you have given me

To my supervisor, my outmost appreciation for always inspire me to complete this final project and also, for the non-stop counsel and advice throughout expedition

Along with all hard working and respected Lecturers and Friends

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ABSTRACT

Having pets such cats, which are of different breeds, is now an interest that might cost thousands of ringgit. However, most of the cat's owner are usually busy with their daily works and the cats will be left alone and might be starving at home. To overcome this problem, solar powered automated cat feeder was developed in this project. This machine is constructed and designed simply to save owners time and energy when feeding their cats without the presence of the owner. Solar powered Arduino UNO Rev3 and servo motor is used as the automated components, which is placed in a container to provide the cat food when certain requirements are met. Internet of things in terms of ThingSpeak is also used so that the owner will be able to monitor each time the feeding process occurs. This project started with simulation with positive results gathered. Once the hardware fabrication is completed, four different analysis are performed; Radio Frequency Identification (RFID) distance detection, servo motor opening periods, effectiveness of ThingSpeak and Pushover notification and Solar PV battery charging process. Results from the four analysis indicates the funcionality of this project. It is expected that the success of this work will provide a viable feeding method for busy cat owners.

ABSTRAK

Mempunyai haiwan peliharaan seperti kucing yang berlainan baka kini menjadi minat yang mungkin menelan belanja ribuan ringgit. Walau bagaimanapun, kebanyakan pemilik kucing biasanya sibuk dengan kerja harian mereka dan kucing akan ditinggalkan bersendirian dan mungkin kelaparan di rumah. Untuk mengatasi masalah ini, pengumpan kucing automatik berkuasa solar akan dibangunkan dalam projek ini. Mesin ini dibina dan direka semata-mata untuk menjimatkan masa dan tenaga pemilik semasa memberi makan kucing mereka tanpa kehadiran pemiliknya. Arduino UNO Rev3 berkuasa solar dan motor servo digunakan sebagai komponen automatik, yang diletakkan di dalam bekas untuk menyediakan makanan kucing apabila keperluan tertentu dipenuhi. Internet of things dari segi ThingSpeak juga digunakan supaya pemilik akan dapat memantau setiap kali proses penyusuan berlaku. Projek ini dimulakan dengan simulasi dengan hasil positif yang dikumpulkan. Setelah fabrikasi perkakasan selesai, empat analisis berbeza dilakukan; Pengesanan jarak Radio Frequency Identification (RFID), tempoh pembukaan motor servo, keberkesanan pemberitahuan ThingSpeak dan Pushover dan proses pengecasan bateri Solar PV. Keputusan daripada empat analisis menunjukkan kefungsian projek ini. Diharapkan kejayaan kerja ini akan menyediakan kaedah pemakanan yang berdaya maju untuk pemilik kucing yang sibuk.

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LIST OF SYMBOLS

˚C	-	Degree Celcius
V	-	Voltage
mm	-	Milimetre
kg	-	Kilogram
kWh	-	KiloWatt/hour
π	-	Pie
pH	-	Potential hydrogen

LIST OF ABBREVIATIONS

IoT	-	Internet of Thing
LED	-	Light Emitting Diode
RFiD	-	Radio-frequency identification
DoD	-	Depth of Discharge
PSH	-	Peak Sun Hour
DFD	-	Data Flow Diagram
Wi-Fi	-	Wireless Fidelity
BDP	-	Bachelor Degree Project

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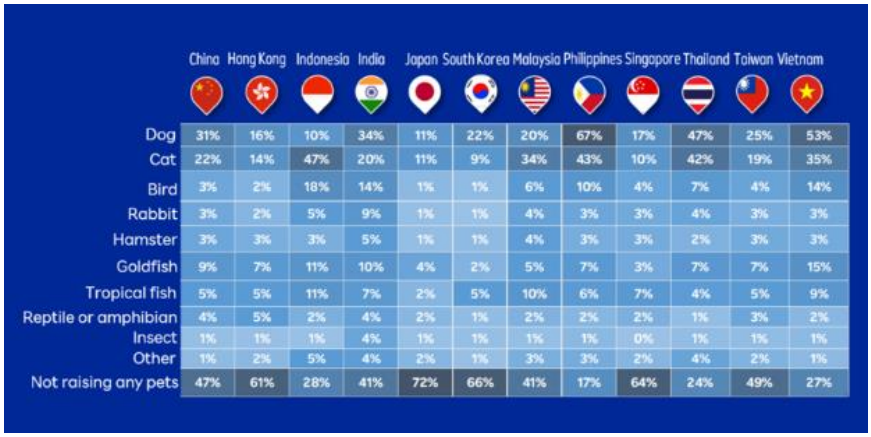
CHAPTER 1

INTRODUCTION

1.1 Background

Why are there so many individuals who keep pets? Pets are kept for a variety of reasons. Some individuals maintain pets for their physical appeal, while others retain pets for companionship or for their playfulness or other distinctive personalities and features. While the majority of animal lovers love the bonding and entertainment their pets offer, few are aware of the other advantages too. Pets can aid in the alleviation of anxiety and depression of their owners. There is a research of the person whom kept a pet in their household that could decreased their cholestrol, blood pressure, and triglyceride levels [1]. Other than that, the person who has a pets are more likely having good mood instead of facing a lot of depression and a person who has Alzheimer were experiencing a decreasing of anxiety [1].

