

StandForPaw: Animal Rescue and Pet Adoption Mobile Application

by

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Dissertation submitted in partial fulfilment of

the requirements for the

Bachelor of Information Technology (Hons)

FYP II

SEPTEMBER 2021

Universiti Teknologi PETRONAS

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CERTIFICATION OF APPROVAL

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A project dissertation submitted to the

Information Technology Programme

Universiti Teknologi PETRONAS

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BACHELOR OF INFORMATION TECHNOLOGY (HONS)

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September 2021

CERTIFICATION OF ORIGINALITY

This is to verify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



LYANA LIVAN ANAK WALTER

ABSTRACT

Companion animal, or better known as a pet to most people, could provide their owners or keepers with both physical and emotional advantages which have been proven by numerous scientific studies and researchers. However, within the society, even though there are quite a number of animal person and rescuers have surrounded us, news and articles regarding animal cruelty, abuse or neglect in Malaysia are frequently published on the Internet, television, newspaper, including on social media, with Facebook being the top source. With the widespread of using mobile apps, there is one example that could be taken as a good platform for animal rescue and pet adoption, which is known as a PetFinder, where this application functions by finding a loving home for pets and improve animal welfare. However, after examining the above-mentioned mobile application, the analyzed app lacks in 3 main key areas of user experience (UX) which are usability, navigation and personalization.

Therefore, in this project, by using Android Studio as the development tool, an Android-based mobile application for animal rescue and pet adoption titled as “StandForPaw” was developed with the objectives to investigate the current issue and situation of companion animal adoption and animal welfare mobile app, as well as to develop an application which can serve as a platform for animal welfare and pet adoption. Rapid Application Development (RAD) is chosen as the software development life cycle as it provides greater significance to quick prototyping and swift response over a prolonged development and testing cycle.

ACKNOWLEDGEMENT

To begin with, I would like to convey my deepest gratitude and appreciation to my supervisor, Ts. Dr. Suziah Binti Sulaiman, for her invaluable encouragement, advice, knowledge as well as guidance throughout this entire project for my final year. She performs a significant role in guiding and supervising my work performance and development during the initial phase of my final year project until today. Her support and active involvement during the process of completing my project has helped me a lot to become more independent despite having limited communication and interaction due to the new normal of online learning in a post COVID-19 world. It was indeed a great experience to be working and studying under her supervision.

Along with that, I would also like to deliver a deep and wholehearted thanks to my family and friends who has been helping and supporting me throughout the completion of my Final Year Project 1 and 2. Their encouragement and assistance has given me strength to complete my project successfully and I am sincerely blessed to have such a supportive people around me. Last but not least, special thanks for those who has giving me a helping hand directly and indirectly during my final year journey and I truly appreciate the generosity and kindness that was given to me.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

A companion animal, or frequently referred to as a pet, could be described as a domesticated animal or four-legged friend kept mainly for an individual's companionship or pleasure, for which these animals should be treated with dignity, care and respect. According to Wikipedia, the most beloved pets are generally regarded to have an appealing appearance, showing intelligence, as well as engaging character, while on the other hand, some pets could potentially be taken in based upon altruistic reason (as for example, like abandoned or lost animal) and openly welcomed by the owner of the pets without regard to these features and qualities (<https://en.wikipedia.org/>).

In the course of time, pets have developed from being a stranger to a friend and eventually become best friends to an essential or necessary part of families throughout the world, with two of the widely favored pets which are cats and dogs. In spite of the fact that pets are able to provide their owners with many straightforward, material benefits such as chasing away prospective robber and decreasing wild animals (generally known as vermin), there is also proof that shows pets could provide constructive psychological implications as well (McConnell et al., 2011). As an example, research pointed out that pet owners who have a dog are more improbable to pass away less than a year of impending heart attack compared to the individuals without pets (Friedmann & Thomas, 1995). Likewise, the influence of pet ownership on depression was also conducted, where the analysis of the results proves that within the HIV-infected men who owned pets, there

are only few depressions medical illness being reported in contrast with the persons with HIV who did not own pets (Siegel et al., 1999). Simply put, people that own a pet live longer than others.

Therefore, it can be concluded that pets, especially dogs and cats, give their owners or keepers both physical and emotional advantages which have been proven by numerous scientific studies and researchers. However, within the society, even though there are quite a number of animal person and rescuers have surrounded us, news and articles regarding animal cruelty, abuse or neglect in Malaysia are frequently published on the Internet, television, newspaper, including on social media, with Facebook being the top source. Technically speaking, not every pet (especially stray animals) in Malaysia is fortunate enough to have a responsible and loving pet owner who can take a good care of them.

Sandøe (2019) mentioned that significant amounts of cats and dogs turn out to be an abandoned or stray animals are frequently considered as a concern to every person. Animal protection NGOs, short for non-governmental organizations, specifically in the Western countries, have developed and built-up shelters to handle the matter. Similarly, in Malaysia, there are also few numbers of shelters and rescue organizations are established by the private organization for the protection, welfare, along with rehabilitation of stray animals such as PAWS Animal Welfare Society (PAWS), Society for The Prevention of Cruelty to Animals (SPCA), Malaysia Independent Animal Rescue (MIAR) and so on.

Despite the fact these shelters and organizations are there to offer a support and being a helping hand to those animals in needs, the number of strays in Malaysia continues to increase annually, particularly in the year of 2020, where the COVID-19 outbreak in

Malaysia begins to hit the country (<https://www.freemalaysiatoday.com/>). By looking at the list of shelters and rescue organizations in Malaysia, it can be observed that the major weakness leading to the rapid number of strays is due to the lack of a mobile application platform on animal adoption and rescue. Over the past ten years, with the expose of internet, society started using website page or portal site to help animals by several methods, but the results of utilizing the internet in accomplishing the purpose of aiding animals are not very effective. The reason is because the website needs a longer period to reply to each and every case, in contrast to mobile application as mobile apps can function even without internet connection and still be able to provide the feature and functionalities to users even in offline mode.

With the widespread of using mobile apps, there is one example that could be taken as a good platform for animal rescue and pet adoption, which is known as a PetFinder, where this application functions by finding a loving home for pets and improve animal welfare. However, after examining the above-mentioned mobile application, the analysed app lacks in 3 main key areas of user experience (UX) which are usability, navigation and personalization. For example, PetFinder simply gives a basic database with a little sparse information regarding the pets featured and the navigation structure was complicated and troublesome to parse. Therefore, as a result, an Android-based mobile application for animal rescue and pet adoption titled as “StandForPaw” was developed. This application mainly focuses to conduct user experience (UX) solutions with an easy exploration of the system, better filtering functionality, along with useful and simple feature that enable potential adopter to book or schedule an appointment to meet the adoptable animals, where this feature can help to ease the process of animal adoption.

1.2 Problem Statement

As a result of the growing number of strays yearly, this situation has become a major concern that must be addressed and treated without further delay. The root of the issue comes mostly from the Malaysian's community itself, at which a large number of pets, mainly cats and dogs, being neglected by unsympathetic and careless pet owners for whatever reasons. (<https://www.malaysiakini.com/>). On top of that, because of the result of COVID-19 pandemic on household income, individuals that become unemployed could no longer manage their pets and that they have decided to dump them. Resulting from the owner's lack of consideration, numerous abandoned cats and dogs be left on their own without adequate care, where the growing number of strays in Malaysia has led to an overpopulation. Making things worse, most of the relevant authorities are not giving a good deal of attention to examine and execute a resolution to handle pressing problem of stray animals in Malaysia.

Nowadays, there are many IT systems that has become a tool to assist in rescuing animals in need, but what actually needed is actually a tool that can be used for a faster communication which is the mobile application. From the argument above, it can be concluded that there is therefore a need of a mobile application development that can be helpful to facilitate animals in various aspects like offering pet adoption or a platform that helps reunite lost animal with the owner in a particular locality. The current methods applied by people nowadays to adopt or searching for pets is unsuitable and disorganized, where most people are taking the advantage of using the social media platform such as Facebook, Twitter and even Instagram to post about their missing pets or searching for adoption. There is no doubt about it that a large number of people use such platform to get or spread information, however, in distributing fake news, social media plays a significant role where anybody be able to set up incorrect information or misleading content and publish it on social media platforms without any verification. In addition to these, as most people using social media are not constantly on their phones all the time,

they would be missing out the informative updates, feeds or events related to animal rescue and pet adoption.

Even if a platform such as PetFinder mobile app has been developed, the usability and consistency of that existing system still do not satisfy certain user experience (UX) guidelines for mobile app where the app inefficient or poor UX design will have a direct outcome on the app poor performance Therefore, this shows that there is a need of an efficient mobile application that can address the matter immediately.

Following below are the summaries of the problem statements that have been discussed above:

- 1) The growing number of strays in Malaysia has led to an overpopulation, whereby this is a problem that results in thousands of animals being killed each year.
- 2) The lack of a pet adoption and animal rescue mobile application – such platform only focusing on web apps compare to mobile apps.
- 3) The usability and consistency of existing mobile app does not satisfy certain UX standards guidelines for mobile app, where this problem could be further improved.

1.3 Objectives and Scope of Study

A platform for pet adoption and animal shelters has been broadly applied all over the countries, including in Malaysia. As the platform provides considerable advantage to the people, local governments, local animal protection organizations, as well as the members of the community or volunteers, there are still issues that arises which must be resolved immediately for the purpose of developing a good system. For this reason, the main

objective of the StandForPaw: Animal Rescue and Pet Adoption Mobile Application are as follows:

- i. To investigate about the current issue and situation of the companion animal adoption and animal welfare mobile app.
- ii. To develop an application which can serve as a platform for animal welfare and pet adoption.

The scope of study for this project is focusing on developing a mobile application using Android Studio as a platform for animal shelters and welfares in Malaysia to help improve the adoption and rescue rate of animals. Besides, this project emphasizes on studying the existing situation of a companion animal adoption and animal rescue in order to develop a good and reliable platform.

1.4 Significance of the Study

The significance of this study consists of 2 sections which are:

- 1) To reduce the number of stray animals by helping them to find their rightful owner through the platform established in the application.
- 2) To encourage animal lovers and rescuers to participate in adoption activities that is conducted by the animal shelter.

CHAPTER 2

LITERATURE REVIEW

2.1 Attitude and Perceptions Regarding Companion Animal Adoption

Wong (2019) stated that a companion animal or pet such as dogs and cats are amongst the regular or usual domesticated animals for human companionship because of its peaceful behaviour, and the relationship between humans and animals mainly offers material benefits and constructive psychological implications. Bernete Perdomo (2021) in her study revealed that numerous researches have concentrated on only one technique of addressing overpopulation in domestic pets by encouraging the community to adopt their companion animals from local shelters rather than purchasing them from profit-making sources, leading the question on how to raise awareness about the benefits of adopting pets instead of shop among the community appears to be frequently overlooked by majority of individuals. Therefore, this literature review examines the factors that lead to the attitudes and beliefs of those people who usually buys animals rather than adopting. In addition, it illustrates the common reasons people acquire companion animals, findings about purchasing versus adoption and the outcome of the current study on the most common attitude about adoption versus purchasing.

The common reasons people acquiring companion animals

In his study, Newland (2019) discovered that for some pet owners, the link between animal and human is as strong as the relationship with any other family member. As a matter of fact, a study highlights that the human-pet attachment link is not only strong, but also

similar to, and even exceeds, the emotional bond humans have formed with other individuals (Saunders et al., 2017). Therefore, according to the survey in Australia created by Salmon & Salmon (1981), they analysed that 46% of the respondents most frequently cited reasons for getting an animal were companionship. Following that, the others reasons involve security/protection (27%), pleasure (10%) and lastly is affection/love (5%). Likewise, according to Southland (2019), more than 60 percent of people in the Switzerland chose companionship as the primary motivation for getting a pet.

