Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF AUTOMATIC PET FEEDER AND WATER FOUNTAIN USING MICROPROCESSOR

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

UMI AYUMI BINTI CHE GHANI

Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours

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DEVELOPMENT OF AUTOMATIC PET FEEDER AND WATER FOUNTAIN USING MICROPROCESSOR

UMI AYUMI BINTI CHE GHANI

A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours

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Faculty of Electrical and Electronic Engineering Technology

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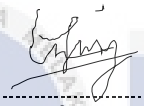
Signature : 

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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 Electronics Engineering Technology (Industrial Electronics) with Honours.

Signature :

Supervisor Name : DR. FARID ARAFAT BIN AZIDIN

Date : 11 JANUARY 2022

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DEDICATION

Thankful to Allah for His grace, for giving me healthy life and strength. Thank you to my family and friends especially my beloved parents Che Ghani bin Che Lah and Che Yam binti Hamat who encourage me to finish this Final Year Project and always stay by side. And also to my siblings, friends, and of course to Dr. Farid Arafat bin Azidin, as my supervisor for shared their opinion, guidance and idea to encourage the completion of this study. Finally, a big thank you to all those involved who helped me up to scar the final report.

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ABSTRACT

An automated pet feeder and water fountain system was created for the use of pets. This machine was created because every individual who keeps these animals such as cats, dogs and so on must have problems with the care of the diet of pets. Problems faced by pet care such as being busy with daily affairs until pet feeding time is neglected and unmanaged. In addition, the high cost of sending a pet to a pet shop or pet nursery. Automatic pet feeder and water fountain is specially designed to solve the problems faced by pet owners where in small or large scope conditions. It is also designed to be easily used by pet owners to feed or drink when not at home. The project is to innovate the existing food dispenser product and water fountain for pets to be of better quality and operate automatically and add to the Arduino program. This machine system uses a servo motor to open the food lid, ultrasonic sensors are also used to detect the food level in the container. While water fountain uses motor pump, ultrasonic sensor and relay.

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ABSTRAK

Sistem pengumpan haiwan peliharaan dan air pancut automatik dibuat untuk penggunaan haiwan peliharaan. Mesin ini dicipta kerana setiap individu yang memelihara haiwan ini seperti kucing, anjing dan sebagainya mesti menghadapi masalah dalam menjaga diet haiwan peliharaan. Masalah yang dihadapi oleh penjagaan haiwan kesayangan seperti sibuk dengan urusan seharian sehingga waktu makan haiwan peliharaan diabaikan dan tidak teratur. Di samping itu, kos penghantaran haiwan peliharaan yang tinggi ke kedai haiwan peliharaan atau taman asuhan haiwan peliharaan. Pengumpan haiwan peliharaan automatik dan air pancut dirancang khusus untuk menyelesaikan masalah yang dihadapi oleh pemilik haiwan peliharaan di mana dalam keadaan kecil atau besar. Ia juga dirancang agar mudah digunakan oleh pemilik haiwan peliharaan untuk memberi makan atau minum ketika tidak berada di rumah. Projek ini adalah untuk menginovasi produk dispenser makanan dan air pancut yang ada agar haiwan peliharaan lebih berkualiti dan beroperasi secara automatik dan menambah program Arduino. Sistem mesin ini menggunakan motor servo untuk membuka penutup makanan, sensor ultrasonik juga digunakan untuk mengesan tahap makanan di dalam bekas. Sementara air pancut menggunakan motor pam, ultrasonik dan relay.

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CHAPTER 1

INTRODUCTION

1.1 Background

For this project, pet feeder is designed which is suitable to use by either cats or dogs. The system will work automatically and will be controlled by the pet owner. With the existence of this project, pet owners can also take care of their pet's diet because the nutrition is very important so that it does not suffer from any health problems. Nowadays, the community out there is too busy with their careers which is the cause of their pets not being well taken care of. One of the factors for pet care is to feed and drink adequately. In particular, its main purpose is to design a system that can provide food and water automatically by controlling them using the Blynk app and can control it remotely, indirectly able to maintain a pet's nutritional diet.

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This project is to Development of Automatic Pet Feeder and Water Fountain using Microprocessor. As we know that the Internet of Thing (IoT) can connect over the world in one place. All the physically devices that can be connected and obtain the data for analyzing for some applications. IoT provides a wide variety of connectivity with difference application qualities. In development of IoT, the technology of WiFi provides a platform for remarkable amount of IoT solutions. The WiFi in this project are using in microcontroller nodemcu ESP8266. ESP8266 are contain crucial element of a computer including networking WiFi, so it is suitable for doing IoT projects. Then, this project are using Blynk application to control it remotely where it can setting the time for the feeding pets. Therefore,

ESP8266 is required in this project because it is built-in with WiFi that can be connected to the Blynk app.