There are also a few type of animals that would be a preference to be a pet such as dogs, cats, fishes, hamsters, birds, rabbits and so many more. Based on the research that had been done in Asia, the dog were having a high demand in the Republic of the Philiphines as the percentage is 67% of the population existed. While the cat were very popular in the Republic of Indonesia as it has the highest percentage of having cats at the percentage of 47%. Next is our country, which were stated that most of Malaysian are keeping a cat as a pet for about 34%. This is an obvious result due to the citizen of each country which is nominated by Muslim, they would prefer to choose cats rather than dogs as a pet. All of these statement can be refer in a Figure 1.1 below.



	China	Hong Kong	Indonesia	India	Japan	South Korea	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam
Dog	31%	16%	10%	34%	11%	22%	20%	67%	17%	47%	25%	53%
Cat	22%	14%	47%	20%	11%	9%	34%	43%	10%	42%	19%	35%
Bird	3%	2%	18%	14%	1%	1%	6%	10%	4%	7%	4%	14%
Rabbit	3%	2%	5%	9%	1%	1%	4%	3%	3%	4%	3%	3%
Hamster	3%	3%	3%	5%	1%	1%	4%	3%	3%	2%	3%	3%
Goldfish	9%	7%	11%	10%	4%	2%	5%	7%	3%	7%	7%	15%
Tropical fish	5%	5%	11%	7%	2%	5%	10%	6%	7%	4%	5%	9%
Reptile or amphibian	4%	5%	2%	4%	2%	1%	2%	2%	2%	1%	3%	2%
Insect	1%	1%	1%	4%	1%	1%	1%	1%	0%	1%	1%	1%
Other	1%	2%	5%	4%	2%	1%	3%	3%	2%	4%	2%	1%
Not raising any pets	47%	61%	28%	41%	72%	66%	41%	17%	64%	24%	49%	27%

Figure 1-1: Percentage of pets in Asia as it was stated Malaysia has 34% of cats as a pet

Since cats are are favorable here, it is not simple as it seem to keep a pet since they need to be fed daily and need to take a good care of their health is just as important as humans. The type of food that are suitable for them definitely cat's kibble. Some of the owner will make homemade cat's food by using fresh chicken or seafood rather than giving an instant wet food that can be obtained at any convenience store.

By looking at the busy schedule of the owner which are not every day had the same timing for going back home, it may effect the cat's feeding time or maybe it will cause hunger. This part could be cruelty to the animals. There is also a lot of animal's cruelty happen in Malaysia as they were tortured to death and died of hunger [2]. There is a statistic of animal's cruelty in Figure 1.2 shown below.

Figure 1-2: Graphically show the Animal Cruelty In Malaysia

Therefore, these pets especially cats, need an invention called an Automated Cat Feeder for them as they need to be feed daily. This Automated Cat Feeder are build to help the cat's owner which are also having a lot of daily commitment outside without any worries about their cats malnourished issue.

1.2 Problem Statement

Based on the daily lifestyle and routine, the people are busy with the workload and task that need to be done. So, for those who are keeping cats in their household definitely would be worried and even cannot focus into their significant job. This case can be settle down by having these invention of Automated Cat Feeder.

This machine would be a simple-to-use for everybody in a variety of ages. Moreover it is perfect for a non-married person who live by themself and it is suitable for on the go too. Not only that, other factor such as travelling for work would make them to leave their cats. Instead of sending their adorable cats to the pet's hotel, they need this invention much more compare to others.

Other than that, for whom having the cats that eat regularly and does not follow by the food timing, the owner of the cats need much more this machine. The machine could be place inside the residence for those who keep their cats indoor while for the one who keep their cats outsdie the house, the machine are also can be outdoors too.

The concepts of the machine itself are made of mechanical component and control by an electronic system which is trouble-free to use as it can improve its function as efficient as possible. The collection of requirements is adapted to the user's or animal's demands. By all means, to ensure a smooth operation, adequate nutrition time, proper food amount, and the most up-to-date engineering characteristics are applied. Finally, this underlying principle may be able to solve the problem of the pet feeding.

1.3 Project Objective

There are three objectives that needs to be attained for this project. They are:

a) To design an invention that can feed a cat.
b) To construct the hardware of the Solar Powered Auto Cat Feeder's project.
c) To determine the period needed by solar panel to fully charged the battery in the system.
d) To validate the system functionality by Push over application software and ensure it meet all the requirement in this project.

1.4 Scope of Project

The scope of this project is divided into two section which consist of hardware implementation and the programming configuration of the software. The scope also will cover as per below:

i. Design the automated type of feeder for the cats that can works with two methods which is automatically and manually.

ii. The source of the power for this machine is solar photovoltaic or normal supply.

iii. The status of the machine will be displayed at the LED color as for green LED, it is for the registered with RFID tagging cats.

iv. All the result will be display at the software application.