UNIVERSITI TEKNIKAL MALAYSIA MELAKA

AUTOMATIC PET FEEDER USING RASPBERRY PI

This report is submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Computer Engineering Technology (Computer Systems) with Honours

by

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DECLARATION

I hereby, declared this report entitled "Automatic Pet Feeder using Raspberry Pi" is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree Bachelor of Computer Engineering Technology (Computer Systems) with Honours. The member of the supervisory is as follow:

………………………….

(Project Supervisor)

ABSTRACT

Automatic feeder for pet is developing to ease the pet owner fulfills their responsibilities to feed their pet at home. They can feed their pet anytime and anywhere by using this system. In this project, Raspberry Pi will be used in the system as a main part and sensors will be used to provide inputs to the Raspberry Pi in order for the system to working. Besides, this automatic feeder makes the pet owner easy to control how much food is given to their pet. This is because suitable amounts of food that will be given to pet depend on the programming of servo motor to control the speed and positioning. As they know, pets need to eat several times a day, up to 5 times. In this system, it will make sure pet can eat when its hungry and if in the bowl contain the food, motor will not rotate .Hence, the problem of wasting the food can be avoid by using this feeder. Besides, most pets eat dry food. The pet owner cannot leave out wet food because it will go bad in the time that pet has to eat it. But with this feeder, all of the food is in an air tight container.

ABSTRAK

Bekas makanan automatik untuk haiwan peliharaan dicipta untuk memudahkan pemilik haiwan kesayangan memenuhi tanggungjawab mereka untuk memberi makanan kepada kucing mereka di rumah. Mereka boleh memberi makanan kepada kucing mereka bila-bila masa dan di mana sahaja dengan menggunakan sistem ini. Dalam projek ini, Raspberry Pi akan digunakan dalam sistem sebagai bahagian utama sistem dan ultrasonic dan infrared sensor akan digunakan sebagai input kepada Raspberry Pi. Selain itu, bekas makanan automatik ini menjadikan pemilik haiwan kesayangan mudah untuk mengawal berapa banyak makanan yang diberikan kepada haiwan kesayangan mereka. Ini kerana jumlah kuantiti makanan yang sesuai akan diberikan kepada haiwan bergantung kepada pengaturcaraan motor servo untuk mengawal kelajuan dan kedudukan. Mereka juga tahu, haiwan perlu makan beberapa kali sehari, iaitu sehingga 5 kali. Dalam sistem ini, ia akan memastikan haiwan kesayangan boleh makan apabila lapar dan jika dalam mangkuk mengandungi makanan, motor tidak akan berputar .Oleh itu, masalah pembaziran makanan boleh dielakkan dengan menggunakan sistem ini. Selain itu, kebanyakan haiwan makan makanan kering. Pemilik haiwan peliharaan tidak boleh meninggalkan makanan basah kerana makanan akan rosak semasa haiwan memakannya. Tetapi dengan sistem ini, semua makanan disimpan dalam bekas kedap udara.

DEDICATIONS

Alhamdulillah, praise to the Almighty Allah S.W.T

This project is dedicated to:

My mom Rohana Ismail,

My beloved family,

My Supervisor Sir Zulhasnizam Hasan,

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LIST OF SYMBOLS AND ABBREVIATIONS

A   =   Ampere

DC   =   Direct Current

GPIO   =   General Purpose Input/Output

IDE   =   Integrated Development Environment

IR   =   Infrared sensor

OS   =   Operating System

PWM   =   Pulse Width Modulation

PC   =   Personal Computer

PHP   =   Hypertext Preprocessor

Wi-Fi   =   Wireless Fidelity

HTML   =   Hypertext Mark-up Language

I/O   =   Input and Output

HDMI   =   High Definition Multimedia Interface

NOOBS   =   New Out Of The Box Software

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter will explain the project with its background, problem statement, objectives, project scope and limitation, project significance and thesis outline.