1.2 Problem Statement

As we all know, the majority of people out there necessarily have pets that are made friends at home. These pets need to be taken care of by their owners where they need to feed and drink adequately. Some pets are unable to control their diet where they will continue to eat as long as the food is served. Then, problems will also arise and feel burdened if the owner has to leave their pet for a certain amount of time and no one there is watching over it. Therefore, with this system that pet owners can feed their pets automatically is the best way to solve this problem. The system can also help the owner to keep a close eye on his pet's nutrition properly. Animal nutrition and health should be taken care of so that they will not be a problem in the future. The best part is pet owners can feed and drink their pets anywhere without setting foot into their home by simply setting feeding times on a smartphone application only and no need to ask for help from neighbors or friends to feed their pets.

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1.3 Project Objective

The main aim of this project is to develop of automatic pet feeder and water fountain using microprocessor for the convenience of pets. Specifically, the objectives are as follows:

1. Feed the pet automatically without being physically present according to the time the owner wants.
2. To control the pet's nutritional diet in the right way.
3. Find out if pet's food and water are inadequate or running out.

1.4 Scope of Project

The scope of this project are as follows:

a) This project will develop a prototype to Development of Automatic Pet Feeder and Water Fountain using Microprocessor which using Nodemcu ESP8266 and Blynk application.

b) This project was made to prioritize the use of IoT by using Blynk apps downloaded on smartphones.

c) This project is specially designed to facilitate users in taking care of pet nutrition in an orderly manner which is set the time 3 times per day to feed the pet.

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Nowadays, pet feeder and water fountains have many types that used around the world that have the same main function which is to make it easier for consumers to feed and drink on pets. Each type is different based on the components that used. In this chapter, I will review previous articles to know every different process.

2.2 Pet

Pets are animals that are kept at home to be kept as companions [1]. There are some of them who make the animal part of their own family. We already know, that many people out there who have pets at home for example, cats, rabbits, dogs, hamsters and so on and it can be said that everyone will have a pet that they love and even take care of it so well and grow up healthy.

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There are many benefits or advantages if we have a pet at home. One of them, it can relieve stress or pressure because animals have their own aura that can give peace to anyone who approaches them. Pets also teach us what responsibility is and the existence of a caring attitude. This is because they need daily care and attention. They also depend on humans for entertainment or happiness and most importantly the care of their food. Then, pets also taught humans about commitment. This is because taking care of pets is a big commitment that should not be underestimated. They are not like toys or dolls that we can keep and put on the shelf when we are tired of playing with them. They need to be given adequate attention by playing, being cleaned, given enough food and so on. Pet food requires regular care.

However, there are a handful of owners who are so worried if they are not at home and no one can feed and drink their pets. So, with this project, it can help owners who do not have enough time to manage their pet's feeding time because the system will work by controlling through an application uploaded on the smartphone. It make it easier for the owner even when not at home. As we know that excellent pet nutrition care can bring joy and happiness in the family.

2.3 Type of Pet Feeding

In this era of technology, many entrepreneurs out there have built various types of systems which can help pet lovers to take good care of their pet's nutrition. Some common pet nutritional care foods used by pet lovers are automated pet food containers that use simple technology with minimal features.

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2.3.1 The Petsafe 5 Meal Pet Feeder

Figure 2.1: The petsafe 5 meal pet feeder

Based on the figure above which is 2.1, this pet feeder has just six buttons underneath the hood, along with a digital display that has the quality of a cheap calculator.

The directions that come with the feeder are very clear, so programming the pet feeder is simple once you get the hang of it. After setting the clock using the labeled up and down buttons, you can then program the times at which you'd like your feeder to spin, offering your pet a new batch of food or whatever you put inside the 5-part 1-cup tray [2].

2.3.2 Pet Food Autofeeder by using Arduino

For this article, [3] the project use an Arduino as a microcontroller where it can adjust the meal time and the number of portions. This project uses a rotational motion mechanism. The rotation of this mechanism is placed linearly under the container where it moves the pet food using a rotational motion [7]. To make this project work successfully, it must be use the components that are appropriate to its function. It consists of a Real Time Clock, DC motor, limit switch, buzzer, 4x3 keypad and liquid crystal display.

