iNavigate-An Android Based Navigation Application

Ms. Vaishali Zilpe, Dr. P. N. Chatur

Abstract—Android, currently developed by the Open Handset Alliance, is a platform for mobile devices that includes an operating system, middleware and key applications. The Android Software Development Kit provides the tools and Application Programming Interfaces necessary to begin developing applications on the Android platform using the Java programming language. The increase on the usage of phones that can run applications has resulted to a significant increase in their number and variety.

The approach used in the current project is to develop an android based navigation application to navigate through Mysore DC area of Infosys without requiring internet connection since it’s not always possible for the user to continuously keep monitoring using GPS and sometimes also due to unavailability of the network. Navigation is provided by offline maps stored in SQLite database.

Index Terms—Android, Content Providers, SQLite, Xml Parsing, Intents.

I. INTRODUCTION

Android is a Linux-based operating system for mobile devices such as smartphones and tablet computers. Android has a large community of developers writing applications (“apps”) that extend the functionality of the devices. Developers write primarily in a customized version of Java[1]. Apps can be downloaded from third-party sites or through online stores such as Google Play (formerly Android Market), the app store run by Google. In October 2011, there were more than 500,000 apps available for Android, [2] and the estimated number of applications downloaded from the Android Market as of December 2011 exceeded 10 billion,[3]. Android was listed as the best-selling smartphone platform worldwide in Q4 2010 by Canalys[4][5] with over 300 million Android devices in use by February 2012.[6] According to Google’s Andy Rubin, as of December 2011, there were over 700,000 Android devices activated every day.[7]

Google Maps and GPS-based navigation services have become very popular, mainly because they let people to rapidly explore unknown areas also. Since GPS always try to connect with nearest cell tower and tries to catch up signal every time, it consumes more battery on your phone and GPS is the highest battery draining component on the smartphones. It’s always not possible to be connected with data connectivity on your phone and possible reason is no data coverage or less signal strength, if you have 3G or 4G data plans then expect a low coverage to known areas only. In such cases Offline GPS maps are always good for the people which can help them in navigation even though they are not connected to the web.

In this Navigation application, there is no need for all the time to constant data connection during your navigation. This application is available to navigate through vast area of Mysore DC of Infosys Limited.

II. LITERATURE SURVEY

A. Introduction to Android

Android is a software stack for mobile devices that includes an operating system, middleware, and key applications. The Android SDK provides the tools and libraries necessary to begin developing applications that run on Android-powered devices. Android, as a system, is a Java-based operating system. Some of the important features of Android that makes it so useful are as follows:

1. Android applications are developed using Java and can be ported rather easily to the new platform.

2. Android, while recognizing and allowing for programmatic UI development, also supports the newer, XML-Based UI Layout.

3. One of the more exciting features of Android is that, because of its architecture, third party applications—including those that are “home-grown” are executed with the same priority as those that are bundled with the core system.

4. Aside from SDK and the well-formed libraries that are available to develop with, the most exciting feature for Android developers is that we now have access to anything the operating system has access to.

For example, if we want to create an application that utilizes the phone’s internal GPS, we have access to it.

5. On top of all the features that are available from the android, Google has thrown in some very tantalizing features of its own. Developers of Android applications will be able to tie their applications into existing Google offerings such as Google maps and Google search.

Android applications are written in the Java programming language. The Android SDK tools compile the code—along with any data and resource files—into an Android package, an archive file with an .apk suffix. All the code in a single .apk file is considered to be one application and is the
file that Android-powered devices use to install the application

**B. Android Architecture**

The following diagram shows the major components of the Android operating system. Each section is described in more detail below.

![Android Architecture Diagram](image)

**Figure 2.1: Android Architecture**

*a. Applications layer*

Android ships with a set of core applications including an email client, SMS program, calendar, maps, browser, contacts, and others. All applications are built using the Java. Each of the application aims at performing a specific task that it is actually intended to do.

*b. Application framework*

The application framework is a set of basic tools with which a developer can build much more complex tools. By providing an open development platform, Android offers developers the ability to build extremely rich and innovative applications. Developers are free to take advantage of the device hardware, access location information, run background services, set alarms, add notifications to the status bar, and much more. Developers have full access to the same framework APIs used by the core applications. The application architecture is designed to simplify the reuse of components; any application can publish its capabilities and any other application may then make use of those capabilities (subject to security constraints enforced by the framework).

*c. Libraries*

Android includes a set of C/C++ libraries used by various components of the Android system. These capabilities are exposed to developers through the Android application framework. Some of the core libraries are System C library, media libraries, LibWebCore, etc

*d. Android Runtime*

Android includes a set of core libraries that provides most of the functionality available in the core libraries of the Java programming language.

Every Android application runs in its own process, with its own instance of the Dalvik virtual machine. Dalvik has been written so that a device can run multiple VMs efficiently. The Dalvik VM executes files in the Dalvik Executable (.dex) format which is optimized for minimal memory footprint. The VM is register-based, and runs classes compiled by the included "dx" tool.

The Dalvik VM relies on the Linux kernel for underlying functionality such as threading and low-level memory management.

*e. Linux Kernel*
Android relies on Linux version 2.6 for core system services such as security, memory management, process management, network stack, and driver model. The kernel also acts as an abstraction layer between the hardware and the rest of the software stack.

