Fast and Furryous:

A Mobile Application

to Assist in Pet Locating

Engineering Problem

Over 100 million households in the United States have pets. Approximately 15 percent of pets go missing annually, and only 15 percent of those are found through microchip tracking and identification tags. An alternative option is needed.

Engineering Goals

The goal of this application is to help people locate their lost pets by facilitating direct communication with the person who found their lost pet.

Specific Goals

The app will be able to:

- Allow a user to report a missing pet
- Store the user's information in a database
- Send an alert to others in the area
- Allow others to communicate back to the owner once the pet is found

Background

- There is a need for improved pet locating technology.
- Some people track their pet with Global Positioning System (GPS) collars.
  - GPS had previously been used in human tracking studies, although it proved to be unreliable.
  - With pet collars, people have been dissatisfied with their tracking inaccuracy, excessive battery usage, size/weight, lag time, and cost.
- Not all pet owners using tracking devices for their pets, which becomes a problem when they are lost.
  - In the event of a natural disaster, such as the recent hurricanes, people were forced to quickly evacuate and leave their pets behind.
  - Rescuers used a combination of two apps to locate them without tracking technology; one app allowed communication between the rescuer and the owner, and the other showed a map of the area.

- One study found that people would rather have a mobile application relaying pet location information rather than a website or text message system.
- Android Studio is a major mobile application platform; 650,000 mobile applications are available on the Android market, making up 45% of the smartphone market.
- It is user friendly, supports a user interface creator, and links to Google Maps and Firebase.
    - Firebase, a mobile application development platform, offers a real-time database which developers can use in their apps to store user data.
- Apps are tested by defining specific performance metrics, depending on the goals and purpose of the app.

Decision Matrix

Criteria	Weight	Build Device	Program an app	Total Device	Total Program
Low cost	3	3	5	9	15
Low time	5	2	3	10	15
Many resources available	3	3	4	9	12
User friendly	5	3	5	15	25
			Total	43	67

Figure 1: A matrix depicting the criteria considered to decide the best option to solve the problem.

Materials and Programs

- Laptop with app developing programs:
  - Android Studio with emulator
  - Firebase
  - Google software development kit with Google Maps
- 2 Nexus 7 ASUS tablets

Procedure

- The app was designed using Android Studio with Firebase capabilities and Google software development tools including Google Maps.
- Throughout this entire process, video tutorials were consulted for assistance and every time a new function was added, the app was run with an emulator or tablet to test it.
- The user interface (the main page) was coded first with XML and Java, with buttons that trigger other activities.
- Firebase tools including the database and authentication were added.
- Google Maps were added, and the preset marked location was changed.

- Another activity was added for users to input information. This activity was duplicated and altered so users could enter missing or found pet information.
- The buttons on the main activity screen were named and coded to trigger their respective activities.
- A permissions check was added to the Maps activity to access user location and when permission was granted, user location was displayed.
- Soon, the app will be coded so that the information entered is stored in a database and able to be accessed by certain users.
- Code will be added to send an alert to others in a specified area when a pet report is filed and to allow user to user communication.

