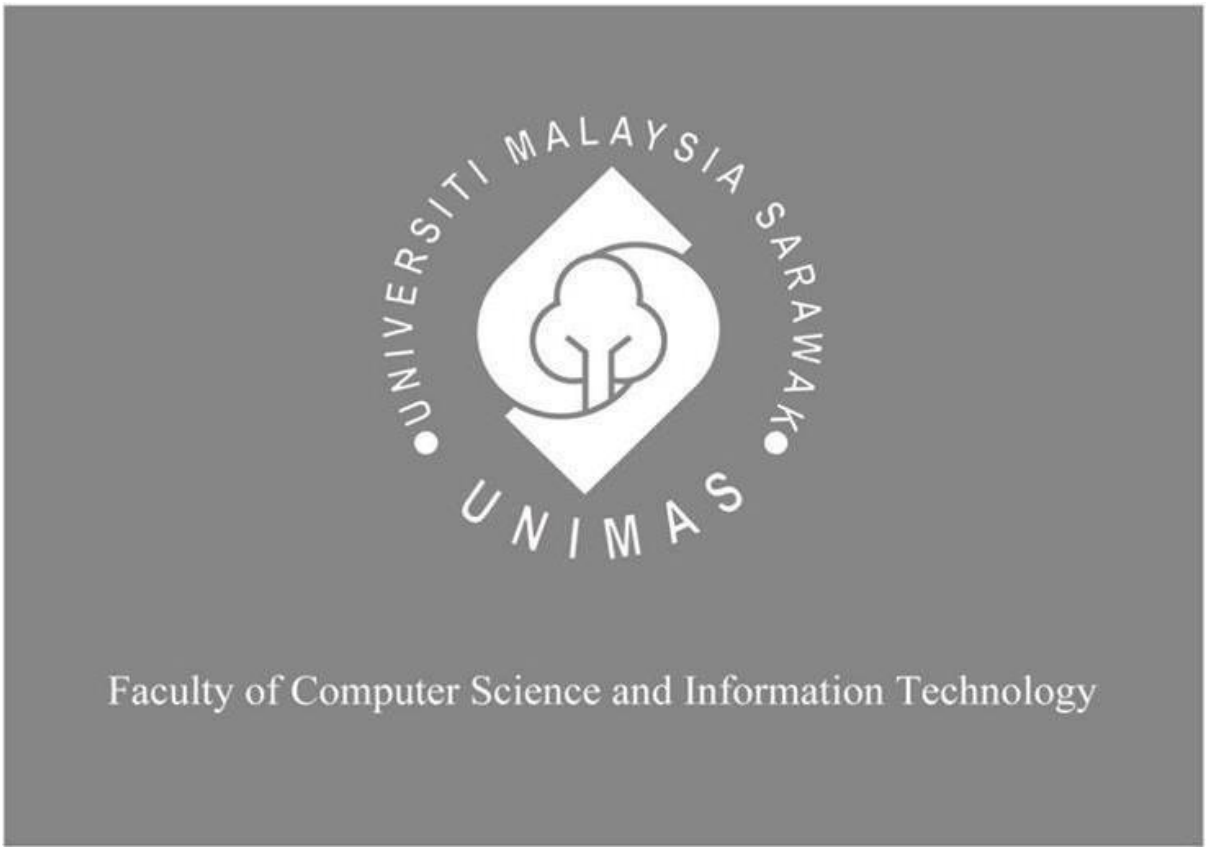

PET TRACKING SYSTEM USING IOT

Amelia Kiew Lee Ping

Bachelor of Computer Science with Honors (Software Engineering) 2020

UNIVERSITI MALAYSIA SARAWAK

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PET TRACKING SYSTEM USING IOT

AMELIA KIEW LEE PING

This project is submitted in partial

fulfillment of the requirements for the

degree of

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2020

SISTEM PENGESANAN HAIWAN PELIHARAAN MENGGUNAKAN IOT

AMELIA KIEW LEE PING

Projek ini merupakan salah satu keperluan untuk
Ijazah Sarjana Muda Sains Komputer dan
Teknologi Maklumat

Fakulti Sains Komputer dan Teknologi Maklumat

UNIVERSITI MALAYSIA SARAWAK

2020

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledge. I also declare that no portion of the work referred to in this report has been submitted in support of an application for another degree at University Malaysia Sarawak (UNIMAS).

