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# Location Based Services Classifications

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***Abstract*—** *The use of location-based services has become widespread in mobile applications, which serve many areas, including maps, searching for nearby services, social media and even entertainments and games have become highly dependent on the location. However, the use of location based services in the area of risk reduction and evacuation of accidents and risks needs more effort to be made, as each of the current location based means has its technical or economic difficulties that makes it difficult to rely on when the danger occurred to alert those nearby and send warning alerts what they should do, especially in developing countries, despite the urgent need for these means, especially in the fight against terrorism. This paper focuses on survey research for current location based services classifications and presents a new proposed to improve the process of delivering important messages and alerts automatically to mobile devices in a particular location related to an event when it occurs by integrating GPS technology with GIS tools, and GIS measuring distance algorithms. The proposed approach could help people receive alerts in a timely and in-location manner. It would be an alternative solution to existing messaging systems such as SMS, CBS and social media applications for use by Governments or a licensed civil society organization at the lowest possible cost. The success rate in the practical experience of the proposed approach was 98.6%.*

***Keywords*—***Location based services, Machine-to-Machine auto interaction. Mobile phone in risk reduction management, Real-time information, Wireless communications.*

## I. INTRODUCTION

Location-based Services (LBS) seems to be a crucial for life saving and for many other fields such as marketing, health caring, and anti-terrorism. LBS is the information, which obtained by mobile devices and uses information of the geographical location of the mobile device. [1] Recently, there are huge efforts have been made to deliver information to audience through their smart phones, especially in risk management, These efforts are being made in many areas such as in development of communication, GIS, and cloud technologies, which have wide-ranging of tools and applications in disaster preparation, reduction, mitigation, and management. Remote sensing in warning dissemination is also successfully have been used to minimize the impact of unawareness people about the risky areas near them and supply them with the vital information and Instructions to follow. Cloud services, Social media, LBS mobile applications and traditional messaging system SMS and CBS are examples for methods used to deliver LBS. However, each of those technologies has its limitations that reduce the possibility of relying on risk time.

Next sections of this paper organized as follows. Section 2 presents a brief explanation of Technical Elements of LBS. Section 3 discusses Location-based services Classifications. Section 4 presents Problem Definition. Section 5 discusses proposed approach Section. Section 6 gives the conclusion.

## II. TECHNICAL ELEMENTS OF LBS

Any LBS depends on the critical elements, *Location* that can be determined be positioning technology, *Data* for this location through geospatial database, *User interface* that may be a mobile device that can deliver the produced service. [*1*] [*2*]

### *A. Positioning Technology*

Current location of mobile device can be identified by one of many positioning systems (e.g. Network tours, GPS, Wi-Fi, Bluetooth, and RF)

### *B. Spatial Data*

The availability of a data map for the requested LBS will be more useful to the user, It can including geospatial data such as streets, buildings, terrain, mountains, rivers etc., along with points-of-interest (PoIs) data such as location of hospitals, ATM, parks, restaurants, etc. The spatial data set also includes geo-referenced satellite images, aerial photographs and panoramic views of streets and localities. The need for geospatial data and its granularity may vary from application to application. The accuracy of sub-decimeter may be not necessary for LBS, but granularity and updating is required. (e.g. for map data providers are: Google, Yahoo, Nokia, Government initiatives, MapmyIndia, and Satnav )

### *C. User Interface Device*

Today mobile handsets are the devices, which the positioning systems are determining its location for providing the needed services. Mobile devices range from Tablets, in-dash car navigation panel, mobile Phones, laptops etc. Many of these devices are either fitted with GPS/GNSS or their location is computed through telecom service providers.

## III. LOCATION-BASED SERVICES CLASSIFICATIONS

Because of the multiplicity of uses and variation of used technologies in LBS, there is no unified classification agreed. This current paragraph will present some standard taxonomy and considerations in the literatures.

