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 the application was to help people locate lost pets by alerting nearby users of missing pets and by facilitating direct communication between owners and the people who find their lost pets.

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

Losing Pets

A Prevalent Problem for Furry Friend Owners

For pet owners, their pets are considered a loved member of the family. If the pet happens to go missing, shouldn't there be a quick way to find them and bring them home?

An Annual Problem

Over 100 million households in America have pets.

15%

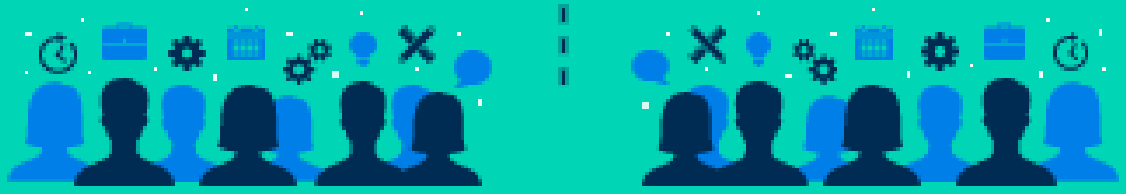
of pets go missing annually.

15%

of pets were found with tracking devices.

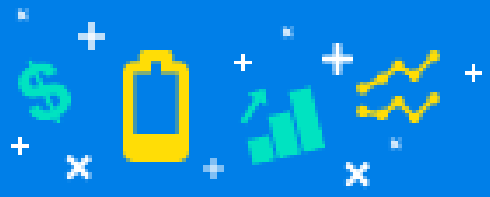
Pets During Hurricanes

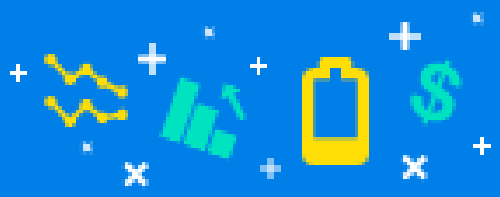
During Hurricane Katrina 2005, an estimated 600,000 pets were abandoned during evacuations and only 15,000 were found. In Hurricane Harvey 2017, thousands of pets were abandoned and rescued with a combination of two apps.



Customer Satisfaction

Pet owners generally want a device that displays information on their pet's whereabouts through a mobile application. They also would prefer to directly contact their pet's finders.





Issues with Current Devices

Pet owners who purchase pet tracking devices are most generally dissatisfied with the device's inaccuracy, high cost, low battery life, high lag times, and inability to communicate with pet finders.

An Alternative Solution is Needed!

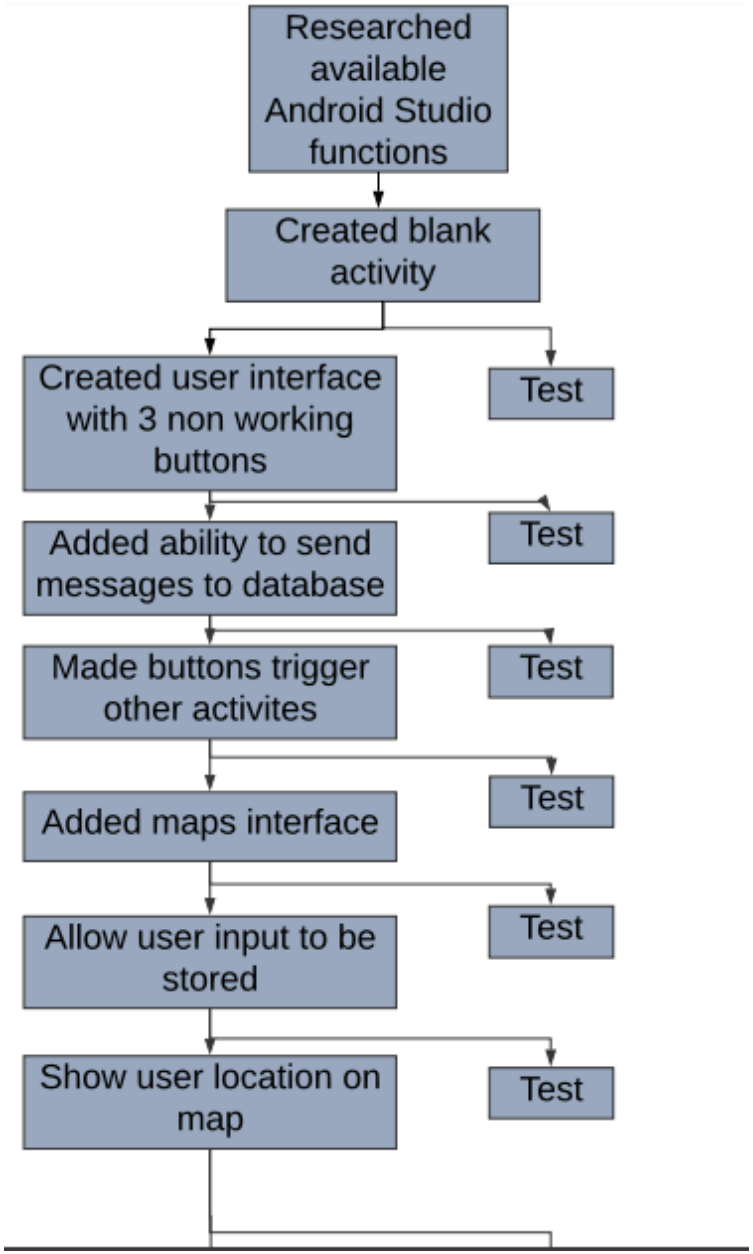
Pets need to be brought home more efficiently and quickly to their loving families, who miss them incredibly!

