



## **Faculty of Electrical and Electronic Engineering Technology**



### **DEVELOPMENT OF PET ENTRANCE SYSTEM USING RFID**

**NUR ALIZA BINTI MD ZAM**

**Bachelor of Electronics Engineering Technology with Honours**

**2022**

# **DEVELOPMENT OF PET ENTRANCE SYSTEM USING RFID**

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**A project report submitted  
in partial fulfilment of the requirements for the degree of  
Bachelor of Electronics Engineering Technology with Honours**



**Faculty of Electrical and Electronic Engineering Technology**

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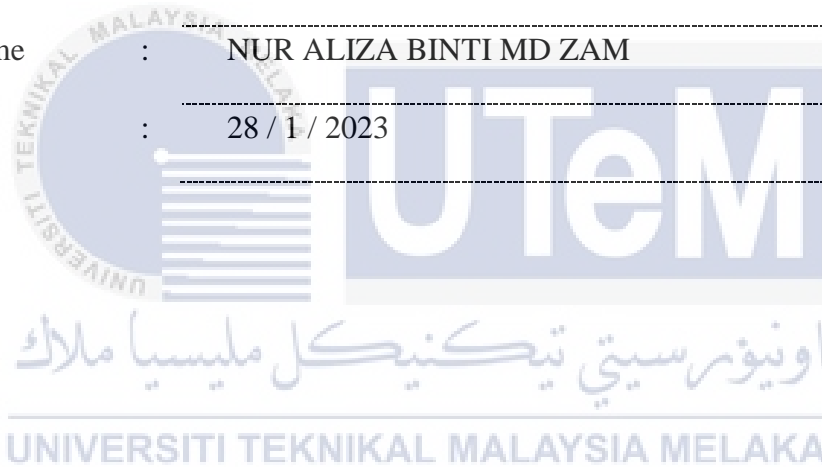
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I declare that this project report entitled “Development of pet entrance system using RFID” is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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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 Electronic Engineering Technology with Honours.

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.....

## DEDICATION

*I would like to dedicate this project to my supervisor, Mr Ts. Saifullah Bin Salam and Mr Amar Faiz bin Zainal Abidin whom had guided me this project. I would like to thank my beloved parents, Md Zam bin Gimman and Ramlah binti Hj Hassan for encouraging me to finish my final year project. Thank you for the support and prayer. I would like to thank my sibling,. friends, lecturer and and my favourite person whom had helped and supported me.*



## ABSTRACT

Nowadays, the advancement of quickly increasing technical facilities has substantially aided in improving the quality of living in human daily existence. Simultaneously, this raises the demand for technologies that can assist pet owners in monitoring their pets while they are away from home. Since pet owners are preoccupied with their daily routines, they do not have time to allow their pets out of the house and keep them healthy. The goal of this project is to design a pet entry system which uses RFID technology to allow pets to pass through doors without human assistance. This invention is using RFID technology to allow access to the pet through the door.



## **ABSTRAK**

*Pada masa kini, kemajuan kemudahan teknikal yang meningkat dengan pesat telah banyak membantu dalam meningkatkan kualiti hidup dalam kehidupan seharian manusia. Pada masa yang sama, ini meningkatkan permintaan untuk teknologi yang boleh membantu pemilik haiwan peliharaan memantau haiwan peliharaan mereka semasa mereka berada jauh dari rumah. Oleh kerana pemilik haiwan peliharaan sibuk dengan rutin harian mereka, mereka tidak mempunyai masa untuk membenarkan haiwan peliharaan mereka keluar dari rumah dan memastikan mereka sihat. Matlamat projek ini adalah untuk mereka bentuk sistem kemasukan haiwan peliharaan yang menggunakan teknologi RFID untuk membolehkan haiwan peliharaan melalui pintu tanpa bantuan manusia. Ciptaan ini menggunakan teknologi RFID untuk membenarkan akses kepada haiwan peliharaan melalui pintu.*