Purchasing versus adoption

A study analysed the perspective and actions of individuals regarding adopting a companion animal in comparison with buying their pets at a breeder or pet shop. The outcomes show that individuals are inclined to acquire dogs from pet shop and breeders mainly due to (i) people are searching for a pup or particular dog breeds, followed by (ii) having an incorrect perception of price and advantages about purebred dogs that people think impossible to be fulfilled by adopting a rescue dog, and (iii) people either made impetuous decision to purchase or did not give a thought to stop by at an animal shelter during the duration of purchase (Frank & Carlisle-Frank, 2008).

Attitudes about purchasing versus adoption

According to the survey that was conducted on random households and chosen registered dog guardians, the result of the respondents on their attitudes about purchasing versus adoption strongly suggested that a large number of people were having no knowledge of shelter choices or merely did not give thought to the shelter during the time they paid money for their cat or dog (73.3%). In addition to this, small percentage of respondent (13.3%) pointed out that they had in fact searched for the specific type of dog breed they desire at a shelter, but they did not provide any sign of information that they had tried to

stop by at the shelter and might as well not be informed that shelters always include both pups and purebred dogs available for adoption (Frank & Carlisle-Frank, 2008).

In summary, it can be concluded that based on the three current evidences and researches, the results of the study showed several main reasons for understanding why individuals did not take their pets from the nearby animal shelter. The conclusion that can be drawn from these results provide some beneficial details for raising adoption and rescuing rates on the reason people buying animals from for-profit sources. Therefore, by taking all the information provided above, an implementation of a mobile application can be taken to be a good solution to solve the problems and issues faced by animal welfare and shelter. By having the mobile app, pet adoption rates may likely to increase and the negative attitudes and perceptions of people regarding companion animal can be adapted.

2.2 Animal Abuse

Companion animal abuse, often known as animal cruelty, can be defined as any deliberate and frequent behaviour that causes psychological or physical discomfort in animals, including, but not limited to, causing undue pain, trauma, sadness, or even death (van Wijk et al., 2018). As reported by the DVS, short for Malaysia's Veterinary Services Department, there has been about 30 percent growth in the amount of recorded animal cruelty all over the country from 510 in 2017 to 662 in 2018 (152 cases increase in a year). In addition, over than 90 percent of these reported cases included dogs, followed by cats (<https://theaseanpost.com/>). Therefore, this literature review will study about different types of animal abuse, or often called animal cruelty and the ways to avoid it, as well as illustrating the information about understanding of the reason why people are being harsh towards harmless animals.

Animal cruelty has a variety of causes, all of which are complex (Bright et al., 2018). Hensley & Tallichet (2005) in their study revealed that according on respondents reported acts of animal cruelty, over than 15% of aggressive offenders executed about three or more acts of animal cruelty in comparison to less than 6% of moderate and unaggressive offenders and none of the non-offenders. In reference to the respondents' answers, Hensley & Tallichet have created a classification scheme comprising of nine animal cruelty motivations, which incorporated the following:

- 1) To control an animal.
- 2) To make an attack in return for a similar attack against an animal.
- 3) To fulfil prejudice against a species or breed.
- 4) To show aggression through an animal.
- 5) To increase one's own aggressiveness.
- 6) To startle individuals for entertainment.
- 7) To retaliate against someone else.
- 8) To replace hostility from an individual to an animal.
- 9) To act out nonspecific sadism.

Animal testing, or widely refers to as an animal experimentation, animal research and in vivo testing, can be defined as any scientific research or experiment which is, where a living animal are imposed or pushed to experience something that is potentially to cause them injury, distress, pain or permanent damage. To put it another way, animal testing is significantly different from bringing one's companion animal to the veterinary clinic, as animals used in laboratories are intentionally harmed, not for their own good, and most of the time is slaughtered at the end of the experiment. The animal testing includes injecting or force-feeding animals with possibly toxic or hazardous substances, medically eliminating animal's organs or tissues to purposely create damage, pushing animals to inhale poisonous gases as well as subjecting animals to terrifying positions to cause anxiety and depression. Strictly speaking, animal testing in laboratories has been considered as one of the worst cases of animal abuse, followed by animal fights (<https://www.crueltyfreeinternational.org/>).

Animal fighting, namely organized cockfighting and dogfighting to be specific, represents intentional, harsh abuse and cruelty towards animals. Precisely, the definition of animal fighting can be classified as an aggressive fight where people provoke and force two or more animals to compete against one another for the reason of entertainment, and more frequently, animal fighting usually goes hand in hand with betting (also known as gambling), drug dealing, illegal gun sales and murder. Lawson (2017) indicated that contingent on the country and species involved, there are various official definitions of animal fighting and its associated offences, among which its elements may comprise of spectating, doing or taking bets, publishing fights, providing or displaying video footage, along with having the equipment or stuffs related with training and getting animals ready to fight. Animal fighting appears to have stayed well-known and gained the most attention, despite the fact that it is prohibited in a vast section of the developed, where dogfighting is the most popular kind of unlawful animal fighting among the general populace (Briffa & Lane, 2017).

Taking everything into account, Clure and Lum (2011) in their study have discussed several responses to the animal abuse issue and divide the methods into two sections namely (i) education programmes or events and (ii) animal protection legislation. These approaches are reviewed and developed further below:

Education Programmes

As it is known, animal rescue groups and shelters have made their best efforts in reviewing and screening potential adopters that meet certain eligibility criteria before the adoption process can be proceed further. Whether the adopter is paying the adoption fee or not, there is numerous studies and evidences have stated that pet adoption particularly helpful in dealing with the problem of animal abuse.

Taking Clear the Shelters programme as an example, the public is strongly being encouraged to participate in this adoption event that inspires people all around the world to open their hearts to rescue animals and increase adoptions by adopting a homeless animal from a nearby local rescue or shelter. In addition, NBC Universal Local is working together with more than hundreds of shelters throughout the country to host Clear the Shelters, a nationwide companion animal adoption celebrated for the entire month of August 2021 that strive to find loving homes for pets and improve animal welfare (<https://www.cleartheshelters.com/>).

Legislation

Despite the fact that animal fighting such as dogfighting and cockfighting is against the law in all 50 states and the federal Animal Welfare Act forbids animal fighting ventures

(section 2156), this organized abuse of animals still pervades all over the United States of America (U.S.A.) and infrequently takes place in isolation.

State animal fighting laws are usually set apart from state animal cruelty laws and may be subject to more severe punishment. For example, individuals could be indicted for animal fighting, along with animal cruelty, contingent on the severity of the case and those convicted of this criminal offence can be imprisoned. Apart from that, appropriate sentencing can also comprise individual or family therapy, social work, placed in a diversion program, as well as a prohibition on having or treating animals (<https://www.humanesociety.org/>).

2.3 Enacted Law Regarding Animals

Law of animal is a joining or merging of statutory and case law whereby the nature - legal, social or biological - of nonhuman animals is a significant element. To put it simply, animal law is any legal issues that include all animals, such as pet animals, animal raised for food and used for research, learning, entertainment as well as wild animals collectively. For this reason, there are several enacted laws regarding animals and the explanation of each law is shown as per below:

Cruelty to Animals Act 1876

The Cruelty to Animals Act 1876, or also called under the name of An Act to amend the Law relating to Cruelty to Animals, was the world's primary legislation that controls the utilization and treatment of living animals in scientific research. According to Finn and Stark (2015), the Act stated clearly that researchers will be indicted for brutality, however, this matter can be avoided as long as they complied to its provisions, which required that a trials or test concerning the suffering of pain in animas can only be performed when “the proposed trials or test are completely essential for the due command of the persons – so that they could continue to use that command – to rescue or prolong human life.

Animal Act 1953

Animal Act of 1953 (AA) is the Malaysia's important section of animal welfare legislation, in which under this law, an individual can be formally accused or charge with an animal cruelty crime if they severely and violently injure animals, ill-treats, creating trauma or death of an animal.

Therefore, the purpose of Animal Act 1953 is shown per below:

- i. To manage the import and export of animals, particularly birds.
- ii. To avoid the transmission of diseases.
- iii. To prevent mistreatment of animals.
- iv. To manage the movement or slaughter of livestock.
- v. To maintain and enhance the general well-being of animals.

Animal Welfare Act 2015

The Animal Welfare Act (2015) is a comprehensible and inclusive law that sets standards for good animal welfare throughout Malaysia. Despite the fact that this law has not officially acknowledged animal sentience, the Animal Welfare Act, including with other regulations have recognized not only those animals are able to suffer physically, but can also become mentally ill, which is where this has shown that the mental well-being of animals is critically important. In addition, this act established the Animal Welfare Board whose responsibility comprises of:

- i. Observing establishments, teaching and promotion of animal welfare.
- ii. Giving animal welfare guidance to the member of the government on any issues concerning to animal welfare.
- iii. Prevention of injury, distress and suffering of animals.

Taking everything into account, laws are the formal embodiment of the way individuals' relationship with animals are governed, and the way whereupon the law regulates the treatment of animals indicates how the general public view animals. Substantially, law is also constitutive of, or assists to establish, one comprehension of the place of animals in the world. In this regard, animal law plays a significant role in defending and fighting for animal rights, as animal rights are the ethical standards grounded in the belief that non-

human animals is entitled to live as they want, in the absence of being subjected to the desires of humankind.

2.4 Existing Website or Mobile Applications on Animal Adoption and Rescue

Existing website or apps	Description
PetFinder	<ul style="list-style-type: none"> • PetFinder mobile application, released on 6 December 2011, is a Malaysia's leading animal welfare platform that strive to seek loving homes for stray animals, guiding the public and advocate responsible pet ownership, improving animal welfare, as well as providing a collaboration platform for shelters, rescuers, including animal lovers. • PetFinder addresses 3 fundamental goals and objectives which consist of: <ol style="list-style-type: none"> 1) To facilitate effective communication With a PetFinder mobile application, communication is significantly overhauled in real time, enabling organization to communicate in record time with all potential adopters and collaborators. 2) Raise awareness among the general public PetFinder helps to increase awareness about animal adoption and rescue by exposing public to the positive messages about adoption, animal rehome, first aid and pet care. In addition, PetFinder also provides news and articles regarding latest animal welfare information from leading NGOs. 3) To lessen the number of stray animals PetFinder prototype system provides a reliable platform for users to adopt abandoned or lost animals, in which the Pets and Nearby module

	allows users to search the pets by Pet Type, Status, Age as well as Location.
SPCA.com	<ul style="list-style-type: none"> • SPCA, short for Society and the Prevention of Cruelty to Animals (SPCA Selangor) is an NGO which serves Selangor and The Federal Territory. • SPCA Selangor is a well-respected integrated animal welfare organisation registered with the Registrar of Societies since 1958. SPCA Selangor promotes kindness and compassion towards all animals great and small, aiming to alleviate cruelty and reduce suffering. • The 6 pillars of SPCA Selangor includes shelter and adoption, spay/neuter services, education, investigation of animal abuse, assistance to caregivers, and lobbying the government — and a new pillar was added in 2020 to promote farm animal welfare.
PAWS.com	<ul style="list-style-type: none"> • PAWS (PAWS Animal Welfare Society) is a non-profit animal shelter in Petaling Jaya that has been in operation since 1987. PAWS receive the surrender of unwanted dogs and cats which will be vaccinate, deworm, neuter/spay, and put up for adoption. • The shelter and all costs involved in running PAWS are entirely funded by the generous donations of the public as well as proceeds from charitable events. The PAWS team consists of four office staff, a number of part-time veterinarians, one vet assistant, six kennel workers, and one driver.