How the App Works

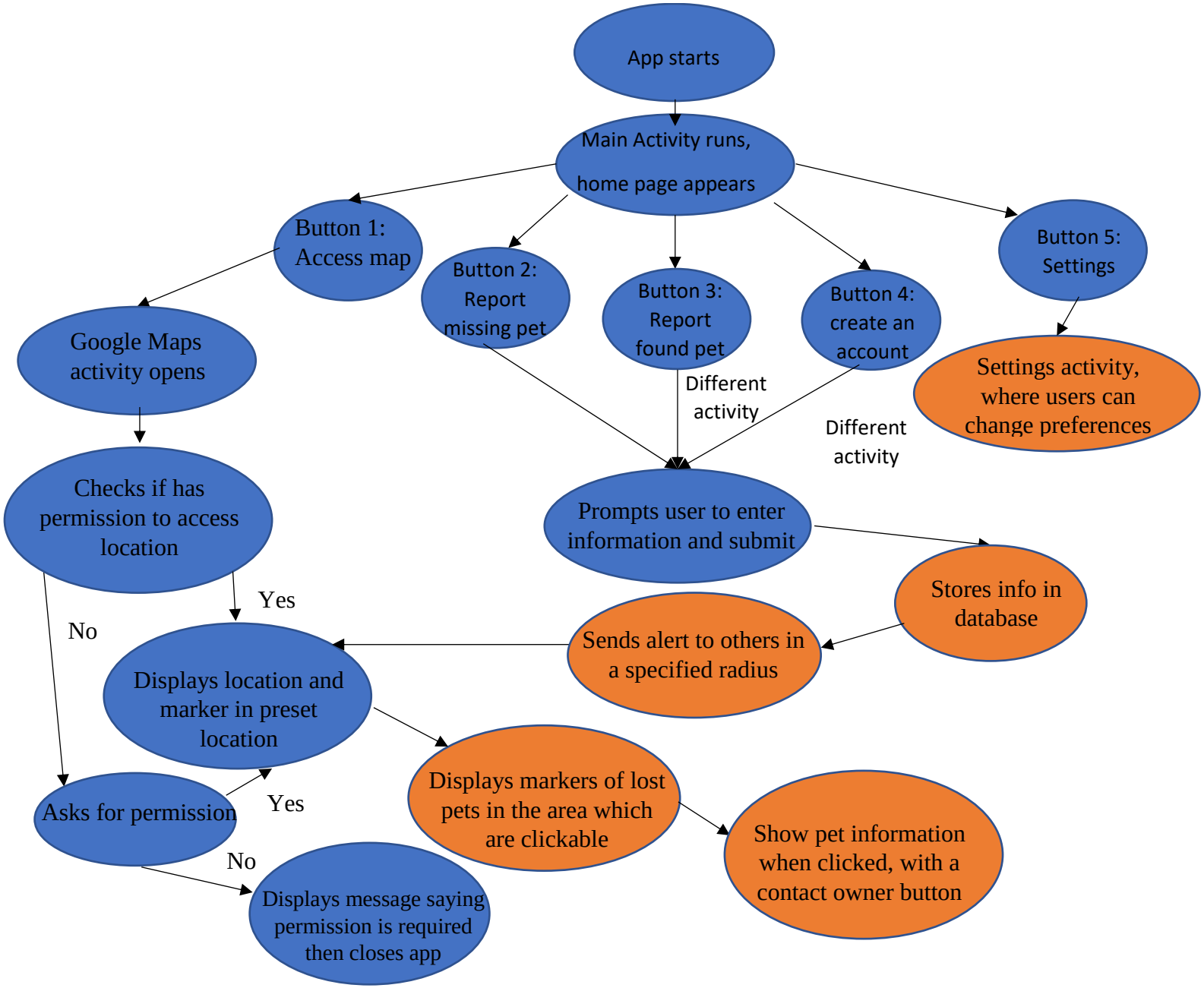

App starts
Main Activity runs, home page appears
Button 1: Access map
Button 2: Report missing pet
Button 3: Report found pet
Button 4: create an account
Button 5: Settings
Google Maps activity opens
Settings activity, where users can change preferences
Different activity
Different activity
Checks if has permission to access location
Prompts user to enter information and submit
Stores info in database
Yes
No
Sends alert to others in a specified radius
Displays location and marker in preset location
Displays markers of lost pets in the area which are clickable
Asks for permission
Yes
No
Show pet information when clicked, with a contact owner button
Displays message saying permission is required then closes app

Figure 2: Flow chart showing the progression of the app's functions starting from the main screen.

Raw Data Matrix

Criteria	Home Again Micro Chip	Loc8tor Pet Finder	Tractive GPS Pet Tracker	POD 2	Pixie	Tile	Gibi	Nuzzle	Garmin Astro Radio Tracker
Tracks a pet accurately in real time	No	No	Yes	Yes	No	No	Yes	Yes (can be wrong)	Yes
Alerts others in the area of lost pet	No	No	No	No	No	No	No	No	No
Allows others to tell owner when pet is found	Yes	No	No	No	No	No	No	No	No
Battery Life	N/A	Good 10+ days	Bad 2-5 days	Bad 6 days	Good 12+ month	Good 1 year	Bad 1 day	Bad 8 hrs	Good 10+ days
Lag time	N/A	High	Low (2-3 s)	Low	High	Low	Low	Low	Low (2.5 s)
Shows a map	No	No	Yes	Yes	No	Yes	Yes	No	Yes