### *A. From the System-Human Interaction Point of View:*

LBS can be classified into reactive (pull) and proactive services (push). [*3*]

*a. Reactive LBS*

In this type the user always initiates the process when he/she requests any information via a device, to (e.g. an



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information list of nearby restaurants or theatres, including relevant information such as the distance from the user location, directions, contact numbers or postal address) (Küpper, 2005).

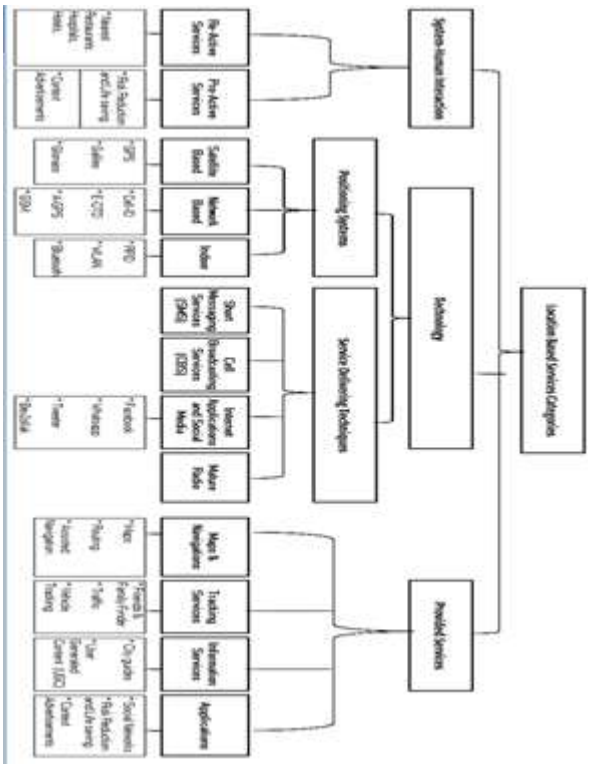

Fig. 3.1. LBS classifications.

*b. Proactive LBS*

Are the other type of LBS, in which the user automatically get the services in case of the predefined location event occurs, (e.g. if the user enters, leaves or comes into risky area or marketing targeted Geofence) [*4*].

*B. From the Technology Point of View:*

The used technologies in LBS can be classified into two main categories positioning technologies (outdoor like satellite based, network based, or indoor like Wi-Fi, RF, Bluetooth. etc.), According to Dix: based on the used source there are three different types of location technologies, GPS using systems, other systems determine the location on the basis of nearby Wi-Fi routers, and the third type uses GSM antennas. [*5*]

The second classification - from the technology point of view -is according to the service delivering techniques (e.g. SMS,CBS, Mature-Radios, Social media applications and Internet apps).

TABLE 3-1. Characteristics of SMS and CBS for RRM [*6*].

| Characteristic | Short Message Service (SMS) | Cell Broadcast (CBS) |
|---|---|---|
| Handset compatibility | All handsets support SMS | Most handsets support CBS except Handset compatibility few e.g. Nokia 3310 (celltick.com, 2003) |
| Transmission form | Unicast and Multicast communication (Messages sent point-to-point) | Broadcast service. Message received indiscriminately by every handset within broadcast range (Messages sent point-to-area) |
| Mobile number dependency | Dependent. Foreknowledge of mobile number(s) is essential | Independent. Message is received on activate broadcasting channel |
| Location dependency | Independent. User receives the message anywhere | Dependent. Targets one cell or more |
| Geo-information | Achieved by obtaining cell ID from the network operator | Cell(s) location is known for broadcaster beforehand |
| Service barring | No barring | Received only if the broadcast reception status is set to “ON”, Users can turn off CELL BROADCAST reception or a specific channel. |
| Message type | Static messages will be sent to pre-registered numbers. | Location specific. Context messages can be sent to different areas. |
| Message length | 140-160 characters. Longer 'concatenated' messages are supported. | 93 characters. Longer 'multiple pages’ messages are supported. |
| Reception | Message is received once the mobile is switched on | No reception if handset is switched on after broadcasting |
| Bi-directionality | Direct. Users can receive messages and respond directly to the sender via SMS. | Indirect. The message should contain a URL or number to reply. |
| Congestion and delay | Affected by network congestions. Enormous number of SMS may produce delays, Delivery is queued. | Congestion is unlikely as CBS are sent on dedicated channels. Almost no delays except if received in poor coverage area |
| Delivery failure | Network overload might cause delivery failure | Busy mobile handset might fail to process a CBS message |
| Delivery confirmation | Sender can request delivery confirmation | No. Confirmation of delivery to the handset is not available, however actual broadcast in the network is. |
| Repetition rate | No repetition rate | Can be repeated periodically within 2 to 32 minutes intervals |
| Language format | Identical to all receivers | Multi-language messages can be broadcast on multiple channels simultaneously |
| Spamming | Some mobile service providers support internet connectivity. Internet-based SMS spamming is possible | Not possible expect through uncontrolled access to mobile network infrastructure and lack of safeguards by an irresponsible service provider |
| Security | Poor authenticity. The source of the message cannot be verified. | Good security. Only the mobile operator can broadcast messages. |
| Message storage | Yes. | Handset dependent. |

