

Track Log: A Mobile Application for Real Time Tracking and Monitoring of Tracked Routes

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Abstract:-This research study was conducted to develop a mobile application for real time tracking and monitoring tracked routes. The features that have been enhanced by the researchers were based on the existing applications which lacks of features that presented in this application. The study helps to view the previous tracked route in a single map while user is currently tracking. In this study, users will know which way they have been already and where is their current location. The application has history where user can view previous routes which are categorized by city and municipality. This application also can take pictures while tracking. Pictures can be pinned in the map and can give information on where it was taken. The researchers concluded that this study is a successful one since the application was able to pass the usability and functionality testing.

Keywords:-Track Log, GPS App, Route Tracking, Geolocation, Route Monitoring

I. INTRODUCTION

A. Background of the Study

Global Positioning System (GPS) is one of the many features that make the android so great, but what make that GPS even better are the apps that take advantage of it. The idea of a mobile application for tracking and visualization of activities is based on existing applications that utilize the functionality of GPS technology on mobile phones to provide meaningful information to users, ranging from activity tracking to navigation. The concept of using mobile phones to track significant distance movements on mobile phones is no longer new. With provided familiarity of the technology, this project targets the introduction of new features onto existing tracking applications.

Nowadays, Android applications that track current location have brought features that are alike with respective route tracking applications. More and more people own navigation

applications such as GeoTracker – GPS Tracker (Bogdanovich, 2016), Mobile Phone Tracker (App Nava Pvt Ltd, 2015), and GPS Follow Track (SiqSoft Apps, 2014) which mainly used for orientation (determining where you are), navigation (determining where to go) and communication (exchanging information with others or accessing information services). In relation to that, existing applications related to route tracking have lack of features. First, existing application has inability to view all tracks recorded in a single map. Second, the history of the existing application is not categorized according to a place. Lastly, existing application cannot give real-time single map of your entire route activities in a certain place instead you have to go to your recorded map in the history and look what have you recorded.

Track Log has its unique way. Log or history is important in such a way that user could still see and look the previous route in a certain place and can monitor which route they have taken in a certain geographical area. Track Log can categorize recorded routes by place. It can pin in the map through taking picture. The application also will help the user to show all tracked routes in a map to avoid going back to a place they have been. This will also eradicate the logs or histories that are confusing at the existing tracking location. Track logalso can now give a single map with your entire route activities in a certain place which will be easy to look in your history. Track log also will let the user view the tracks recorded in a map that has been recorded. Lastly, users can avoid themselves of going back in a place they have been already visiting.

The researchers come up with the study that will develop and design features from the existing route tracker applications. All the existing tracker applications have a likeness in terms of features, but we identified several features which showed promising performance for tracking subjects' time location patterns in this study.

B. General Objective

This study aims to develop an android application that is able to record and monitor a tracked route of the user and can take

pictures along the tour. This application can able to view specific tracked route in the history and able to view previous tracked route in a single map.

C. Specific Objectives

- To design an android application that will help users avoid going to the place that have been visited already.
- To develop a GPS based route tracker with ability to locate current location of users in motion.
- To evaluate the usability and functionality of the system.