Uses mobile application	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Can be used without GPS	Yes	No	No	No	No	No	No	No	No
Size (dimensions in mm) **(g)**	12 x 2 x 2 0.029	30.5 x 19.5 x 8.5 5	50.8 x 40.64 x 15.24 35	22.9 x 50.8 x 0.5 27.2	76.2 x 114.3 x 45.72 113.4	33 x 33 x 5.1 5.7	76.2 x 203.2x 152.4 226.8	15.2 x 101.6 x 22.9 144.6	160 x 35.56 x 61.0 272.2
Cost	$20/ year	$89.95	$120.28 + $5/ month	$198.5	$30	$20	$130	$190	$650
Data is user friendly	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
For different kinds of pets	Dogs	All	Cats and dogs	All	All	All	All	Dogs	Dogs
Tracking range	N/A	120 m	Where cell service is	Where cell service is	45.7 m	100 m	Where cell service is	Where cell service is	14484 m
Shows user current location	No	No	No	No	No	No	No	No	Yes
User can enter location	No	No	No	No	No	No	No	No	No
Friendly user interface	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Figure 3: Matrix of direct values on nine existing pet locating devices for specified criteria.

App Versions

Criteria	Version 1	Version 2	Version 3	Version 4	Version 5	Version 6	Projected February Version
Tracks a pet accurately in real time	No	No	No	No	No	No	No
Alerts others in the area of lost pet	No	No	No	No	No	No	Yes
Allows others to tell owner when pet is found	No	No	No	No	No	No	Yes
Battery Life	Good	Good	Good	Good	Good	Good	Good
Lag time	N/A	Low	Low	High	High	Low	Low
Shows a map	No	No	No	Yes	Yes	Yes	Yes

Uses mobile application	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Can be used without GPS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cost (low)	$0	$0	$0	$0	$0	$0	$0-$0.99
Data is user friendly	No	No	No	Yes	Yes	Yes	Yes
For different kinds of pets	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tracking Range	N/A	N/A	N/A	N/A	N/A	N/A	At least 1 mile
Shows user current location	No	No	No	No	No	Yes	Yes
User can enter location	No	No	No	No	No	No	Yes
Friendly user interface	No	No	No	No	No	Yes	Yes

Figure 4: Matrix of raw data for the app versions made, rated against the same criteria as Figure 3.

Scoring Matrix

Criteria	Weight	A	B	C	D	E	F	G	H	I	1	2	3	4	5	6	FEB
Tracks a pet accurately in real time	4	1	1	5	5	1	1	5	3	5	1	1	1	1	1	1	1
Alerts others in the area of lost pet	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5
Allows others to tell owner when pet is found	4	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5
Long battery life	5	5	5	1	1	5	5	1	1	5	5	5	5	5	5	5	5

Low lag time	5	1	1	5	5	1	5	5	5	5	1	5	5	1	1	5	5
Shows a map	4	1	1	5	5	1	5	5	1	5	1	1	1	5	5	5	5
Uses mobile application	5	1	1	5	5	5	5	5	5	1	5	5	5	5	5	5	5
Can be used without GPS	4	5	1	1	1	1	1	1	1	1	5	5	5	5	5	5	5
Small size	5	5	4	2	4	1	4	1	1	1	5	5	5	5	5	5	5
Low cost	5	5	1	1	1	5	5	1	1	1	5	5	5	5	5	5	5
Data is user friendly	5	5	5	5	5	5	5	5	5	5	1	1	1	5	5	5	5
For different kinds of pets	2	3	5	3	5	5	5	5	3	3	5	5	5	5	5	5	5
Large tracking Range	5	1	1	5	5	1	1	5	5	4	1	1	1	1	1	1	5

