

IMPLEMENTATION OF ANDROID APPLICATION REPORTING FOR EMERGENCY CASES

– Prof.S.S.Vanjire¹,Prajakta Wade²,Radha Taware³,Prajakta Nandawate⁴,
Department of Computer Engineering
Sinhgad Academy of Engineering, Pune, India

Abstract— Late attention by officers in charge to high volumes of crimes and emergency cases can lead to an increase of unsolved cases nationwide. In this paper, we propose the use of Pull & Push Location Based Service model in experiments of the implementation of Location Based Service environment to lessen the problems faced by Police and Fire Fighters in retrieving accurate information while patrolling high risk area. The time taken and the accuracy of information are problems normally faced by Police and Fire Fighters in Emergency Case department. It is crucial for them to get the right information at the right time to their walkie talkie or mobile phones.

We first proposed the usage of RSS as the web services to provide feeds for the smart phone application. Updates on crimes or emergency cases within the users' locations are sent upon users' retrieval or push based on the users' locations. The application is developed by using Eclipse IDE platform and tested using HTC Magic with Android OS. The application flow starts by retrieving the location position and information on emergency cases will then be displayed according to date listed. The conceptual design and architecture are designed for Pull and Push Location Based Services..

Index Terms— Location Based Service, emergency finder, pull LBS model, mobile LBS

I. INTRODUCTION

A number of studies been done on location-based services (LBS) due to its wide range of potential applications. LBS can be used to provide useful information such as tourism guide and roadside assistance to users according to the current locations of them. It is consisted of mobile devices, communication networks, service provider and data provider.

The enormous trend of crimes happening in Malaysia

shows the need for polices and fireman officers to get reports of emergency cases as fast as it could to enable to act effectively. In Malaysia, the emergency call number in Malaysia or the 999 hotline number is currently served by Telekom Malaysia, the biggest telecommunication provider here. The findings of a review found that international

practice indicates that many jurisdictions use similar KPIs(Key Performance Indicator) of an 8-minute (or 7 minutes

and 59 seconds) response time for first responders to attend to a life-threatening incident [5]. Actual response times may vary due to local road characteristics, traffic lights, congestion, road networks, weather conditions, and visibility .

The hotline number is entertained by several operators that pick up emergency calls and record reports from the callers. Once all the details required are recorded, they channel the report to the correct agencies based on the problem faced by the caller. The caller's identity and details like location and emergency details will be verified and if the call is a prank call, the operator will stop from the channeling process to the agencies.

This is a normal work flow at the emergency call centre every day. Time is the critical factor for the rescue of occupants and the application of extinguishing agents to minimize loss [10]. Crimes are solved based on the information channeled to the agencies and how fast the information can be delivered to the agencies targeted. A police officer which is on patrol should be alert to the information provided by the call centre and has to move right on getting the target.

II. PROPOSED SYSTEM

In this research, we tried to focus on simplifying the flow of emergency information flow by utilizing the usage of pull and push location based service. Figure 1.0 shows a flow for an emergency medical call management in Malaysia [2]. Rosidah (2010) reported that at a busy time, the call answering process was not on a First In First Out (FIFO) basis.

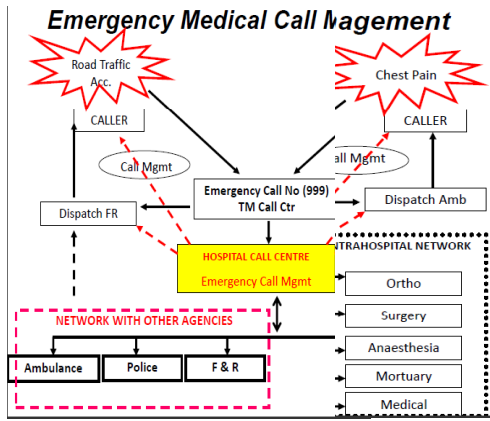


Figure 1.0: Call flow for the emergency call management in Malaysia

At peak time, the emergency call work flow was constrained by the number of staff that was able to handle the calls. It was due to the manual system being practiced by the agencies taking the emergency action which involved much timewasting while on the operation since emergency cases involve life, one of the requirements stated by EMSS (Emergency Medical System Service)Act is that 95 percent of all ambulance response time must be within twenty minutes in rural areas and within ten minutes in urban areas [8].

