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The Campus Navigator: An Android Mobile Application

P. S. Bangare[1], P. N. Gandhi[2], S. B. Diwate[3], R. S. Gujar[4], S. L. Bangare[5]

Assistant Professor, Department of Information Technology, Sinhgad Academy of Engineering, Pune, India[1, 5]

Department of Information Technology, Sinhgad Academy of Engineering, Pune, India[2, 3, 4]

Abstract: Navigation is a technique which basically focuses on process of monitoring and controlling the movement of person or vehicle or craft from one place to another e.g.: Land navigation, Marine Navigation, Aeronautic Navigation etc. The campus navigator is the android mobile application which is basically used for navigating routes inside any campus premises e.g.: Mall, College, Hospital etc... Mobile phones are nowadays far more than merely devices to communicate with. Especially, Smartphone's are products that help to make our work and everyday life easier. Along with the advance in technology and popularity of these devices, the use of mobile applications has increased enormously in the last few years. Based on new techniques like GPS, sensors, compass and accelerometer, that can used to determine the orientation of the device, location-based applications coupled with augmented reality views are also possible. There are several commercial navigation applications - such as Google Maps, Yahoo Maps and Map quest that provide users with directions from one place to another. However, these applications must search along existing roads; they are not able to provide routes that are as precise as an on-campus path would require.

Keywords: Navigation, Campus Navigator, GPS Sensors, Location Based

I. INTRODUCTION

A campus is a complex infrastructure. Especially new students and people who are on it for the first time have a hard time to orientate themselves and find places. The campus occupies more than two square kilometers and thus is even larger than that. The campus has many different buildings. Most of the buildings are connected to each other, some of them even by underground walkways. Even if there are maps at some points on the campus, users do not have continuous help to get to their destination. They can try to figure out a way to get to their target on these static maps, but as soon as they start walking in the target direction they have no help any more. Whereas it is very common to use navigation systems in cars to reach designated locations, systems for pedestrian navigation are quite hard to find. So, how is it possible to help freshmen and other inexperienced people orientate themselves in the campus and support them finding places on campus with the help of modern techniques. The answer to this question is *"CAMPUS NAVIGATOR"*. Our Campus Navigator application enables users to obtain routes that are much more detailed than an existing commercial application can provide. Our implementation of a navigator application calls for much greater complexity than the simplest version of this type of application. At its core, a simple navigation application would not be difficult to create. The campus would be represented as a Graph structure, with locations (buildings, parking lots, etc.) on campus stored as vertices of the Graph and transitions between the locations (roads, sidewalks, etc.) stored as edges between the vertices. This application directs the user from his current location to the exact location he searches in the campus. It reduces the effort of the user to walk all over the campus.

The user has to access this application through an android phone when he enters the premises of the campus and register prior to using the application. The user cannot use the application outside the campus area. The user also has to mandatorily register to proceed. There already exist several commercial navigation applications - such as Google Maps, Yahoo Maps and MapQuest - that provide users with directions from one place to another. However, these applications must search along existing roads; they are not able to provide routes that are as precise as an on-campus path would require. For example, a user of our application enters destination address as viable transportation options; the shortest path will appear then the user can walk to their destination via this path [1] [2] [3].

II. BASIC ADJUSTMENT FOR PEDESTRIAN NAVIGATION

A route on campus can be very long and thus very confusing for a person who is not familiar with this area. To simplify the route , it has to be broken down into smaller segments that provide an easy overview. Regarding the low travel speed of a pedestrian, the route segments should not be longer than a few hundred meters. With those small segments the user can track his progress better and is more motivated to get to the next waypoint, because it is achievable in a shorter period of time[4][5]. There are three main criteria that define important waypoints on a campus route on which it would be useful to divide the route into different segments:

A. Entering or leaving a building

If a pedestrian enters a building his complete perception will change. To reflect the user's perception change the view on his mobile device should also change. For example, the map view should change from an outdoor map (only showing ground plans of buildings) to an indoor map (showing the map of the current floor).

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B. On height change

If the path uses more than one floor it has to be split, because it is not possible to display more than one floor on a 2D map at the same time. Therefore, the route is segmented at every elevator or staircase.

C. Landmarks

Such as sculptures, big signs.

1. Navigation View

For different situations while navigating on campus there have to be separate views:

- Map Mode
- Walk Mode

D. Map Mode

The basic mode, which appears after defining the route, is called map mode and displays an overview of the entire route, the different segments and the user's progress on it. A screen is designed with a map that covers the route segment and displays basic information on it.