Table 1: Existing Website or Mobile Applications on Animal Adoption and Rescue

2.5 Shortcomings of Existing Mobile Application on Animal Adoption

Pain Points/Flaws of PetFinder mobile app

These issues aided in the development of the StandForPaw application feature set.

1. Lacks in 3 main key areas of user experience (UX) which are usability, navigation and personalization

For example, PetFinder simply gives a basic database with a little sparse information regarding the pets featured and the navigation structure was complicated and troublesome to parse. On the other hand, PetFinder only provide generic interaction with their app, where user need to communicate with rescuer by calling, text messaging and email to continue with the adoption process, without having the option to schedule or book an appointment to meet the adoptable animals. As all of the animals listed on PetFinder is rescued by public and not from the local animal shelter itself, user have to contact each and every one of the rescuers for a different animal in order to find and meet their desired pet to be adopted. Overall, the rest of the procedure is time-consuming, forcing potential adopters to conduct their own research, send emails, and make phone calls.

2. Poor user interface (UI) on the app

For instance, when the author is looking and interacting with the app for the very first time, the bad user interface (UI) components has caused the author to feel that the app is complicated and difficult to operate, delivers misunderstanding info to users. The common user interface (UI) mistakes which can be seen in PetFinder are:

- Little distinction between primary and secondary buttons.
- Lack of text hierarchy
- Unaligned elements.

CHAPTER 3

METHODOLOGY

3.1 Introduction

A methodology can be described as a collection of guidelines or concepts regarding how to proceed in collecting and validating knowledge of a subject matter (<https://understandingsociety.blogspot.com/>). In this Chapter 3, the author will provide a description of the development and research methodology applied for this project, elucidate how to develop the proposed application, explaining the methods and approaches used in designing the application, together with providing procedures on how to examine the collected data. This methodology chapter will examine on the following sections as per below:

- Development Methodology
- Quantitative Research
- Development Tool
- Use Case Diagram
- Flowchart
- Gantt Chart
- Project Milestone

3.2 Development Methodology

3.2.1 Rapid Application Development (RAD)

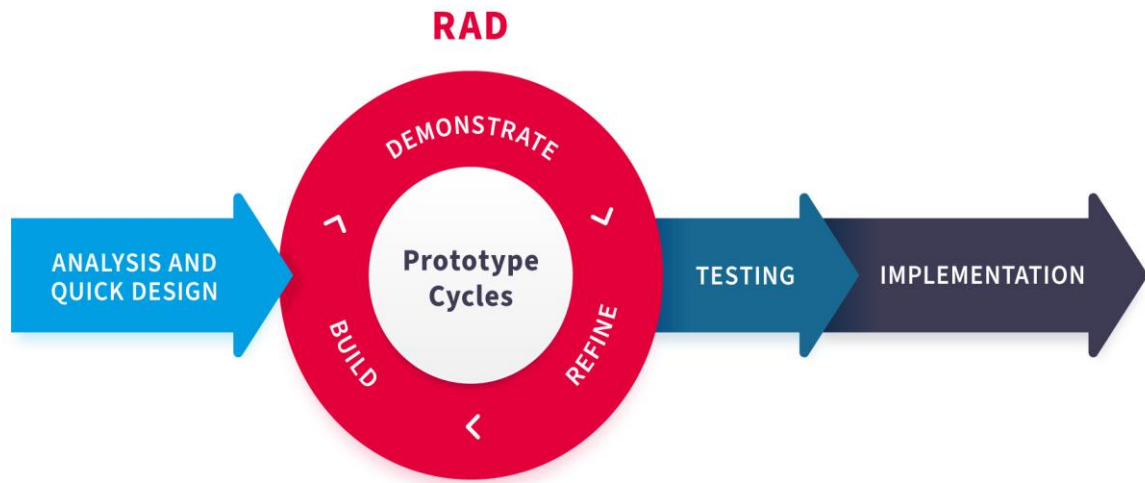


Figure 1: Rapid Application Development (RAD)

On completion of this project, the author decided to use Rapid Application Development method (RAD) in the process of developing the mobile application because of its progressive development model which provides greater significance to quick prototyping and swift response over a prolonged development and testing cycle. Simply put, this methodology suits to the nature of the project's work. Technically speaking, this methodology is an agile software development approach that emphasizes on continuing software projects and user feedback, as well as less emphasis on planning task.

For instance, the RAD model enables developers to create numerous iterations and updates to a software rapidly, excluding the need to reset a development plan from scratch constantly. Though frequently mistaken for a particular model, RAD is the overall concept that developers benefit by handling their software projects like clay, instead of steel, which is how standard development practices manage them. In a nutshell, RAD makes use of the

low-code/no-code programming tools that access cross-platform development of mobile applications across numerous device's operating system (OS), as for example like iOS (formerly iPhone OS) and Android.

3.2.2 Project Activity

On completion of this project, there are four main phases of RAD that need to be implemented by the author, in which the process consists of Analysis and Quick Design, Prototype Cycles – Build, Demonstrate and Refine – followed by Testing as well as Implementation.

i. Analysis and Quick Design

The initial phase of every RAD begins with the author defining a loose set of project requirements, in which project requirements are the conditions or assignments that should be fulfilled to guarantee the success or completion of the project. During this phase, the author needs to determine what the possible risks and difficulties enclosed with the available solutions.

ii. Prototype Cycle – Built, Demonstrate and Refine

The methodology of RAD concentrates on prototype iterations, which implies that the UX Design phase makes RAD to be noticeable from the other management frameworks. At this phase, the author will start to work closely in a prototype lifecycle to assure all the user requirements and expectations are fulfilled.

iii. Testing

During this phase, the author will be able to detect all the errors on the prototype encounter during testing. Therefore, as a developer, the author

will adjust and provide the other version of prototype in an iterative process and at the end of the phase, the latest satisfied prototypes will be fully developed without any potential problems.

iv. **Implementation**

Implementation is the final phase of the RAD method in which the finished product goes to launch. It involves data conversion, testing, and changeover to the new system, as well as user training. The author will write a thorough documentation and complete other necessary maintenance tasks, before a complete product being released to the public.

3.3 Quantitative Research

3.3.1 Primary Research

The term of primary research gives the meaning of a type of research design whereat the researchers are closely involved in the data collection process. To put it another way, the researchers collect pertinent or applicable data samples directly rather than relying on previously existing data regarding the research context.

Radically, primary research is tailored towards collecting context-specific data which could settle a certain problem. On top of that, it gives authorization to the researchers to put together first-hand information that may be considered to be more valid and authentic in a research environment.

Therefore, the primary research methods employed by the author to gather first-hand data from research subject include surveys and in-depth interviews, in which these two methods will be further explained in the next section of this chapter.

3.3.1.1 Survey

This primary research methods section focuses mainly on the analysis and discussion of the gathered information on the latest matter regarding animal abuse or neglect and platform feasibility, whereby the author had conducted an online survey, which is amongst the most well-known data-collection sources nowadays. To perform the survey, a set of survey questions is sent out mainly focusing on the pet owners and animal lovers as a targeted group, and the respondents receive the online surveys through multiple mediums, for example like social media, email, and so on.

Google Forms was selected as a tool for this research methodology which is the free online tool from Google that allows author to create surveys and distribute it to the target sample. The summary of the results is acquired from the survey, and the number of respondents to the survey were 40 people that consist of 16 male respondents and 24 female respondents from various states in Malaysia. In the survey, there are 15 total questions being created in order to identify their demographic information, companion animal details, along with their awareness and perception about the latest topic relating to animals. On top of that, the survey also targets to examine the platform idea's viability. As a summary, a large percentage of the respondents are very much aware of the current situation concerning to animal, however small percentage of the respondents does not fully inform regarding animal issues due to not owning any pets. In the next chapter, detailed explanation on each survey output will be further analysed and discussed.

3.3.1.2 Interview

In order to further obtain information about animal welfare organizations in Malaysia and to analyse animal welfare workers' expectations and opinions on the platform for animal adoption and rescue, an interview was conducted with one of the staff member of Hope 4 Strays, a non-governmental animal organisation (NGO) in Bintulu, Sarawak, which based association focused on TNVR (Trap, Neuter, Vaccine, Rehome/Release) and active in providing pet adoption and welfare services to reduce the population of strays in Bintulu city. The description of the interview is listed as per below:

Interview date : 13th June 2021

Duration of Interview : One hour

Method of Interview : Message/text-based interview (via social media)

Interviewee : Isabel Wong

Objectives of Interview :

1. To understand the current issues and problems faced by Hope 4 Strays Bintulu in handling the animal rescue and adoption process.
2. To acquire their brief ideas and future planning for the proposed mobile application system.
3. To find out more about how Hope 4 Strays Bintulu manage and care for the animals that have been rescued before they are available for adoption.

3.3.2 Secondary Research

On top of the primary research method to gather data, the author performs secondary research in line with the development of mobile application. The term of secondary research, or also called as desk research to most people, can be classified as a general method to a systematic investigation, whereat the researcher relies completely on current data in the course of research procedure. The existing data have been summed up and collated to boost the overall effectiveness of research.

Additionally, secondary research frequently depends on data given by primary research and therefore some researches merge both methods of investigation. For this project, the author begins by assessing and determining gaps in existing knowledge before adopting primary research to collect new information that will serve author research.

Following are the secondary research methods that have been implemented by the author which includes:

- **Online data**
Online data, one of the most famous methods of collecting secondary data, can be referred as a data that is available and collected through the Internet. For example, the author studies and examines the contents of online books, journals, articles and other available online reading materials that is available on the website in order to write the report, especially on literature review and/or theory section.
- **Public libraries**
The author is also making use of the public libraries as an additional source to search for data as business directories, newsletters, annual reports and other equivalent documents that can serve as research data, where these sources are collected and stored in libraries.

3.4 Development Tool

3.4.1 Software

App development software is referred to as a programme that assists in the app development procedure by offering features such as an integrated development environment, widely called as IDE, code-free development, templates, an API, data synchronization, together with analytics.

By having such software, it contributes to the application's quick development, where these tools allow the author to build and create Android-based mobile application for this project. Listed below are the software tools that is required:

3.4.1.1 Android Studio

Mobile application development resources and tools are the required elements to support author workflow in mobile application creation. Therefore, Android Studio is the selected tool for this project by the author.



Figure 2: Android Studio logo

Android Studio is the integrated development environment for Google's Android platform and versions of Android Studio are compatible with some Apple, Windows and Linux operating systems. The author chose this software tool because it provides code editing, debugging, and testing tools all within an easy-to-use-drag-and-drop interface.

The lists below are the key advantages of Android Studio for mobile application development:

- i. Faster deployment of fresh builds
- ii. More accurate programming
- iii. Faster programming and testing
- iv. Perfectly fitting to Android devices

3.4.1.2 Flutter



Figure 3: Flutter logo

Flutter is a free and an open-source UI software development kit established by Google and the community, where it was available to be used by public in May 2017. As Flutter is comparatively new compared to the other existing application framework, majority of mobile app developers select Flutter for building and coding native apps for Android and iOS.

Flutter comprises of two significant elements:

- An SDK (Software Development Kit) is a set of tools that would assist the developer in the development of their applications. Tools for compiling the code into native machine are incorporated (code for iOS and Android).
- A Framework (Widget-based UI Library): A set of reusable user interface elements (buttons, text inputs, sliders, and so forth) that allow developers to customise according to their specific needs.