III. SYSTEM ARCHITECTURE

The Inter-process Communication (IPC) in Figure 2.0 shows the flow of the design for current application developed.

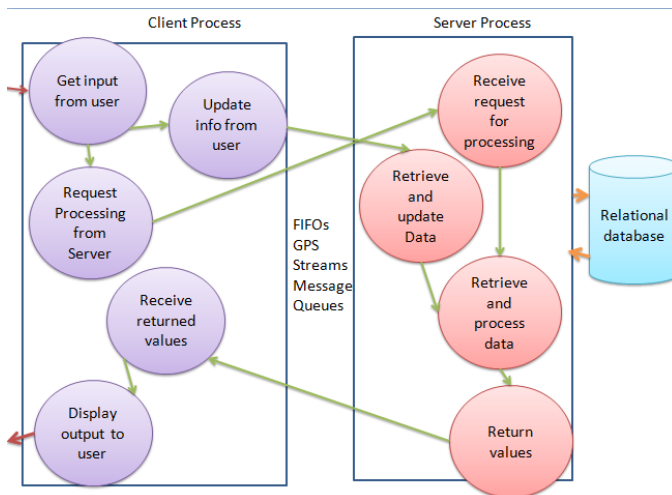


Figure 2.0. Proposed Inter-process Communication for Pull Location Based Service

It involves in getting input from user and updating it. It also process the request from server and follows with received

request for processing and retrieving information and ensure that the information displayed is matched with the current postcode that user currently in. The value is returned by displaying the output to user. Within this process, it also involves the relational database. This IPC communication is the basis for client/server computing and the client is communicates with server. Each process is performing separate functions. The data is passes between processes using the IPC functions. Therefore, if the use of location based service is utilized, the call centre operator for 999 which is handled by Telekom Malaysia can automatically inserts the details of the emergencies from the client server computer and automatically stored into database. The information later is retrieved by using RSS feed and pull location based service technology by the targeted users like police and fire fighters.

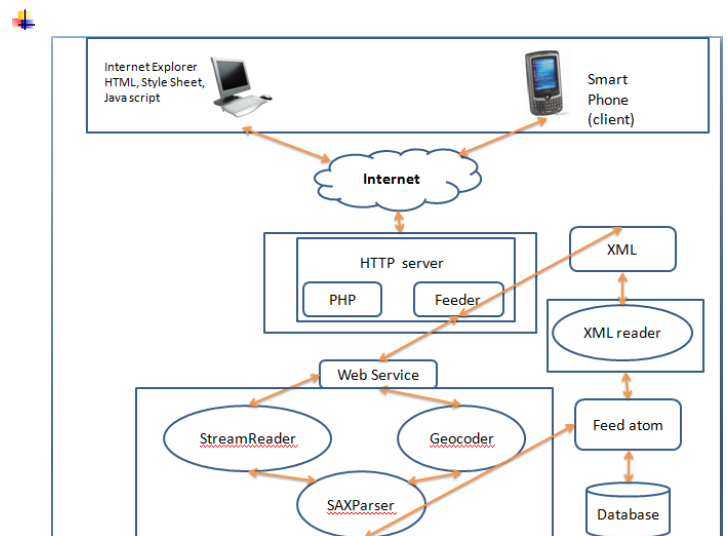


Figure 2.1. Proposed N-Tier Architecture for Web Services, XML, HTTP server, PHP, feeder and Database for Pull Location Based Service

The N-Tier architecture for the above Figure 2.0 shows important element that is involved which is Internet and may access HTTP server contain PHP and Feeder. For the feeder that is provided by Web service is a standardized way of integrating web based applications using XML, SOAP(Simple Object Access Protocol) and WSDL (Web Service Definition Language). Web services not provide user with a GUI but instead sharing logic data through programmatic interface across a network. Different application may use other sources to communicate as it is not tied to any operating system or programming language. The connection for Web service is interlinking with SAXParser through feed atom and database.

