



BOOK TRACKING APPLICATION IN ANDROID FOR LIBRARY USING GPS

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Abstract: This book tracking application the concept of enhancing real physical world with an extra layer of information. The project is built around the innovative use of GPS (Global Positioning System) to navigate the person in the library. This will enable the library to live on your mobile at any time of day or season. Updated data (collated by librarian after arrival of new books) will provide the raw material for creating layers of graphical and multimedia content which can be accessed and viewed by compatible smart phone.

Keywords: Android, Library, GPS (Global Positioning System), Book.

I. INTRODUCTION

The scope of this research work is to develop an application for tracking a book in a library on Android mobile operating System. This application will enable the library to live on your mobile at any time of day or season. Updated data (collated by librarian after arrival of new books) will provide the raw material for creating layers of graphical and multimedia content which can be accessed and viewed by compatible Smartphone.

II. HISTORY OF TRACKING BOOK IN A LIBRARY

In early stages of the library system, people didn't face the big problems to search a particular book as they were having small libraries and less number of books. As number of books and size of library increased they started facing problems. As a solution to this problem, librarian used to assist the people to track the book. This technique got failed because to assist every member coming to the library was not an easy job for the librarian. After that, books were used to arrange in alphabetical order in the library so that one can easily find the book. But this method was a time consuming. So it was dropped in standard libraries. Some libraries are using this technique till today. To minimize the search time, libraries started keeping catalogue (a list of the books that library owns) with accession number to each book. This technique also failed due to the complex structure of the catalogue. Then to minimize the search time we divided the library into different compartments like science, fiction, Technology etc. Today this technique is used by the many of the libraries. And considering these compartments there is one technique to search book using RFID (Radio Frequency Identification) tags.

In this technique, each book will have the RFID tag and it will be read by the reader. Actually this technique is good but it is too expensive. Comparatively, our technique is too cheap. In our application, user just have to enter the name of the book he want then all the responsibility will be of that application to navigate user correctly in very short time. User will also get the information of number of copies of book available in the library at the current time.

III. SYSTEM ARCHITECTURE

A. Research objectives:

- Display information like number of copies available in library at current time and a path to particular book in a creative and accessible way by using GPS and mobile camera which enable engaging interaction between physical and virtual worlds.
- Use technology as a medium to promote and engage with Education for sustainable development.
- Introduce students, staff and the wider community to the concept of a 'Living Library', using interactive technology.

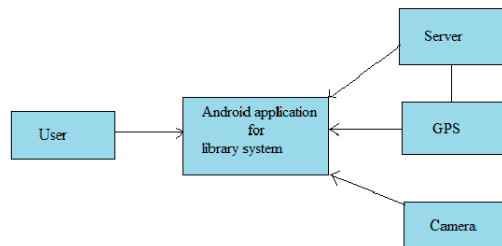


Fig. 1: System Architecture

B. User characteristics

In the UI (User Interface), the user can enter the name of the book, name of author and the name of publication which he wants. Only the name of the book field is mandatory. After giving details about the book the application will tell the user about the availability of the book along with the additional information like the number of copies available in the library. If the book is available then user will be navigated to the book by the application.

C. Module characteristics

- 1) **Server:** In most common use, a server is a physical computer (a computer hardware system) dedicated to run one or more services (as a host), to serve the needs of the users of other computers on a network. In this application the server side technology will help client side technology access the pre-stored database. The application will be loaded in client side and then connected through server side technology and data can be retrieved and stored at server side technology. In our application we will be using Apache Tomcat application server in which the database will be stored. Apache Tomcat is an open source software implementation of the Java Servlet and JavaServer Pages technologies.
- 2) **Database:** A database is a collection of information that is organized so that it can easily be accessed, managed, and updated. In our application we are using MySQL database. It is an open source technology and it's a relational database. The database will consist of information regarding: name, publication, author, quantity, GPS co-ordinates of the book.
- 3) **GPS:** The Global Positioning System is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the earth where there is an unobstructed line of sight to four or more GPS satellites. In this application, we will be using this technology to navigate user from source (user's current position) to destination (where the book is located).
- 4) **Camera:** The application uses the camera to give a realistic touch to the application by augmenting the user's view with arrows. Camera will help the user to get the directions towards the book in real time. It simplifies the job of the user to locate the book.

D. Working of android application in smart phone

A UI having fields to enter the name of the book, author of the book and publication is provided to the user. In this the first field is compulsory while the second and third fields are optional. After entering the required details the user can hit the submit button. Then a new UI appears which shows the availability and Quantity of book. The user can then decide whether to get the book or not. After this step if he says yes then process makes a calculation of the current GPS location of user and finds the co-ordinates of the books present in the online database this thus determines a path from source (user) to destination (book) by using the shortest path algorithm. Then the forthcoming UI consists of an active camera interface which is overlapped by directed arrows that will show the user where the book is located and thus helps him find the book in the library with the help of GPS technology.