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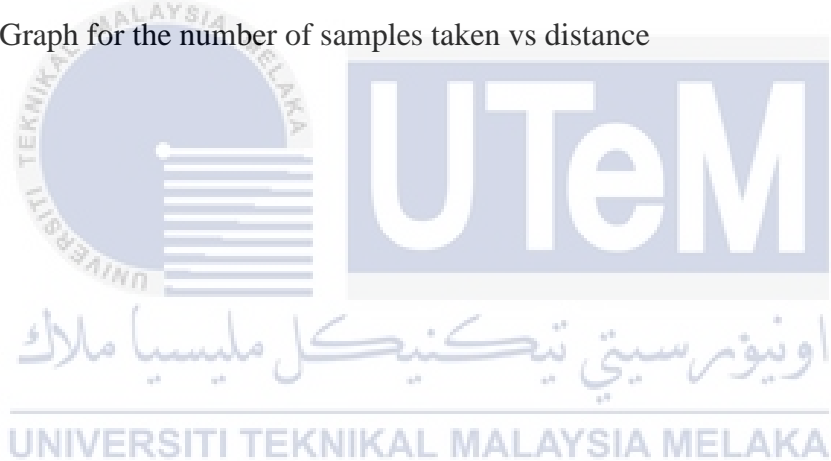
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## LIST OF ABBREVIATION

RFID	-	Radio Frequency Identification
LCD	-	Liquid Crystal Display
PWM	-	Pulse Width Modulation
DC	-	Direct Current



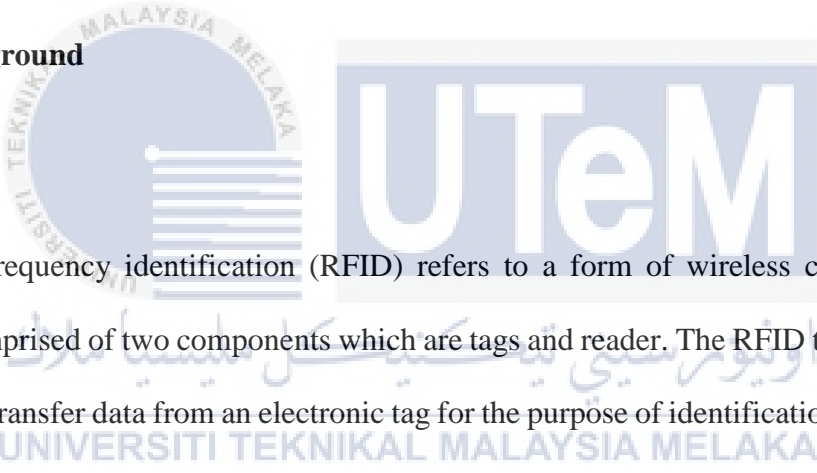
# CHAPTER 1

## INTRODUCTION

### 1.0 Overview

Chapter 1 provides information about the introduction of the project including research background, problem statement, objective and scope explained in detail to give best overview of the project.

### 1.1 Background



Radio frequency identification (RFID) refers to a form of wireless communication system that comprised of two components which are tags and reader. The RFID technology use radio waves to transfer data from an electronic tag for the purpose of identification and tracking object. The RFID chips contain a radio transmitter that emit coded identification number to read by the reader when prompted. This RFID technology consists of three part which are an antenna, a transceiver and a transponder. The RFID reader consist of an antenna and transceiver while RFID tag consist of transponder.

By using this RFID technology, the result is a prototype of development of pet entrance system to help make it easier for pet owner to monitor their pet. This project allows pet to enter without the help of the pet owner to open the door and at the same time this door only allow pet which have access to enter to avoid unwanted pet in the house. The RFID reader will be put



at the door entrance will the RFID tags will be worn on the pet as a collar. The RFID tag on the pet collar have the dentification of each pet such as name.

This system allows a time to be released and a return time to be set. Moreover, this system using RTC Clock IC to keep track on current time to enable the setting of time for this project. This project is design with servo motor to control the opening and closing of the door which this servo motor can control its rotation. An Arduino will be used as a microcontroller to be the main processor for the input and output. The keypad 4X4 will be used an input for setting the time.

## 1.2 Problem Statement

According to statistics, an estimated total of 85 million families own some kind of pets. Moreover, statistics show that dogs are the most popular pet of about 471 million followed by cat of about 370 million kept as pet worldwide [5]. The pet owner usually let their pets out about 1 -2 hours a day to let this pet stay healthy and stress-free. Due to this activity, the pet owner must monitor their pet which causes the owner to spend more time and energy in finding the pet.

By purposing this project development of pet entrance system using RFID can help the pet owner life easier. This project is ideal for cat and pet owners. The goal of this project is to monitor the whereabouts of pets. This project is to track whether a pet has returned home at the time set by the user. In addition, the project will display which pet did not return on time. For safety, the door controls the entry of the animals in and only pets with access that are allowed to enter. This is for safety precautions to avoid the unwanted pets in the house. Furthermore, this project is using RFID technology to ensure the project can run successfully.