ALGORITHMS

1] REPORTING ALGORITHM

These of Pull & Push Location Based Service model in experiments of the implementation of Location Based Service environment to lessen the problems faced by Police and Fire Fighters in retrieving accurate information while patrolling high risk area. Updates on crimes or emergency cases within the users' locations are sent upon users' retrieval or push based on the users' locations by using android application. The flow steps of Reporting algorithm are as follows.

- Steps 1 Start the application.
- Steps 2 check for authentication. If yes.
- Steps 3 On the single click event of button fetches the current location of user using GPS.
- Steps 4 Sends the Longitude/Latitude and type of service to the server.
- Steps 5 Calculate the distance from Longitude/Latitude.
- Steps 6 Fetch the nearby service provider.
- Steps 7 Push message to victim.

2] HAVERSINE DISTANCE CALCULATION FORMULA

The variety of calculation for longitude/latitude points with formulae and code fragments for implementing them.

All these formulae are for calculation on the basis of spherical earth which is accurate enough for most purposes.

This uses the 'haversine, formula to calculate the great-circle distance between two points- that is shortest distance over earth's surface giving an 'as-the-crow-flies' distance between points.

Haversine formula-

$$dlon = lon2 - lon1$$

$$dlat = lat2 - lat1$$

$$a = (\sin(dlat/2))^2 + \cos(lat1) * \cos(lat2) * (\sin(dlon/2))^2$$

$$c = 2 * \text{atan2}(\text{sqrt}(a), \text{sqrt}(1-a))$$

$$d = R * c \text{ (where R is the radius of the Earth)}$$

3]BASE 64 ALGORITHM

Base64 is a method of encoding binary data within text. Binary data is a full 8 bit per bytes, where as text uses a little more than 6 bits per bytes. A 6 bit number has 64 combination, hence the term "Base64".

The way it works is that every three 8 bit bytes are store in four 6 bit characters, where the character are in the range[A-Za-z][0-9][+/-]. since this doesn't exactly lineup, pad characters of [=] are used the very end.

MATHEMATICAL MODEL

Technique used for determining the mathematical analysis of the project:- "SET THEORY"

SET THEORY

1. Set Theory Analysis

1. Let 'S' be the "Enabling Mobile Location Based Services for Emergency Cases"

$$S = \{S1, S2, S3, \dots, Sn\}$$

Set S is divided into 7 modules

- S1= GUI Handler (GH)
- S2= Location Manager (LM)
- S4= Configuration Manager (CM)
- S5= Google Map Handler (GMH)
- S6= Database Manager (DM)

2. Identify the inputs as I.

$$\text{Inputs} = \{X1, X2, X3, \dots, Xn\}$$

- X1= Location
- X2= Emergency Services

3. Identify the output as O.

$$\text{Outputs} = \{Y1, Y2, Y3, \dots, Yn\}$$

- Y1= Location of victim
- Y2= Allocation of request to Service provider
- Y3= Notification

TIME COMPLEXITY

The time complexity of the final result is $O(n^2)$. That is Quadratic time, then we say the algorithm runs in polynomial time and the problem it solves is in class P.

IV. RESULT ANALYSIS

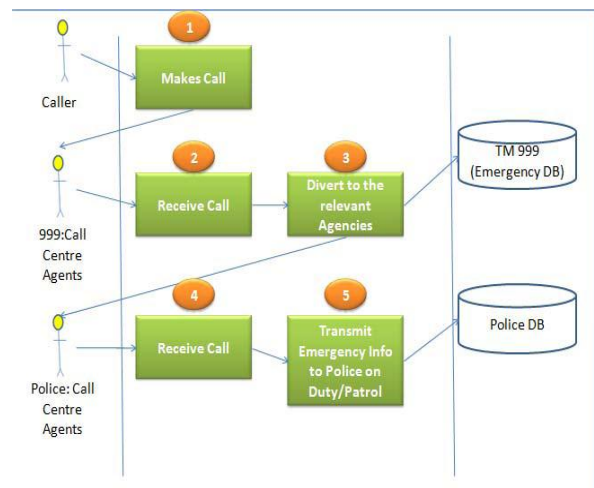


Figure 3.0 The Mobile Conceptual Design for Mobile Pull LBS in Police Emergency Case Management.