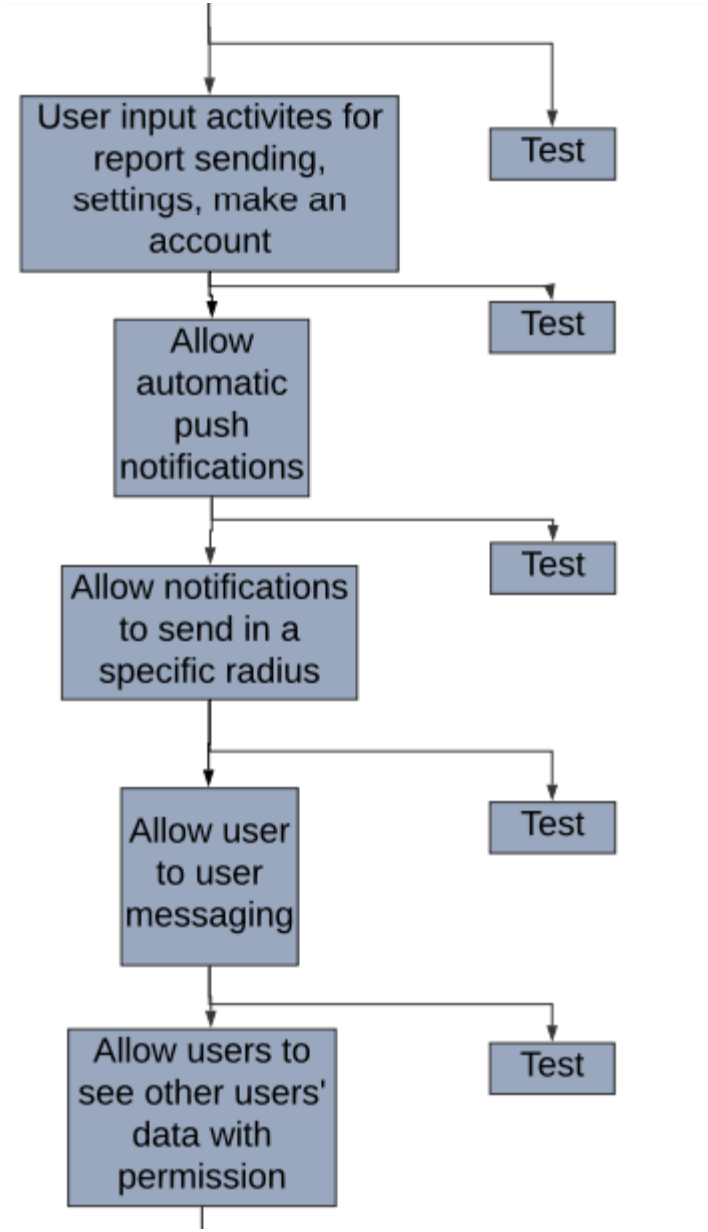
Figure 1: Background information explaining the problem of lost pets

