

CAMPUS NAVIGATION BASED ON IOT

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ABSTRACT

The outdoor location can be tracked using digital electronic maps. These maps are used for outdoor environment. There is no well-organized technology to search the internal location. Many smart-phones are used to track the location by electronic map. The electronic maps may be the Google map, GPS navigation and offline GPS maps. Using the android SDK Indoor based location tracking system can be implemented. It provides an API for developers to create application for inside building navigation. This application is useful for vision impaired people by giving voice messages for searched location. The approach on designing a graphical user interface for pedestrian use on mobile devices is described. This application enables the user to find paths to specific locations on campus and offers him the ability to explore the campus environment.

Keywords-RFID tag and reader, microcontroller, LCD, Bluetooth, Android.

1. INTRODUCTION

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 many navigation applications - such as Google Maps, Yahoo Maps and Map quest which provide users with directions from one place to another place. 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.

2. RELATED WORK

The objective is to guide blind people with voice navigated GPS using an Android Phone. This application is an innovative and cost effective guide system for blind people [1].

There will be different seminars and conferences at colleges, the college cultural fest, tech fest events in which teachers and students from different colleges may wish to be a part. But one may faces problems like finding the location, which route should be taken and about updates in an event. To overcome these problems we have created a Global Positioning System (GPS) based Android App known as "College guide navigation" which will give proper notification of the upcoming events to the users [2].

Mobile based application which we are developing can provide valuable information regarding a particular event in particular college and guide participants to find the desired location. The application provides functions such as finding current location of event and direction to the particular event and gives description about it to the user [3].

Navigator application we use GPS. GPS is used Dijkstra's algorithm to get the current position of each node. Distance is also calculated with respect to this position. This concept of GPS is also used on others shortest path algorithms like a, Warshals algorithm & Bellmans Ford algorithm etc [4].

In the context of this work a mobile navigation application for the university is developed. The approach on designing the GUI on mobile devices is described. To provide user the location information a location tracking algorithm is used based on wireless network signals .which determines the geographical position inside any buildings [5].

3. EXISTING SYSTEM

GIS is generic and more complex mapping technology that is connected to particular database. GIS is a computer program or application that is utilized to handle and view data about geographic locations and spatial co-relations among others. It simply gives the user a framework to obtain information.

It identifies the locations and navigates you to the nearest route.

In existing system the campus assistant application only shows the direction, walk able path, building, and only text based approach is used.

Disadvantages:

- Complex algorithms are used to find the paths.
- This makes the work more complicated.
- Navigator application use GPS which does not work in offline mode and not reliable.

4. PROPOSED SYSTEM

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.

The answer to this question is “CAMPUS NAVIGATOR”. The Navigator application provides users with routes that are much more detailed than an existing application can provide. 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 and the user also has to mandatorily register to proceed.

Advantage

- Eases navigation for visitors, within a huge campus.
- Saves time for the visitor to locate destination.
- Navigator application works in both online and offline mode without using GPS.
- Detection of intrusion also possible

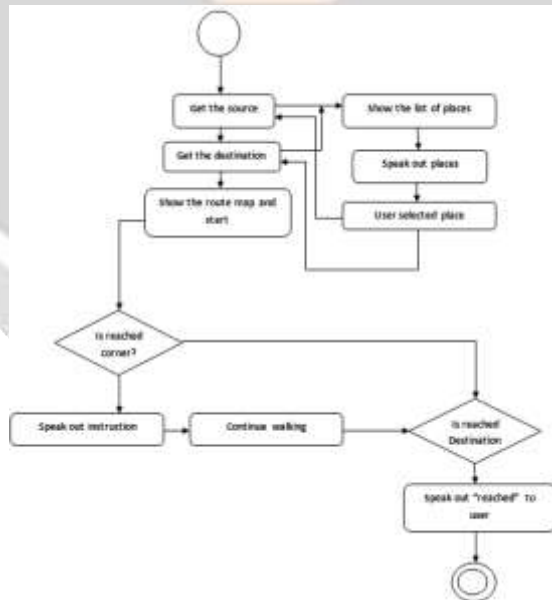


Fig-1:Flow chart

This system includes four modules which are used for the purpose of navigation without the help of other persons. The system gets the sources as input from the user as command then it gets the second input which is the destination. Then the route map of given source and destination will be displayed. When the person starts walking the direction of walking will b given in the form of command (spoken out). For finding the route map the route tracker map is used. Then for the speaking command the command guided system is used.

4.1 Implementation

Many embedded systems have considerably different designs according to their functions and utilities. In this project design, structured modular design concept is adopted and the system is mainly composed of microcontroller, RFID reader, Bluetooth and LCD. The microcontroller located at the centre of the block diagram forms the control unit of the entire project. Embedded within the microcontroller is a program that helps the microcontroller to take action based on the inputs provided. Tags will be placed on the floor in certain directions resembling that of a path to various offices or different buildings in a campus. The visitor will be given a RFID reader. The direction to the particular office or buildings in a campus will be shown on a map in his/her android smart phone.

If the visitor deviates once or twice from the path shown in the android smart phone, the microcontroller will pass message to the android smart phone via Bluetooth. On receiving this message the android smart phone will activate a predefined voice output, thereby suggesting the visitor to take the correct path. If the visitor deviates from the path, for the third time, the microcontroller will pass this message to the android smart phone via Bluetooth and as usual a voice output will also be created. Immediately, after the voice output is given, a message will be passed to the security centre on that campus from visitor's android smart phone.

As seen in the block diagram (figure1) an LCD is added. The LCD is used to display any event taking place between microcontroller and peripherals connected to it.