*Other technologies utilization in risk reduction management*

In order to push alarms and notifications to peoples, there are several technologies with no less important of pervious listed in this research, mobile computer internet applications named social media (e.g. Facebook, whatsApp, tweeter), some



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other traditional technologies such as Sirens, TVs and Radio sets, and mature radio technologies can help in pushing broadcast notifications , but each one of those technologies has its pros and cons as follow.

*C. From the Type of Provided Information Point of View:*

Today there are numerous applications of LBS like locating coffee shop in a nearby locality, locating friends, tracking and monitoring patients, asset tracking, fleet management etc. Availing taxi service without prior knowledge of local number or calling an emergency service by dialing a short and generic number have become a reality in many parts of the world today. [*2*]

Local search and information services are now the leading LBS category in terms of unique users, driven by the adoption of handsets with improved capabilities and changing user habits. Most leading social networking services are now focusing more on their mobile offerings as users increasingly access services from mobile devices. Many of these services have various forms of location support ranging from sharing geo-tagged content to location sharing and check-in features. Also mobile workforce management services that aim to improve operational efficiency for businesses are gaining traction as the cost of hardware and software declines. [Berg Insight]

Some kind of the applications of LBS systems according to the kind of information they provide: [*5*]

***Applications*** *The extent of horizontal coverage of LBS has virtually covered all the walks of life from selecting the restaurants to emergency services to aid in navigation, it is all there. Some of the fields where network operators are moving in are:*

The ability to pinpoint location is going to revolutionize customer billing in the wireless industry as carriers move from flat-rate billing to location-sensitive billing models. For an example, a family could receive better rates for residential location.

Fleet management using the remote tracking of taxis and trucks will be common place. One could know the proximity of their trucks or packages and in years to come even the precise location of their goods.

Roadside assistance and driving directions will become more prevalent with the availability of improved location service. It could later turn out to be turn-by-turn driving directions a complicated location service.

If you're driving to the theatre and are low on gas, your handset will know there's a gas station three blocks ahead on the right. It will display directions to the theatre and even indicate that you can upgrade your tickets to orchestra seating if you request it in the next few minutes.

On the leisure and sports sector, golfers would "tag" their ball with a satellite transmitter before and after each shot. The location data would be shot to a satellite and tracked. When users go back to their home they would be able to track their performance on a Web site, complete with maps of fairways marked with the flight of their ball.

*Mapping and navigation* is the leading segment in terms of revenues and the second largest in terms of number of active users. Although the number of active users of mapping and navigation services is still growing, revenues under these categories are slow due to cut throat competition from low-cost service providers.

*Emergency Services* can be used to locate a person, for emergency health service for security related incidences, in search & rescue operations in the case of natural disasters etc. Children can be tracked by their parents through the location of their mobile device.

Mobile phones are emerging as an alternative to deliver warning notifications and emergency alert information. Broadcast of emergency information through SMS or CBS to the disaster prone area is gaining grounds in many of the emerging markets for LBS.