E. Walk Mode

In case of car navigation, the navigation device is in the driver's field of view all the time. In case of pedestrian navigation it is different. While it is okay to hold the device vertical and look at the display for a short time to explore nearby points of interest, it is not possible to do so while walking. Beside the fact that there is a danger of colliding with other people due to a lack of attention, it would not be very comfortable for users to hold up their device and walk around on campus with it. The walk mode has to be designed in a way so that it can be used in a more natural way while walking.

DATA FLOW DIAGRAMS

LEVEL-0 DFD

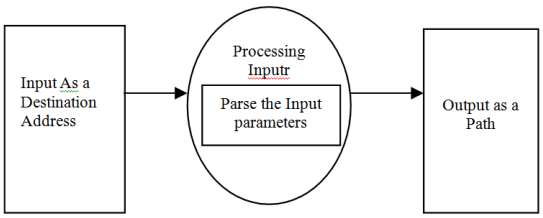

Fig. 1 Level 0 DFD

LEVEL-1 DFD

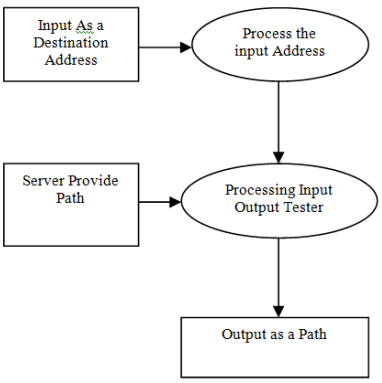

Fig. 2 Level 1 DFD

III. PROJECT PLAN

The following figure (Fig.3) depicts the project plan. It describes the activity plan of t/he project. The activities will be carried out in the same order. We are implementing the proposed system on the basis of object oriented concepts. It means dividing whole system into different modules.

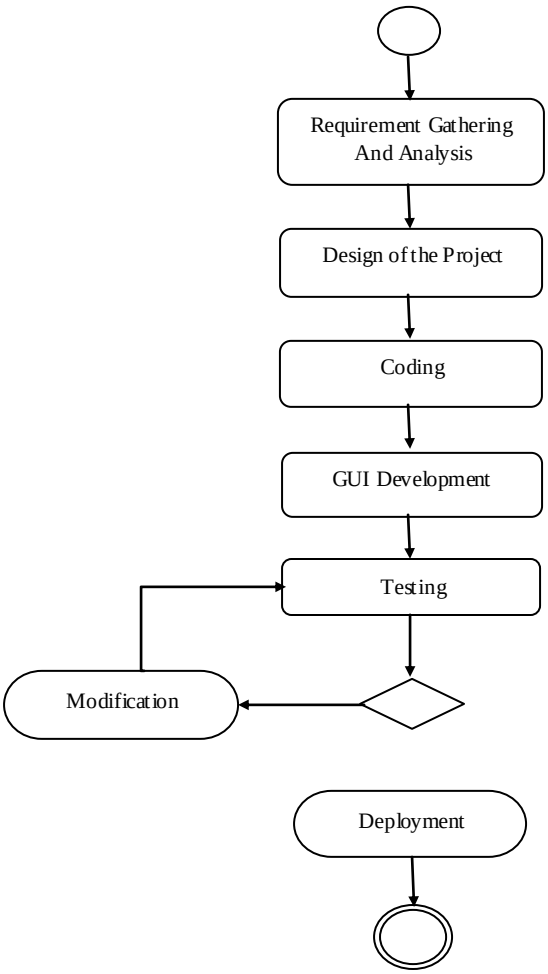

Fig 3: Project Plan

IV. CONCLUSION

Campus Navigation can be an effectively used in wide campus such as college, hospitals, etc.The shortest path feature of this application will save time of user. Hence the strength of this application is the easy to use navigation feature which is able to find paths on campus to user-defined locations.

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BIOGRAPHY

Pallavi S. Bangare, Assistant Professor, Department of Information Technology, S.T.E.S.'s Sinhgad Academy of Engineering, Pune, India, ME [IT], BE [E&TC], PGDC-DAC, Microsoft Certified Technology Specialist (MCTS). Associate member of CSI. Life Member ISTE, Published 12 papers in various International Journals & Conferences. Also published 5 books Chapters for Information Technology & Computer Engineering.