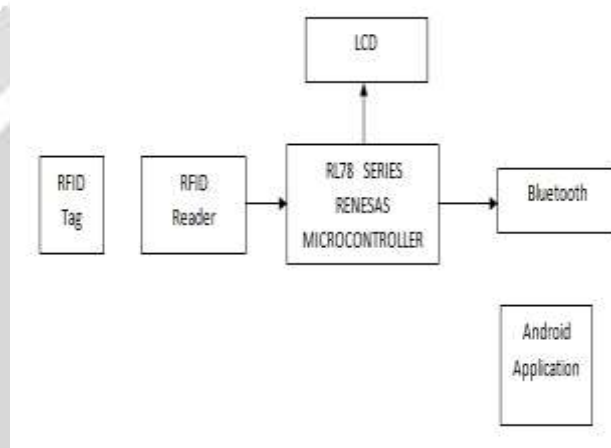


Fig -2:Block diagram

4.2 RFID Tag and Reader

RFID(radio frequency identification and detection) methods utilize radio waves. RFID systems consist of three components: an RFID tag, RFID reader, and an antenna. RFID tags contain an integrated circuit and an antenna, which is used to transmit data to the RFID reader.

RFID uses some electromagnetic fields to automatically detect and track tags attached to objects. The tags contain electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source such as a battery and may operate at certain meters from the RFID reader.

Tags may be either read-only or having a factory-assigned serial number which is used as a key into a database, or may be read/write, where object-specific data that can be written into the tag by the system user. Tags that are field programmable may be write-once, read-multiple; "blank" tags or may be electronic product code written by the user.

The RFID tag may includes either fixed or programmable logic 0 receives the message and then responds with its identification and other information. This may be only a unique tag serial number, or may be product-related information such as a stock number, lot or batch number, device while the other one connects to slave device.

4.3 Microcontroller Unit

The QB-R5F100LE-TB is a target board used for evaluating microcontroller operations, using the E1, the Renesas Electronics on chip debug emulator with programming function (hence it referred as E1). As a CPU board usable in connection with the on chip debugging emulator E1, this product achieves simple and easy evaluation of the target MCU.

- Built in RL78/G13 (R5F100LE) MCU
- High speed operation of 32MHz main clock (oscillator used) when supplied with 2.7 to 5.5V

Both flash memory programming and on chip debugging supported (TOOL0 pin)

- Simple testing possible with 2 LEDs and 1 SW
- Equipped with universal area (2.54 mm pitch)
- MCU pins assigned to the peripheral board and connector for higher expandability

4.4 Bluetooth

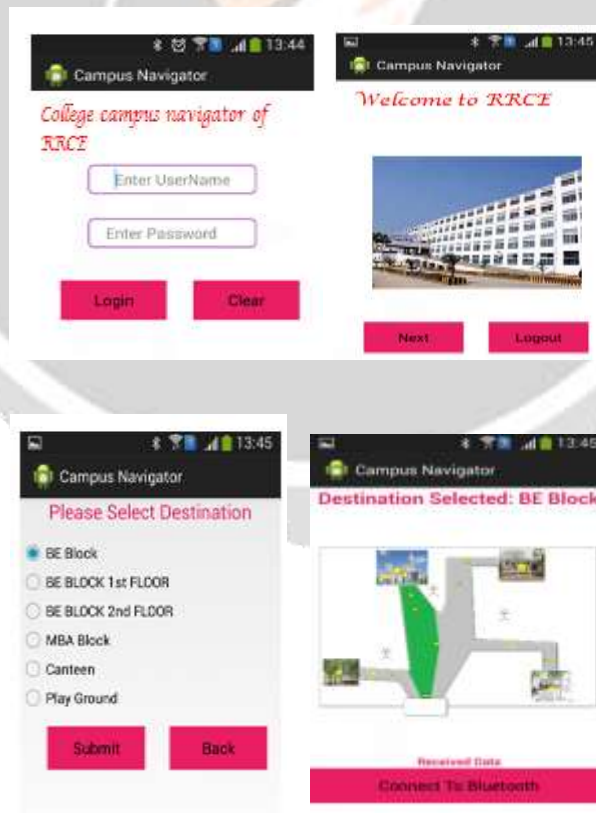
HC serial Bluetooth products consist of Bluetooth serial interface and Bluetooth adapter. There are two types of Bluetooth serial interface module: Industrial level and civil level. HC-05 belongs to civil level Bluetooth serial interface module. Bluetooth serial module , which is used for converting serial port to Bluetooth. These modules have two modes: master and slave. The device named after even number is defined to be master or slaver when out of factory and can't be changed to the other mode. But for the device named after odd number, users can set the work in either mode (master or slave) of the device by AT commands. The main function of Bluetooth serial module is replacing the serial port line, such as

1. If there are two MCU's, desiring to communicate with each other, one connects to Bluetooth master built once the pair is made, hence communicating between each other.
2. When MCU has Bluetooth slave module, it can communicate with Bluetooth adapter of computers and smart phones.
3. The Bluetooth devices available in the market are mostly slave device. Examples are Bluetooth printer, Bluetooth GPS.etc., Hence we can use master module to make pair and communicate with them.

5. ANDROID PLATFORM

An android application is created for this project, to display the route map of the campus on any visitor's android smart phone. At the entrance of the campus the security guard will be in charge of installing this android application on any visitor's android mobile phone. Automatic transmitting of message to security centre is part of the android application feature. If visitor takes correct path or wrong path, an acknowledgement in the form of voice output will be given through the visitor's android phone.

Below are snapshots of how the android application looks.



6. CONCLUSION

In this project we have developed a prototype module. In future, this project can be taken to the product level. To make this project as user friendly and durable, we need to make it compact and cost effective.

7. ACKNOWLEDGMENTS

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