II. METHODOLOGY

A. System Architecture

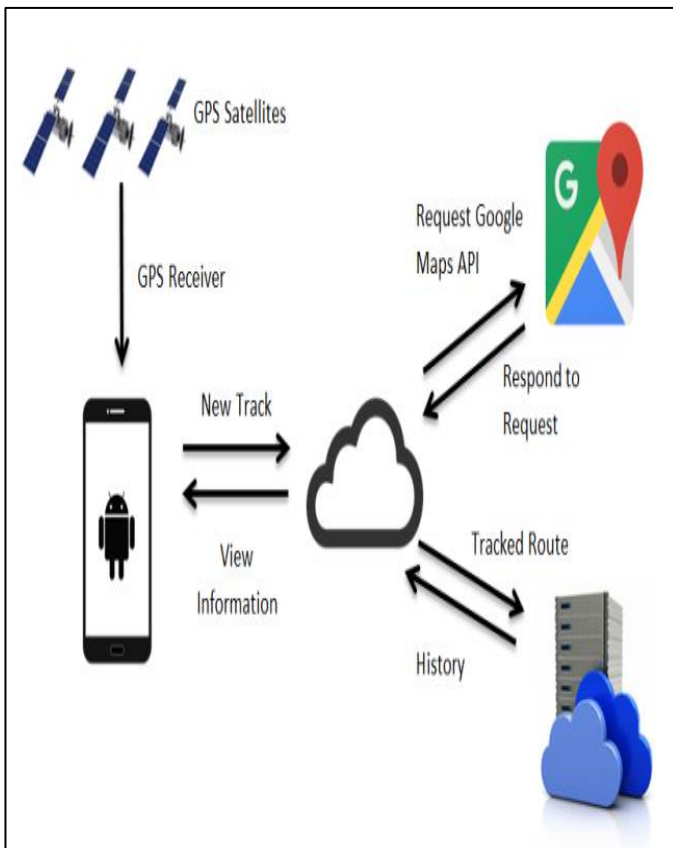


Fig. 1: Track Log Architectural Design

Figure 1, is the application’s architectural design which shows the need of GPS to get the current location and internet connection to show the map and to save track route in order view history from the server.

B. Use Case Diagram

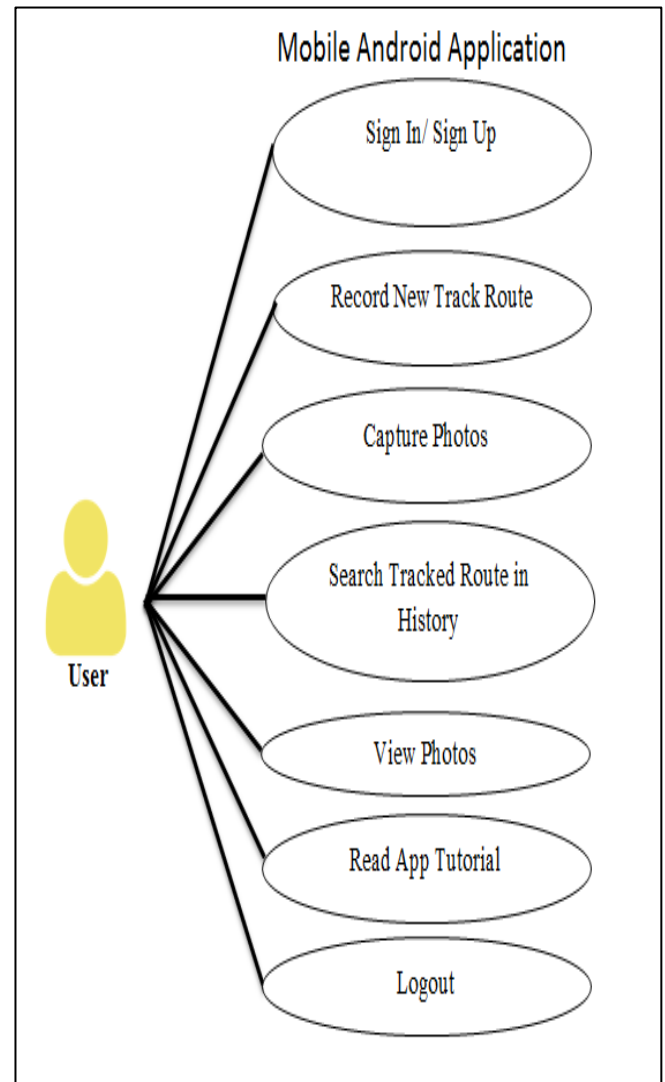


Fig. 2: Use Case Diagram

Figure 2, is the Use Case Diagram of the application that shows the list of action or event steps typically defining the interactions between a user and the application to achieve a goal. The user will login using Gmail account. In home page the user can record New Track Route, capture photos during recording and search Tracked Route in History once the data are saved. Read App tutorials in Help as well as Logout which can be found in side menu.