3.4.1.3 Visual Studio Code

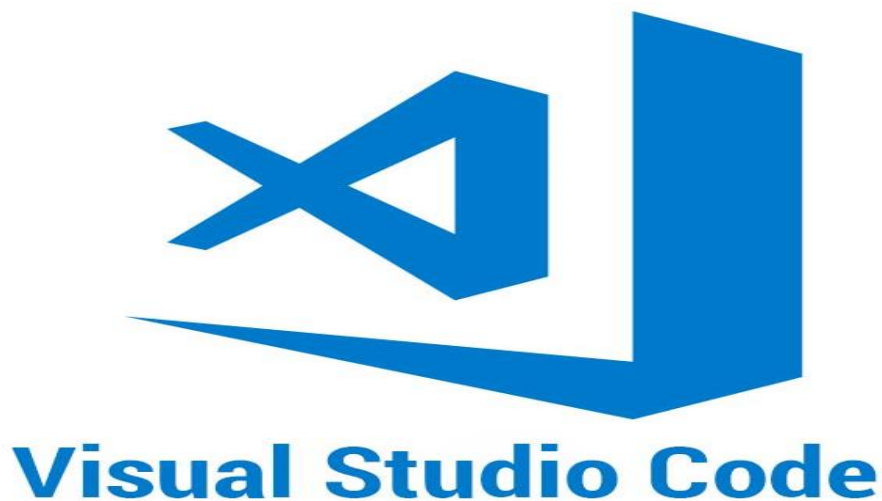


Figure 4: Visual Studio Code logo

Visual Studio Code, or shortly refers to as VS Code for most people, is a source-code editor made by Microsoft for Windows, Linux and macOS. For the development of this project, the author has utilized VS Code to write the lines of coding, debugging and running the android emulator on it terminal. Despite VS Code modest weight, this free open source consists of numerous significant features that have made it one of the most popular development environment tools in recent years.

3.4.2 Programming/Scripting Language

3.4.2.1 Dart



Figure 5: Dart logo

Dart is a client-side programming language that can be utilized to create a web and mobile apps. Developed and established by Google on October 2011, this client-optimized language is used to create both server and desktop apps on any platform. Apart from that, Dart is a garbage-collected, object-oriented, class-based language with C-style syntax that is applied together with Flutter to build mobile apps.

3.5 Use Case Diagram

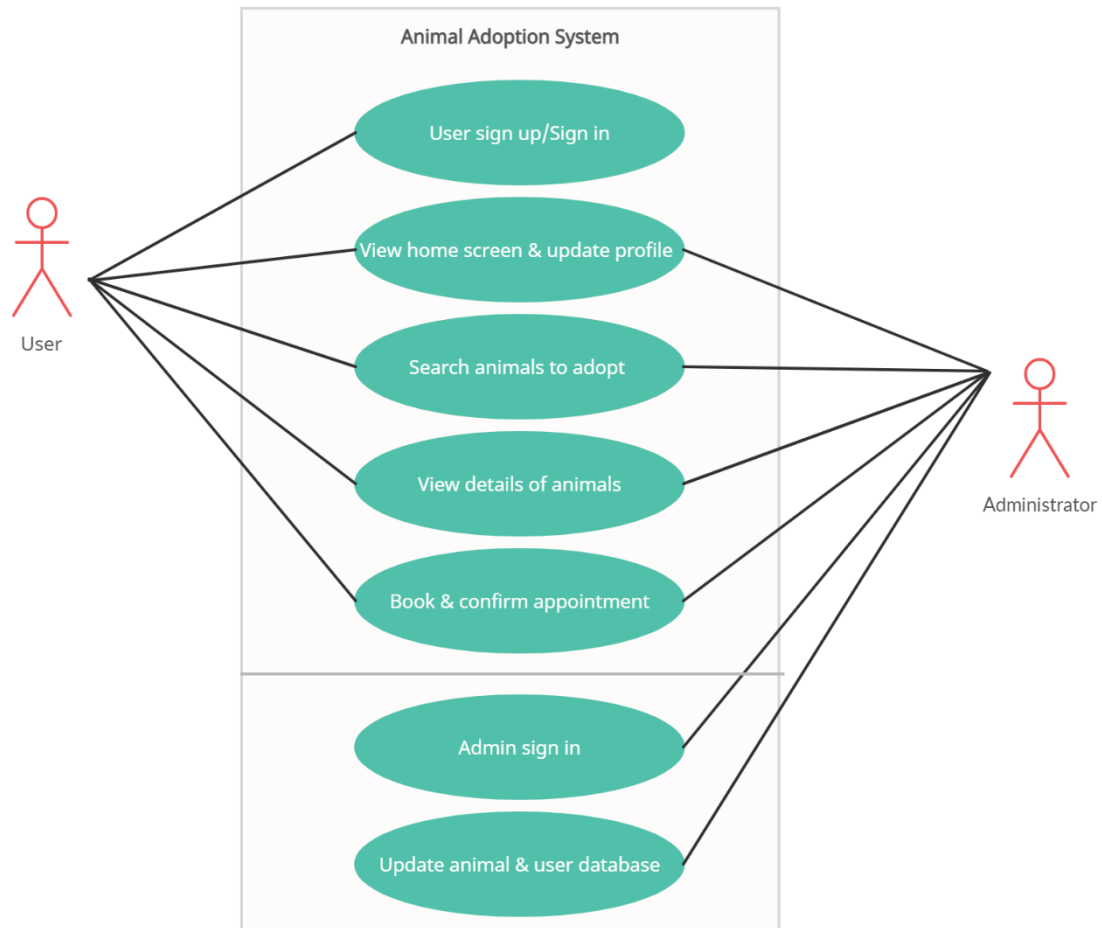


Figure 6: Use Case Diagram for Animal Adoption Platform System

The term of use case diagram can be defined as a method of summarising information about a system and its users. In addition, it is typically depicted as a graphical representation of the interactions between various elements in a system. Based on the use case diagram shown above, the administrator, or generally called as an Application Administrators, has the access to almost all of the system, as the admin are critical to the continued operation of the applications. This includes updating or deleting animals and user database, viewing list of animals available, along with managing booking adoption appointment. On the other hand, users are able to sign in to the application's system, searching animals to adopt, viewing the animal's details, as well as booking an appointment to meet their potential pets.

3.6 Flowchart

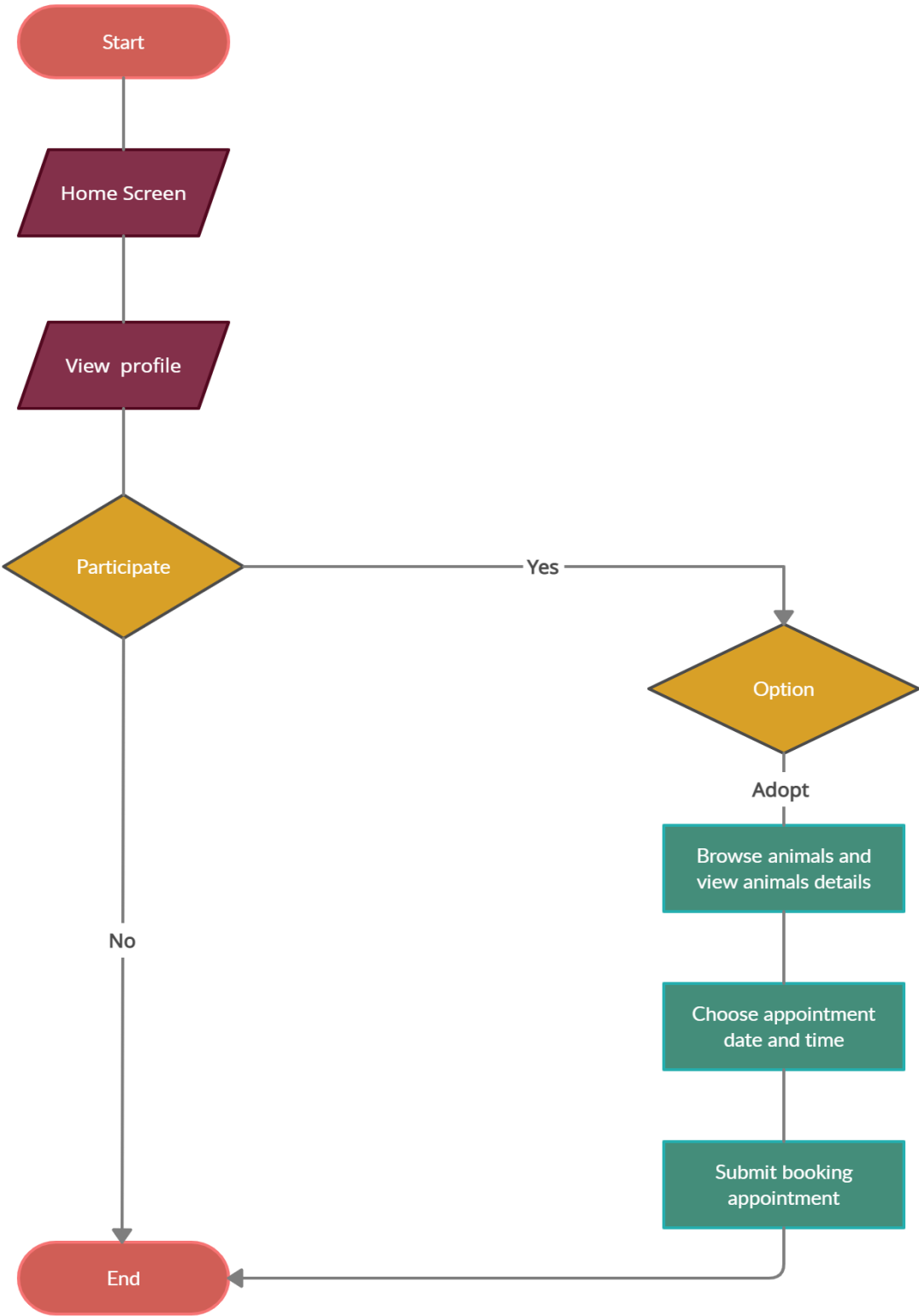


Figure 7: Flowchart

3.7 Gantt Chart

- Final Year Project 1 (FYPI)

Project Activities	Week											
	1	2	3	4	5	6	7	8	9	10	11	12
Phase 1: Project Planning 1.1 Determine Project Idea 1.2 Understanding Problem 1.3 Define Project Goals 1.4 Proposal Submission												
Phase 2: Data Gathering 2.1 Preliminary Research Work 2.2 Requirement Gathering 2.3 Progress Assessment 1 Submission												
Phase 3: Execution 3.2 Proposal Defence 3.3 Continues Project Work 3.4 Updating Information to Supervisor												
Phase 4: Completion FYP1 4.1 Progress Assessment 2 Submission 4.2 Interim Draft Report Submission 4.3 Final Interim Report Submission												

Table 2: Final Year Project 1 Gantt Chart

- Final Year Project 2 (FYP2)

Project Activities	Week														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Development and Prototyping	█	█	█	█	█	█									
Fixing coding error							█	█	█						
Testing system functionality and usability										█	█	█			
Tabulate result and discussion										█	█	█			
Project implementation and documentation											█	█			
Submission of Dissertation report												█			
Submission of video presentation													█	█	
Viva															█

Table 3: Final Year Project 2 Gantt Chart

3.8 Project Milestone

- Final Year Project 1 (FYP1)

Milestones	Description	Schedule
M1	<ul style="list-style-type: none"> • Information gathering: Ideas, concept and objectives • Submission of project proposal and approval 	Week 1 - 3
M2	<ul style="list-style-type: none"> • Understanding project requirement • Preliminary research requirement 	Week 4 - 6
M3	<ul style="list-style-type: none"> • Project defence • Submission of draft report 	Week 7 - 11
M4	<ul style="list-style-type: none"> • Prototype development • Submission of interim report 	Week 12

Table 4: Key milestone of Final Year Project 1

- Final Year Project 2 (FYP2)

Milestones	Description	Schedule
M5	<ul style="list-style-type: none"> • Design and develop user interface 	Week 1 - 4
M6	<ul style="list-style-type: none"> • Project implementation 	Week 5 - 8
M7	<ul style="list-style-type: none"> • Data gathering and surveying • Testing system functionality and usability 	Week 9 - 11
M8	<ul style="list-style-type: none"> • Submission of soft bound dissertation • Viva 	Week 12 - 15

Table 5: Key milestone of Final Year Project 2

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

On Chapter 4, the results section indicates on what the author have discovered simply and objectively, whereby it is a part in which the major findings of a study are described. Meanwhile, on the other hand, the discussion section offers readers with an interpretation of the findings, as well as the importance of it. Simply put, the discussion interprets the findings, then places them in perspective, and clarifies why they are important. This results and discussion chapter will examine on the following sections as per below:

- Result of Data Gathering
- Learning and Analysis of Mobile Application Development Process
- Mobile Application Prototype
- Mobile Application Testing

4.2 Result of Data Gathering

4.2.1 Result of Data Gathering for Survey

Animal Rescue and Pet Adoption Mobile Application Survey

In the survey questions, there are several sections heading have been created by the author, in which each of the sections heading have enabled the segmentation of a long-winded survey into separate sections. Additionally, it helps in holding the interest of respondents intact and grouping similar question together. Therefore, the author has created a classification scheme comprising of three sections heading – with a total of 15 questions regarding animal rescue and pet adoption, which incorporated the following:

a) Demographic question:

The purpose of demographic questions is created is to assist survey researchers decide what components or elements may influence a respondent's answer, interests, and views. Gathering demographic details can allow the author to cross-tabulate and measure the similarity or dissimilarity between subgroups to see how the responses vary between these groups.