Short Message Service: SMS is capable of transmitting limited size of binary or text messages to one or more recipients. SMS offers virtual guarantee for message delivery to its destination (European Telecommunications Standards Institute, 2006).

Cell Broadcasting Service: Cell broadcasting technology is a service delivered by mobile providers where uniform text messages are broadcast indiscriminately to all mobile handsets in a specific geographic area. The messages could also be broadcast to all towers in a carrier network covering a whole country or to a specific cell covered by a single tower. CBS does not require the foreknowledge of mobile phone numbers.

*Traffic Management* LBS can also play an important role in disseminating information about traffic condition.

*Navigation* Turn-by-turn vehicle navigation assistance through smartphones is quite popular. This will help people navigate to their destination by the shortest route. Navigation can be categorized into:

*Outdoor Navigation (Directions)*: LBS helps in determining an individual's location (positioning), selecting and providing guidance on the best route available, mode of transport etc.

*Indoor Navigation*: Indoor services extend to personal navigation services to the indoor environment. The user can obtain more detailed guidance and information on the sites in which he/she is interested. The technical basis for the development is provided by rapidly developing wireless local area networks (WLAN, Bluetooth etc.) and their associated positioning methods. Different kinds of guidance and marketing information and their linkage to a certain location in a department store, museum, terminus and other such public spaces may be the most important aspect of indoor navigation.

*Mobile Work Force Management* LBS have been helping in Mobile Work Force Management (MWFM). Location of field resources is used to provide better decision making and optimization of services through 'location awareness' of field staff.



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*Tracking* From tracking of assets, high value consignments to tracking of individuals and wildlife etc. are very common today. Location based tracking technology is being used to streamline supply chains for faster movement of products, asset monitoring and prevention of inventory loss. It is assisting logistics and supply chain firms to monitor their trucks/fleet to provide better services to their clients.

*Advertising* Location-aware marketing is gaining momentum nowadays. Location is playing a critical role in enabling successful consumer engagement through and with the mobile devices. Location Based Advertising delivers relevant ads for products and services that are in close proximity to consumers' current location or in the area of the advertiser interest. It is very helpful for a business to know if a consumer is in close proximity and offer them an incentive to make them visit the store.

*Social Networking* International giants such as Foursquare, Places of Facebook are examples of social networking services. People like to share events associated with location. Social networking applications like Loopt notify consumers when their friends are nearby and Foursquare and Gowalla let consumers "check in" at specific locations. Social networking services may collect and retain location data along with photos, status updates and comments, and information about friends, interests, gender and more.

*Examples for LBS role in governance, emergency service and public service*

- *Governance*

New Police vans to be fitted with Smart VTS and GPS, GPS fitted tankers to curb water wastage, Chartered buses and GraminSewa to be deployed with GPS as a mandate, Rajkot Municipal Corp to use vehicle tracking system, High Court orders GPS deployment for commercial vehicles, GPS chips in walkie-talkies to track police movement, Trucks carrying food grains fitted with vehicle tracking system in 12 districts, GPS to help in keeping an eye on Corporation vehicles, GPS tracking system for waste management in Jamshedpur.

3. *The Challenges Face the Location Based Services Applications Architecture*

Legal, political, and technical arguments are the reasons behind the lack of adoption and diffusion of LBS in RRM

• *Attractive Business Model*: One of the biggest obstacles for adoption of CBS has been finding a visible business model that can lure mobile operators to use it since information is sent without registration to which it is delivered (celltick.com, 2003). Because it is a broadcasting service, there is no way to know the number of people who will receive it, it's not peer-to-peer communication model where potential recipients can be clearly quantified.

• *Obligation of National Service Providers:* Existing emergency regulations are largely subject to voluntary participation. No country except Singapore has mandated the involvement of commercial mobile service providers in the case of emergencies. In the United States, for example, even after 9/11 terrorist attacks and the devastating Hurricane Katrina, the Federal Communications Commission (FCC) is debating whether to obligate mobile service providers in a mandatory mobile emergency alert system or leave involuntary, as it is (Washington, 2006).