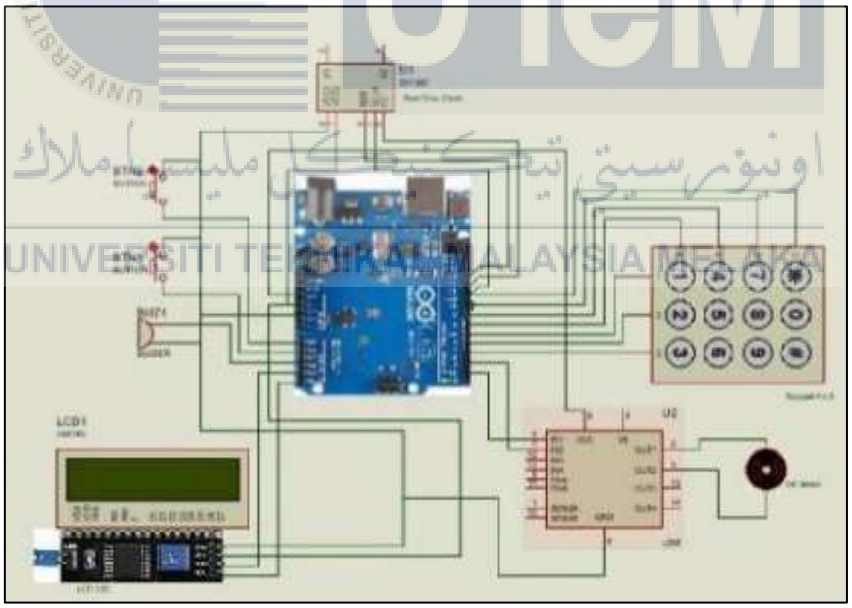

Figure 2.2: Schematic diagram of project

For the schematic diagram that has been shown on figure 2.2 above, there are three main criteria in this project where when '*' is pressed, users can adjust the actual time based on the time they first used it. Second, when '1' and '2' are pressed, the user can set the first

meal time and the second meal time, respectively. Finally, when '3' is pressed, within 9 periods the user can adjust the feed size.

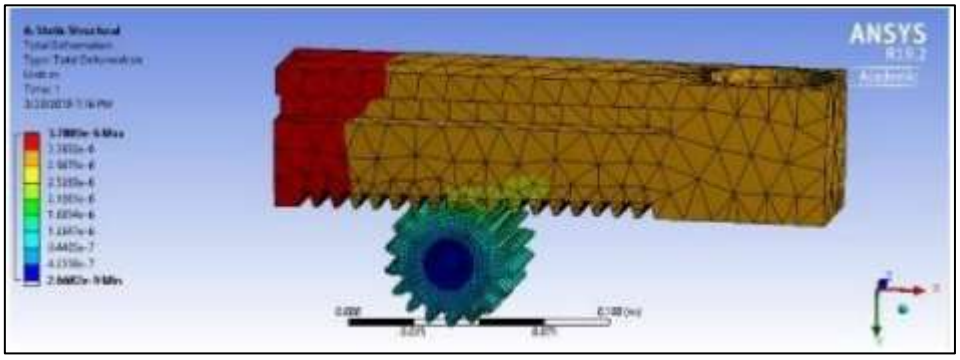

Figure 2.3: Result of mechanism analysis. [12]

ANSYS is used to analyze the maximum pressure that it can withstand at a critical point. Then, the analysis used is a static structure and a rectangular shelf is a moving object. And the spur gears is fixed on the base of the pet feeder. Nozzle diameter and layer thickness 0.1mm. The lowest (level8) has an orientation angle of 60 degrees which is 0.3mm of nozzle diameter and 0.1mm of layer thickness.

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2.3.3 Arduino MEGA based PET Feeding Automation

In this article, [4] I found out that this project uses the Arduino Ethernet Shield to connect the Arduino to the internet easily for all consumers. This project also makes it easy for the owner to set the quantity of food to be given to the pet on the smartphone app. Then, all the predefined information will be transferred to the PCB via Ethernet then the signal will be sent to the food production gate. The most important component is the DS3231 RTC (Real Clock) Module. This component will be used to set each date and time for the pet to be fed. Therefore, by setting the pet's meal time according to the schedule, the device will fill the food bowl automatically.