2) Gender
40 responses

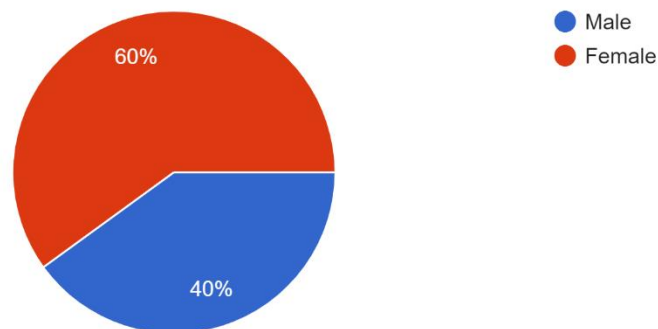


Figure 8: Respondent gender distribution

3) Age
40 responses

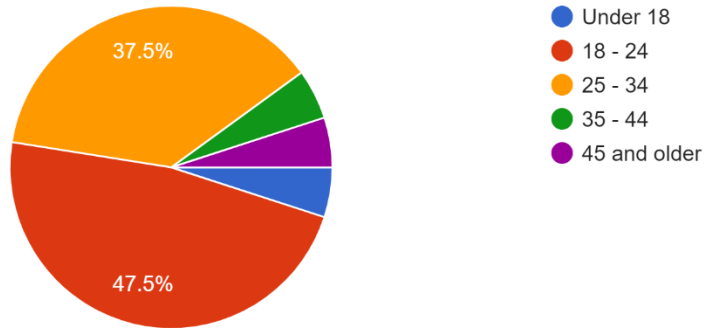


Figure 9: Respondent age distribution

b) Pet / Companion animal question:

In this section, the author has designed a several questions regarding pet/companion animals and its well-being in order to record how many animal owners is aware about their pet's welfare and care management. In addition, the purpose of this section is to determine whether a general public promotes and encouraging pet adoption, rather than buying them from pet stores.

4) Do you own a pet?
40 responses

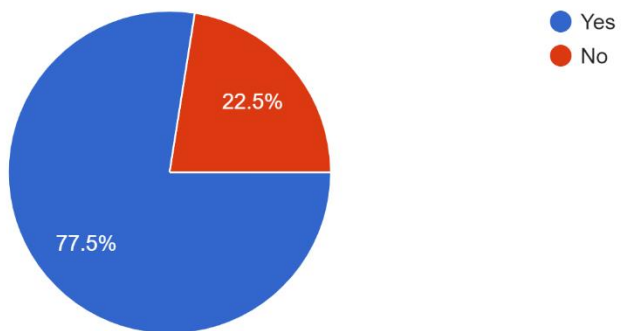


Figure 10: Pet ownership

5) Do you adopt your pet instead of buying?

31 responses

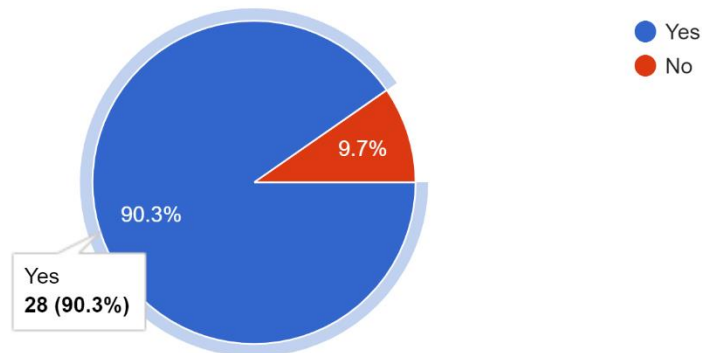


Figure 11: Adopt or buy a pet

10) When it come to your pet's well-being, what is your concern? Please rate by importance, 1 being least important and 5 is the most important

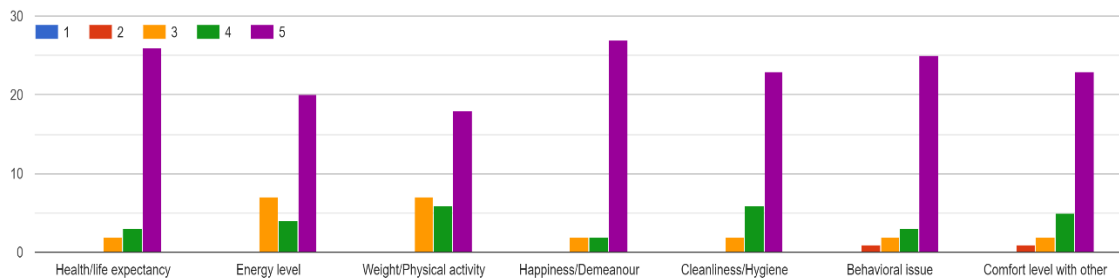


Figure 12: Pet's wellbeing

Based on Figure 10 which is about pet ownership, large number of respondents currently owning a pet with a percentage of 77.5%, meanwhile about 22.5% does not have any pet. This pie chart clearly indicates that the majority of the respondents have the experience of having and taking care of a pet. In reference to the pet owner's percentage on the previous survey question, Figure 11 shows that 90.3% of respondents (28 out of 31 people) adopt their pet, rather than buying them. Meanwhile, for Figure 12, majority of the respondent rate 5 (the most important) on each of the options provided regarding pet's well-being.

c) Awareness about current animal issue and perspective regarding animal adoption platform question:

11) Are you aware about current issue relating to companion animal/pet?
40 responses

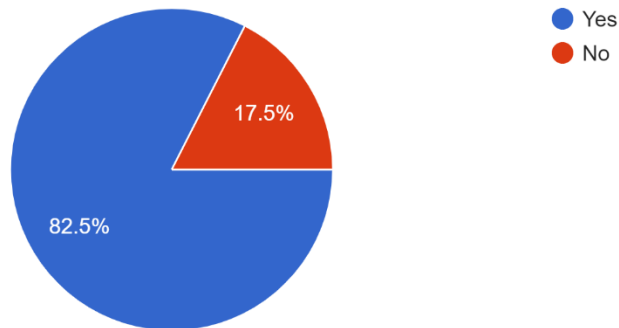


Figure 13: Current issue relating to pet/companion animal

According to the figure above, there are 33 out of 40 people choose “Yes” for their answer regarding the current animal issues relating to pet/companion animal, in which this indicates that the general public has a high awareness of animals. On the other hand, a question about animal rescue and pet adoption mobile application has been placed on the survey at which the majority of respondents choose “Yes” for their answer (Figure 14).

13) Other than website, do you think animal rescue and pet adoption mobile application will be useful to you?
40 responses

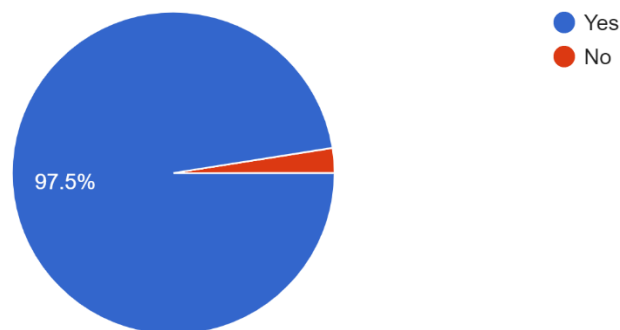


Figure 14: Animal issue and pet adoption mobile application

4.2.2 Result of Data Gathering for Interview

In order to acquire or gather detailed information on the current situation of animal shelter and its adoption process, Miss Isabel Wong, the animal caretaker and one of the main supervisors of Hope 4 Strays, a non-governmental animal organisation (NGO) in Bintulu, Sarawak, was interviewed on 13th June 2021 via message/text-based interview. According to her work profile, Miss Isabel has a numerous experience with stray animals because she is one of the people in charge to manage and arrange the available animals at the shelter to be adopted.

As she has been working with Hope 4 Strays for more than 2 years, the author considers that Miss Isabel is the ideal person to discuss to regarding animal adoption concern and shelter management, in which there are 3 questions given, where the result of data gathering for interview is shown as per below:

Question 1:

What are the current issues and problems faced by Hope 4 Strays Bintulu in handling the animal rescue and adoption process?



Hope 4 Strays Bintulu

Current issue of adoption

Public only search for puppies / kittens. Because puppies / kittens are cute. When we offer them puppies / kittens that is 4 months old (fully managed) they already think twice and feel that is adult dogs. Reason why we dont put up for adoption for puppies below 3 months old : all of the puppies we rescued are strays, probably might carry deadly disease such as rabies. puppies only able to take rabies vaccine at the age of 3 months and above & they need to be quarantine prior adoption.

As mentioned above small animals below 3 months old are fragile prompt to many disease such as parvovirus, rabies, distemper and worm disease. Therefore, proper care is essential to ensure they survival. Yes they are cutest during that age but they die easily if the new owner doesnt have experience and all these strays babies had been exposed all viruses.

-we only put puppies that is neutered and vaccinated up for adoption.

Due to above reason public might feel 3-4 months puppies / kittens are too big, not as cute as they expected which cause the adoption go slow.

Another thing over the long run adoption rate getting lower is because those who has adopt already adopt their pets. Animal life span is 10-15 years old. If owner been taking care of the animals well each household might have maximum of 3 dogs or 5 cats. So over the time adoption rate goes slower.

Publics only adopt small or young animals age 1-5 months. Adult animals become a big challenge. So far since our establishment 3 years ago only 1-2 adults dogs been adopted. Due to our space limitation because we dont run shelter when these adult animals not been adopt then we could not rescue new animals in need. Actually be it is adult or young animals our volunteer actually gives them a simple training and healthy (make sure they are safe for public) only then we will open them for adoption.

Figure 15: Question 1 interview answer

Question 2

How do you manage and care for the animals that have been rescued before they are available for adoption?



Hope 4 Strays Bintulu

All animals must be properly managed before they can be up for adoption such as deworm, defleas, vaccinated and neutered/spayed. aside we ensure that animals are in healthy condition prior to adoption.

Figure 16: Question 2 interview answer

Question 3

Other than Facebook, is there any medium/platform you use to let people know about your organisation?