Figure 3.0 and 3.1 show the conceptual design of our system. Calls from callers will be received by the 999 Call Centre Agents. The call then will be diverted to the respective agencies like Police Call Centre Agents or Fire Fighters. The

information of the calls too will be recorded directly into Telekom Emergency Database and Police Database.

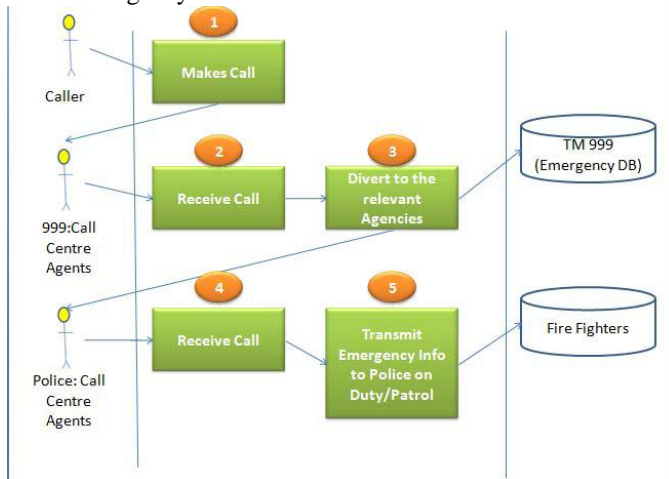


Figure 3.1 The Mobile Conceptual Design for Mobile Pull LBS in Fire Fighters Emergency Case Management.

Figure 3.2 and 3.3 show the current workflow for an emergency call handled by the Fire Fighters and Police call centre. The estimated time taken is based on best time basis which is approximately within 5-8 minutes.

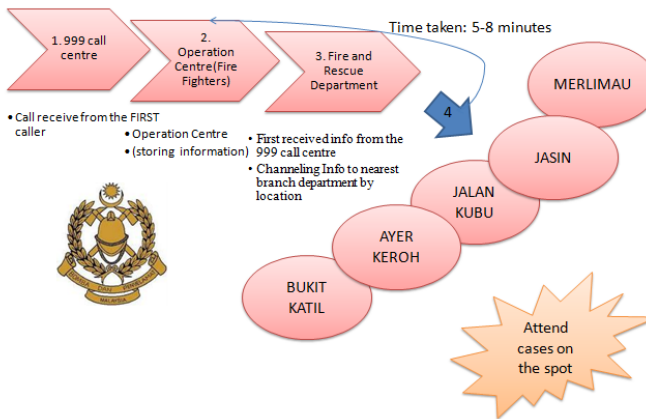


Figure 3.2: The current workflow for emergency call handling by Fire Fighters.

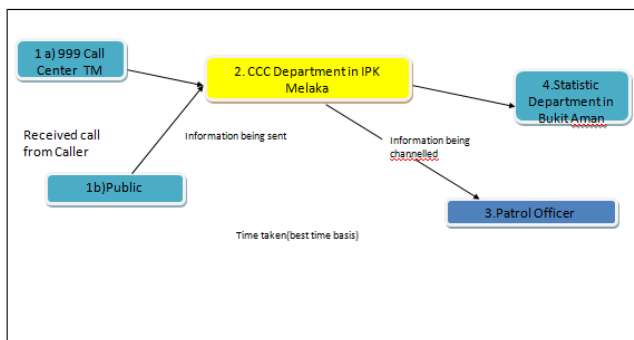


Figure 3.3: The current workflow for emergency call handling by Police.