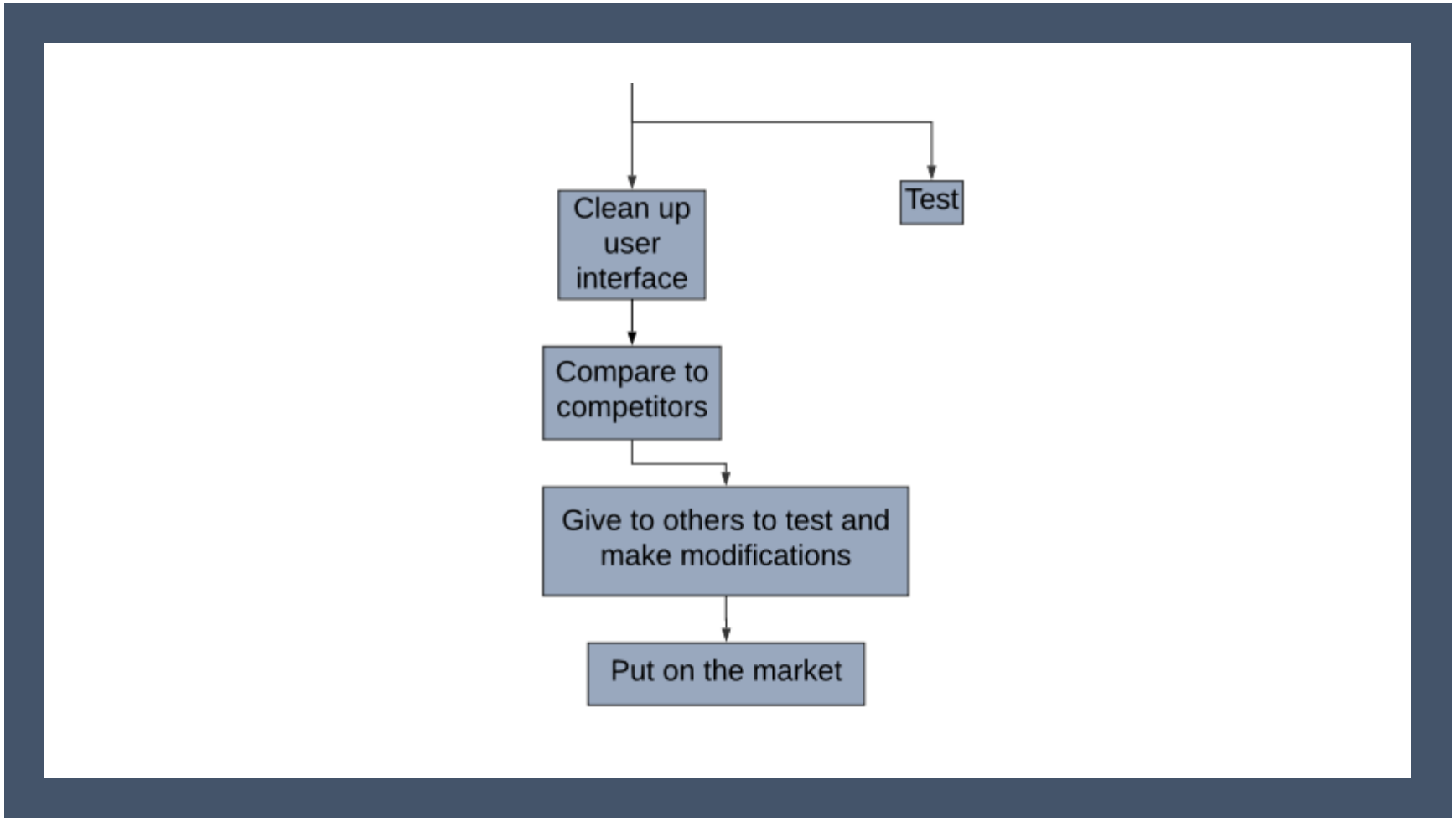
Materials and Programs

- Laptop with app developing programs for coding:
  - Android Studio with emulator
  - Firebase- provides real-time database, crash reports, authentication
  - Google software development kit with Google Maps
  - OneSignal- push notification platform
- 2 ASUS Nexus 7 tablets for testing

Procedure


Researched available Android Studio functions
Created blank activity
Created user interface with 3 non working buttons
Test
Added ability to send messages to database
Test
Made buttons trigger other activites
Test
Added maps interface
Test
Allow user input to be stored
Test
Show user location on map
Test