1.2 Background

In this modern age, people running out of time to complete their daily activities. But, this cannot be reason not to fulfill their responsibility include as a pet owner. Statistic from PFMA (Pet Food Manufacturer's Association) show that in 2016 it is estimated that 11million (40% of) households have pets. The pet population stands at around 57 million. Cat population is 7.5 million and 17% household with a cat.

Automatic feeder for pet is developing to ease the pet owner fulfills their responsibilities to feed their pet at home. They can feed their pet anytime and anywhere by using this system. In this project, Raspberry Pi will be used in the system as a main part and sensors will be used to provide inputs to the Raspberry Pi in order for the system to working. Besides, this automatic feeder makes the pet owner easy to control how much food is given to their pet. This is because suitable amounts of food that will be given to pet depend on the programming of servo motor to control the speed and positioning.

As they know, pets need to eat several times a day, up to 5 times. In this system, it will make sure the bowl not become empty for a long time hence, the problem of wasting the food and over-feed the pet can be avoid by using this feeder. Besides,

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most pets eat dry food. The pet owner cannot leave out wet food because it will go bad in the time that pet has to eat it. But with this feeder, all of the food is in an air tight container.

1.3 Problem Statement

Nowadays, almost every family have a pet, even they are busy with their work. Owning a pet in these days are not easy as those pet needs to be take care when the pet owner not at home. Rushing for works and other priority leads to the time constraints in feeding their pet, and having to feed their pet in daily basis becomes a burden to the pet owners. Besides, think about the fact that, the pet owner must be want to make sure their pet gets fed at the same time every day, even when they are not at home. Pets are very accustomed to a schedule, whether their owners realize it or not. The pet owner cannot expect someone else to follow their schedule. Therefore, a new invention has come out as the solution for this problem which is the Automatic feeder for pet using Raspberry Pi. Instead of asking neighbour or friends to feed the pet, now the pet owner can feed their pet every time and everywhere without stepping foot into their home by just click inside of a smartphone app to feed their pet.

1.4 Objectives

The objectives of this project are:

i. To study the behavior of the pet when the automatic system is implemented at their home.
ii. To develop the automatic system for pet feeder using Raspberry PI.
iii. To analyses how the develop system work and the impact of the automatic pet feeder to the pet.

1.5 Scope of projects

The area of the scope for this project is focus on cat at home. This pet feeder only supplies the food and no water. In this project, Raspberry Pi work together with Infra-red sensor to detect the level of food in the bowl. It will prevent the overflow of food in the bowl. Besides, ultrasonic sensors use sonar to determine the distance to an object. Infrared sensor can only tell when an obstacle is within a certain distance (threshold distance). It also cannot be used outside in the sun. Next, like any other computer, the Raspberry Pi also uses an operating system and the "stock" OS is a flavor of Linux called Raspbian. Servo motor will be used to dispense the food into the bowl. After sensor connect with Raspberry PI to send data, the Raspberry PI will be communicate with motor and link to android application, Pushover using internet connection to send notification to user, "Done feed cat".

1.6 Significant of study

In today world, time has become an essential aspect in the daily life's and nowadays people has to put up a race against the time as they not have as much of time to take care everything. Hence, they hope for a new invention or new technology that can ease their work in order to save their time include as pet owner. Therefore, a new invention which is Automatic pet feeder using Raspberry Pi will become important because will be able to give the benefits for both pets and their owner .This is because the pet can get feed on time and the owner also can save their time and energy. Lastly, this project also is mainly focused on the performance of Raspberry PI which depends on the programming and servo motor. By the good performance of Raspberry Pi and servo motor the objectives of the project will be achieved.

1.7 Structure of project

Thesis for this semester cover three chapters and the following is the outline for each chapter in order to understand the project reports.

The first chapter introduces about the project background, objective of the project which needs to be achieved, problem statement of the project, project scope and limitation, and project significance.

The second chapter will explain briefly about literature review .This chapter required to do more research and gather more information about the project such as the theory, method of project that available, and some characteristic of component of hardware or software that used in this project.

