*IOSR Journal of Computer Engineering (IOSR-JCE)*
*e-ISSN: 2278-0661,p-ISSN: 2278-8727, Volume 20, Issue 1, Ver. IV (Jan.- Feb. 2018), PP 77-80*
*www.iosrjournals.org*

# Vehicle Navigation System using ANDROID

Ipsita Samal[1], Pallavi Priyadarshini[2]
[1](Department of Electronics & Communication Engineering, Gandhi Engineering College, India)
[2](Department of Electronics & Communication Engineering, Gandhi Institute For Technology, India)

***Abstract:*** *The main contribution of this research is an enhanced level of reliability in the navigation solutions of GPS-denied environments. The research on aiding navigation applications is a very important topic nowadays due to the enormous need for reliable navigation solution that account for different applications. The developed map aided, low-cost, user-friendly navigation system can be used in many systems such as in- vehicle navigation or smartphone location-based tools.*
***Keywords:****Android, GPS and GIS.*

## I. Introduction

Android is a mobile operating system, which is a modified version of Linux. Android system is chosen due to its open-source and based on Linux. APIs in Android SDK are good for developing and transferring applications and controlling the interoperability between different LBS modules. Earlier navigation system used to provide the use of a handheld GPS receiver in the areas of precise positioning, mapping locations, navigating across the mapped locations [5]. Now with the advancement of technology and development of smart phones and android devices, it has become easy to track and locate with the help of GPS through various applications. This research throws a light on a newly developed algorithm which is useful in tracking a route between two defined points and it also saves and shares the tracked route for the future use for otherusers.

## II. Geographical Information System (Gis)

A Geographical Information System is a collection of spatially referenced data (i.e. data that have locations attached to them) and the tools required to work with the Data). A Geographical Information System (GIS) is a system of hardware, software and procedures to facilitate the management, manipulation, analysis, modeling, representation and display of geo-referenced data to solve complex problems regarding planning and management of resources. Functions of GIS include data entry, data display, data management, information retrieval and analysis. The applications of GIS include mapping locations, quantities and densities, finding distances and mapping and monitoringchange[1].

## III. Global Positioning System

The Geospatial Data Models are the GIS maps consisting of specific properties which are necessary for a navigation application. The map is used to present the user location by direction, distance, latitude, longitude as well as various other information such as velocity, time and orientation. The map used for navigation should consist of various layers based on the region and exact application.

## IV. Maps In Navigation Applications

When dealing with navigation applications, the accuracy of the digital map plays an important role. If the positional accuracy of the spatial data is higher than that of the navigation solution, specifically in GPS-denied environments, then the spatial data itself can help in improving the accuracy of the navigation system. Coverage area affects the quality and accuracy of the main service provider . The information regarding the spatial feature of objects is present in the spatial databases. On compilation of various databases, it is very important to select only the necessary information and treat it with the most appropriate structure to fit the required application. For example, there are five main functions in digital road databases required for navigation application: map matching, address matching, path finding, and route guidance[4].

## V. Kalman Filter

The Kalman filter keeps track of the estimated state of the system. It has an optimal combination, in terms of minimization of variance, between the prediction of parameters from a previous time instant and external observations at the present instant. The Kalman filter is used to remove undesirable GPS data[6]. The general Kalman filter consists of two main steps: a prediction and correction step. The prediction step reflects the effects produced by a change in the states and states-covariance over time while the correction step presents combined information of the states and states-covariance with the measurements and its covariance. The

strength of the KF technique lies in its ability to recursively estimate current states based on previous time steps and current measurement inputdata.
The implementation of the KF is optimal for linear systems driven by Additive White Gaussian Noise (AWGN). The state model can be written in the following form:
X = Fx + Gw
Where x is the state vector, F is the state transition matrix, and Gw represents the covariance matrix of the applied state model. The measurement system can be represented by a linear equation of the form of Equation asfollows:
Z = Hx + v
Where Z is the vector of measurement updates, H is the design (observation) matrix that relates the measurements to the state vector, and v is the measurement noise.

KF equations are divided into two groups; time prediction and measurement update [4]. The time prediction equations are responsible for the forward time transition of the current epoch (k) states to the next epoch (k+1) states.
Where K is the Kalman gain, R is the measurements variance-covariance matrix. All noise terms are considered to be white sequences with known covariance.

**1. Map View**

In this android based navigation application, the map is displayed in four different views: normal, hybrid, satellite and terrain view. Normal view shows roads, used lands and rail lines. Hybrid view is a combination of normal view and satellite view. Satellite view shows the pictures captured by satellite. Terrain view represents altitude.