Hope 4 Strays Bintulu

So far, major side only facebook (80%) and instagram (20%)

Figure 17: Question 3 interview answer

4.3 Learning and Analysis of Mobile Application Development Process

The basic goals of research are to inform action, acquire evidence for theories, and contribute to the advancement of knowledge in a particular sector. It entails gathering, organising, and analysing data in order to gain a better knowledge of a topic or issue. For this reason, the author required to obtain a common knowledge of the subject during the stage of design process before focusing on the specifics of the problem that should be resolved.

To begin the project, the process of pet adoption and rescue, as well as basic statistics and the current issue faced by animal shelter has been examined and gathered by conducting a message/text interview with Hope 4 Strays Bintulu to look for any further insights into animal adoption/rescue statistics. For bringing out the best solution, there is one example that could be taken to conduct a competitive analysis on pet adoption mobile applications on the market, which is known as a PetFinder, where this application functions by finding a loving home for pets and improve animal welfare.

4.3.1 Competitor Analysis and Research

In order to effectively carry out the competitor analysis and research for this project, the author has looked at over 20 customer reviews and ratings from PetFinder, with a view to get a comprehensive look at the overall user experience and feedback. Additionally, the author also has downloaded this app to get hands-on experience with the user interfaces and to understand how existing app products handle the adoption process, verifying both the author observations and potential user experience (UX) design solutions. The figures below shown several of negative reviews of PetFinder on Play Store:

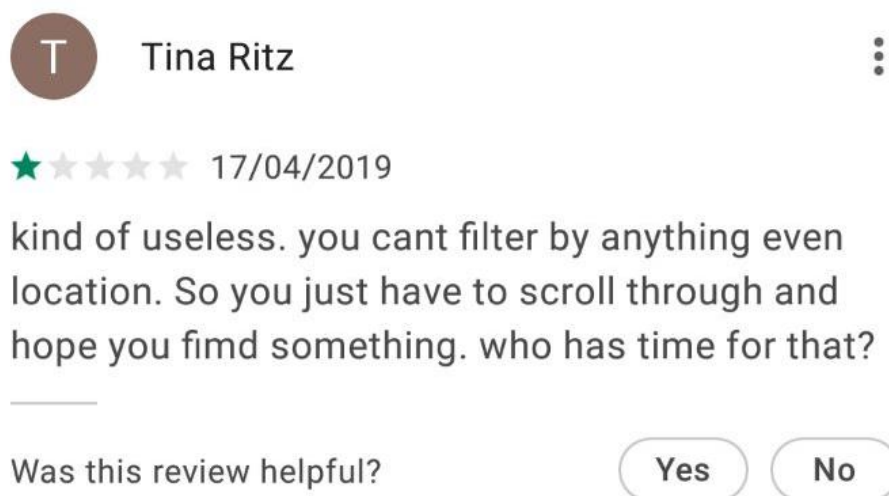


Figure 18: Negative review 1



edward wilson-smythe



★☆☆☆☆ 25/12/2019

This app contains unreliable information about available animals, based on stealing information from various rescues. Some of the dogs listed are from several years ago and/or not available for adoption. Avoid these services and work with a local shelter or rescue.

Was this review helpful?

Yes

No

Figure 19: Negative review 2



Nancy Sweetsir



★☆☆☆☆ 16/10/2019

Don't allow you to read discription of any of the pets

Was this review helpful?

Yes

No

Figure 20: Negative review 3



Aanvi Mahant



★☆☆☆☆ 19/09/2020

Very bad app It was not taking location

Was this review helpful?

Yes

No

Figure 21: Negative review 4

By analysing and examining the PetFinder app, it enabled the author to discover the users' pain spots and places for improvement, whereby the experiences of users with this pet adoption/rescue applications were mainly mixed.

4.3.2 User Analysis and Research

The next step in the designing and development process of this project is to acquire and collect public feedbacks and opinions via online surveys. As previously mentioned on Chapter 3: Methodology, the author had conducted an online survey by using Google Forms to gather information on the latest matter regarding awareness and perception about the latest topic relating to animals. On top of that, the survey also targets to examine the platform idea's viability. Therefore, after the learning and analysis of mobile application development process section, the author was able to validate some of the user experience (UX) ideas based on the user analysis and research. According to the respondents, an ideal pet adoption mobile application should have some of the following criteria:

- Complete and updated pets profiles— animal's name, breed, age, gender, along with its health's details and personality description.
- Have a rich media experience— image-based UI to easily see more photos, homepage and a list of available animals.
- Include the option to schedule or book an appointment to meet the adoptable animals which can ease the process of animal adoption.
- Contain search/filtering functionality.

14) What are the important features that pet adoption mobile application should have?

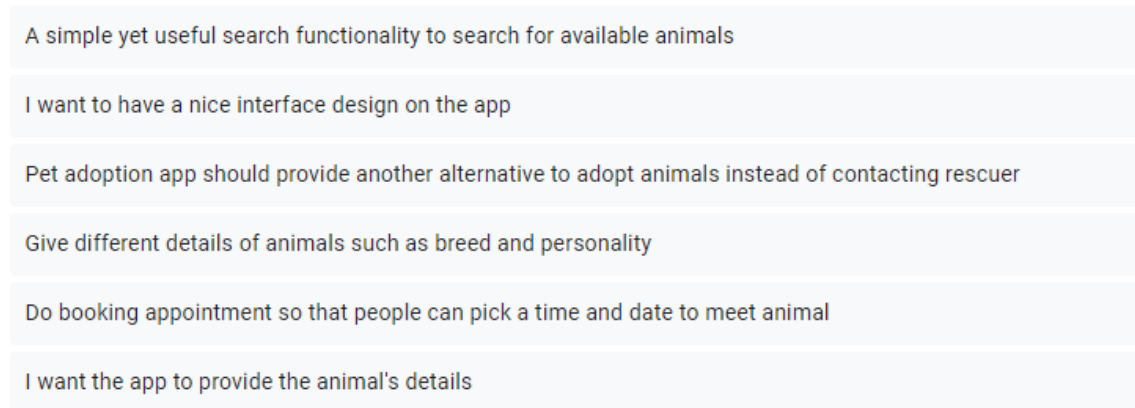


Figure 22: Respondents' answer

4.4 Mobile Application Prototype

Based on all the researches and discussions that has been discussed above, especially on the learning and analysis of mobile application development process, the most critical features that is required to build a good and an efficient pet adoption mobile app is to have an accurate pet profiles, short pet descriptions, gorgeous pet photographs as well as search filtering options.

Therefore, as a result, an Android-based mobile application for animal rescue and pet adoption titled as “StandForPaw” was developed. The author settled on user experience (UX) solutions with a short and simple animal descriptions, providing a complete animals profile which include name, age, breed, gender and animal’s health details, include a rich media experience such as image-based UI to easily see more photos of available animals, together with having a simple and straightforward search functionality.

Besides, this “StandForPaw” application mainly focuses on one specific feature, where it provide user with the option to schedule or book an appointment to meet the adoptable animals, instead of having generic interaction only like PetFinder app, where this feature can help to ease the process of animal adoption. Furthermore, rather than having a rescuers to update the list of animals that is available for adoptions, the database of the animal will be taken from the animal shelter itself, at which this can ensure the accuracy of the pet’s details based on the animal’s health and a fee for animal adoption will not be charged at will.

Access Page and Sign In Page

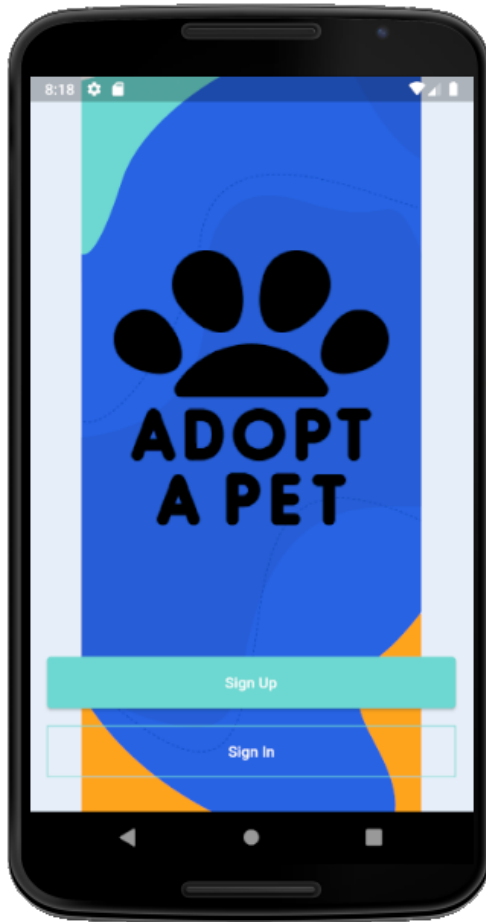


Figure 23: Access page

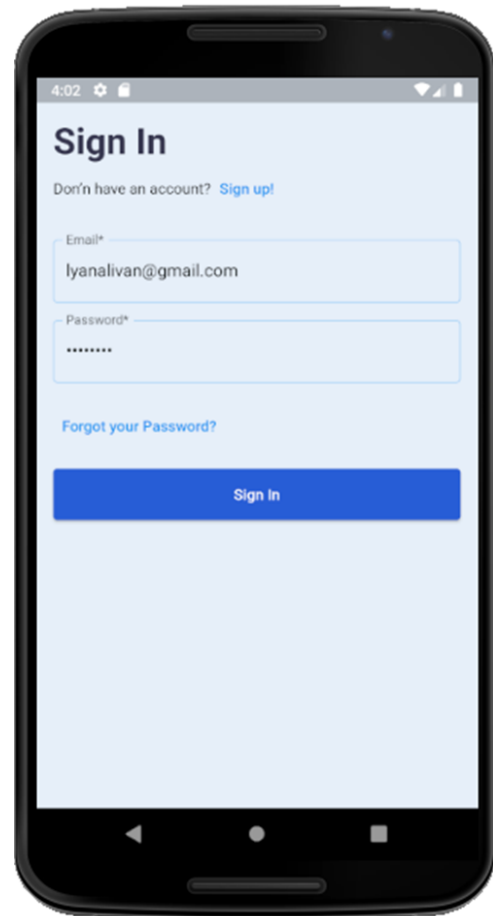
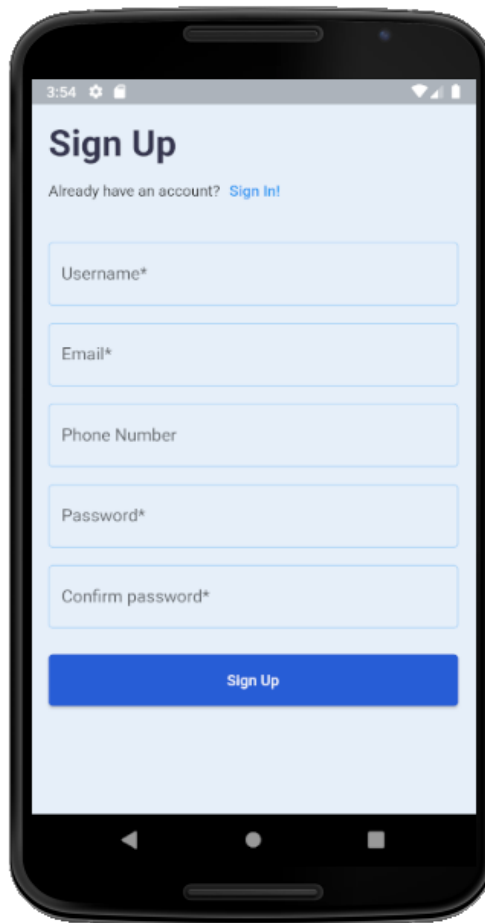


Figure 24: Sign in page

As a start, in order to gain an access into the StandForPaw app system, user is required to key-in their registered data such as email and password on the sign in page based on the Figure 24 provided above. However, on the other hand, the user will be denied an access when a login fails, which is caused by an invalid email and password combination that does not match a user account. When a user have successfully logged in, they will be directed straightaway to the home page screen, where user can have the option to navigate across, into and back out from different pieces of material within StandForPaw app.

