Reduction Vehicle Speed Using GPS Android Smart Phone Programming

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Abstract

Today the new generation of smart phone such as Samsung galaxy, Sony, Motorola, HTC is used to build smart applications that made the human life more comfortable and safe. The Android open source operating system with java programming language can be used to develop such applications. In this paper a new software application has been developed using Samsung, galaxy note smart phone to control the speed of vehicle using GPS and Android programming for such smart phone. By collecting the speed and location information from Global Position System (GPS) receiver and using the global map application programming interface to determine the location nearby university, school and hospital in Baghdad city. The application will be check the speed of vehicle in zone of school, hospital and university using GPS information. If the speed over the limit the application produce sound alarm to reduce the speed to set up limit.

Keyword: Android, GPS, Google Map API.

الخلاصة

الجيل الجديد للهواتف الذكية مثل سامسونغ كلاكسي ، سوني، موتورولا، HTC وغيرها يمكن أن تستعمل لبناء التطبيقات الذكية التي تجعل حياة الإنسان أكثرمريحة وآمنة. ان نظام التشغيل الخاص بتلك الهواتف هو الاندرويد وهذا النظام ذات المصدر المفتوح مع البرمجة بلغة جافا يمكن أن يستعمل لتطوير مثل هذه التطبيقات. في هذا البحث تم تطوّير تطبيق برامجي جديد بإستعمال سامسونغ كلاكسي نوت 2، للسيطرة على سرعة المركبات بأستخدام الـ GPS والبرمجة لهذا الهاتف الذكي. بجمع المعلومات عن الموقع والسرعة من نظام الموقع العالمي (GPS) وبأستخدام وصلة برمجة تطبيق الخريطة العالمية لتقرير الموقع في مكان قريب من الجامعة أوالمدرسة أوالمستشفى في مدينة بغداد. التطبيق سوف يراقب سرعة العربة التي في منطقة المدرسة والمستشفى والجامعة بأستخدام معلومات نظام التموضع الالكتروني. إذا كانت السرعة فوق الحد المطلوب يعمل الهاتف الذكي على اخراج صوت معين ينبه السائق بضرورة خفض السرعة الى السرعة المحددة وعند وصوله للسرعة المحددة يختفي التنبيه .

الكلمات المفتاحية :- نظام اندرويد، نظام تتبع الاقمار الصناعية، تطبيقات خرائط كوكل .

Introduction

A modern Smart phones models become less expensive models with more advanced computing capability and connectivity by adding the functionality of used the newest communication devices, such as GPS navigation units to form one multi-use device, and High-speed data access is provided by Wi-Fi and Mobile Broadband .In recent years, the rapid development of the newer mobile Apps enabled smart phones to support many applications and programming languages with more future can be add to the mobile programming. The public demand and the availability of developer tools drove rapid expansion into newest services, such as GPS and location-based services (Kumar *et.al.*, 2009;Whipple *et.al.*, 2009)

Using such services a new proposed application has been developed to inform the driver to have more attention and to reduce the speed of Vehicle near schools, universities and hospitals zones. These zones have been pre-located using Google map API. When driver enter these zones the GPS information will be used inform the drive to reduce the speed near these zones.

Global Position System (GPS)

Global navigation satellite system deployed by US department of defense and maintained by the US Air force. GPS satellites are just beacons, like lighthouses, that tell you where they are in space; they do not tell you where you are. Your navigation device uses the satellites as reference points to determine your coordinates on the Earth in terms of latitude and longitude (Kumar *et.al.*, 2009).

This service made available for citizen in 1996 for navigation purpose, is free of chargeand can be used for undefined number of user and any place in the world, all smartphone today equipped with GPS receiver and application for mapping. GPS is a space radio navigation system that provides accurate location and timing service to anyone with a GPS receiver (Whipple *et.al.*, 2009).

Android Software and Hardware

Android is a mobile operating system that is based on a modified version of Linux, Google wants the Android open and free most of the Android code was released under the open source Apache License, which means that anyone who wants to use Android can do so by downloading the full Android source code.

Google release an alternating operating mobile and application programming interface (API) for mobile phone called android, this operating system join IPhone (OS), Symbian (OS), blackberry and windows mobile (Frank and Robi,2005).

The android backed by (OHA) Open Handset Alliance whose member Sony, Samsung, Motorola and NVidia, these companies are new to costumer of smartphone market therefore used android operating system and design the hardware for this operating system (Felker 2011).