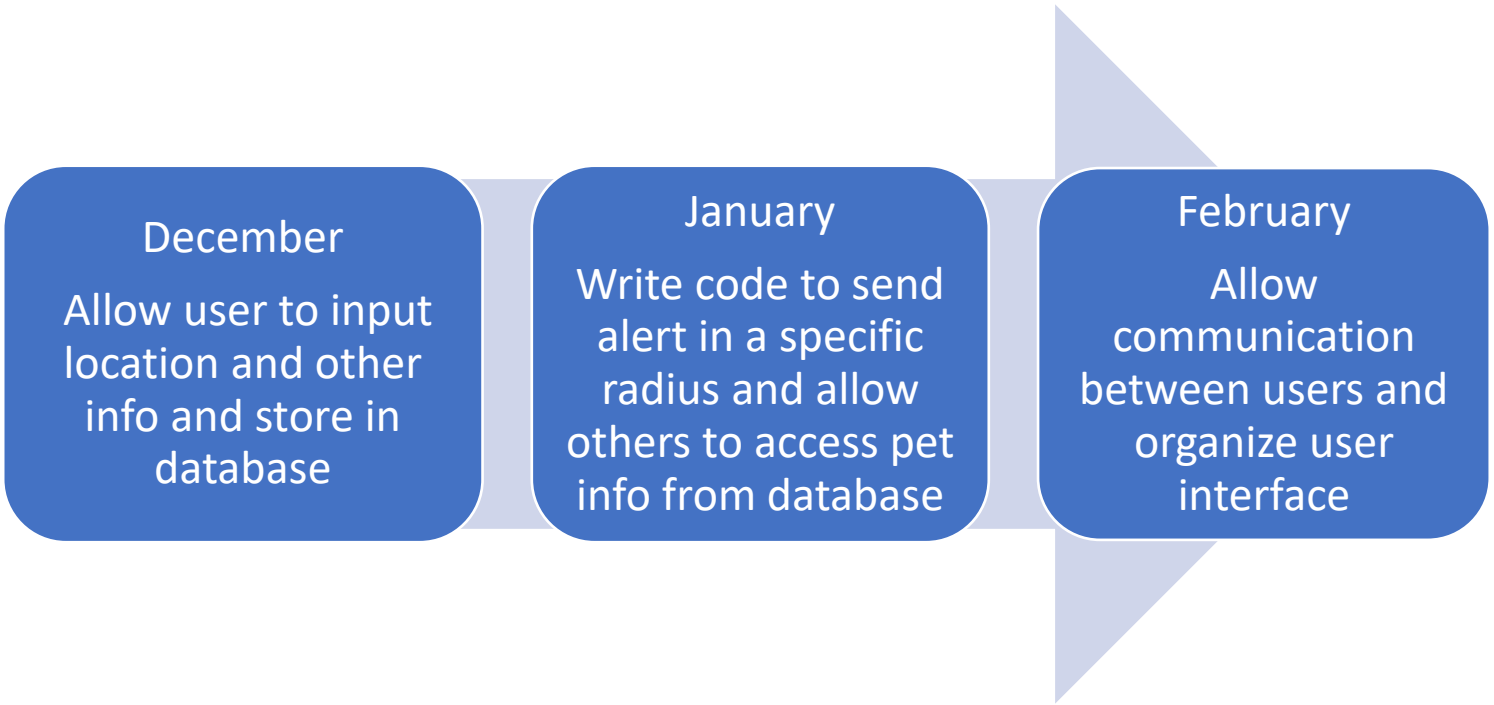
Shows user current location	3	1	1	1	1	1	1	1	1	5	1	1	1	1	1	5	5
User can enter location	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5
Friendly user interface	5	1	1	5	5	5	5	5	5	5	1	1	1	1	1	5	5
	Total	184	131	209	223	176	227	208	180	211	172	192	192	208	208	260	324

Figure 5: Matrix which compares existing technology and app versions to selected weighted criteria. Weights were chosen based on a study that determined what people looked for in a pet tracker.

Future Work

- For February fair, the app is expected to be able to:
  - Alert others in the area of a missing pet
  - Allow others to access pet information from the database
  - Allow communication between users
- The project can be extended further than these goals to:
  - Display other missing pet markers on the map
  - Include a search bar to narrow searches for pets in an area
  - Be compatible with tracking devices or geofencing technology

Timeline


December
Allow user to input location and other info and store in database
January
Write code to send alert in a specific radius and allow others to access pet info from database
February
Allow communication between users and organize user interface