

**EASY BUDGET-SHOPPING**

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**Abstract:**

Mobile application for the convenient of the customer who all are going to buy the product or item in market. In which the barcode of the item will be get by the customer's phone itself and the information about the item will display and the price of the item will be obtained. The price of the product will be added to the kart of the customer. At last the selected item gets the approval from the customer. And then the total amount will be debited from the customer account which was synchronized in the customer's mobile already. If the customer is new to that shopping mall, they will get the internal structure of the shopping mall and merge with their phone, it will shows the location of the listed items that will be easy to find the product and buy it. Thus the shopping will be easier and it also includes e-payment methodology.

**Index Terms** — Android, bar-code, e-payment.

**INTRODUCTION**

Smartphone industry has been grown rapidly since the supply and subscription rate of smart phone increase steadily. This change has created more jobs as well as opportunities to develop the nation. By developing new smart phone application, the industry has been extending the smart market and resulted in economic activation. As a result, people start depending on the online service. The main reason for its popularity is because of open system market and its millions of useful application which attracts their customer for using android operating system.

Android OS is made based on the Linux operating system. The Linux is lying at the last level of the android architecture in the form of Linux kernel which provides much

security as well as it speeds up the overall performance of the device. In comparison with other OS, Android application developers are increasing frequently for making of various open source applications for which their customers are making demand. This android application development needs much skill on java programming language and its various APIs which in further will be used for developing applications in android.

The rest of the paper is organized as follows:  
Section II

focused on the fundamental concept of android OS. For developing any android application it needs some development environment such as Eclipse IDE, Android Development Tools (ADT) that is ADT

Plugin and Android Software Development Kit (SDK). These are discussed in Section III. Further the general security that android follows in its architecture and various security issues are discussed in Section IV, Standardized two-dimensional bar-codes explained in Section V, decoding of the barcode (Image Processing with J2ME) in Section VI, Mapping in Section VII, VIII, IX. Online transaction in Section X, finally the conclusion of this paper is given in Section XI.

### ANDROID OPERATING SYSTEM

ScholarOne® Manuscripts Android is a Google's Operating System which is totally based on Linux environment [1] and is mainly aimed for touch screen cell phones such as smart phones and tablet computers. It is an open source under the Apache license. Android middleware, libraries and APIs are coded in C programming language.

Android also supports its native API which is on C or C++ programming language. Developers can go with this environment if they want to make bit faster application than the java application. For this purpose android provides NDK which contains all the necessary libraries to develop and android applications. But generally 85% of the developers prefer java language because of its modularity and many other unique features rather than C or C++. First version of grows up with different versions which are mentioned.

#### Android Architecture

The general architecture of an android operating system [1] which is divided in to 5 major components as shown in Fig. 1. Android architecture components are applications, application framework, libraries, android runtime, and linux kernel and described below,

#### B. Applications

All the components of the development framework are combined into one installable

file called ".apk" file which contains the entire application and could be installed in any android cell phone.

#### C. Application framework

This will include development components which is an open platform to make any application with the use of some other API which is used by the core application. This framework contains many managers like Activity M, Window M, Resource M, Telephony M, Package M, Content M, otification Area and etc.