Platform of android open source, one goals used to enable developer to create application that utilize the feature of mobile device to offer feature that need of customer

The open-source code allows phone manufacturers to create custom user interfaces (UIs) and add built-in features to some devices. This also puts all developers on an even playing field. Everyone can access the raw Android source code.

The kernel of android was Linux these include low level device driver support for android devices, (JVM) java virtual machine that's included in Linux these was programming language of android application (Whipple *et.al.*, 2009). Software Development Kit (SDK) includesdebugger, libraries, emulator, documentation, sample code and tutorial.

The android official integrated development environment is Eclipse using the Android Development Tool (ADT) plug-in. The simulation of GPS and Wi-Fi allowed in emulator of android included in ADT plug in as shown in Figure (1). Android is open source and freely available to manufacturers for customization, there are no fixed hardware or software configurations. However, Android Hardware supports Accelerometer Sensor, Camera, Digital Compass, Proximity Sensor and GPS (Riley 2012;Singhal & Shukla 2012).

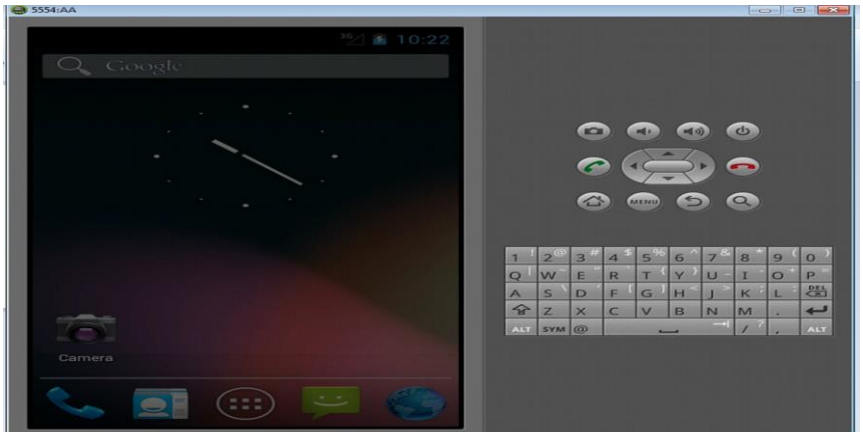


Figure (1) Emulator of Android Operating System

The current Android version is 4.1. Android releases are nicknamed after sweets or dessert items like Cupcake (1.5), Frozen Yogurt (2.2), Honeycomb (3.0), Ice Cream Sandwich (4.0) and Jelly Bean (4.1). Table (1) shows the Android version development [(Lee 2011)]. The last version is android v4.2 jelly beam in 29 October 2012 the first devices to run Android 4.2 will be LG's Nexus 4 and Samsung's Nexus 10, which will be released on 13 November 2012(Victor H. n.d.).