The third chapter describes about the project methodology that will be implemented in this project. It explains the process flow of the whole project which can be understood from the flowchart. In this chapter also, will be explain the procedure taken to complete the project which consist the detail development of the project.

The fourth chapter describes about the results and discussion. It will explain the results based on the objectives of the project and also difficulties that faces when finishing these projects.

The last chapter explains about conclusion and recommendation of the project. It will explain how future work should be and the suggestion for recommendation project.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

New technologies of an Automatic pet feeder using Raspberry Pi will be implementing to assist pet owner in order to manage their pet. For this chapter, to obtain the idea and information about this project, some research has been studied based on the journals that are related to the scope of this project work and methodology.

2.2 Raspberry Pi

The Raspberry Pi is a credit-card sized computer that helps people of all ages to learn computing in languages like Python and Scratch. It's proficient of doing almost everything reaching from browsing the internet, playing high-definition video, to word- processing and playing games.

Besides, before this in the middle 80's, kids have to code computers to use them, as a results, these kids makes an in-depth understanding on how computers work. But now with easier application and software developed around the world, the understanding of computers seems to be diminished. To deal with this problem, founder of Raspberry Pi thought of reigniting the inspiration of programming in the public. Since the creation of Raspberry Pi, people around the world use it in a variety of application, taking advantage of its size, portability, programmability, and connectivity. The sky is the limit !(Pi, 2015)

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2.2.1 History of Raspberry Pi

In 1990s, most of the teenager came for interview had a skill as a programmer compared to nowadays, almost people just know the basic of programming. The idea of Raspberry Pi began in 2006, when a group of people from University of Cambridge's Computer Laboratory which led by Dr. Eben Upton became worried about the decreased number of the skill students in the Computer Science field.

First idea of the Raspberry Pi was based on the Atmel ATmega644 microcontroller. Its PCB layout and schematics were in public. Dr. Eben Upton were collected a group of teachers, academics and computer fanatics to invent an inexpensive computer whereas Raspberry Pi to encourage children and people outside involved in this field. (Ms. Sejal V. Gawande*, Dr. Prashant R. Deshmukh 2015).

2.2.2 Raspberry Pi 2, Model B

The Raspberry Pi 2, Model B as showed from Figure 2.1 below is the second group of Raspberry Pi. The original of Raspberry Pi 1 Model B+ in February 2015 was replaced by this model. It also has the power consumption to be as low as possible. This single board contains two USB ports, GPIO pin, Ethernet port, Audio/video port, slot for camera, HDMI port, and power-in port.
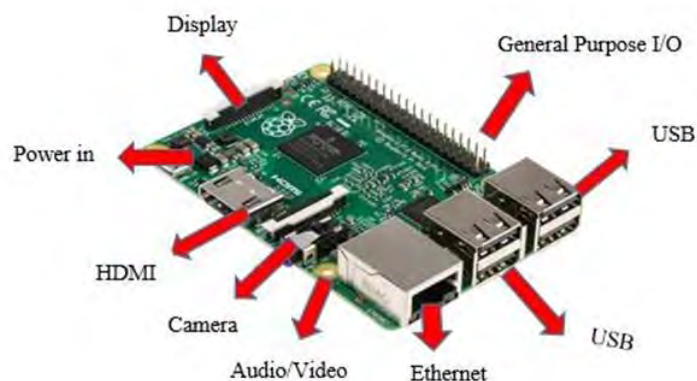

Figure 2.1: Overview of Raspberry Pi 2

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The following lists the Raspberry Pi Model 2 B features in Table 2.1:

Table 2.1: Raspberry Pi's Model 2B Specification

Operating system	Linux
RAM	1Gb
USB port	4 USB ports
Ethernet Socket	Yes
Micro SD Card Slot	Yes (on underside)
HDMI port	Yes
CSI Camera Connector	Yes
Dimensions	The PCB is 85 x 56 x 17 mm.