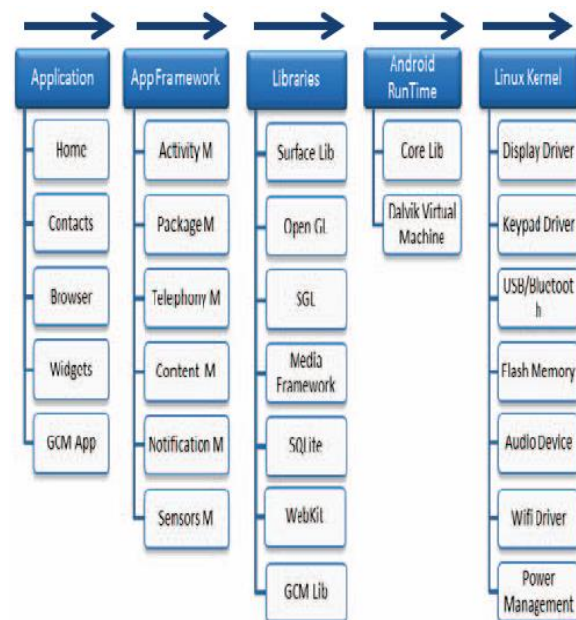


Fig 1: Android architecture components

#### D. Libraries

Android is also famous for its rich set of libraries which enables developer to make any kind of android application. This layer includes core library, media library, web kit, SQLite Library and other resource packages with its library files.

#### E. Android runtime

In android every process is having individual memory to execute; so android provides a specific runtime to each and every activity. This is all done by Dalvik Virtual Machine (DVM).

#### *F. Linux kernel*

Linux is known for its security and activity management system. Linux also provides better memory management, process management and many features. Kernel is an abstract layer of any operating system which helps for interaction.

#### **DEVELOPMENT ENVIRONMENT**

The development environment is the very first topic while starting any application development. Generally programmers prefer eclipse classic version to develop any android[1] application. Eclipse classic is an Integrated Development Environment that is IDE for android. To configure this IDE we require the following components from the open market.

#### *A. Android SDK*

Eclipse IDE is only for developing java based application and android is a java based language but it also requires some other useful tools for developing such applications. Therefore this Software Development Kit of Android will be used for that purpose only.

#### *B. Android Development Tools plugin*

Programmer also requires various tools to manipulate the developed code in the android device. For that purpose this Android Development Tools (ADT) Plugin for the eclipse will be used so that programmer can optimize the framework and its resources.

#### *C. Android emulator*

This is a virtual android mobile phone which has the same configuration as like any real mobile phone. This emulator is specific for testing and debugging any android application. This is an inbuilt feature in Android SDK under the AVD manager tools. There are some limitations also in these AVDs like no camera, Bluetooth, can't

receive or call or message service. These types of tasks cannot be performed in the virtual device.

Check style plugin is very useful open source plugin embedded into an Eclipse IDE which tells the programmer where they committed mistake in the code. This plugin running at back end side of the eclipse and improve our code even before testing it on real emulator.

#### *D. Eclipse IDE*

This is a very basic requirement to develop any android application. This will provide graphical user interface with the combination of android development kit. It provides such tools like project manager, code window, console window, compiler notification, activity log and other important tools to develop any application.

#### *Java Development Kit (JDK)*

As mentioned in early sections, android is java based programming language. Therefore to execute any java program we require its development tool kit which enables system to run the developed application. This JDK is also integrated with the eclipse IDE and is also an open source platform so anyone can use it free of cost.

#### *Java Runtime Environment (JRE)*

Like android, java program also runs under the java runtime environment. Because of this JRE, java programming language is called a platform independent programming language. JRE will convert byte code which is compiled by the java compiler and convert it into a machine level language.

#### **ANDROID SECURITY**

Android is an open source operating system so anyone can use its code for their own purpose. Therefore maintaining security is quite difficult at the development side [1]. Because developer can make any application which is running behind the user notice and

steal their information from the mobile device and transfer it to developer's database on the server side. There are such applications which affect the mobile environment and make a defect in user's applications.

There are some characteristics from which developers can easily steal user information. So user need to be aware of these criteria while installing any unknown application.

#### *A. Re-packager application*

The malicious program is hidden into any application and covers it with the normal application interface so that any user will install without knowing that there is such program behind this application. The well-known example is Trojan horse.

#### *B. Receiving unknown commands*

Android supports a push back service which enables server to send any small information to the android device. But the malware server can be used to send harmful commands over the internet. Therefore if user is unknown to any such commands or notifications then they should not approve them to make an effect in the system.

#### *C. Steal information*

Therefore user needs to aware of these criteria for their own security. Many people make their Android device continuously connected with the internet. Sometimes while surfing on the internet or while downloading some files, there are some virus which came along with our actual data so if user is not aware about the secured security layer then they may have such virus problem. Always prefer secured site to download such contents which provides better security as shown in Fig. 2.