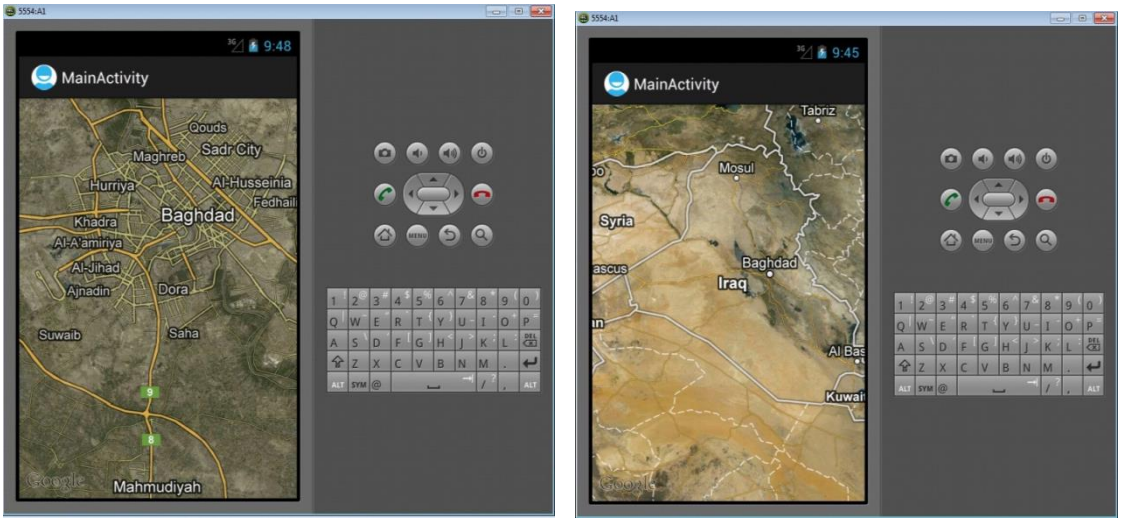
Table (1) Android Version Development

CODENAME	RELEASEDATE	ANDROIDVERRS
	9 February2009	1.1
Cupcake	30April2009	1.5
Donut	15September2009	1.6
Éclair	26October2009	2.0/2.1
Froyo	20May2010	2.2
Gingerbread	6December2010	2.3
Honeycomb	22February 2011	3.0/3.1/3.2
IceCream Sandwich	19October2011	4.0

Practical Work

In this work we used Google maps interface with android emulator as shown in Figure (2).

To identify each zone we used the internet to run the Google map combined with GPS signal to find all specified locations areas. We save these locations as (longitude, altitude) in array in order to check these locations with the real location obtained from GPS by the program. If the smart phone enters to zone of these saved points, the mobile will start to check the speed of vehicle depending on GPS information. If the speed greater than limited speed, the smart phone will produce an audio alarm.



(A) Baghdad map **(B) Iraq map**

Figure (2) Android emulator using Google map API

The program start by using location manager class to obtain the location data by the following code

```
lm= (LocationManager)
getSystemService(Context.LOCATION_SERVICE);
locationListener= new MyLocationListener();
```

To change the position we have new location from GPS using the code below

```
lm.requestLocationUpdates(
LocationManager.GPS_PROVIDER,
0,
0,
locationListener);
```

To comparing each location (longitude, altitude) with **A[]=locationarray[]** that have data for location

```
public void onLocationChanged(Location loc)
{
While(i<200)
if(loc != A[i])
{
Intent intent =
new Intent(GenerateAlarm.this, AlarmReceiver.class);
PendingIntentappIntent =
PendingIntent.getBroadcast(GenerateAlarm.this;
0, intent, 0);
Calendar calendar = Calendar.getInstance();
calendar.setTimeInMillis(System.currentTimeMillis());
calendar.add(Calendar.SECOND, 30);
AlarmManager am =
(AlarmManager)getSystemService(ALARM_SERVICE);
am.set(AlarmManager.RTC_WAKEUP, calendar.getTimeInMillis(),
appIntent);
"Location changed :Lat: " + loc.getLatitude() +
" Lng: " + loc.getLongitude(),

p = new GeoPoint(
(int) (loc.getLatitude() * 1E6);
(int) (loc.getLongitude() * 1E6));
}
GenerateAlarm.this.mToast.cancel();
```

The running configuration of this application can be performed by the following steps:

1- Run the program on android emulator first
2- Locate the SDK debug certificate located in the default folder (C:\Users\<*username*>\.android
3- Verify the existence of the debug certificate by going to Eclipse and selecting Window ➪Preferences
4- Using the debug keystore, you need to extract its MD5 fingerprint using the Keytool.exe
5- Issue the following command to extract the MD5 fingerprint: on command prompt
   keytool.exe -list -alias androiddebugkey –
   keystore"C:\Users\<username>\.android\debug.keystore"-storepass android-keypass android –v
6- Copy the MD5 certificate fingerprint and navigate your web browser to **http://code.google.com/android/maps-api-signup.html**
7- We obtain the key : 0_pabs3p7tDYRZi7UpI45mRXBwqaBW-_ySuePBg
8- Now used the key to display the map write the code on mail.xml file

```
android:id="@+id/mapView"
android:layout_width="fill_parent"
android:layout_height="fill_parent"
```

```
android:enabled="true"
android:clickable="true"
android:apiKey="0_pabs3p7tDYRZi7UpI45mRXBwqaBW-_ySuePBg" />
```

9- Add code to AndroidManifest.xml file

```
<uses-permissionandroid:name="android.permission.INTERNET"/>
<uses-library android:name="com.google.android.maps" />
```

10- Add the fallowing to the mainactivity.java

```
packagenet.learn2develop.LBS;
importcom.google.android.maps.MapActivity;
importandroid.os.Bundle;
public class LBSActivityextends MapActivity
```