Sign Up Page



The image shows a mobile application interface for a sign-up page. At the top, the status bar displays the time 3:54 and standard Android icons. The main heading is "Sign Up" in a bold, dark font. Below the heading, there is a link that says "Already have an account? Sign In!". The form consists of five input fields, each with a light blue border and a light blue background: "Username*", "Email*", "Phone Number", "Password*", and "Confirm password*". The asterisk indicates that these fields are required. At the bottom of the form is a prominent blue button with the text "Sign Up" in white. The phone's navigation bar is visible at the very bottom.

Figure 25: Sign up page

For a sign-up page, new user is requested to enter or register their information, including their username, email address, phone number, together with a password. The author has incorporated the “Confirm Password” field to prevent any security difficulties in the future, where it can detect typos by reminding and suggesting user to re-enter their password twice. In addition, the password that have been inserted must contain at least one special character and should have a minimum of 8 digits long, for the purpose of ensuring that the user account become more secure.

Home Screen Page/Main Screen Page

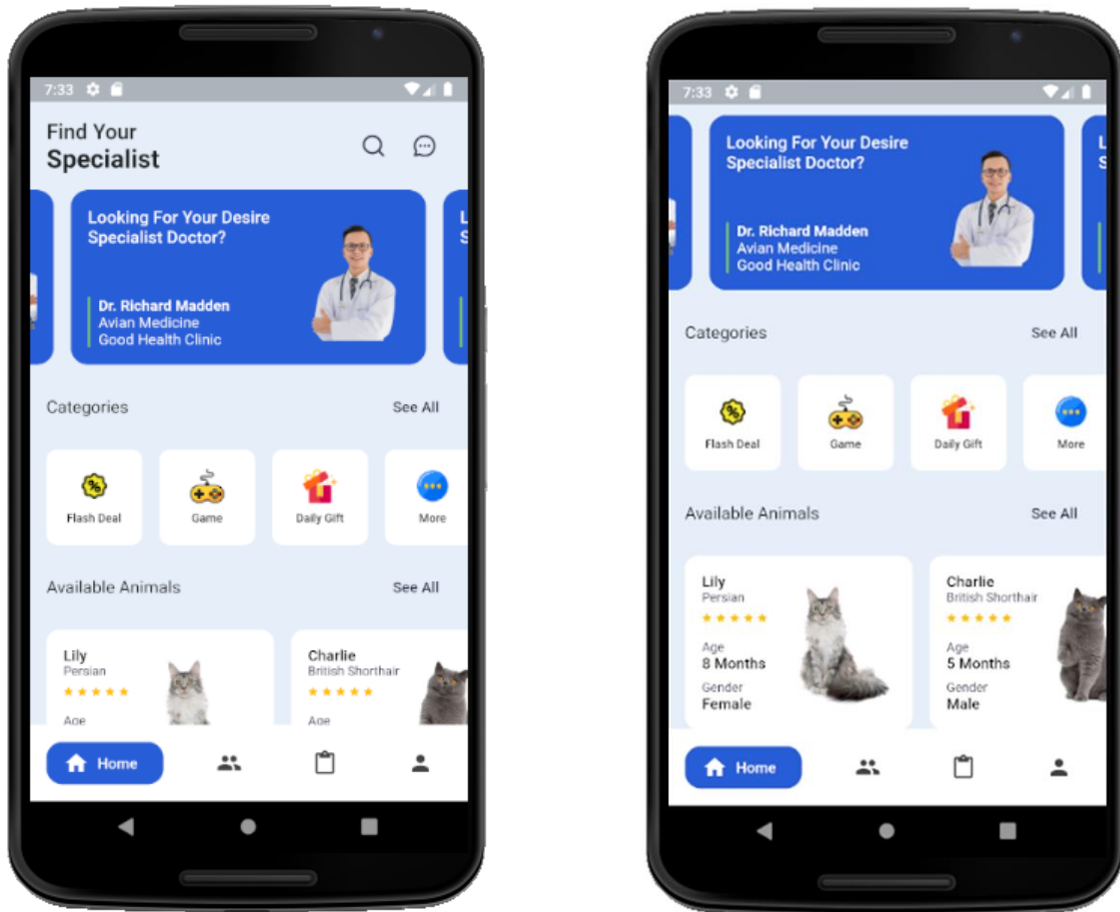


Figure 26: Home screen page

According to the Figure 26, the home screen page is utilized to display any crucial information of StandForPaw app, as it is the starting point of the user journey. There are three main aspects of this home screen, whereby it depicts the product's concept, the app's features, as well as the overall flow and possible paths for the user to take. The goals on the StandForPaw home page screen are as follows:

- Listing the available animals for adoption.
- To book an appointment for pet adoption.

Searching/filtering Page

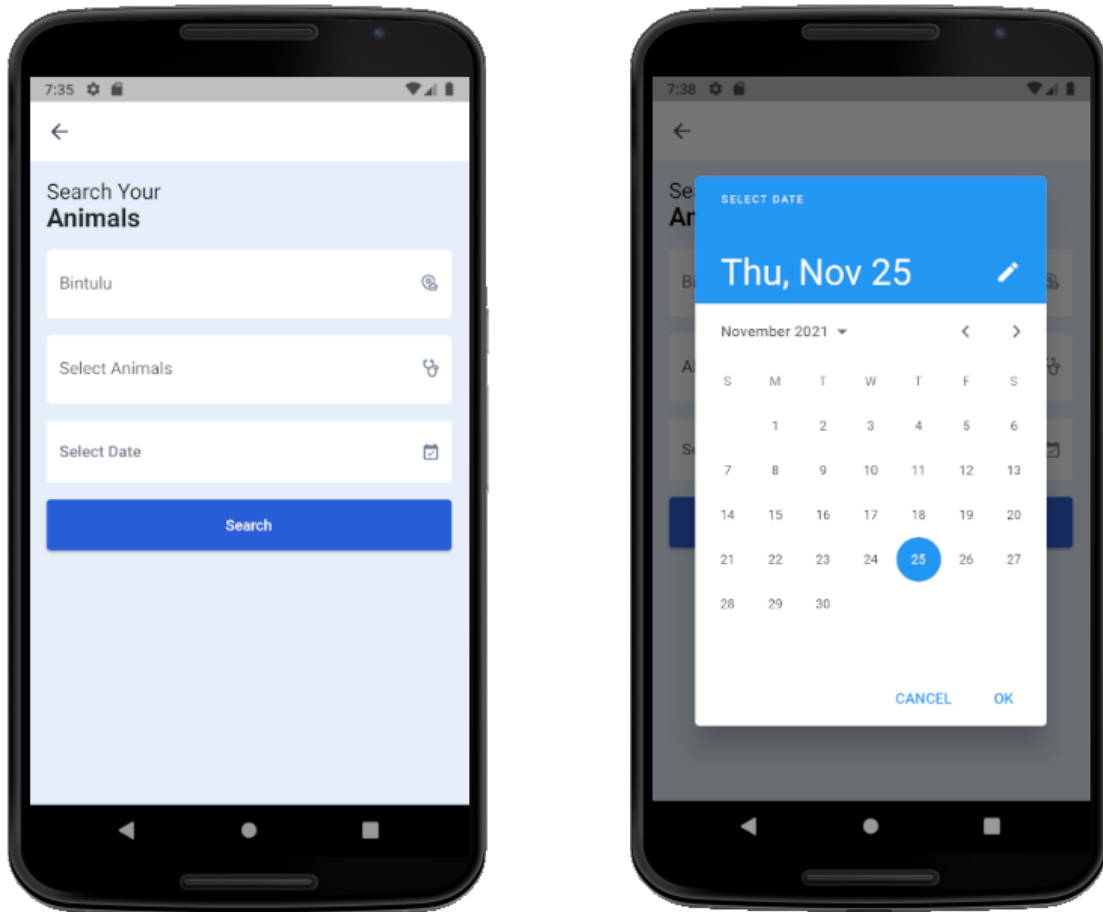


Figure 27: Searching/filtering page

When a user clicked on the tab bar ‘magnifying glass’ icon which can be seen on the top page of the home screen, a new section will appear with pre-filled content that the user could find useful. In instance, for this StandForPaw app, the searching/filtering tab bar can lead user to look for animals according to their place or area, the types of animals they want to view (for example like cat, dog or even a hamster), together with selecting a date to meet their future pets. By pressing the ‘Search’ button, the user is able to view the list of all the available animals that they want to see as pictured below (Figure 28).

Available Animals Page

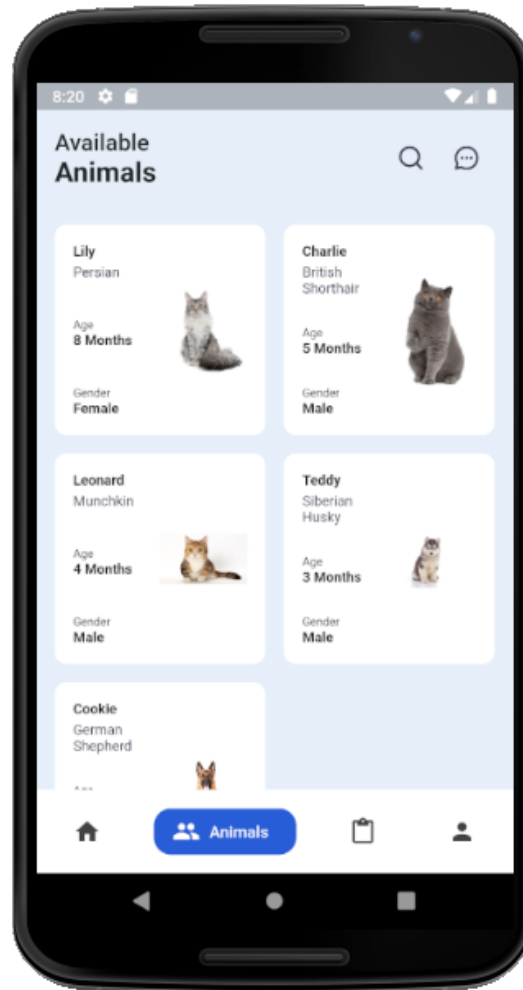


Figure 28: Available animal page

This page focuses on displaying every animal that is available for adoption, where the user can also view the important details of the pets on one info card such as the animal's name, breed, age as well as the gender. By having this feature, it could help and guide the potential adopter to observe multiple animals in one screen at the same time, making it easier for user to scan certain types of information quickly.