### 1.3 Project Objective

There are three main objectives to be focus on to make sure this project is build successfully.

The objective is stated as below:

- To study the RFID technology on the pet entrance system.
- To develop a safety system using Arduino to prevent unwanted pet to pass through the door.
- To evaluate id system of pet that can be read by the system for data collection.

### 1.4 Scope

The scope if this project are as follows:

- a) Implementing a low-cost prototype that can make the life of pet owner become easier.
- b) The technology of Radio Frequency Identification (RFID) that will be used as a tag and reader to allow the opening and closing the door without help from the human.
- c) Analyse on the functionality of the sensor to detect the tag and control the opening and closing the door.
- d)

## CHAPTER 2

### LITERATURE REVIEW

#### 2.0 Overview

Chapter 2 will explain the background of the study that contain the literature review of the study regarding this project. This literature review based on articles previous and current project.

#### 2.1 Project Research

#### 2.2 The study And Applications of the IoT in Pet Systems.

This article is to study the ability of computational, communication, and control technologies to enhance interactions between human and pets based on the Internet of Things (IoT) technology [5]. It is an improvement of the pet monitoring systems that involve IoT and also enhances the pet appliances with the location awareness capabilities that help the lives of pet owners become easier [5]. This project uses IoT system instead of using infrared detector or recognition that has been used in most pet care system. The disadvantages of using infrared detector and recognition is that it is easily influenced by various factors and can result in the detection not recognizing correctly [5].

This project focuses on pet doors and pet feeding system. To achieve the target, the project uses IoT technology. IoT can be referred as “connected together” and its function are for identification, localization, tracing and management. RFID technology act as “speaking technology” for IoT systems consisting of RFID tags, readers and applications [4]. The RFID

tags can uniquely mark the objects because there is agreement from the preserved code data. It is also must be supported with battery to avoid serious vulnerabilities that could result in short communication distance of the passive HF RFID tags. Therefore, sensor network tags were used to extend the communication distance for this study.

The IoT can be divided into three parts [5]. The first part is hardware device or sensing layer that uses less space and makes it easier to connect to anything, anywhere and anytime. In addition, it uses wireless sensor network (WSN) technology that can obtain object environment information and distinguish each object accurately [5]. The second part is the infrastructure or sensing layer where it consists of all types of communication network and the internet form a concentrated network. It is an IoT management centre and information centre that have the network operational capabilities and enhance information operational capabilities. The third part is the application layer where it consists of applications and services that use the large quantity of information created by IoT. This layer is to provide information services and it consist mainly of three part namely IoT client part, data storage module and data inquiry module.

The first project of pet monitor system was a smart pet door [5]. These pet doors are designed to allow pets to pass through the door easily without human assistance. The pet door consists of one control door, one smart pet door, several environment nodes and the tags on collars. This WSN-based project and its purpose is to control the activity of their pets. The sensing tag on the collar will broadcast the pet's identification for every 20 seconds continuously [5].



Figure 2.1 pet wears collar with the sensor tag identification [5]

Then, pet door will detect the location of the pet and it will request the pet activity list from the server. After the pet door receive the activity list from the pet tag, the device will measure the estimated distance by the RSSI (Received Signal Strength Indicator) [5]. This designated collar allows the pet tags to broadcast the pet ID for every 20 seconds continuously. The sensing range that can be achieve is about 1m to 2m due to the node of WSN which is an active tag. The door will be unlocked when the activity is permitted. The WSN module is installed on the upper right of the pet door that act as the control and communication centre. It is responsible for receiving and control the motors. Moreover, this project is using tow motors that are used to unlock the pet door which its control the direction of the flap [5]. There is also light motion sensor that implemented on the top panel of the door to detect the flap swing direction. The LED will be triggered based on the data collected of the flap swing direction. this will inform the pet owner the location of the pets either indoor or outdoor. The led will turn green to indicates the pet are at outdoor.