11 – press F11 to run the program and we see the map

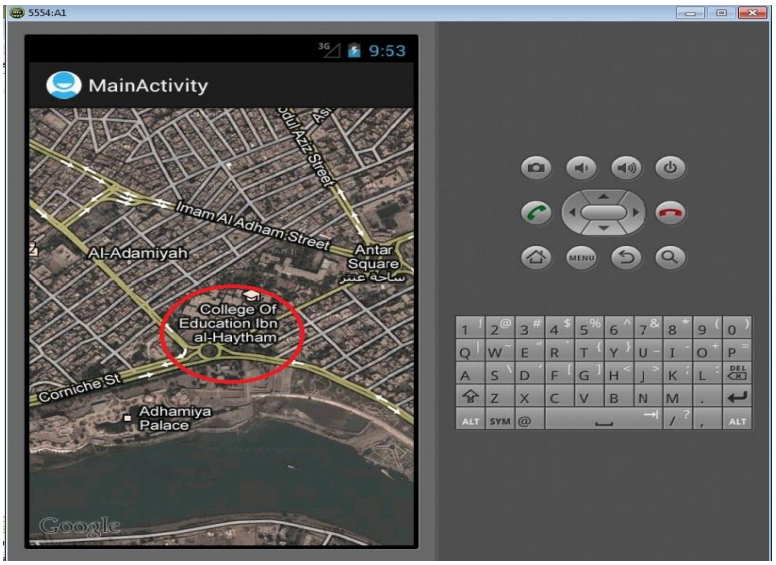


Figure (3) Identifying the zone with Android emulator

Figure (3) shows identifying process for each zone, by entering data (longitude, altitude) for each location place, to define this point to application program. When the driver enter the selected zone, the application run the silent mode when the speed below and on the same limited speed of vehicle and the green color will appear on the map, as shown in Figure (4). While alarm mode and a red color, shows the speed over the limit, as shown in Figure (5).