C. System Flow

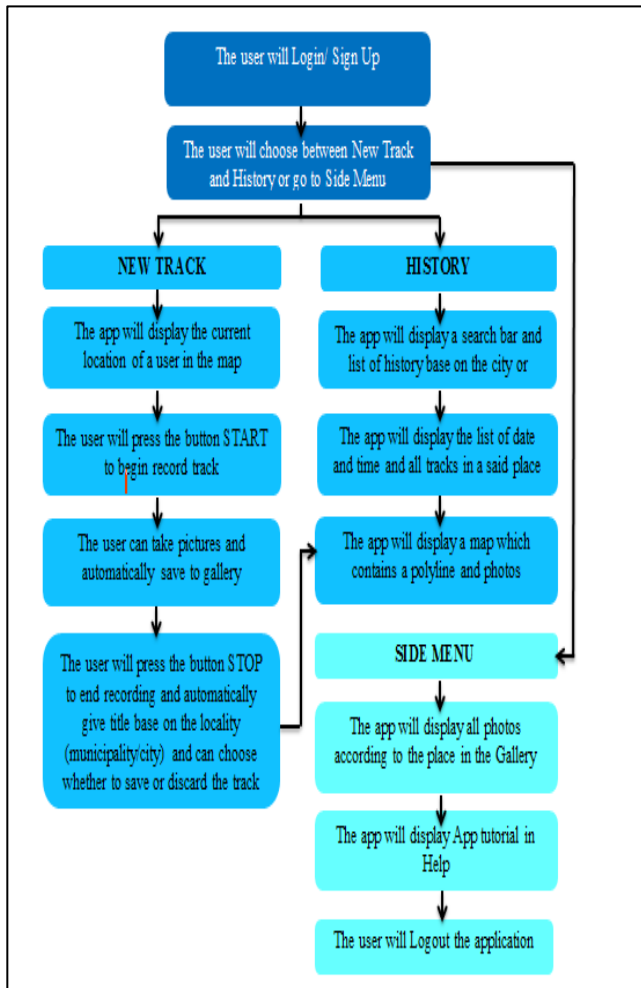


Fig. 3: System Flow of Track Log

Figure 3 is the System Flow of the application. This diagram shows the step by step process on how the user used this application.

D. Time Interval Points in a Route

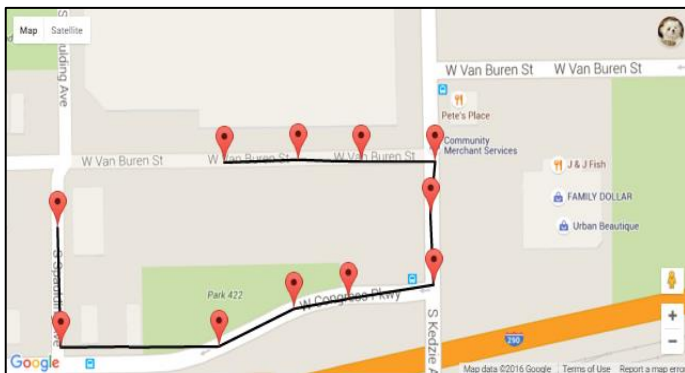


Fig. 4: Time Interval Points

Figure 4 is the process on getting the Time Interval Points in a Route. The researchers use Complex Polylines and set the time interval by 6000 milliseconds/ 6 seconds. In every 6 sec. the applications detects and compare the value of the user position points. If the same points (Latitude, Longitude) no return else return value.

E. GPS Locating Process

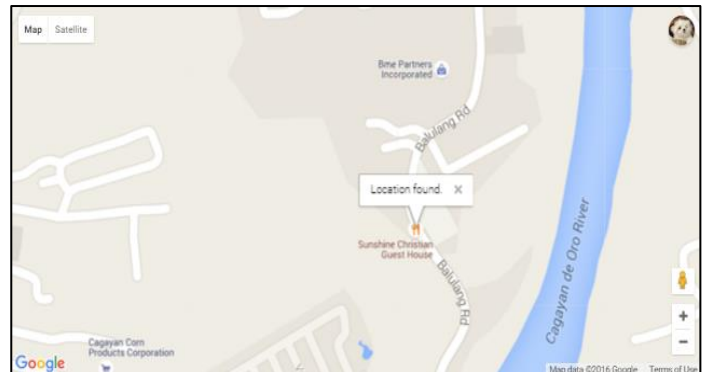


Fig. 5: Process of GPS Location

Figure 5 is the process on how to get current location of the user. The application used Google Maps API to load map, Geolocation to connect jquery from java and GPS depends on the mode settings High accuracy (Internet connection or GPS), Wifi only or GPS only.

