

Autonomous Campus Driver Assistant for Indoor and Outdoor Navigation

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Abstract: Mobile Campus Navigation Application with indoor outdoor navigation is an application with severely unique functions and properties that delivered in a well user friendly way to typical users of the system. It apparently gives the user productivity with the combination of technical and user requirements in advance. This system is being introduced to enhance the user satisfaction and ease the self-touring experience within the college campus. QR Code technology makes our system more easy to use so that user doesn't need to tell where he/she is in campus.

1. Introduction

The main purpose of this system - Mobile Campus Navigation Application- is to give a mobile based solution, mainly for handling matters related to students and visitors when travelling around the campus premises, in a manageable way to reduce the wastage of time, dissatisfaction and to gain application friendliness of the application to the small campus environment. And also to get the maximum satisfaction from the users, both students and non-students (visitors), by providing a quality and standardized service. In this system we will use GPS for outdoor navigation so that application will detect user's position and location and will give correct navigation to reach any place. Application provides an efficient way to determine indoor positions by using a special indoor location tracking method when GPS signals become weak and that mechanism is using QR code detection. QR codes will be presented at different locations user has to capture the QR code and server will get the notification, server will detect the QR code and match with existing QR codes. Server will fetch information from QR code and using that location information server will send a navigation details to user.

2. Architecture

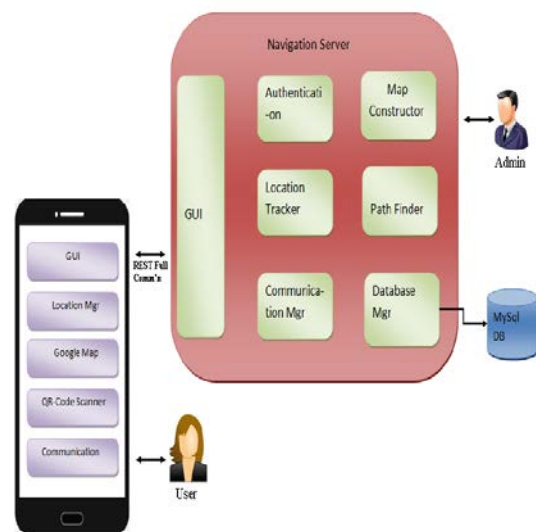


Fig.1: System Architecture

3. Modules

3.1 Web based GUI:

Server will be web based application and this module will be responsible to take inputs from admin. The GUI is developed in HTML and Java-script Our server input will be taken through this GUI where proper validations are supported. This includes new room registration, uploading timetable information, etc.

3.2 Database Manager:

This module will help to handle all database related activity. All the SQL queries will be taken care in this module. A database connection polling system will be present to avoid repeatedly opening and closing database connection. The JDBC driver manager ensures that the correct driver is used to access each data source. The driver manager is capable of supporting multiple concurrent drivers connected to multiple heterogeneous databases.

3.3 Communication Manager:

Communication Manager will handle the client server communication part. We have used REST over HTTP Standard communication technique for communication. REST stands for Representational State Transfer. (It is sometimes spelled "ReST".) It relies on a stateless, client-server, cacheable communications protocol -- and in virtually all cases, the HTTP protocol is used. REST is an architecture style for designing networked applications. The idea is that, rather than using complex mechanisms such as CORBA, RPC or SOAP to connect between machines, simple HTTP is used to make calls between machines.

3.4 Navigation Logic:

This module handles all navigation related scenario. Here graphic class has been use to draw lines and points on floor images. All the data is kept on server side, client request data from server per what destination address user has selected.

3.5 System Configuration:

The configuration manager which will be holding IP address of the entire client will be singleton in nature. The singleton pattern is a design pattern that restricts the instantiation of a class to one object. This is useful when exactly one object is needed to coordinate actions across the system.

3.6 Encryption/Decryption Module:

Base64 encryption/decryption technique has been implemented in system. This module will handle all encryption and decryption logic of all types. This encryption is applied on database where each user's password is stored

3.7 Audio Notification:

This module takes care of generating audio of the navigation

3. Algorithms

Input: Current Location

Output: Navigation Information

Steps:

- 1) Visitor will start application.
- 2) His current location will get fetched.
- 3) Visitor will then scan the QR code.
- 4) Application will decode room information from QR code.
- 5) Application will then fetch information of that room from server.
- 6) Application will then use floor image to draw navigation as per source and destination.
- 7) Visitor will get navigation display as output.