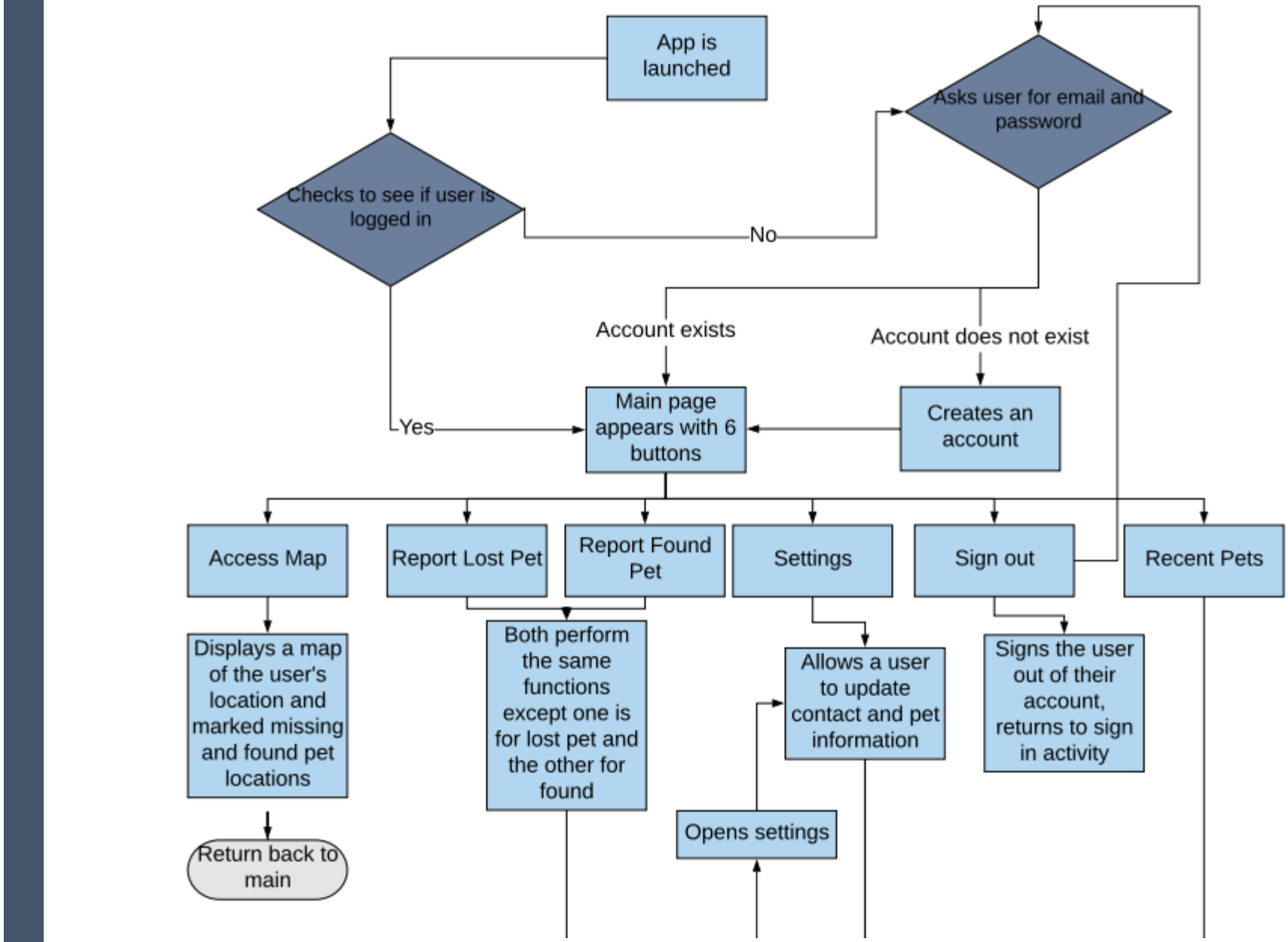

User input activites for report sending, settings, make an account
Test
Allow automatic push notifications
Test
Allow notifications to send in a specific radius
Test
Allow user to user messaging
Test
Allow users to see other users' data with permission
Test


Clean up user interface
Test
Compare to competitors
Give to others to test and make modifications
Put on the market

Procedure

Figure 2: A flowchart depicting the procedure followed to program and test the app.