F. Saving Route to Cloud

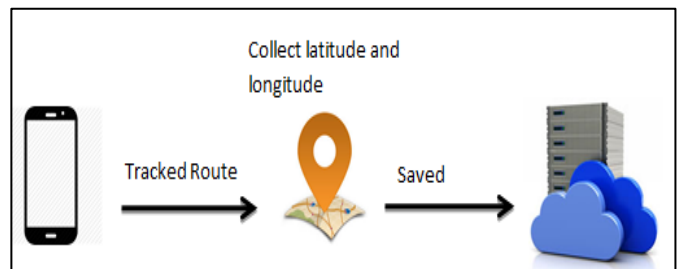


Fig. 6: Cloud Saving

Figure 6 is the process on how to save the tracked route to the cloud. When the user press save button it will then save to the cloud and it will redirect the user in the history page to view the save route.

G. Polyline and Direction Service

Polylines and Direction Service are used to create routes in a map. A Polyline is a list of points, where line segments are drawn between consecutive points. A polyline has the following properties: points, width, and colour. On the other hand, Direction Service is an object communicates with the Google Maps API Directions Service which receives

direction requests and returns computed results. You may either handle these directions results yourself or use the DirectionsRenderer object to render these results. It can return multi-part directions using a series of waypoints. It displayed as a polyline drawing the route on a map, or additionally as a series of textual description.

III. RESULTS AND DISCUSSIONS

A. User's Current Location

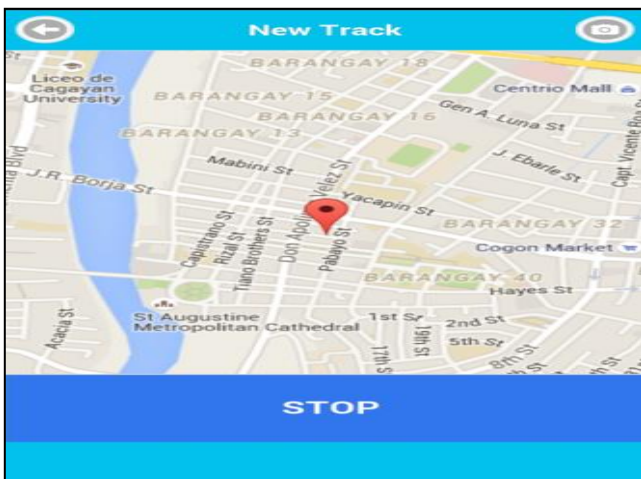


Fig. 7: Current Location

Figure 7 shows that the application was able to get the current location of the user with the use of Google maps API Geolocation. The Red marker represents as the current location of the user.

B. User's Drawn Route using Polyline

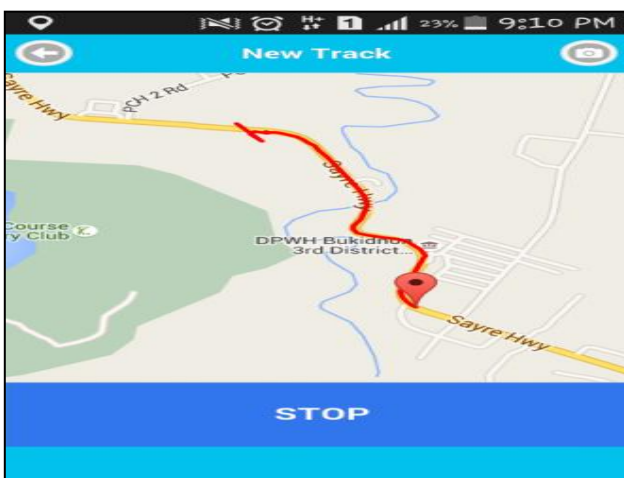


Fig. 8: Drawn Route Using Polyline

Figure 8 shows that the application was able to draw Route using polyline start from the current location of the user to its desired destination.