## **V.RELATED WORKS**

We done our android application by using MIT App Inventor (to learn the basics for create application), Google App Engine Launcher (cloud connection) and python 2.7

#### *A.MIT App Inventor*

App Inventor is a cloud-based tool, which means you can build apps right in your web browser. It is an innovative beginner's introduction to programming and app creation that transforms the complex language of text-based coding into visual, drag-and-drop building blocks. The simple graphical interface grants even an inexperienced novice the ability to create a basic, fully functional app within an hour or less .The mission of MIT App Inventor project seeks to democratize software development by empowering all people, especially young people, to transition from being consumers of technology to becoming creators of it.

#### *B. Google App Engine Launcher*

Google App Engine is a cloud computing platform for developing and hosting web applications in Google-managed data centers. Google App Engine is free up to a certain level of consumed resources. Fees are charged for additional storage, bandwidth, or instance hours required by the application. It was first released as a preview version in April 2008 and came out of preview in September 2011. Google App Engine supports many Java standards and frameworks. Core to this is the servlet 2.5 technology using the open-source Jetty Web Server, along with accompanying technologies such as JSP. Java Server Faces operates with some workarounds.

#### *C. Python 2.7*

It is the standard environment for the App Engine which makes it easy to build and deploy an application that runs reliably

under heavy load and with large amounts of data. Your application runs within its own secure, reliable environment that is independent of the hardware, operating system, or physical location of the server.

#### **VI. STANDARDISED TWO-DIMENSIONAL BAR-CODES**

Modern mobile phones are equipped with high resolution color displays, they support different standards of wireless networking, and they have reasonable processing power and memory. Although still primarily used for voice communication, with the inclusion of digital cameras these devices have become a potential platform for machine vision applications such as bar-code recognition [2].

An interesting approach is capturing bar-codes with their cameras and decoding them with software running on the phone. Depending on the nature of the application, alternative actions can follow the decoding stage: A number can be displayed, or a back-end application can be accessed.

##### *Data Matrix*

Data matrix is one of the most well known 2D bar-code standards. It is widely used in the automotive, aerospace and computer manufacturing industries, for large data capacity labeling, such as direct part marking and package marking. The symbology is in the public domain, free of any licensing or royalties. As shown in figure 1, it consists of a solid-line locator (the two solid lines), a patterned-line locator (the two alternating dark and light patterned lines), the inside area with encoded data in binary, and a quiet zone (a blank area) surrounding the whole tag. Its capacity is 2334 alphanumeric characters or 1556 8-bit ASCII characters, encoding any data. It employs the Reed-Solomon error correction to enable accurate reads even when substantial parts of the code are distorted.

##### *QR code*

Developed originally in Japan by Denso in 1994, and later recognized as an international standard [2], QR Code is another 2D bar-code. The main objective of its design was



**Fig 3: "Pervasive Computing 2007" with the same module size. The left image is using QR Code; the right is using Data Matrix.**

The efficient encoding of Japanese Kanji symbols, in addition to any other data. As can be observed from figure 3, there is a clear finder pattern composed of three square patterns in the upper left and right and the lower left corners. It also employs Reed-Solomon error correction.

#### **VII. IMAGE PROCESSING WITH J2ME**

Initial Java implementations on mobile phones have left much to be desired in terms of performance, but the situation has been improved significantly over the last couple of years [2]. Although a native application (C++ on a Symbian environment for example) will always execute faster than a comparable Java application, the portability issue is a major factor to consider for consumer applications. The proposed approach is based on Java Mobile Edition (J2ME), supported by most modern camera phones. J2ME is designed to work on low-end devices in terms of processing power and memory capabilities. It is supported by Symbian, Linux, Windows Mobile, Palm



OS, and phone vendor-specific operating systems.