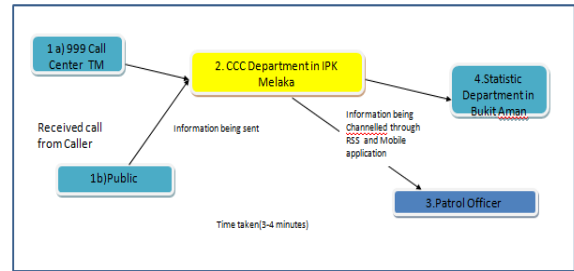


Figure 3.4: Proposed call flow for Police Officer by using Pull Location Based Service Information Retrieval.

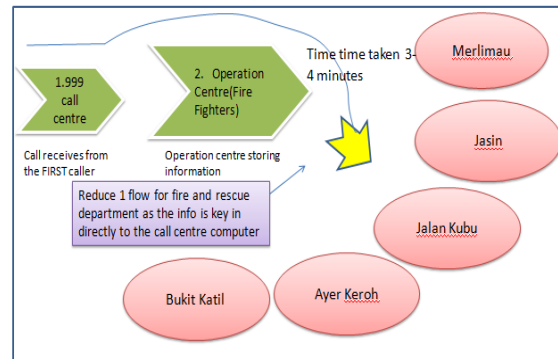
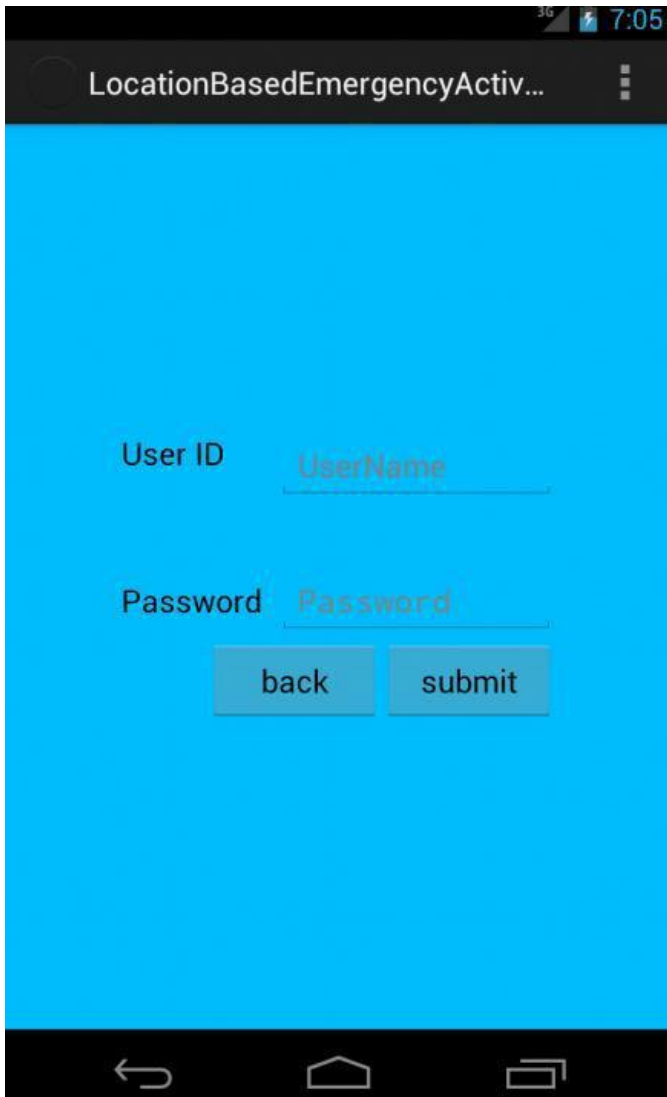


Figure 3.5: Proposed call flow for Fire Fighters by using Pull Location Based Service Information Retrieval.

If the use of RSS is implemented for Pull Location Based Service in both of the agencies, the results of the emergency cases information can retrieved in 3 to 4 minutes as referred in Figure 3.4 and Figure 3.5. Therefore the information will be more organized as it is stored into the system database and also this will remove one step that lessen the processed involved and time taken. The work of a patrol officer for police and the fire fighters will bitterly be more organized.