Animal Profile Page

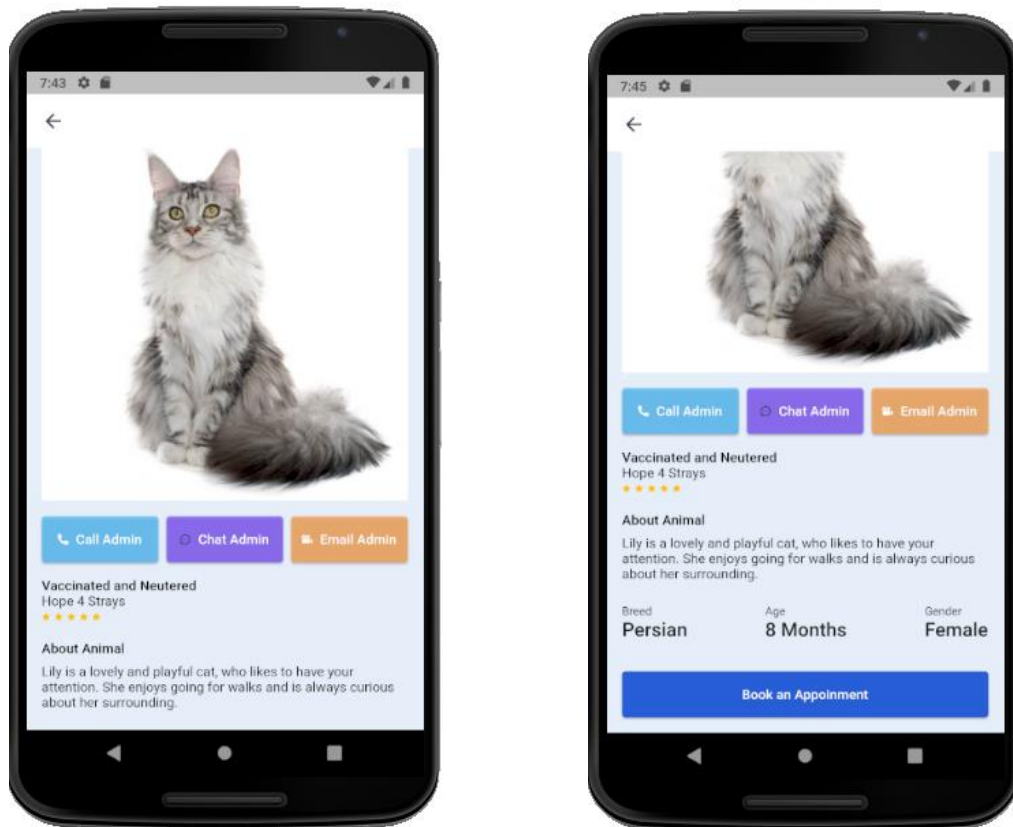


Figure 29: Animal profile Page

According to Figure 29, the purpose of having this animal profile page is to highlight all of the records of the animals, especially on their behaviour, personality and health which can be seen on the 'About Animal' section. This details screen provides the user or potential adopter with a more knowledge about a pet before an appointment is reserved. By clicking on the 'Book an Appointment' tab, user will be directed immediately to the online appointment booking section to schedule their time and date in order to meet the future pet.

Booking Appointment Page

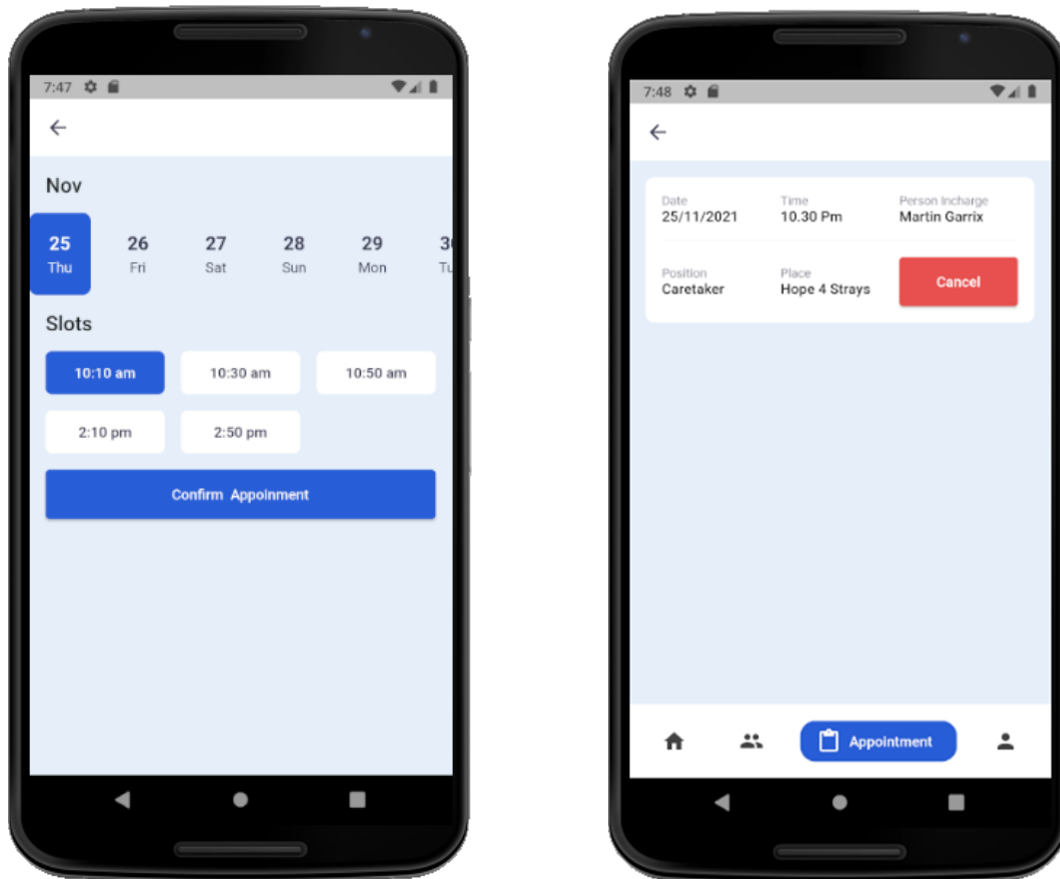


Figure 30: Booking appointment page

A booking appointment screen page shown above allows the user to schedule an appointment to meet with a specific pets that they have choose based on the list of the available animals. For StandForPaw app, user can only book one appointment at a time as most shelter have a single appointment available during each time slot, however, they are allowed to visit another animals at the shelter depending on the situation. On the other hand, if the user wants to delete their appointment with the animal shelter, they can click on the 'Cancel' button.

4.5 Mobile Application Testing

The term of mobile app testing can be defined as the type of testing in which programmes intended for mobile devices are evaluated for functionality, usability, consistency, together with several other factors. By using automated mobile app testing tools or manual testing procedures, mobile app testing can be done effectively and efficiently. Therefore, for this project, there are two types or stages of mobile application testing which incorporated as per below:

- Usability Testing
- UI (User Interface) Testing

4.5.1 Usability Testing

The author has conducted the usability testing for this project as a technique for determining how user-friendly StandForPaw mobile application is. The tests are conducted with real users to determine how this app is usable or intuitive, and how easy it is for users to achieve their objectives.

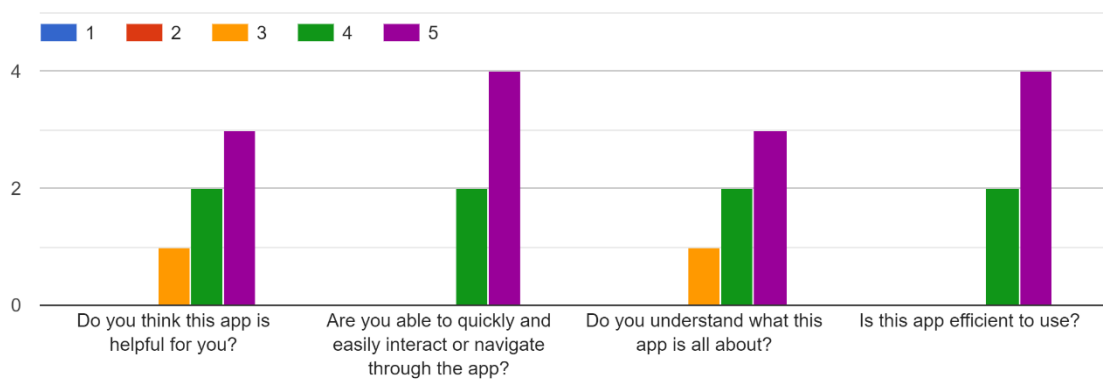


Figure 31: Usability graph on StandForPaw mobile app

Based on the graph above, the usability testing was given to 6 people, with four questions in total and the vast majority of respondents are aware of the mobile application's purpose. Additionally, almost everyone who responded believes that StandForPaw app is easy to use, especially for a first-time user.

4.5.2 UI (User Interface) Testing

UI testing, or commonly called as GUI testing can be defined as the practise of testing the visual parts of an application in order to check whether it is accurately satisfied the required performance and functionality. By doing so, the author is able to ensure that the UI functionalities are defect-free by testing the GUI. The checklist below will verify thorough GUI testing for StandForPaw such as:

- Check Font used in an application is clear and easy to read.
- Verify that the text is properly aligned.
- Make sure the typography and warning messages are in a suitable colour scheme.
- Check to see if the photographs are clear and aligned properly.
- Check for error messages are accurately presented.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Limitation of project

In completing the development of Android-based mobile application for this project, the findings of this study have to be seen in light of some limitations, whereby there are two major limitations that the author has identified and could be addressed in future research. The explanation for the limitation of project is shown as per below:

- 1) This study emphasizes on studying the existing situation and problems of a specific local animal shelter in Malaysia in order to develop an effective and reliable pet adoption platform, whereby the prototype of mobile application develop by this study is only covering Hope 4 Strays, a non-governmental animal organisation (NGO) located in Bintulu, Sarawak as a proof of concept.

- 2) The development of StandForPaw app is solely focusing on the front end of the mobile application. The term for a front end of mobile app can be defined as a part where the user interacts with directly. In other words, it is commonly known to as the “client side” of the programme. The front end includes everything a user sees when engaging with StandForPaw app, including text colours and styles, images, search bar, widgets and many more. For this project, the two most important aspects that was implemented by the author during StandForPaw front end development are responsiveness and performance.

5.2 Future Work and Recommendations

During the development process of this app, the author has identified a number of features that can be improved or customized in many ways for the future and upcoming work of the project. These features appeared to be valuable to the application, however, owing to a time and resources limitation, it was not implemented. As a result, recommendations were given for future researchers or developers who might be interested in continuing this research. Therefore, the following features may help to improve the system's value in the future:

1. The prototype of StandForPaw should have covered more location of animal shelters in Malaysia. For example, when the user clicks on the search animal button, they should be given the options to input their own location, in order to view the list of available animals for adoption at another places.
2. To implement back-end development in StandForPaw mobile app that can organizes and saves data, along with making sure that everything on the client side of the mobile app run smoothly.

5.3 Conclusion

StandForPaw is an Android-based mobile application that functions as a platform for animal welfare, where the prototype system of this app allows user to rescue and save homeless animals by adopting from the animal shelters. The development of this app concentrates in conducting user experience (UX) solutions with an easy exploration of the system, short and simple animal description, providing a complete animals profile, include a rich media experience such as image-based UI to easily see more photo of available animals, as well as having a simple and straightforward search functionality.

Besides, this “StandForPaw” application mainly focuses on one specific feature, where it provide user with the option to schedule or book an appointment to meet the adoptable

animals, instead of having generic interaction only like PetFinder app, where this feature can help to ease the process of animal adoption. Furthermore, rather than having a rescuers to update the list of animals that is available for adoptions, the database of the animal will be taken from the animal shelter itself, at which this can ensure the accuracy of the pet's details based on the animal's health and a fee for animal adoption will not be charged at will.

In a nutshell, by referring to all of the findings, data and information that was provided and properly explained by the author in each chapter of the project, it can be concluded that the two main objectives of this app are achieved, where the first objective is to investigate the current issue and situation of companion animal adoption and animal welfare mobile app, following by the second objectives of this study, where the author wants to develop an application which can serve as a platform for animal welfare and pet adoption.

Although the findings of this study have to be seen in light of some limitations, where the development of StandForPaw app is solely focusing on the front end of the mobile application, however, the author is still able to build an application that can help finding homes for stray animals, providing a collaboration platform for shelters, as well as creatively leverage technology to improve human and animal welfare, which leads to a more harmonious and compassionate society.

Lastly, responsiveness and performance are two of the most important aspects of StandForPaw front-end development, and therefore, the author ensure that the app is responsive, meaning that it operates well on all devices. Besides, the application's performance is consistent at all times, regardless of the device used to access it.

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APPENDICES

- User profile