Signed,

_____

(AMELIA KIEW LEE PING, 55445)

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ABSTRACT

Pet care is progressively gaining more attention. Even with the growth of wireless technology, application to pets has not been much researched. Finding a lost pet through flyers, a walk or drive around the neighborhood, posting on media, etc. would generally take a longer time to locate the lost pet especially when a certain period of time has passed. Now, with the Internet of Things, owners can look up their pets' location on a desktop or mobile application through GPS. The "Pet Tracking System IoT" uses advanced technology that enables it to have multiple functions. It is able to perform functions like GPS tracking, location history and distance monitoring using sensors.

ABSTRAK

Penjagaan haiwan semakin mendapat perhatian. Walaupun dengan pertumbuhan teknologi tanpa wayar, aplikasi untuk haiwan peliharaan tidak dikaji dengan teliti. Mencari haiwan peliharaan yang hilang melalui risalah, berjalan kaki atau memandu di sekitar kawasan kejiranan, mengepos di media, dan lain-lain secara umumnya akan mengambil masa yang lebih lama untuk mencari haiwan kesayangan yang hilang, terutamanya apabila tempoh masa tertentu telah berlalu. Sekarang, dengan Internet Pelbagai Benda, pemilik boleh mencari lokasi haiwan mereka di desktop atau aplikasi mudah alih melalui GPS. "Pet Tracking System using IoT" menggunakan teknologi canggih yang membolehkan ia mempunyai pelbagai fungsi. Ia dapat melaksanakan fungsi seperti pengesanan GPS, sejarah lokasi dan pemantauan jarak jauh menggunakan sensor.

Chapter 1

Introduction

1.1 Introduction

Growth of wireless technology, improved microprocessors and enhanced power support have all worked to make the dream of pervasive, interconnected “smart” devices a real possibility (Tang, et al., 2005). However, application to pets is one usage that has not been much researched by context ware systems. Finding or locating a lost pet can be a very complicated and straining process. Walking or driving around the neighborhood, peering into your neighbor’s house compounds, searching under drains as well as abandoned territories. And if those efforts prove futile, you end up putting up “lost pet” flyers around the whole neighborhood area. Besides that, you would also post photos of your pet on social media, hoping you someone would eventually leave a message or a call regarding your post. You would contact your local shelters to know if anyone brought in any lost dog or cat, or the vet for any lost injured pets.

Now, things have changed drastically thanks to the advances in the Internet of Things (IoT) and GNSS tracking. A lost pet is more likely to be found by using IoT technology for pet tracking. According to Reilly (2019), smart collars contains GPS tracking technology in conjunction with WiFi or cellular data, allowing owners to check their pet’s location on a desktop or a mobile application.

For this Pet Tracking System using IoT, owners will be able to set a distance limit of how far the pet can roam from the house via a website. If the pet goes beyond the distance limit, an email will be sent to the owner. The owner will be able to locate the pet’s location from the website through GPS.

To improve the location accuracy, both Global Positioning System (GPS) and GLONASS (Global Navigation Satellite System) can be used concurrently. In terms of positional accuracy, GPS is slightly better than GLONASS overall, however, due to the different positioning of the GLONASS satellites, GLONASS has better accuracy at high latitudes (far north or south) (Heukelman, 2015).

1.2 Problem Statement

An online questionnaire was carried out where self-selected participants provided data on their cat that had gone missing. Of 1210 study, only 61% were found within a year, where 34% found alive within 7 days by the owner, while after 90 days, few cats were found alive (Danielle, 2018). As a conscientious owner, you would want to keep your pets safe at all time. But sometimes, even the most attentive and diligent pet owners can lose their pet.

In some cases, which the pet escapes from the house compound unnoticed in the middle of the night, or in broad daylight when the owners are away. Most of the time, when the owners realize their pet is no longer within the house compound, it is already too late, the pet might have wandered too far away from home and with no means to return on its own. Pets may also dig their way out of the backyard or even break free while going out for walks. When pets wander far away to a place they're unfamiliar with, they might be attacked by other stray dogs or cats, fallen into a drain, dognapped by someone or worse, knocked down by a vehicle. Time and location are two very critical factors to keeping pets safe.

1.3 Scope

The pet tracking system is targeted to be used for pets like cats and dogs that are kept in house compounds. It will have one fix location point on the device (house) that is used as the starting point to measure the distance between the device and the mobile point (pet).

Pet tracking system will run on a website that can be opened through a smartphone's browser to notify and locate the coordinates using GPS, of the mobile point (on pet) to the user.