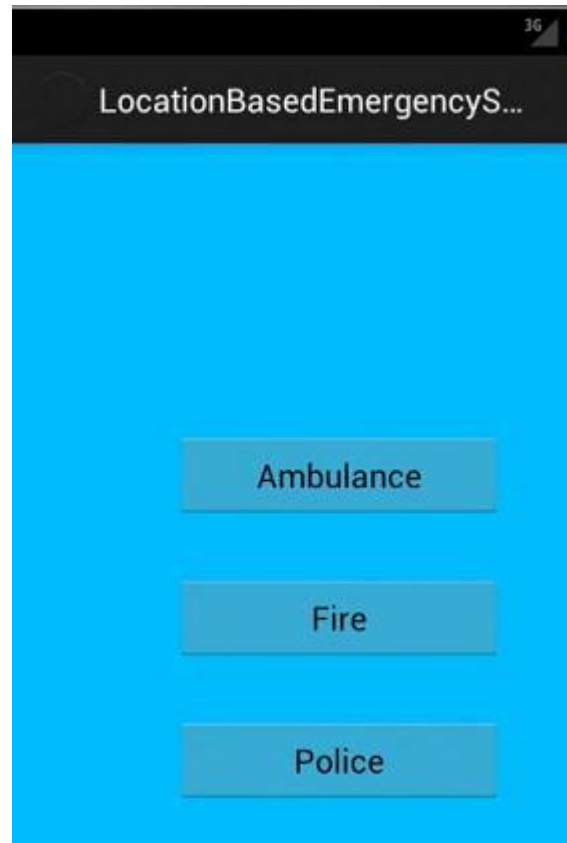


Application screen shot

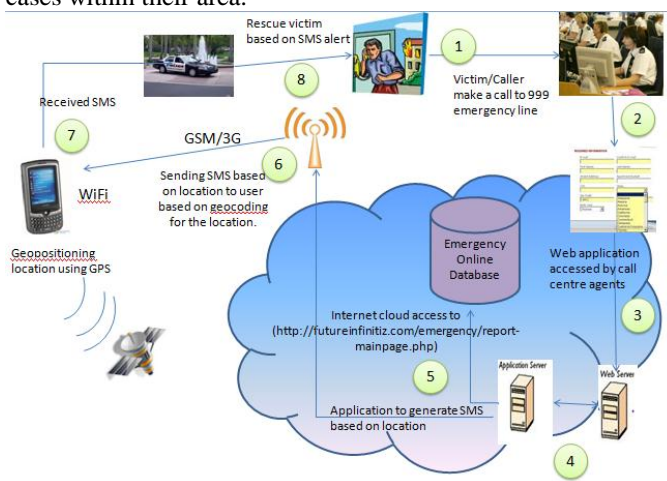
Figure 3.6: The Emergency Type option that be selected by the user in order to get the information of emergency cases within their area.

3.7: Proposed architecture for SMS (Location Based Messaging)

The number of flows in Figure 3.7 describes the flow of data being retrieved using SMS, interaction between application server and database, Internet and the way information is returned to the user. The call centre agents will record the call and stored the information into emergency database. The application which is hosted in an application server will generate short message service and send them based on the user's location. User's location is tracked using GPS and should matched with the message location to ensure the correctness of the recipient. After the user received the message, he will proceed with rescuing the victim based on his location.



Application screenshot



CONCLUSION AND FUTURE WORK

The existence of web services is considered as a part of important element for rendering the information for this mobile application prototype; Emergency Finder. The information will always be updated based on the information feeds from the web based system at the call centre site and are retrievable according to the user location based. In this paper, we have proposed the usage of Pull and Push Location Based Service as a basis for the architecture of providing emergency Location Based Service.

V. ACKNOWLEDGEMENT

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VI. AUTHORS

1]Prajakta Wade, B.E, SAE Kondhwa,

pwade1992@gmail.com

2]Radha Taware, B.E, SAE Kondhwa,

radha1293@gmail.com

3]Prajakta Nandawate, B.E, SAE Kondhwa,
prajakta.nandawate@gmail.com

4]Professor S.S.Vanjire, SAE Kondhwa,
sskale.sae@sinhgad.edu



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