#### A. Preprocessing steps

Images are captured in JPEG format by most phones. Once the bar-code is captured, the steps followed are:

1. **Gray-scaling:** The captured color image is converted to gray-scale using standard brightness equations.
2. **Local grey-scale histogram stretching:** The image is partitioned in four regions (schemes with one partition and sixteen partitions have been examined, with worse results). The brightness histogram of each region is calculated and the grey levels are adapted so that the histogram is stretched to cover the whole brightness range. The top and bottom 1% of the original values are mapped to the maximum and minimum respectively, to avoid effects of outliers.
3. **Local adaptive thresholding:** Following the contrast enhancement, the image is converted to a binary bitmap by evaluating the optimum threshold for each region in an adaptive way.
4. **Noise filtering:** Standard opening and closing techniques are applied to the bitmap to remove noise.
5. **Cropping:** The unnecessary background is cropped, to reduce the size of the image and processing time.
6. **Rotation correction:** Although decoding can be designed to handle rotated images, rotating before decoding is faster. Further cropping can be applied.
7. **Tilt correction:** Preprocessing is required to bring the image to its expected square shape before decoding.

#### B. Decoding steps

Open source libraries [2] are employed for decoding, since the study tried to develop the image processing algorithms independently of the decoding part, to allow a reader to decode multiple symbologies

from a pre-processed image. After preprocessing, the software locates the corner and edge patterns first, and then decodes the black and white modules in the data area of the tag. A very interesting approach for decoding was suggested. The basic idea is to search for straight lines in a suitable parameter space, therefore it is beneficial to transform the interesting part of the image into magnitude and angle coordinates (Hough transform). The runtime performance of this transform needs to be carefully evaluated though.

### VIII.MAPPING

Mobile map app is an important traffic application; its big data is embodied by two aspects of mobile map app. One is that the map makers need to collect and process a lot of geographic data. The other is that plenty of geographic data is generated by a large number of users. Using third-party component and using third-party JavaScript interface are the two important methods of integration of geographical location and map services in Android application. It has the advantage of abundant functions, geographic coverage and geographic information update quickly. Its disadvantage is that there is a amount of web map data, if the network speed is slow to bring such problems as poor user experience, as well as business is influenced by the Java development language, such as implementation process complex faults.

Although Android main development language is Java, but SL4A[3](Scripting Layer for Android)technology and Android scripting engine are breaking Java unified Android development situation and make Android development moving towards a more simple and more rapid road and have become an important force to promote the development of Android. SL4A is Android native service components that Google Company provides for the scripts of PHP

and Python and JavaScript and so on. SL4A provides services including UI, radio, mobile phones, multimedia, speech technology, GPS, Wi-Fi, Bluetooth and sensors, etc. P. Ferrill and discussed development technology of Android Python and PHP application based on SL4A. SL4A opens the Android GPS service for Android script, but SL4A has no map services. Android scripting development based on SL4A has received the serious challenge in the field of GIS development. Providing a simple and feasible method of integrating GPS into map for Android script is very important for promoting the development of Android scripting GIS system. To solve the problem of integrating the geographic location and Web map in Android scripting application, we discuss the hierarchical integration architecture, layer model, communication model and GIS implementation model based on Android script and SL4A.

### IX.LOCATION SERVICE OF SL4A

A pair of latitude and longitude can define a geographic location. GPS (Global Positioning System) is currently the most accurate and most widely used navigation and positioning technology and it is also a common configuration of mobile devices. GPS [3] system consists of three parts.

They are Space Segment (GPS satellite constellation) and Ground control part (ground monitoring system) and Mobile devices (GPS receiver). Latitude and longitude and other geographic Information of GPS receiver are calculated by GPS system.

Location Service based on SL4A provides geographic Information of GPS receiver for Android application. The information includes the time, speed, altitude, bearing, the provider, longitude, latitude and accuracy. Time is a time stamp, an integer

type. Speed is a floating point number and its unit is meter per second.

Altitude is a floating point number and its unit is meter. Bearing is the direction and its unit is degree. If location is based on station or network, bearing value is zero.