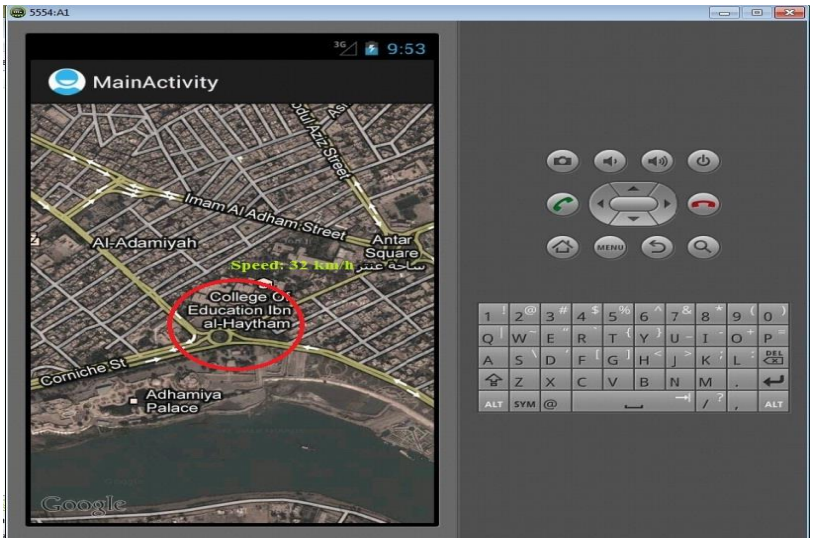


Figure (4) Green color of vehicle speed when drive on and below speed limit

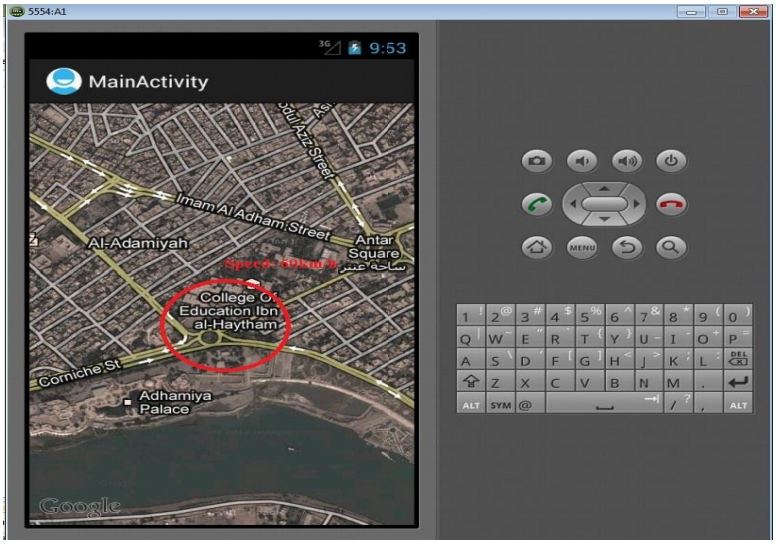


Figure (5) Red color of vehicle speed when drive over speed limit

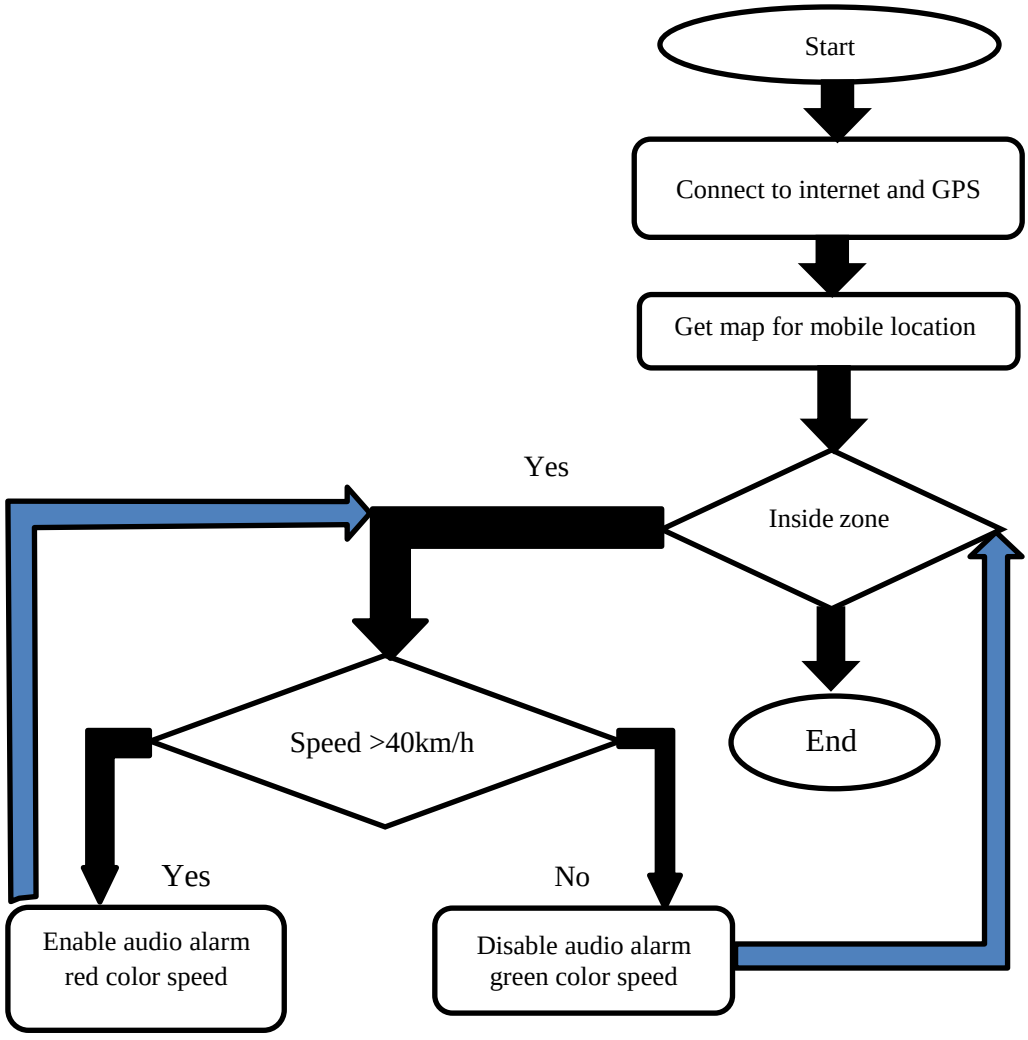


Figure (6) Flow chart of program Application

Conclusions

Android platform proved to be capable of mixing of different services. More integrated communication capabilities give the smart phone ability to communicate with vehicle on road to gain more information about driving condition. In this work

android application combined the GPS data with Google map location service can be used to safe human life and reduce road accident. This application has been implemented in smart phone mobile with android operating system and GPS receiver sensor using java programming language. The run configuration process performed on Google map API as public demand location-based services

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