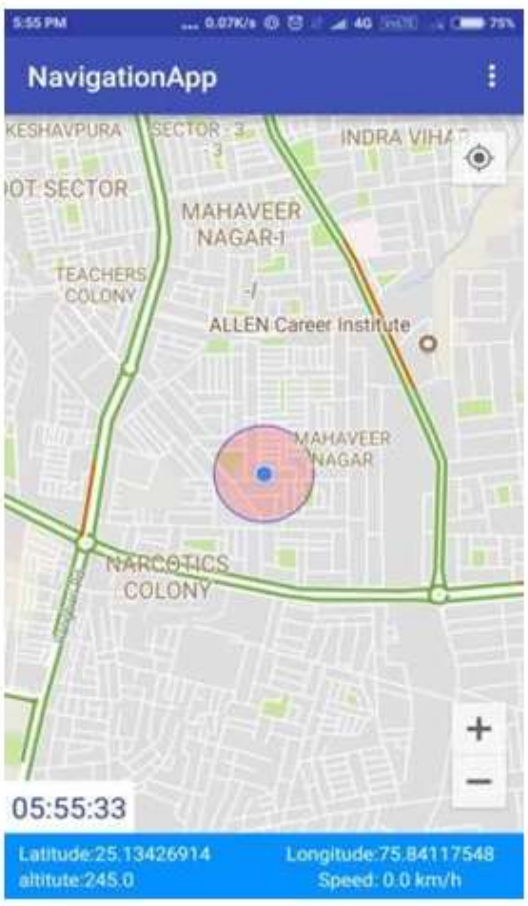


**Figure 1** Map ofNormal View


**Figure 2** Map of SatelliteView

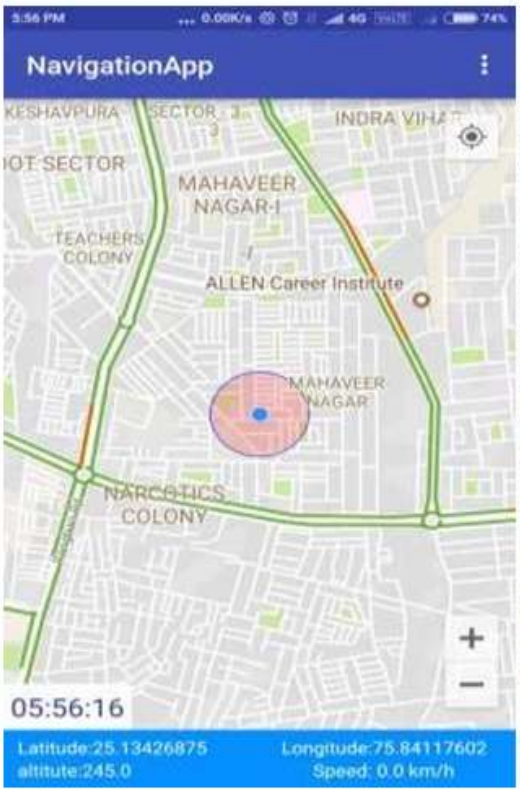


**Figure 3** Map ofTerrain View


**Figure 4** Map of HybridView

## 2. Shortest Path Finder

In the developed android based navigation application, one can find the shortest path from the various visible paths between the source and destination. The shortest path is shown in navy blue colour while the others are shown in sky blue colour.