Provider represents the geographic information provider and its value is "gps" or "network". Longitude is a floating point number and its unit is degree. Latitude is a floating point number and its unit is degree. Accuracy is a floating point number and its unit is meter. Table 2 shows the core API of SL4A Location Service.

API	API description
geocode	Returns a list of addresses for the given latitude and longitude. latitude (Double) longitude (Double) maxResults (Integer) maximum number of results (default=1) returns: (List) A list of addresses.
getLastKnownLocation	Returns the last known location. returns: (Map) A map of location information by provider.
locationProviderEnabled	Ask if provider is enabled provider (String) Name of location provider
locationProviders	Returns available providers on the phone
readLocation	Returns the current location by all available providers. returns: (Map) A map of location information by provider.
startLocating	Starts collecting location data. The default update time is 60000 milliseconds. The default update minimum distance is 30 meters.
stopLocating	Stops collecting location data.

TABLE 2. SL4A LOCATION API

### X. INTEGRATION OF LOCATION AND WEB MAP SERVICES

#### A. Architecture

The architecture of Android script for the integration of geographic location and map service: It shows that the architecture

consists of the three layers of Data, View and Business. The Data layer runs on the Web server, which is implemented by the map service [3]. Its main function is to provide the Web map service to mobile phone. The View layer and the business layer are running on the Android mobile phone, the role of the View layer is to request the map service, display and manipulate the map from the data layer. The function of business layer is to get location data based on GPS or network and process the accuracy of data. Communication interaction of the view layer and the data layer is based on HTTP protocol, the interaction between the view layer and the business layer is based on event model.

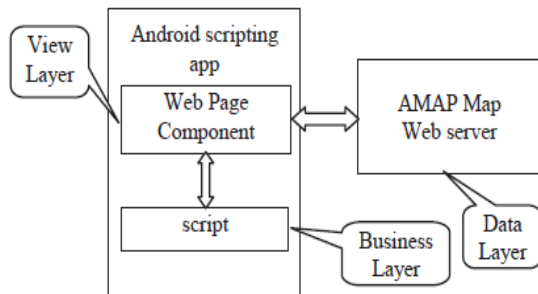


Fig 4: Architecture of android scripting app on location and map

### B. Data Layer and A Map

A map is a free map navigation product that a map company provides, and it is also mobile phone map that life function is the most comprehensive and information is the most abundant. A map's map data covers Mainland China and Macao, Hong Kong. In addition to providing the basic function of the map, a map also provides administrative region query, path query, Chinese and English map settings, street display, map display, geography (inverse geographic) analysis, real-time traffic, distance measurement and route planning service and so on. The features that architecture is light, map's visual effect is rich, development interface design is flexible and open, compatibility is very good are the main

characteristics of the A Map library. In terms of architecture, the file size of the A Map library is very small; the API of the A Map library is very easy to use. As for visualization, map support for drag and drop operations, map's zoom effect is very smooth, map's dot mark and form is very gorgeous.

### C. View Layer and WebView

The problem of HTML +CSS +Java Script [3] rendering must be solved to display and manipulate the map's map in Android Scripting Application. WebView running on Android is a web browser component based on Web Kit rendering engine, which supports HTML5 and CSS3 and JavaScript standards. If an application's data to be displayed is always obtained from an email system on the internet, it is a good choice to use WebView to develop similar applications like this. Because WebView can directly display email system interface, developers do not need to write code to perform network request, parse data from network, and render the page from the data. WebView can use HTML to design user interface, HTML file can be stored in mobile or network. WebView can seamlessly interact with JavaScript.

Content of WebView can be accessed by JavaScript, at the same time; WebView can call methods of JavaScript. With WebView, developers can use JavaScript instead of using Java to develop an android application that is similar to a map. A map JavaScript API is application interface written in JavaScript language. It can be used to develop the web or mobile applications which are rich and interactive map applications. Its characteristic is light, rich visual effect and compatible Android browser. The principle of Android scripting application integration a map service is that Android scripting application is to load the WebView component to render local HTML



page by SL4A, and put a map JavaScript API into local HTML page, and remote access a map's web map service by a map JavaScript API.