C. User's Tracked Route with Pinned Image

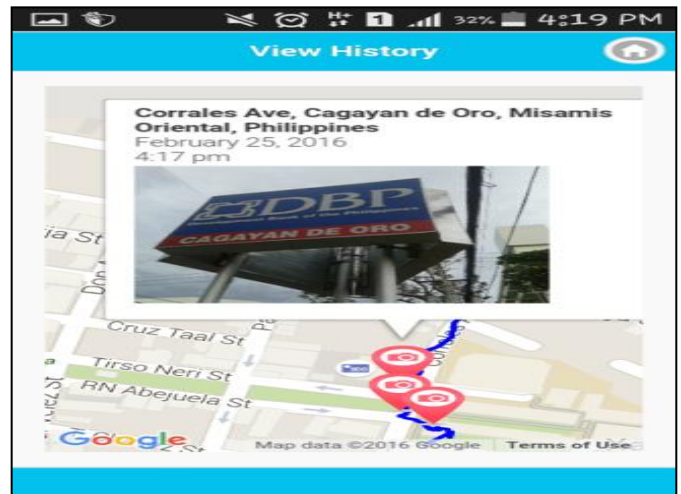


Fig. 9: Tracked Route with Pinned Image

Figure 9 shows that the application was able to save the route created by the user as well as the image taken during tracking. By tapping the icon pin it will appear the image and its info.

D. User's Tracked Routes and Current Route

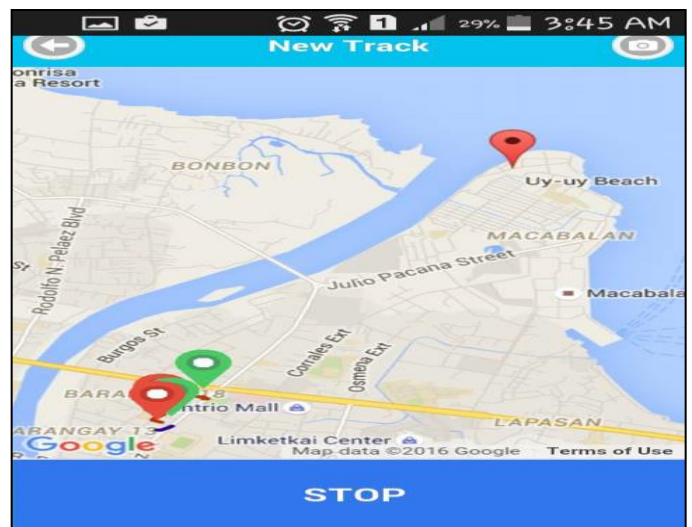


Fig. 10: Tracked Route and Current Route

Figure 10 shows that the application was able to show the previous tracked route in the same place together with the newly route track. Every route corresponds to different colour

in order to identify specific route. And it has start (green color) and end (red color) mark for detailed info.

E. Usability Evaluation

USEFULNESS	5		4		3		2		1	
	S A	%	A	%	F	%	D	%	S D	%
1. The app location is nearly accurate to my location.	23	77 %	6	20 %	1	3 %				
2. The real time tracking gives efficient results.	24	80 %	5	17 %	1	3 %				
3. The history is helpful to remember my previous routes in a place.	25	83 %	4	14 %	1	3 %				
4. It helps me to know all my previous tracked route.	23	77 %	5	17 %	2	6 %				
5. I can easily remember the tracks I've been, through taking picture.	26	87 %	4	13 %						
6. The categorization by places in the history is convenient.	23	77 %	6	20 %	1	3 %				

Table 1: Usability Evaluation for Track Log

Table 1 indicates the application usability results. As presented, 77% of the respondents strongly agreed, 20% are agreed and 3% answered fair In terms of real time tracking

gives efficient results, 80% of the respondents strongly agreed, 17% are agreed and 3% answered fair. With regards to the history is helpful to remember user's previous routes in a place, 83% of the respondents strongly agreed, 14% are agreed and 3% are answered fair. There are 77% of the respondents strongly agreed, 17% are agreed and 6% answered fair. There are 87% of the respondents strongly agreed and 13% are agreed that the user can easily remember the tracks they've been, through picture. The categorization by place in the history is convenient, 77% of the respondent strongly agreed, 20% are agreed and 3% answered fair.

In general, in the entire usability test, the respondents strongly agreed and tested that the application are very efficient and useful.