1.4 Objectives

The main objective of this project is to design and develop Arduino UNO based pet tracking system to be used to find lost pets. Other objectives of this project include:

1. To design a device that will be able to detect the distance between two points using a GPS sensor constantly.
2. To design and develop website to keep track of the distance between two points received from the device and notify the user when the distance exceeds the distance limit set.
3. To evaluate the proposed pet tracking system.

1.5 Methodology

The method used for this project is the Waterfall methodology. According to Margaret Rouse (2019), the waterfall model is a linear, sequential approach to the software development life cycle (SDLC) that is popular in software engineering and product development. The Waterfall model emphasizes a logical progression of steps; distinct endpoints or goals are set for each phase of development and cannot be revisited after completion. The Waterfall model has a total of six phases which are: Requirement Analysis, System Design, Implementation, Testing and Deployment.

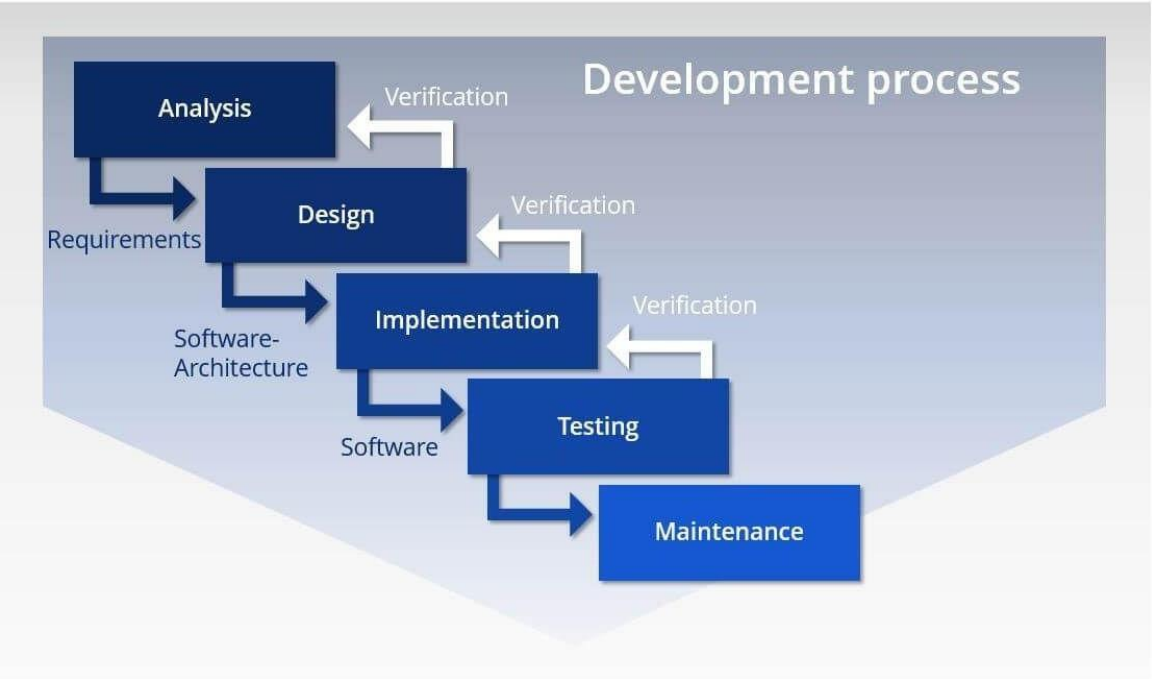


Figure 1.1 *Waterfall stages (digitalguide, n.d)*

1.5.1 Analysis

The first phase of Waterfall model, which is the Analysis phase, provides an analysis of the requirements' definition, in which complex problems are broken down into small subtasks and appropriate solution strategies are developed.

1.5.2 Design

In this phase, a concrete solution concept will be developed based on the previously determined requirements, tasks, and strategies. Software developers develop the software architecture and a detailed construction plan for the software, concentrating on specific components such as interfaces, frameworks, or libraries in this phase.

1.5.3 Implementation

In the implementation phase, the software design is implemented in the desired programming language. Individual components are developed separately, checked within the framework of modules testing and integrated step by step into the overall

product. The result of the implementation phase is a software product that is tested for the first time as complete product in the subsequent phase.

1.5.4 Testing

The test phase includes the integration of the software into the desired target environment. The acceptance tests, which is developed in the analysis phase, then from the beta versions which are delivered to selected end users can be used to determine whether the software meets the previously-defined requirements. The software product is ready to be released when the beta testing is completed.