Moreover, Raspberry Pi 2 Model B also used ARMv7 processor. The original architecture in BCM2836 is same to BCM2835. The only significant difference is the removal of the ARM1176JZF-S processor and replacement with a quad-core Cortex- A7 cluster.

2.2.3 Comparison between different Raspberry Pi models

Table 2.2: Comparison between Raspberry Pi 3 Model B, Raspberry Pi 2
Model B and   Raspberry Pi Model B+

	Raspberry Pi 3 Model B	Raspberry Pi 2 Model B	Raspberry Pi Model B+
Processor Chipset	Broadcom BCM 2837 64Bit Quad Core	Broadcom BCM 2836 32Bit Quad Core ARM	Broadcom BCM 2835 32Bit ARMv6k at 700MHz

GPU	Videocore IV@400MHz	Videocore IV@250MHz	Videocore IV@250MHz
Processor speed	QUAD Core@1.2GHz	QUAD Core @ 900MHz	Single Core@700MHz
RAM	1GB SDRAM @ 400MHz	1GB SDRAM @400MHz	5.12MB SDRAM@ 400MHz
Storage	MicroSD	MicroSD	MicroSD
USB 2.0	4xUSB Ports	4x USB Ports	4xUSB Ports
Max Power Draw/Voltage	2.5A @5V	1.8A @ 5V	1.8A @ 5V
GPIO	40pin	40pin	40pin
Ethernet Port	Yes	Yes	Yes
WiFi	Built in	No	No
Bluetooth LE	Built in	No	No
Video Output	HDMI/Composite via RCA Jack	HDMI/Composite via RCA Jack	HDMI/Composite via RCA Jack
Audio Output	3.5mm Jack	3.5mm Jack	3.5mm Jack

2.2.4 Power supply for Raspberry Pi

The power source that a Raspberry Pi uses is a micro USB plug of 5-volt (V) direct current (DC) lines, also shown in Figure 2.2. No data connections are wired to this socket. Hence, any power supply ranging from the smartphone charger to Raspberry Pi's power supply would be sufficient as long as the output voltage reading meets the specification. It is also noted that the Raspberry Pi kit power supply is rated to 5V 1A, and Raspberry Pi Model 2 B requires a minimum current of 500-700 mA (Liang, 2013) (Norris, 2014).
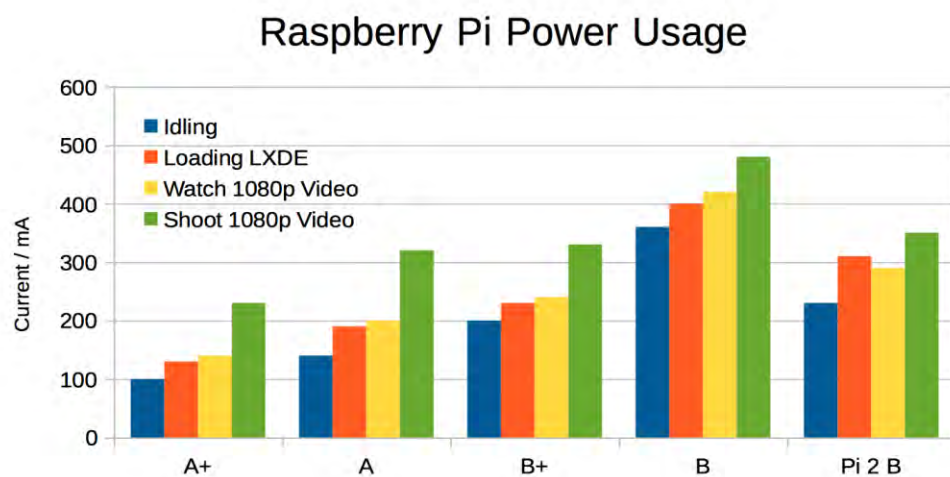

Figure 2.2: 5V micro USB Power Supply

Figure 2.3: Chart of Raspberry Pi 2 model B
Power Usage