A. Application Components

Application components are the essential building blocks of an Android application. There are four different types of application components. Each type serves a distinct purpose and has a distinct lifecycle that defines how the component is created and destroyed.

a. Activities
An activity represents a single screen with a user interface. activity represents a single screen with a user interface. Although the activities work together to form a cohesive user experience in the application, each one is independent of the others.

b. Services
A service is a component that runs in the background to perform long-running operations or to perform work for remote processes. A service does not provide a user interface.

Another component, such as an activity, can start the service and let it run or bind to it in order to interact with it.

c. Content Providers
A content provider manages a shared set of application data. You can store the data in the file system, an SQLite database, on the web, or any other persistent storage location your application can access. content provider manages a shared set of application data.

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d. Broadcast Receivers
A broadcast receiver is a component that responds to system-wide broadcast announcements.

D. Activating Components

Three of the four component types—activities, services, and broadcast receivers—are activated by an asynchronous message called an intent. Intents bind individual components to each other at runtime, whether the component belongs to your application or another. We can use Intents to support interaction between any of the application components available on an Android device, no matter which application they’re part of. This turns a collection of independent components into a single, interconnected system.

For activities and services, intent defines the action to perform (for example, to "view" or "send" something) and may specify the URI of the data to act on.

For broadcast receivers, the intent simply defines the announcement being broadcast (for example, a broadcast to indicate the device battery is low includes only a known action string that indicates "battery is low").

The other component type, content provider, is not activated by intents. Rather, it is activated when targeted by a request from a Content Resolver.

E. The Manifest File

Before the Android system can start an application component, the system must know that the component exists by reading the application’s AndroidManifest.xml file (the "manifest" file). Your application must declare all its components in this file, which must be at the root of the application project directory.

The manifest does a number of things in addition to declaring the application's components, such as:

- Identify any user permissions the application requires, such as Internet access or read-access to the user’s contacts.
- Declare the minimum API Level required by the application, based on which APIs the application uses.
- Declare hardware and software features used or required by the application, such as a camera, Bluetooth services, or a multitouch screen.
- API libraries the application needs to be linked against (other than the Android framework APIs), such as the Google Maps library.

III. APPLICATION RESOURCES

An Android application is composed of more than just code—it requires resources that are separate from the source code, such as images, audio files, and anything relating to the visual presentation of the application. For every resource that we include in our Android project, the SDK build tools define a unique integer ID, which we can use to reference the resource from our application code or from other resources defined in XML.

One of the most important aspects of providing resources separate from our source code is the ability for us to provide alternative resources for different device configurations. For example, by defining UI strings in XML, we can translate the strings into other languages and save those strings in separate files.

IV. PROPOSED SCHEME

A. Hardware-Impossed Design Considerations

Small and portable, mobile devices offer exciting opportunities for software development. Their limited screen size and reduced memory, storage, and processor power are far less exciting, and instead present some unique challenges. Compared to desktop or notebook computers, mobile devices have relatively:

- Low processing power
- Limited RAM
- Limited permanent storage capacity
- Small screens with low resolution
- Higher costs associated with data transfer
- Slower data transfer rates with higher latency
- Less reliable data connections
- Limited battery life

B. Design Details

The Infosys Mysore DC is one of the largest campuses in India spread across 345 acres of land, houses the following facilities:

- Software Development Blocks
- Infosys Leadership Institute
- Global Education Center
• Multiplex
• Hostels
• Food Courts
• Recreation (ECC)

It has many software development buildings (SDB), two GEC centers and 9 food courts (FC). It also has enormous number of hostel buildings to accommodate up to 15,000 employees at a time.

An employee who is new to campus will face difficulty to locate various buildings like ECC, GEC, and FC etc. To facilitate such employees, we can think of developing Google map based navigation application called as 'iNavigate', which can be easily installed in employees Android based smart phone.

Using 'iNavigate' application, an employee should be able to get the directions from one building to another and find out the distance between them. Also should be able to get the directions from current place to destination. It should be easy to use.

When the user is navigated to this page, he will be prompted to enter Source and destination location values. Here,

• Source and destination fields need to be entered compulsorily. Otherwise exception message prompting the user to make proper selection is displayed.
• Also, source and destination must not contain same location values. Otherwise appropriate exception message will be displayed on the same screen.

Till both the above conditions are not fulfilled, application will not move proceed further.

When the proper selections are made, user can click on the “Go” button. When this button is pressed,

• Longitude and latitude values of source and destination will be displayed to the user.
• Also, User can see Google map, highlighting the path from source to destination location.

User can go back to home page displaying options by pressing back button.
When the proper selections are made, user can click on the “Go” button. When this button is pressed,
• Longitude and latitude values of source and destination will be displayed to the user.
• Also, User can see Google map, highlighting the path from source to destination location and the textbox indicating the distance for its path in meters.

User can go back to home page displaying options by pressing back button.

V. CONCLUSION

With all upcoming applications and mobile services Google Android is stepping into the next level of Mobile Internet. Such offline navigation application can help user to navigate through Infosys Mysore DC without any need to all the time monitor mobile network, without any hindrance due to loss of network.

As a future Work, this application can be to equipped with turn by turn voice prompt guide. Whether traveling as either driver or pedestrian, the users will enjoy voice guided navigation. While driver are given lane assistance and real time traffic updates, pedestrians on the other hand, are guided to shortcuts, pedestrian only zones and re-routing options.

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REFERENCES