1.5.5 Maintenance

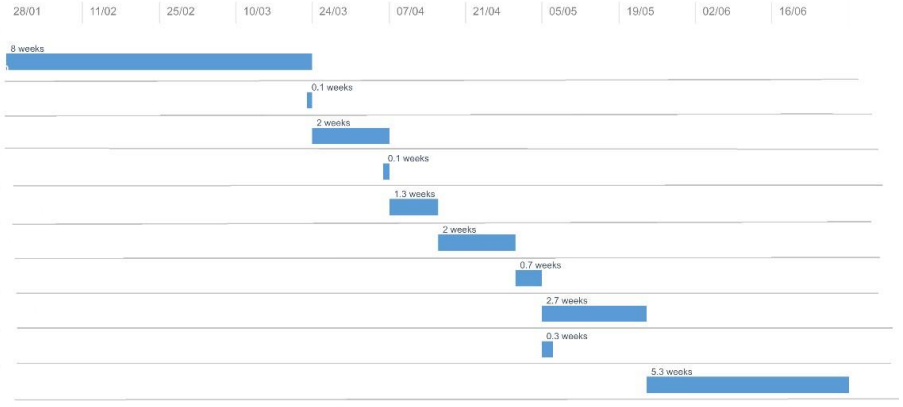
After successful completion of the test phase, the software is released for productive use. The final phase of the Waterfall model includes delivery, maintenance, and improvement o the software.

1.6 Significance of Project

The significance of this project is that it helps to alert the pet owners on their pet escaping so that they can react promptly to avoid any serious accidents or situations. When the distance limit set by the owner has been breached, the owner will be alert through the application, with this, the duration of the pet wandering will be shortened and chances of finding the pet unharmed will be higher.

1.7 Project Schedule

	Title	Start	End	
	Chapter 4 Preparation	28/01/2020	23/03/2020	8 weeks
	Chapter 4 Submission	23/03/2020	23/03/2020	0.1 weeks
	Chapter 5 Preparation	24/03/2020	06/04/2020	2 weeks
	Chapter 5 Submission	06/04/2020	06/04/2020	0.1 weeks
	Full Report & Paper	07/04/2020	15/04/2020	1.3 weeks
	Final Report	16/04/2020	29/04/2020	2 weeks
	FYP Symposium Preparation	30/04/2020	04/05/2020	0.7 weeks
	Amendments and Modification	05/05/2020	23/05/2020	2.7 weeks
	FYP Symposium	05/05/2020	06/05/2020	0.3 weeks
	Submission of Final Report Hardcover	24/05/2020	29/06/2020	5.3 weeks



	Task Name	Duration	Start	Finish
1	Define Project Title	2 days	Fri 20-09-19	Sun 22-09-19
2	Preparation of Brief Proposal	6 days	Mon 23-09-19	Sat 28-09-19
3	Submission of Brief Proposal	1 day	Sun 29-09-19	Sun 29-09-19
4	Preparation of Full Proposal	15 days	Mon 30-09-19	Fri 18-10-19
5	Submission of Full Proposal	1 day	Sat 19-10-19	Sat 19-10-19
6	Chapter 1 Preparation	6 days	Sun 20-10-19	Fri 25-10-19
7	Chapter 1 Submission	1 day	Sat 26-10-19	Sat 26-10-19
8	Chapter 2 Preparation	16 days	Sun 27-10-19	Fri 15-11-19
9	Chapter 2 Submission	1 day	Sat 16-11-19	Sat 16-11-19
10	Chapter 3 Preparation	14 days	Sun 17-11-19	Wed 04-12-19
11	Chapter 3 Submission	1 day	Thu 05-12-19	Thu 05-12-19
12	Submission of FYP 1 Final Report & Paper	5 days	Fri 06-12-19	Thu 12-12-19
13	FYP 1 Symposium Preparation	2 days	Fri 13-12-19	Mon 16-12-19
14	FYP 1 Symposium	2 days	Tue 17-12-19	Wed 18-12-19
15	Amendment and Modification Period for FYP 1	14 days	Fri 20-12-19	Wed 08-01-20
16	Submission of Final Report (Softcopy)	3 days	Thu 09-01-20	Sat 11-01-20