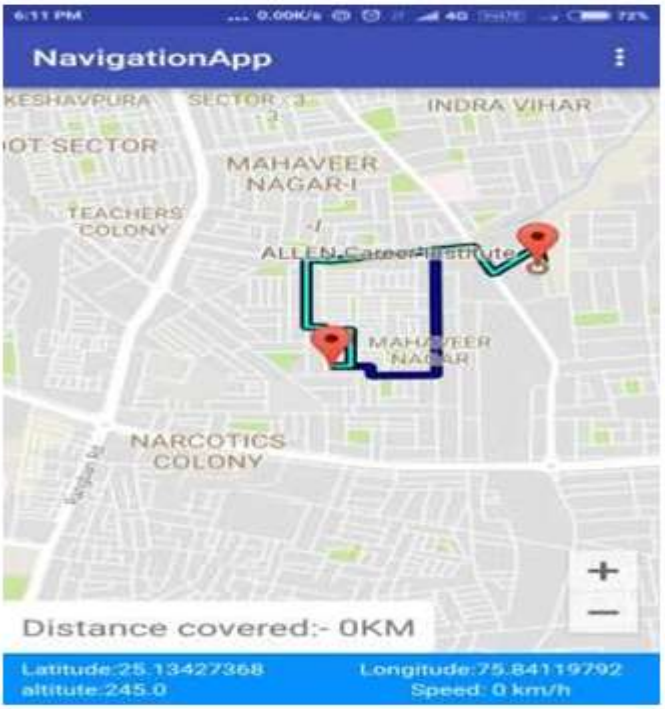


**Figure 5** Showing multiple paths

### 3. AlarmingFacility

The mobile device is hardware equipment which enables the usage of distance based alarm system. The GPS is a space-based satellite navigation system that provides longitude and latitude of location in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. It will also enable the user to view the nearby places and generate the alarm after regular interval of distance of the desire location which be tracked by the GPS. This is useful when user is driving a car and searching for a destination through navigation system. It generates an alarm after every given distance specified by user. The alarm will rise when the user is travelling. (The default distance is 1000 meters, user can also change the distance according to his desire).Whenever user reach at destination the alarm generates and display the message destinationreached.

### 4. Recording And Sharing OfRoute

The application has been checked on various road maps with multiple paths. It is found that on road map with the help of GPS and location based services this application performs well while navigation. This navigation system application also stores navigated path in to web server which would be very helpful for future aspect. The pre-stored path successfully stored on web server is tested to share anotheruser.

### 5. Navigation In Rural Areas By Direction

It is difficult to move and navigate without road map in rural areas due to deficiency of availability of proper landmarks. In this case, the developed android based navigation application invented a new concept that is move by direction. User can navigate by moving in north, south, east and west directions. While travelling with the help of direction user can define kilometers to travel in specific direction. Once user click on the start navigation, as per the movement of user in the specified direction and specified kilometers whenever user reached at pre-specified distance automatically alarm generates by the application.

## VI. Result And Conclusion

With the help of this application, the user can navigate in both urban as well as rural areas. Multiple path features is available which allows the user to follow the desired path. Automatic notification prevents to move in wrong route and direction as the application notifies on following the wrong route. Time, speed, altitude, longitude are advantages of the developed android based navigation system as they all are integrated simultaneously in single application. All these are very informative and useful for the user while using the application. Recording or saving of the route is an ultimate characteristic of the developed navigation system. Sharing of the saved route is a boon for such user who is going to that saved route for the first time as the already saved same route is easily navigated and available for him to reach hisdestination.

## References

[1] Deepesh Namdev, S. Mangal, M.Singh, ImageProcessing with GIS and ERDAS, LAMBERT Academic publishing, 2012
[2] "Global Positioning System, Hereafter Referred to as GPS, is A Space-Based Radio Navigation System Owned by The United States Government (USG) and Operated by The United States Air Force(USAF)."
[3] "GPS: Global Positioning System (or Navstar Global Positioning System)" Wide Area Augmentation System (WAAS) Performance Standard, Section B.3, Abbreviations and Acronyms.
[4] J.B. Bullock, E.J. Krakiwsky, Analysis of The Use of Digital Road Maps In Vehicle Navigation The 1994 IEEE Position Location and Navigation Symposium, Las Vegas, 1994.
[5] J.Parthasarathy, International Archives of the Photogrammetry, Remote Sensing and Spatial Information Science, Tokyo Japan2006
[6] Yifang Yuan, Dakai Yang, Baigen Cai, An Improved Map-Matching Algorithm Used in Vehicle Navigation System Intelligent Transportation Systems, 2003. Proceedings. 2003 IEEE, Shanghai,China.
[7] Aromal C M, Jini Kuriakose, Sujith Kumar P S, Controller Area Network as the Security of the Vehicles. International Journal of Computer Engineering & Technology (IJCET). 5(12), 2014, pp.76–81.
[8] Aromal C M, Jini Kuriakose, Sujith Kumar P S, Controller Area Network as the Security of the Vehicles. International Journal of Computer Engineering & Technology (IJCET). 5(12), 2014, pp.76–81.
[9] Mallesh Babu S, Lokesha H, Mrs.Veena S, Jayantkumar.A.Rathod, Controlling the Micro Air Vehicle through Voice Instructions. International Journal of Computer Engineering & Technology (IJCET). 6(4), 2015, pp.21–27.
[10] Ramesh Kamath, Siddhesh Nadkarni, Kundan Srivastav, Dr. Deepak Vishnu Bhoir, Data Acquisition System and Telemetry System for Unmanned Aerial Vehicles for SAE Aero Design Series. International Journal of Electronics and Communication Engineering & Technology (IJECET), 4(5), 2013, pp.90–100.