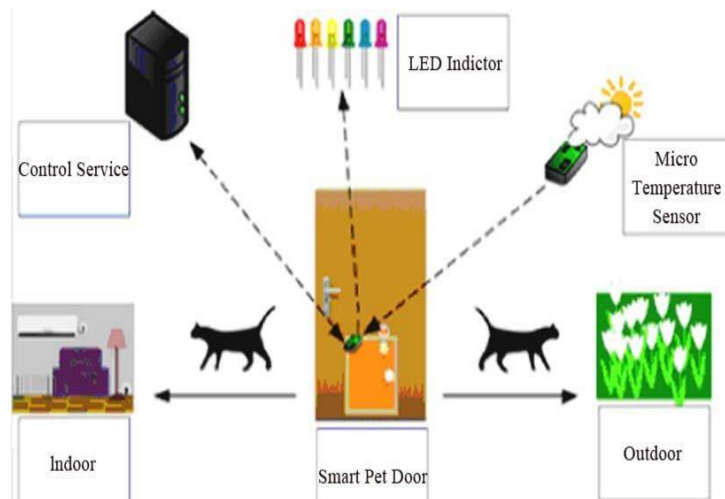


Figure 2.2 interior design of pet door [5]

This pet system also associated with smart pet feeder. It helps the pet owner to feed the pet automatically without worrying when they are outside the home. Moreover, the pet food hygiene is guarantee because it helps to avoid contamination of the food because of insects. This objective can be achieved because the implementation of the pet feeder which it has a bowl cover that opens and closes automatically with the help of infrared proximity sensor and battery-operated electric motor. The infrared proximity sensor is responsible to detects the presence of the pet to allow the opening of the bowl cover to give an access to the food. Then, the bowl cover will close when there is no presence of the pet. This pet system consists of one control server, one smart pet feeder and a tag on the collar. This project using WSN module which it is operates to drive the rotation gear to remove the bowl cover, receiving the signal pet id and responsible for checking the RSSI value, controlling the voice greeting and trigger the bowl cover to open and close [5]. However, this implementation project is higher cost and use larger power supply due to WSN module. This smart pet feeder is different with other pet feeder in the market because it supported pet identity recognition, and does not require tags for the identification [5].

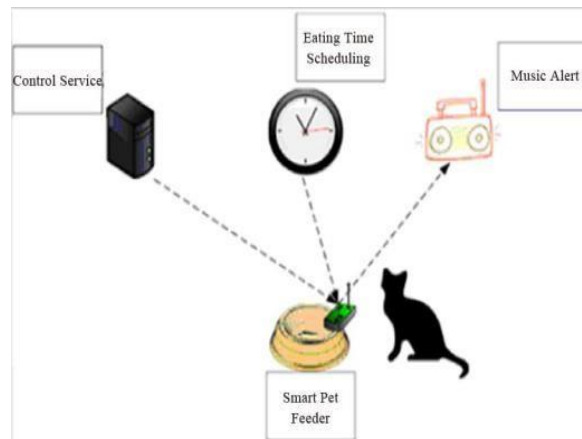


Figure 2.3 interior design of pet feeder system

### 2.3 Radio frequency Identification (RFID) based attendance system with automatic door unit.

This article is about an attendance system with automatic door unit using Radio Frequency Identification (RFID) [2]. It is a technology that uses radio wave to transfer data from an electronic tag for identify and tracking object. Based on this study, this technology is used to produce time-attendance management system that consist of two part which are hardware and software [2]. The hardware part consists of motor unit and RFID reader. For the RFID reader it using low frequency at 125 kHz and it is connected to serial to USB converter cable. This project is developed by using visual basic net. Moreover, this project can be function on displaying live Id transaction, registering ID, deleting ID and recording attendance. Based on this article, it is comparing the techniques that are used to record the time attendance system [2].

The first one is based on manual process where the manual process is has to sign at the office table. However, this type of attendance system has disadvantages where it will become

problem when it has to handle a large number of workers [2]. At the same time, this type of system allows employees to bribe the officers. This will affect the productivity and management of the company. The second type of system barcode attendance system [2]. This system is to measure and tracking employee's time and also provide high levels of accuracy and reliability in tracking of employee attendance. The implementation of the barcode is easy and its using UPC (Universal Product Code) which 12 digits number is assigned to retail merchandise that identifies a product and the vendor [2]. The first 6 digit is for vendor unique identification numbers. The next 5 digits is for product's identity and the last 5 digits as check digit.



Figure 2.4 Picture of barcode [2]

The third type of system is biometric attendance system which it is to study of measurable biological characteristics [2]. This biometric refer to authentication techniques that rely on measurable physical characteristics. There are several types of biometric identification which are face fingerprints, retina, hand geometry, vein, voice and etc [2]. By using biometric system, the time and attendance software is installed along with time clock to enable the use of biometrics for tracking purposes. The advantages of this system is the whole process is easy and fast and also it can eliminate the cost for ongoing expenses related to damage, misplacement, and cards