• *Regulations:* No standard regulations have been established to control the deployment of any proposed mobile alert system. For countries that intend to start deploying such systems, it is necessary to have a dedicated department or organization that is specifically assigned to such tasks. Some of its duties will be shaping regulations, maintaining plans, and associate performance standards, goals, and metrics (Washington, 2005).

• *Security and Privacy Concerns:* There are no guarantees that spammers would not bibelot control the broadcast. Concerns from legal liability in case of hoaxes and false alarms arise as well. Therefore, in The Netherlands and South Korea the cell broadcasting is restricted by law to government agencies and only authorities can send warning messages (O'Brien, 2006).

## IV. Problem Definition

Countries with either natural disasters or political turmoil find themselves forced to spend on risk management infrastructure such as the SMS or CBS, despite their high cost, but in developing countries that do not use any of these means. There is a desire to alert people, specially, after the outbreak of terrorist attacks, beside SMS, CBS and other ways have their defects, which reduces dependence on the time of danger.

So that, this paper involves a new approach that attempt to be an auto sending messages system , in the time of occurrence of event , with picture attached- as a machine to machine, to people who are in /or near the area of the event location to avoid the old technologies disadvantages.

## V. Proposed Approach

*From user interaction point of view:* our proposed approach can be considered as proactive interaction hence the system provide user with the critical information once he/she inters the targeted fence and in the time of event occurrence as a machine to machine interaction communication using the device internet (as IOT solution).

*From technology point of view*: our proposed approach can be considered as a *GPS* with device internet technology (IOT).

*From provided information point of view* it can be considered as *Tracing*, *Emergency* information service, also it can be used as *advertising* information services based on the customer location.

The new system Location-Based System for Messaging Services (LBSMS) can be classified as a location based and handset-based (GPS-based) system. The new system components and their implantation technologies are illustrated in Table.

Wherever the new system Location-Based System for Messaging Services (LBSMS) could be classified as a location based, handset based and as GPS based system.

System components and their implantation technologies are illustrated in Table 5.1.

TABLE 5.1. System components.

| Component | Implementation Technology |
|---|---|
| Sensors | Physical Sensors |
| Mobile application | Android |
| Back-end Server | Cloud server |
| Admin/Client Web App | MS VB. NET |
| Database | MS SQL Server |

The new approach uses sensors such as smoke detector or any other alerting physical sensors which connecting with the cloud server when the accident accurse.

TABLE 5.2. The new approach Vs Traditional systems.

| Characteristic | (SMS) | (CBS) | Proposed Approach |
|---|---|---|---|
| Handset compatibility | √ | √ | √ |
| Unicast and Multicast communication | √ | X | √ |
| Broadcast service | X | √ | √ |
| Mobile number independency | X | √ | √ |
| Location dependency | X | √ | √ |
| Geo-information | X | √ | √ |
| Service barring | X | √ | √ |
| Context messages | X (Static messages) | √ | √ |
| Long Message length | X (140-160 characters) | √ | √ |
| Massage Storage | √ | X | X |
| Two ways communication | √ | X | X |
| No Congestion and delay occurred | X | √ | √ |
| No Delivery failure | X | X | √ (Except if no internet or GPS coverage area) |
| Delivery confirmation | √ | X | X |
| Repetition rate | | | √ (one time for each mobile ) |
| Massage Language Multiplication | **X** | √ | √ |
| No Spamming | X | √ | √ |
| Good security | X | √ | √ |

The new system architecture for this application comprises two main components: the mobile application (Android in this case study) for sending mobile handset coordinates (Latitude, Longitude) to SQL database created on public server, and to receive the notification from the public server if the mobile coordinate's is located in the affected sensor region. The latter component is an admin/client Web Interface(ASP.NET) which has 4 features, presented through Graphical User Interfaces (GUIs) that cover almost all the functional requirements for both ends, the contents provider (system admin), and client module.