How the App Works


App is launched
Checks to see if user is logged in
No
Asks user for email and password
Account exists
Account does not exist
Yes
Main page appears with 6 buttons
Creates an account
Access Map
Report Lost Pet
Report Found Pet
Settings
Sign out
Recent Pets
Displays a map of the user's location and marked missing and found pet locations
Return back to main
Both perform the same functions except one is for lost pet and the other for found
Opens settings
Allows a user to update contact and pet information
Signs the user out of their account, returns to sign in activity

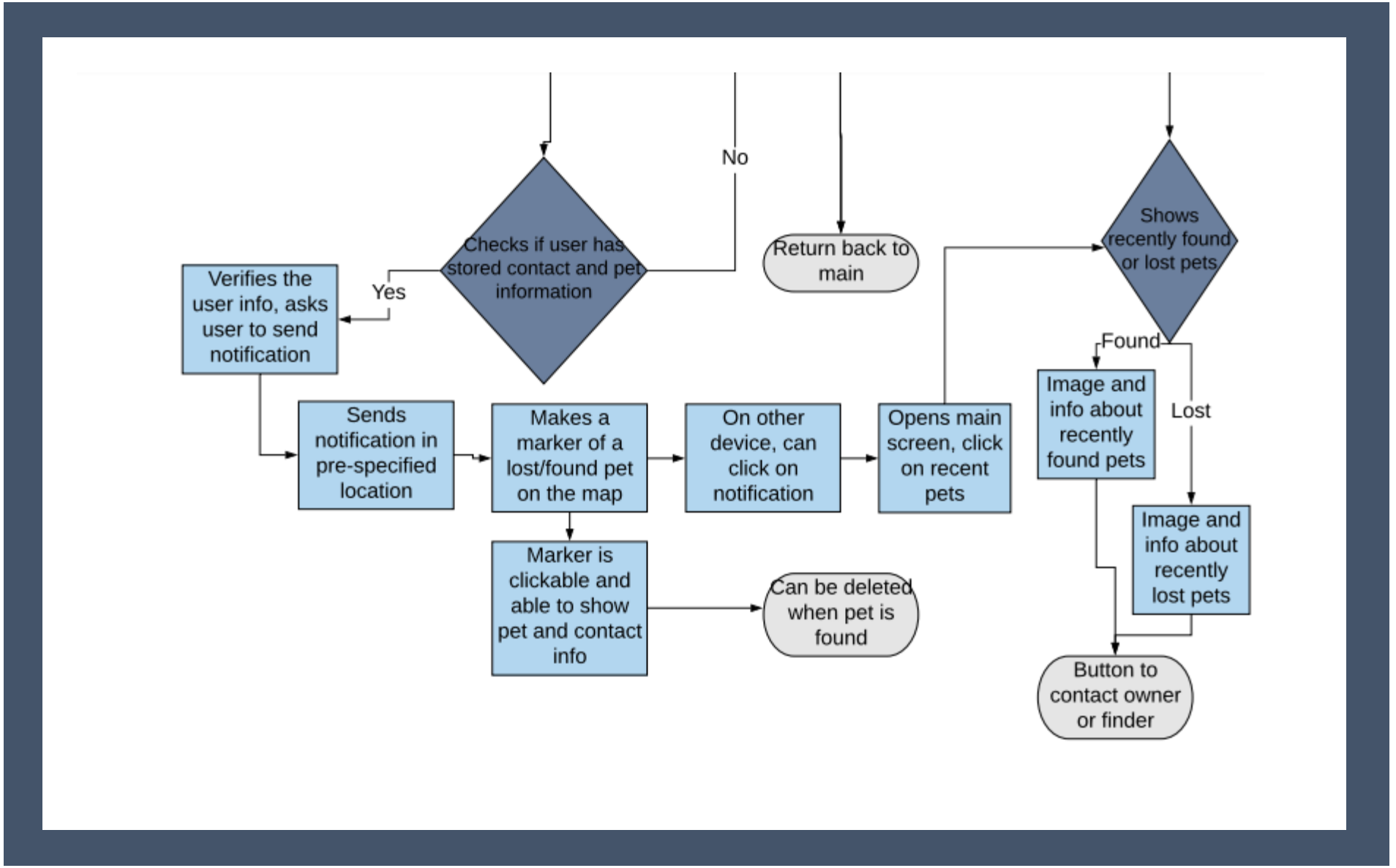

Checks if user has stored contact and pet information
No
Return back to main
Yes
Verifies the user info, asks user to send notification
Sends notification in pre-specified location
Makes a marker of a lost/found pet on the map
On other device, can click on notification
Opens main screen, click on recent pets
Shows recently found or lost pets
Found
Lost
Image and info about recently found pets
Image and info about recently lost pets
Button to contact owner or finder
Marker is clickable and able to show pet and contact info
Can be deleted when pet is found

Figure 3: A flowchart depicting how the app runs upon launch.