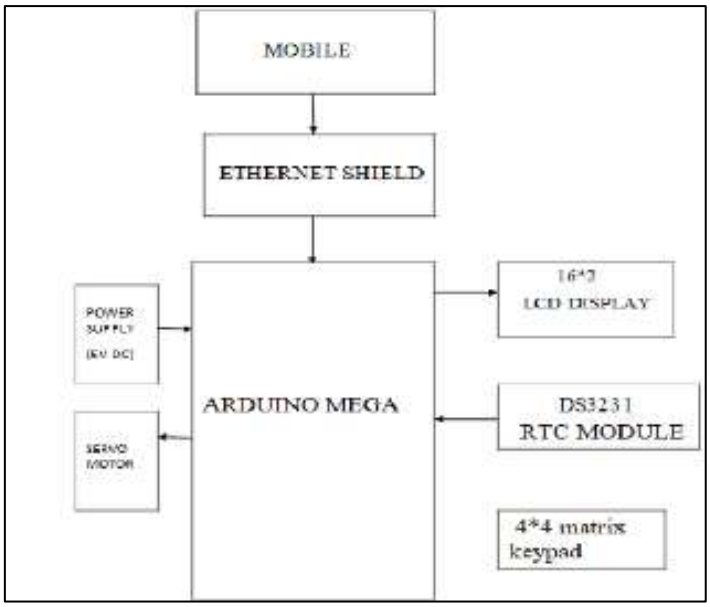

Figure 2.4: Block diagram of project [12]

Based on figure 2.4, 16 * 2 LCD is intended to display the time using the DS3231 RTC Module. The RTC DS3231 module works to set the date and time for the pet to be fed and then the bowl will be filled with food automatically. Then, food preparation by rotating the container using a servo motor. The rotation angle and opening period of the container can also be set according to the amount you want to give to the pet. To arrange the time to feed the pet manually by using 4 * 4 matrix keyboard.

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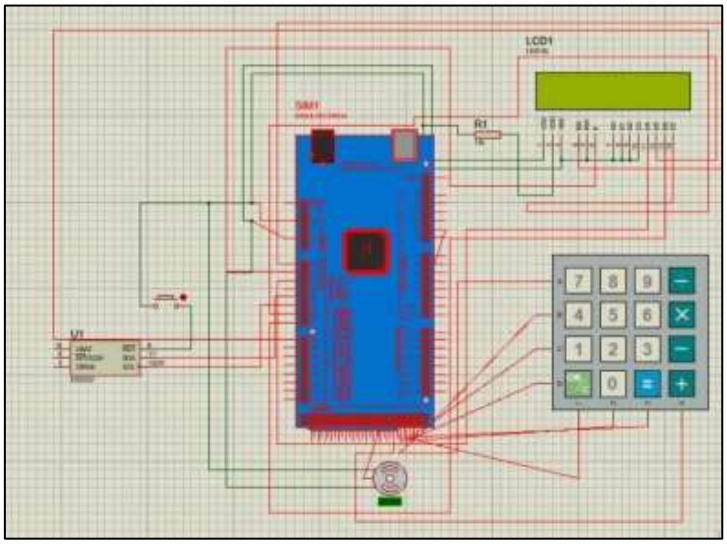

Figure 2.5: Circuit diagram of the proposed system

2.3.4 Certain Investigations on Automatic Feeding of Domestic Pets

In this article, [5] it is intended to enable the user which is the pet owner to automate simple things. This is meant to monitor and also control pet's food where it is controlled by a microcontroller. Next, the project was also built to makes pet's food an automatic machine. It means an automatic machine that can supply food at a set table. This pet's food will be timed when it will be released. To make this project work successfully, it must be use the components that are appropriate to its function. The main components are microcontroller, motor, GSM and also sensors.

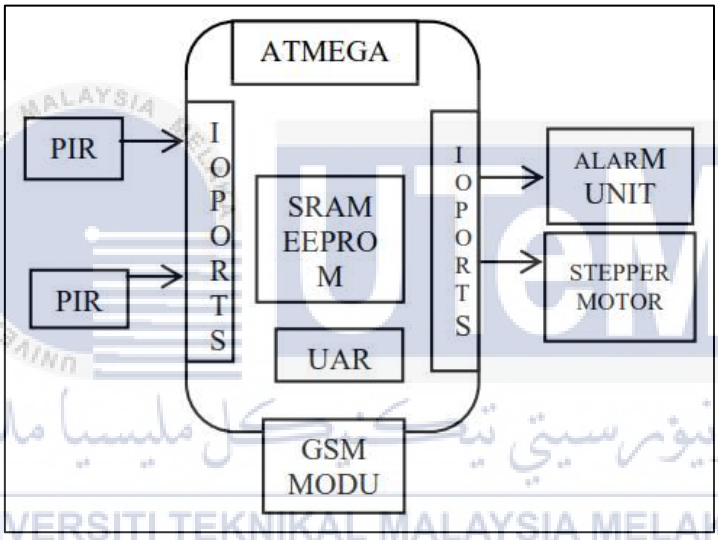

Figure 2.6: Block diagram

Sensor and stepper motors by using microcontrollers. IR sensor will monitor the level of food on the exhale, when the food crosses the pre-set limit then the IR sensor sends a signal to the microcontroller immediately. The microcontroller turns on the steeper motor at certain times. And this process will continue until the IR level is over.

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