F. Functionality Evaluation

FUNCTIONALITY	Remarks
1. Does the application can locate the current location of the user?	Passed
2. Does the application can draw route using polyline while tracking?	Passed
3. Does application take picture(s) while tracking?	Passed
4. Does the application can unhide or hide previous route(s) and pin(s)?	Passed
5. Does the application previous tracked route has indicator for start and end of route?	Passed
6. Does the application can view tracked route(s) on a map?	Passed
7. Does the application can save routes in the history?	Passed
8. Does the application history categorize by its place?	Passed

Table 2: Functionality Evaluation for Track Log

Table 2 shows the result of the application functionality test, all the functionalities that are listed above are functional. It can locate the current location of the user. It can draw route using polyline while tracking, the application can take picture(s) while tracking .It can unhide or hide previous route and pin(s). The application previous route has indicator for start and end route. It can view tracked route(s) on the map. It can save routes in the history and the application history categorized by its place.

IV. CONCLUSION

The researchers concluded that this study is a success based on the findings of the study. The researchers successfully designed and implemented the specific objectives (1) Android application that will help users avoid going to the place that have been visited already. (2) GPS based route tracker with ability to locate current location of users in motion. (3) Evaluate the applications usability and ease of use and satisfactory of the system.

V. RECOMMENDATIONS

- The next researchers are recommended to fix the polyline to make the draw smoother.
- The next researchers are recommended to add notification when user already passed once tracked route.
- In the application, we recommend voice command when you want to start and stop tracking your route.
- In the application it can able to share routes to your friend in social media.

REFERENCES

- [1]. Apache Cordova. In Wikipedia. 2016. Online. 29 January 2016. Retrieved from https://en.wikipedia.org/wiki/Apache_Cordova
- [2]. App Nava Pvt Ltd, (2015, Oct. 16). Mobile Phone Tracker (Version 1.0.3)[Mobile Application]. Retrieved from <https://play.google.com/store/apps/details?id=com.apnava.mobilephonetracker>
- [3]. Android (Operating System). In Wikipedia. Online. 31 January 2016. From [https://en.wikipedia.org/wiki/Android_\(operating_system\)](https://en.wikipedia.org/wiki/Android_(operating_system))
- [4]. Android version history. (2016, January 30). Online. In Wikipedia. From https://en.wikipedia.org/wiki/Android_version_history
- [5]. AngularJS. (2016, January 29). In Wikipedia. Online. 31 January 2016. From <https://en.wikipedia.org/wiki/AngularJS>
- [6]. Bogdanovich, I. (2016, Feb. 18). Geo Tracker - GPS Tracker [Mobile Application]. Retrieved from <https://play.google.com/store/apps/details?id=com.il.yabogdanovich.geotracker>
- [7]. Cascading Style Sheets. (21 January 2016). In Wikipedia. 31 January 2016. From https://en.wikipedia.org/wiki/Cascading_Style_Sheets
- [8]. Cipriani, J. "How to use Google Maps offline mode on iOS, Android" In Cnet. 13 May 2015. Online. Retrieved from <http://www.cnet.com/how-to/how-to-use-google-maps-offline-on-ios-android/>
- [9]. City of Cockburn. Wetlands to Waves (Interactive Mapping System). 11 November 2015. Online. Retrieved from http://www.cockburn.wa.gov.au/Council_Services/Interactive_Mapping_System/
- [10]. Direction Service. (2016). Google Developers. Retrieved from 2016 March 3, From <https://developers.google.com/maps/documentation/javascript/directions>
- [11]. Eclipse (software). In Wikipedia. 26 January 2016. Online. Retrieved January 31, 2016, from [https://en.wikipedia.org/wiki/Eclipse_\(software\)](https://en.wikipedia.org/wiki/Eclipse_(software))
- [12]. EJS Embedded JavaScript Framework. Google code. 2015. Online. Retrieved January 31, 2016, from <https://code.google.com/archive/p/embeddedjavascript/>
- [13]. Express.js. In Wikipedia. 29 January 2016. Online. 2016 January 31 from <https://en.wikipedia.org/wiki/Express.js>
- [14]. Geolocation. PhoneGap Documentation. 2015. Online. Retrieved from http://docs.phonegap.com/en/edge/cordova_geolocation_geolocation.md.html
- [15]. Geolocation. In Wikipedia. 2015. Online. Retrieved from <https://en.wikipedia.org/wiki/Geolocation>
- [16]. Google Maps Android API. (2016 February 15). Google Developers. Retrieved 3 March 2016, from <https://developers.google.com/maps/documentation/android-api/utility/#introduction>
- [17]. Google Maps android API. (n.d.). Developers. Retrieved from <http://developer.android.com/guide/topics/location/index.html>
- [18]. GPS Tracking. (n.d.). In GPS Tracking Review. Retrieved from <http://www.gpstrackingreview.com/>
- [19]. Heroku. (2016, January 28). In Wikipedia. Retrieved January 31, 2016. From <https://en.wikipedia.org/wiki/Heroku>
- [20]. Holmes, Hannah O. "Discoveries on Bathing." Discovery Online. 1998. Online. 20 Oct. 1998. <http://www.discovery.com/stories/skinnyon/skinnyon.html>
- [21]. How does GPS work?. (2015). physics.org (How does GPS work?) Explore |physics.org). Retrieve (2016, January 26). Retrieved from <http://www.physics.org/article-questions.asp?id=55>
- [22]. How to create an exact tracking route from GPS data with animated icon?. (2016).
- [23]. Geographic Information System. Retrieve from 2016 January 31 <http://gis.stackexchange.com/questions/150967/how-to-create-an-exact-tracking-route-from-gps-data-with-animated-icon>
- [24]. HTML. (2016 January 26). In Wikipedia. Retrieved January 31, 2016, from <https://en.wikipedia.org/wiki/HTML>
- [25]. JavaScript. (2016). In Wikipedia. Retrieved 2016 January 31 from <https://en.wikipedia.org/wiki/JavaScript>