Figure 3: A flowchart depicting how the app runs upon launch.

Scoring Matrix

Criteria	Weight	A	B	C	D	E	F	G	H	I	F&F
Tracks a pet accurately in real time	4	1	1	5	5	1	1	5	3	5	1
Alerts others in the area of lost pet	4	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	5
Long battery life	5	5	5	1	1	5	5	1	1	5	3
Low lag time	5	1	1	5	5	1	5	5	5	5	3
Shows a map	4	1	1	5	5	1	5	5	1	5	5

Uses mobile application	5	1	1	5	5	5	5	5	5	1	5
Can be used without GPS	4	5	1	1	1	1	1	1	1	1	5
Small size	5	5	4	2	4	1	4	1	1	1	5
Low cost	5	5	1	1	1	5	5	1	1	1	5
Data is user friendly	5	5	5	5	5	5	5	5	5	5	5
For different kinds of pets	2	3	5	3	5	5	5	5	3	3	5
Large tracking Range	5	1	1	5	5	1	1	5	5	4	5
Shows user current location	3	1	1	1	1	1	1	1	1	5	5
User can enter location	3	1	1	1	1	1	1	1	1	1	5
Friendly user interface	5	1	1	5	5	5	5	5	5	5	5
	Total	184	131	209	223	176	227	208	180	211	304

Criteria	Weight	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14
Tracks a pet accurately in real time	4	1	1	1	1	1	1	1	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	5	1
Allows others to tell owner when pet is found	4	1	1	1	1	1	1	5	5	5	5	5	1	1	1
Long battery life	5	5	5	5	5	5	5	5	5	5	5	5	3	3	3
Low lag time	5	1	5	5	1	1	5	5	5	5	3	3	3	3	3
Shows a map	4	1	1	1	5	5	5	5	5	5	5	5	5	5	1
Uses mobile application	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

Can be used without GPS	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Small size	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Low cost	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Data is user friendly	5	1	1	1	5	5	5	5	5	5	5	1	1	1	1
For different kinds of pets	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Large tracking Range	5	1	1	1	1	1	1	1	5	1	1	1	1	5	1
Shows user current location	3	1	1	1	1	1	5	5	5	5	5	5	5	5	1
User can enter location	3	1	1	1	1	1	1	1	1	1	1	1	1	1	5
Friendly user interface	5	1	1	1	1	1	5	1	5	5	5	5	1	1	5
	Total	172	192	192	208	208	260	256	296	276	266	246	196	232	200

Figure 4: A scoring matrix which compares the competitor devices against the app versions with weighted criteria to determine how well each device/version met the criteria. The numbers represent the app versions and the letters represent the competitor devices.

Legend:

A	B	C	D	E	F	G	H	I	F&F
Home Again Microchip	Loc8tor Pet Finder	Tractive GPS Pet Tracker	POD 2	Pixie	Tile	Gibi	Nuzzle	Garmin Astro Radio Tracker	Fast and Furryous

V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14

Blank activity	Non-working buttons	Working buttons	User input	maps	Get user location	Message others pt 1	login	Sign out	Store images in data-base	Retrieve data	Message others pt 2	Report sending	Clean user interface+ debug

Conclusions

- Matrix weights applied according to a survey on optimal pet tracking technology
- Most features scored on a yes-no basis, others such as cost, tracking range, and battery lives had ranges in order to assign a score
- App versions at first progressively improved in score as more features were added, but then decreased due to bugs and crashes from more complicated features and code

- The final version of Fast and Furryous had the highest total score of 304 when compared to the nine competitors, so application met pet owner expectations and compared favorably with the competition

Future Work

- The project can be extended further to:
  - Include a search bar to narrow searches for pets in a specific area
  - Be compatible with tracking devices or geofencing technology
  - Alert pet owners when a pet has been found which has a similar description to their lost pet

Scoring System

- Features are rated on a yes-no basis (if the device has it, it scores a 5, else a 1)
- Price: 1 = more than $100, 5 = less than $40
- Battery Life: 1= less than a week, 5 = greater than 1 week
- Lag time: for app, more than 3 seconds = 1, for devices, based on number of customer reviews for lag time
- Size (regarding greatest dimension) : 1 = greater than 100 mm, 5 = less than 25 mm

- Tracking Range: 1 = less than 2 miles, 5 = greater than 10 miles
- Different Pets: 1 = one pet type, 3 = several pet types, 5 = all pet types