The process of using the LBSMS android application and the Web Interface (admin/client) is described briefly in the following scenario (considering using the system in field of RRM and evictions):

Fig. 5.2 illustrates the admin home page with the four feathers "Sensor button" to create new sensor data, "Notification" to create a new notification, "Track phone" to show specific mobile number last location stored in the server database, "Active Sensor" to show the current active sensor and its spatial attributes.


Fig. 5.1. LB_SMS system components.

The published web application can be accessed through Mobile phone, PC, laptop, tablet or any device with internet access.


Fig. 5.2. Admin web application.

*5.1 Creating a new Sensor*System admin can install a physical sensor(s), which can connect with the remote server in case of active statue.

Fig. 5.3. GSM Smoke detector sensor.

- System admin can use Google-Maps (or any other solution) to know the current sensor coordinates.
- He/she can use the admin web application GUI to insert the new sensor data (latitude, longitude, sensor full address, alternative other best path) into remote server.



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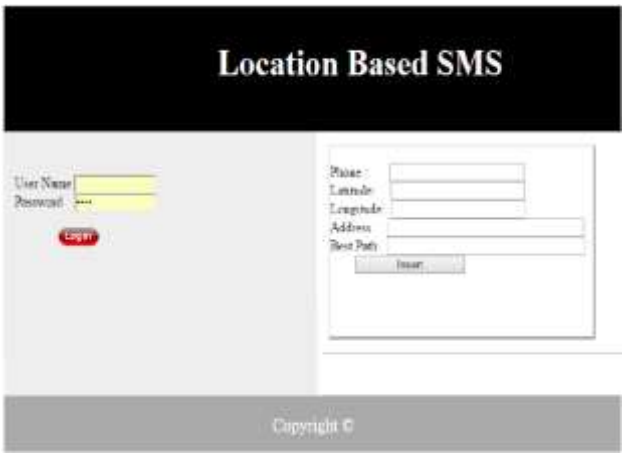


Fig. 5.4. Adding new sensor data to remote server.

*5.2 Creating a New Notification*

- System admin can use the Notification page in the admin web interface GUI to insert a specific notification or alert to a specific sensor (he/she can choose sensor and write the notification text related to this sensor to be sent in its active statue).
- He/she can also add a picture (snapshot) public URL to be sent with the notification text (it could be an advertising picture in the field of Marketing or may be a statue or museum image (in the field of tourism) or may be any security-related photo (in the field of counter-terrorism) etc.

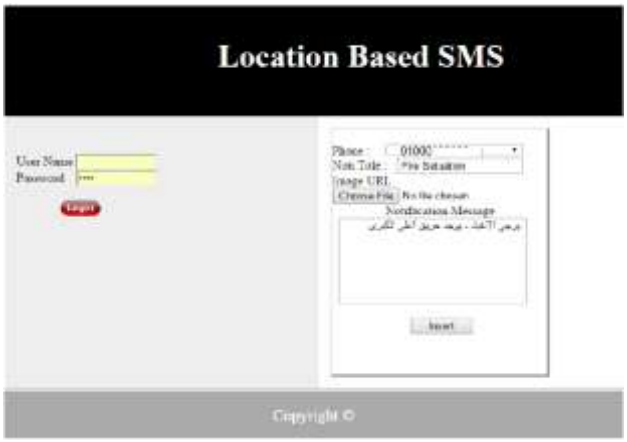


Fig. 5.5. Adding new notification to specific sensor.

*5.3 LB_SMS Android Application*

LB_SMS application enables the mobile handset to send its coordinates to SQL database which on public Server, the data will be updated by the application every period of time or in changing of mobile location (for example we can determine the time as every two or five minutes, and the distance in every 100 Meter from the current location).

Fig. 5.6. LBSMS application sending geo-spatial data to remote server.

*5.4 Notification Delivery*

When any accident will accrues (fire or any other sensed accident), the installed sensor will be in active statue, and establishes connection to remote server, which will deploy SQL queries to determine people who locate inside a circle around this active sensor, using GIS distance function between two pointes on the earth surface. Then SQL query will fire a pre-created notification, the android application LB_SMS will receive the notification and the image (if it is attached) as shown in the follow Fig. 5.7.