- [26]. jQuery. (2016 January 30). In Wikipedia. Retrieved 2016 Feb. 2, from <https://en.wikipedia.org/wiki/JQuery>
- [27]. JQuery Mobile. (2015, December 10). In Wikipedia. Retrieved January 31, 2016, from https://en.wikipedia.org/wiki/JQuery_Mobile
- [28]. Kinage R., Kumari J., Zalke P., & Kulkarni. M. 2013. Mobile Tracking Application. Retrieved from http://www.ijirset.com/upload/march/15_Mobile%20Tracking.pdf
- [29]. Location and Maps. (n.d.). Developers. Retrieved from <http://developer.android.com/guide/topics/location/index.html>
- [30]. MongoDB. (2016 January 29). In Wikipedia. Retrieved January 31, 2016, from <https://en.wikipedia.org/wiki/MongoDB>
- [31]. Node.js. (2016 January 29). In Wikipedia. Retrieved 2016 January 31, from <https://en.wikipedia.org/wiki/Node.js>
- [32]. Pinning and Sharing. (2016). Ride with GPS. Retrieved from <http://ridewithgps.com/help/pinning-and-sharing>
- [33]. Polyline. (2016). Google Developers. Retrieved 2016 March 3, from <https://developers.google.com/android/reference/com/google/android/gms/maps/model/Polyline>
- [34]. Reddy, S. S. (2011, May). Trip Tracker <http://sdsu-dspace.calstate.edu/bitstream/handle/10211.10/1303/Sreenivasa.pdf?sequence=1>
- [35]. Representational State Transfer. (2016 January 16). In Wikipedia. Retrieved 2016 January 31, from https://en.wikipedia.org/wiki/Representational_state_transfer
- [36]. SiqSoft Apps. (2014 June 24). GPS Follow Track (Version 4.0) [Mobile Application]. Retrieved from
- [37]. <https://play.google.com/store/apps/details?id=pfc.saurqui.followtrack>
- [38]. V8 (JavaScript engine). (2016 January 22). In Wikipedia. Retrieved 2016 January 31, from [https://en.wikipedia.org/wiki/V8_\(JavaScript_engine\)](https://en.wikipedia.org/wiki/V8_(JavaScript_engine))
- [39]. Waterline: Node.js adapter-based ORM. (2015, March 16). Retrieved 2016 January 31, from <http://ottogiron.me/2015/03/16/waterline-node-js-adapter-based-orm/>
- [40]. What do business travellers want from their mobile travel service?. Mobile Travel Technologies Ltd (MTT Ultimate Mobile Travel Solutions). (2014 June 02). Retrieved from <http://mttnow.com/mobile-mainstream-what-business-travellers-want-from-their-mobile-travel-service/>
- [41]. What is the difference between a route and a track?. Garmin. 2012 September 05. Online. Retrieved from <https://support.garmin.com/support/searchSupport/case.faces?caseId=%7B67ef9980-50c4-11dc-4ec8-000000000000%7D>