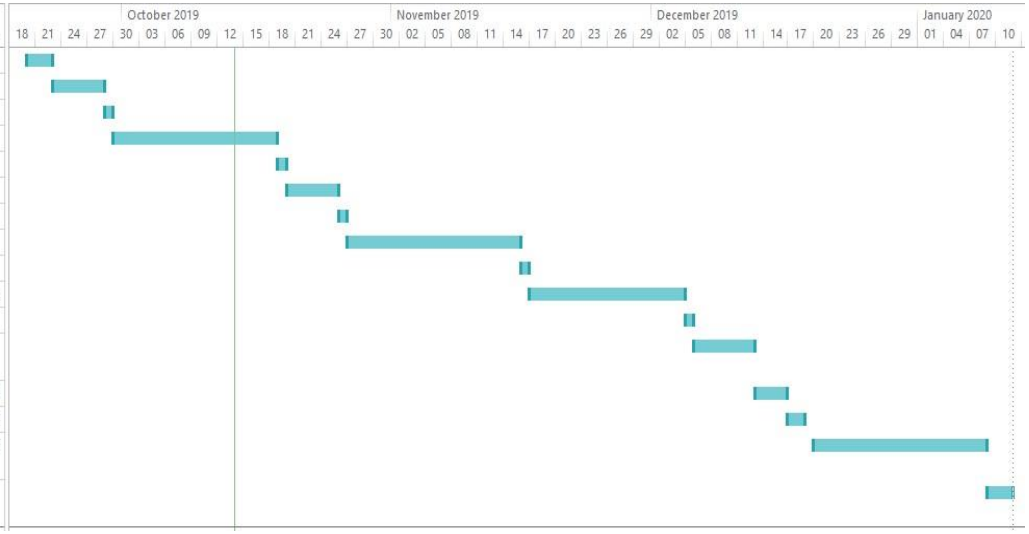


Figure 1.2 *Project Schedule*

1.8 Expected Outcome

The distance between one static point and a mobile point will be constantly monitored using a mobile application. User will set a distance limit. When the distance exceeds the limit set, the user will be notified. The location of the mobile point will be sent to the user. When the mobile point enters a new location, the previous location will be stored in a list.

1.9 Project Report Outline

The report consists of five chapters, namely introduction, literature review, requirement analysis and design, implementation and testing, conclusion and future works.

1.9.1 Chapter 1: Introduction

Chapter 1 describes about the general understanding and introduction of the proposed system. This chapter contains the introduction, problem statements, project scope, objectives of the study, methodology used, significance of project, project schedule and the expected outcome of the project.

1.9.2 Chapter 2: Literature Review

This chapter focuses and discusses the study and review done on existing methods and systems based on articles, journal and conference papers that are related to the current project. This chapter will highlight the limitation of the project and provide insights on how it should proceed. The strength and weaknesses of this project will be determined and used a foundation in this project

1.3.3 Chapter 3: Requirement Analysis and Design

This chapter provides the details and discussion on how the requirements are obtained, identified and analyzed. Chapter 3 will further elaborate the methodology used throughout the project development.

1.3.4 Chapter 4: Implementation and Testing

Chapter 4 describes the implementation phase and testing phase done in this project. A system prototype is developed according to the system design to conduct testing. Further details on types of testing done on the prototype for evaluation will be explained in this chapter

1.3.5 Chapter 5: Conclusion and Future Works

Chapter 5 concludes the whole project as well as outlines for the future works. Through this project, experience gained through the lessons learnt while developing it is presented with relevant examples.

Chapter 2

Literature Review

2.1 Introduction

In this chapter, literature review on related studies is being done to study the project background in detail. The review provides background knowledge to develop the scientific inquiry system in this project. From the review, various knowledge can be obtained to achieve the proposed objectives by identifying the appropriate method to implement the features into the Pet Tracking System using IoT.

The system with certain features that have been reviewed includes location monitoring and mobile application. These reviewed features might help in brainstorming the ideas and solutions for enhancing the proposed project. There are some technologies and tools that will be discussed about in this chapter. For example, TTGO T-Beam, LoRa, Arduino IDE, Laravel. These technologies and tools are commonly used in GPS tracking project. Consequently, they can be applied in the proposed project.

2.2 Reviews of Existing Systems

2.2.1 Intelligent Pet Collar (Imperial Journal of Interdisciplinary Research (IJIR), 2017)

Akash. D.Apturkar, Afnan. A.Maner, Vishal. P.Jadhav and Sharanabasappa. R. R (2017) have proposed a system that uses a, intelligent pet collar that uses GSM, GPS and motion sensing technology. This system is proposed to curb the problems of runaway pets and other problems such as monitoring the pets' daily activities in the absence of owners. By implementing the system, owners can keep track of their pets' location, health monitoring, activity checking, etc.