Fig. 5.7. LBSMS application received a notification text with an image.

*Part of the code used in implementing this function is given as follows:*

*-Android code for updating mobile location and mobile data to remote server*

```
Package com.example.ash.LBSMS;
import android.graphics.Bitmap;
import org.ksoap2.SoapEnvelope;
import java.net.URL;
import java.util.StringTokenizer;
public class MainActivityextendsActionBarActivity {

private static final long
MINIMUM_DISTANCE_CHANGE_FOR_UPDATES = 100; // in meters
private static final long MINIMUM_TIME_BETWEEN_UPDATES =
50000; // in millisecond
```

Fig. 5.8. The code that determine when the LB_SMS will update and send its geo-spatial data to remote server.



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```
public void sendlocation() {
try {
SoapObject Request = new SoapObject(NAMESPACE, METHOD_NAME);

Request.addProperty("Log",getCel);
Request.addProperty("Lat", getCel2);
Request.addProperty("MC", phNumber);
Request.addProperty("Line1", liNumber);

SoapSerializationEnvelopesoapEnvelope = new
                SoapSerializationEnvelope(SoapEnvelope.VER11);
                        soapEnvelope.dotNet = true;
                    soapEnvelope.setOutputSoapObject(Request);
            HttpTransportSE transport = new HttpTransportSE(url);
                transport.call(SOAP_ACTION, soapEnvelope);
                        } catch (Exception ex) {}}
```

Fig. 5.9. The code for sending mobile geo-spatial data to remote server.

*-C# code for determine the radius of the circle around active sensor by 500 Meters*

```
latA = double.Parse(slat);
longA = double.Parse(slong);
intbt;
cmd = newSqlCommand("select * from AndroidTrack where DateRegister='"
+ DateTime.Now.ToString("yyyy-MM-dd") + "'", openCon1);
openCon1.Open();
reader = cmd.ExecuteReader();