#### *D. Business Layer*

Android scripting application's core business is to collect location data based on SL4A. Because the power consumption of GPS is very big, GPS function should not always be turned on. Collecting location data time strategy or using network to reduce the positioning accuracy should be considered in order to save energy. Because static GPS is without direction indicator function, it needs to cooperate with magnetic sensors and will work. Because the GPS can't locate without satellite signal, so it needs to be equipped with gyroscope and other sensors. Collecting location data considering factors such as time, accuracy and other sensors is very important business of business layer.

#### *E. Communication Model*

Event driven programming is an important feature of modern software. Monitor event communication model[3] consists of the event source, events, event listener and event queue. Event source is the object that generates an event. Event can be generated by the Android system and scripting application. The event listener is responsible for monitoring the event source's events, and responds to events. Event is a mediation of the event source and event listener, event consists of event's name and event's additional data. Event queue refers to a container saving events. Communication of the business logic layer and the view layer is based on Monitor event communication model. The business layer is the event source; the view layer is the event listener. When the business layer collects location data, Android script will create location event for location data and delivery location event to event queue. The view layer is

responsible for polling location event. When it polls an event, it will respond to the event.

#### *F. The Realization of the Integrated Service*

The development of the view and business layer is the main work of the android scripting application on gps and map. The main work of the view layer is to configure a map service and listen and respond to events from business layer. The main work of the business layer is to start the view, then collect and process position data and then pass event of the position data to the view layer in the background. The development process of application based on the map service and Android script is that we apply for key and then configure the map service in Android scripting application and finally develop application. Developers can use mobile phone to the map website <http://lbs.amap.com/console/key> to apply for the key. If the non Chinese mainland developers want to apply for the key, the developers will need to first register a a map account, then send the a map account, non Chinese mainland mobile phone number, email address to [API@autonavi.com](mailto:API@autonavi.com). To apply for a a map account, the developers should go to the Taobao website [https://reg.taobao.com/member/reg/fill\\_mobile.htm](https://reg.taobao.com/member/reg/fill_mobile.htm) to register a Taobao account, and then use the Taobao account to visit a map website. The Taobao account is bound to the map account. You can get the key using the map account. Configuration map service work is to put the key and the following code to JavaScript file in the View layer.

```
<script
src="http://webapi.amap.com/maps?v=1.3&
key=the applied
key"></script>
```

The view layer is based on the event communication model to drive the interactive operation of the map; the view layer must continue to poll the listener in the background. The following JavaScript code

is the core code of the view layer on how to poll and response event. The JavaScript code in the HTML form should be stored the directory

"/sdcard/sl4a/scripts/" in mobile device.

```
<html>
<head>
<script
src="http://webapi.amap.com/maps?v=1.3&
key=the key">
</script>
<script type="text/javascript" >
var map; //a map object
var flag=1;
var droid = new Android(); //create Android
object
while ( flag>0 )
{
//Polling for new events
var ret=droid.eventWait(1000);
ret=ret["result"];
var eventName=ret.name; //event's name
var eventData=ret.data; //event additional
data
switch ( eventName )
{
case 'event 1': //Respond to event 1
break;
/* response to other events */
default:
}
}
</script>
</head>
<body>
<div id="mapContainer"></div>
<script>
map = new AMap.Map('mapContainer', {
center: [ the default longitude , the default
latitude]
});
</script>
</body>
</html>
```

The business layer can be realized by PHP, JavaScript and Python and so on. Table II

shows the core code of business layer. The code is written by PHP and JavaScript. The function of the code is to start a view with webview of and then collect location data from GPS or network and finally pass the event of the data to the view based on sl4a.

## XI.CONCLUSION

Mobile application for the smart shopping will improve the customer to purchase the item with their convenience. This application makes easy for the shopping. And the barcode of the item will improve the selection process of the product and its entry to the list because the data entry for mobile phones has always been limited by the numeric keypad. It will also make e-payment transaction.

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