E. Explanation with diagrams

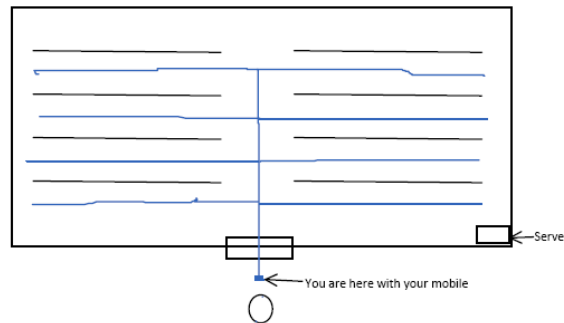


Figure 2

In the figure 2, shown above the blue line represents the library map and the black lines are of library itself. Furthermore, it gives map of library which will be stored in online database.

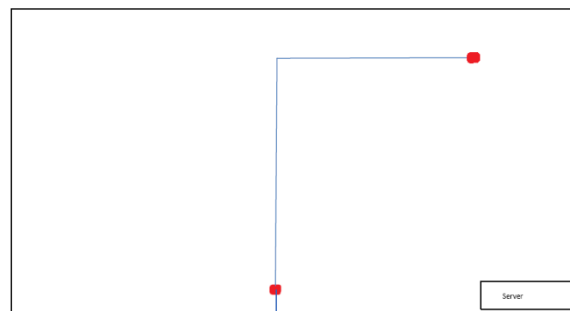


Figure 3

In this figure 3, when the user searches the book in the application it will get the final GPS co-ordinates of the book and the final path through the dijkstra's algorithm will be calculated and be given to the GPS enabled device.

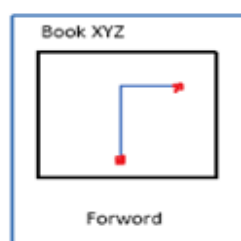


Figure 4

In this figure 4, it shows server and mobile display. Server and mobile will be connected to the network by using Wi-Fi. Then when you search for the specific book it will give the user the path which shows user's and book's position and below it will show the user the directions(navigation) like turn left, go forward, turn right, etc.

Steps for navigation:

1. When the user requests to navigate the book the online server returns the co-ordinates of the book to the application.
2. The application then acquires the current GPS co-ordinates from the mobile Handset.
3. The program then calculates the path from source to destination and guides the user.



F. Algorithm used to find the path

Let the node at which we are starting be called the initial node. Let the distance of node Y be the distance from the initial node to Y. Dijkstra's algorithm will assign some initial distance values and will try to improve them step by step.

1. Assign to every node a tentative distance value: set it to zero for our initial node and to infinity for all other nodes.
2. Mark all nodes unvisited. Set the initial node as current. Create a set of the unvisited nodes called the unvisited set consisting of all the nodes except the initial node.
3. For the current node, consider all of its unvisited neighbours and calculate their *tentative* distances. For example, if the current node A is marked with a distance of 6, and the edge connecting it with a neighbour B has length 2, then the distance to B (through A) will be $6+2=8$. If this distance is less than the previously recorded tentative distance of B, then overwrite that distance. Even though a neighbour has been examined, it is not marked as "visited" at this time, and it remains in the unvisited set.
4. When we are done considering all of the neighbours of the current node, mark the current node as visited and remove it from the unvisited set. A visited node will never be checked again.
5. If the destination node has been marked visited (when planning a route between two specific nodes) or if the smallest tentative distance among the nodes in the unvisited set is infinity (when planning a complete traversal), then stop. The algorithm has finished.
6. Select the unvisited node that is marked with the smallest tentative distance, and set it as the new "current node" then go back to step 3.

G. Advantages of the system

- Application is user friendly.
- It useful to all kind of users.
- It is helpful to save time of not just the application user but also the librarians and staff members.
- It is very simple and considering the above factors it can be concluded that it is efficient.

H. Disadvantages of system

- *GPS accuracy should be very high to find book's exact location.*
- *Location of book should not be changed once its GPS co-ordinates are stored in the database.*

III. FRAMEWORK

A. Android operating system

As we know that Android Operating System is an open source technology. That means, the source code is included with the compiled version and modification or customization is actually encouraged. The software developers who support the open source concept believe that by allowing anyone who's interested to modify the source code, the application will be more useful and error-free over the long term. So we took this as an advantage and we will be developing the application for the android operating system.

B. JAVA

As JAVA is a platform independent language that will help us to develop an application. Using JAVA we will write a code to trigger camera, fetch information from the server etc.



IV. CONCLUSION

Therefore keeping in mind the flaws of the existing system, the proposed system seems to be far better and efficient in terms of technology and integration point of view. Application is easy to use, time saving and efficient to find a book in a library such as British library.

V. ACKNOWLEDGEMENT

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