- 8) Visitor will have chosen to see what is going on in that room.
- 9) Visitor will be able to see room information and its details by scanning QR code.

End:

Following are some standard algorithm which we used in our system.

4. Implementation



Fig.2: Application Screenshot 1



Fig.3: Application Screenshot 2



Fig.4: Application Screenshot 3



Fig.5: Application Screenshot 4

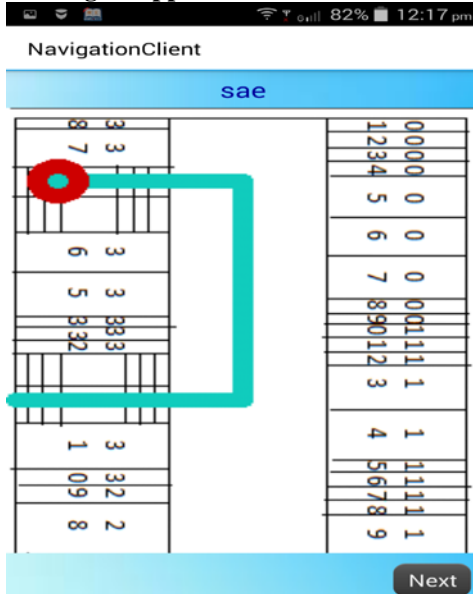


Fig.6: Application Screenshot 5

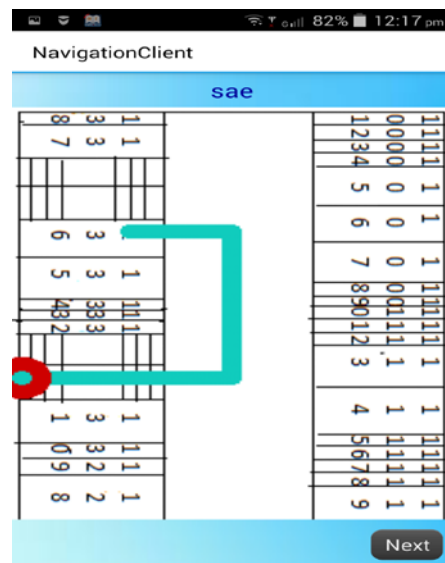


Fig.7: Application Screenshot 6

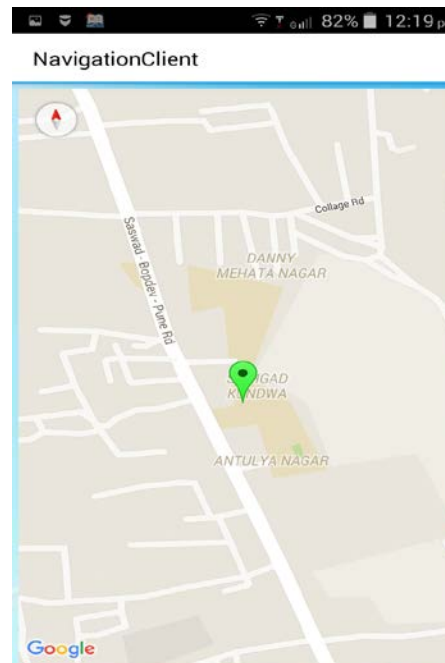


Fig.7: Application Screenshot 8

5. Features

We have provided following features into our system

1. Admin side authentication and client Registration.
2. Password Secure database
3. Database connection polling technique used to efficiently used database connection.
4. Client side android application to access assignment and notice details.

5. REST over HTTP Standard communication technique is used for Client-Server communication.
6. Data Images are encrypted using standard base64 algorithms
7. Modular software design approach so that system can be updated easily
8. QR Code technology is used to find users current location
9. SMS notification on every important event.
10. MVC 3 tire software architecture used as coding style.
11. HTML 5 based server side GUI
12. Proper error messages to user in case of system failure
13. Use of Android TTS engine to navigate user via audio
14. Use of Google map to navigate user with-in campus
15. Multi-user based application
16. Generic way of written code which make system easy to use for any campus with/without minor changes.

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6. Acknowledgements

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7. References

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