while (reader.Read())
                    {
longB = double.Parse(reader["AndroidLog"].ToString());
latB = double.Parse(reader["AndroidLat"].ToString());
mc = reader["MC"].ToString();
varlocA = newGeoCoordinate(latA, longA);
varlocB = newGeoCoordinate(latB, longB);
double distance = locA.GetDistanceTo(locB); // metres
bt = Convert.ToInt32(distance);
if (bt<= 500) {cmd = newSqlCommand("if not exists(select * from
ActiveUser where MC = " + mc + ") " +"INSERT INTO ActiveUser
(MC,Sensor_ID,Act_date,Act_flag) VALUES (" + mc + ",'" + simcard + "','"
+ DateTime.Now.ToString("yyyy-MM-dd") + "',0)" +
"else if not exists(select * from ActiveUser where MC = " + mc + " and
Sensor_ID='" + simcard + "') " +                    "update ActiveUser set
Act_date='" + DateTime.Now.ToString("yyyy-MM-dd") + "',Sensor_ID='" +
simcard + "',Act_flag=0 where MC=" + mc + " " + "else if not exists(select *
from ActiveUser where MC = " + mc + " and Sensor_ID='" + simcard + "' and
Act_date='" + DateTime.Now.ToString("yyyy-MM-dd") + "') " +
"update ActiveUser set Act_date='" + DateTime.Now.ToString("yyyy-MM-
dd") + "',Sensor_ID='" + simcard + "' ,Act_flag=0 where MC=" + mc + "",
openCon);
openCon.Open();
cmd.ExecuteNonQuery();
openCon.Close();
  }
else{
}
```

Fig. 5.10. The C# code for determine the radios of the circle around active sensor by 500 Meters.

- GIS algorithm used by the system to calculate the distance between the two locations (A,B) as follows:

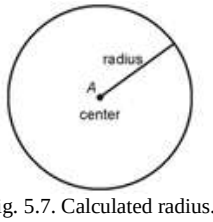


Fig. 5.7. Calculated radius.

- (locA) is the location coordinates for the first location (sensor location) [which the approach can use it as the center point of the circle

  locA = (latA, longA)
- (locB) is the location coordinates for the mobile holder location

  locB = (latB, longB)
- (distance) is the calculated distance between the two points (locations)

  distance = locA.GetDistanceTo(locB)

(Android system use this function to calculate the distance)

LB_SMS System can be used in the other fields, such as in marking, tourisms, education campus, firms, and health, security and counter-terrorism fields. In those cases, the notification (and the attached image) will be sent to the mobile holders without using physical sensors. System admin can create a virtual sensor to the targeted location and store its geo-spatial attributes in the remote server as a virtual sensor, once the mobile holder inters the pre-limited geofence [7] the notification will deliver to the android application LB_SMS on his mobile.

### *5.5 Track Phone Feature*

System Admin can also track any last stored location for mobile, by its SIM number or its Mac address, with Google map button to show this location on the map. This feature could be useful to find lost phones, and very important for parents to track their kid's location and this feature is very important in security and crime control cases.

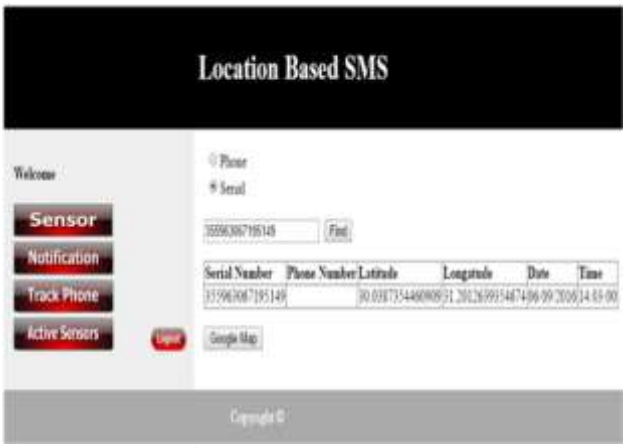


Fig. 5.11. Track Specific mobile phone and its data on the remote server.

### *5.6 Client module to show Active Sensor(s)*

Finally, client application could be installed in fire station, police station or ambulances station. Client users can also show the current active sensors right now and its data (e.g. address and the other best path to reach it), but client users cannot see the other three features (adding new sensor, adding new notification or tracking user phone location), which can be used by a government agency or a licensed security organization only. Fig. 5.12 shows the active sensor(s).



Ashraf Elazab, Bahaa Shabana, and Hesham Hefny, "Location based services classifications," *International Research Journal of Advanced Engineering and Science*, Volume 3, Issue 2, pp. 40-48, 2018.


Fig. 5.12. Active sensor page.

*5.7 Results of the Trial*

Total observations: 865
Successful times: 841 (98.6%) from total observations
Failed times: 12 (1.4%) from total observations

TABLE 5.3. Results of the trial

| No. of trails | Application cubature user location by GPS | User Location updated on the remote server | Results | Notes |
|---|---|---|---|---|
| **826** | Success | Success | Success | Text message delivered with attached Picture |
| **10** | Success | Success | Success | Text message delivered with delaying in attached Picture delivery |
| **5** | Success | Success | Success | Text message delivered without attached Picture (URL Error) |
| **3** | Success | Failed | Failed | internet off / or not responding |
| **9** | Failed | Failed | Failed | GPS off / or not responding |

## VI. CONCLUSION

This paper describes a new approach that involves designing and developing a mobile solution for auto sending location based messages by using physical sensors which are connect to remote server, this server collects the user's location updates from the android software , and gets the message from the server if the mobile holder located in active sensor region. The targeted area will be determined by The GIS algorithm for calculating the distance between two points (the active sensor and the mobile locations). Modern and traditional technologies for content delivery are investigated, and some of its weak points have been clarified, the most important is the high cost and no obligation for service providers to provide citizens with it in risks. Proposed approach is developed to be used in Risk Reduction Management filed or other fields including advertisements, in addition, it can be written in any language, in addition, it can be also with attached Image.

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