Mobile Comprehensive Emergency Support System (MCESS) for Hospitals in Smartphones

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ABSTRACT

Catastrophe response to in-hospital mass-casualty incidents signifies an utmost long awaited challenges in disaster management. Under the current circumstances and in this chaotic milieu, new trends of information technologies and innovative "Smartphones" have an adequate potentiality to immenselyrectify and advance the emergency support system. This paper concerns the Mobile Comprehensive Emergency Support (MCESS) system called "Ayushi" that is based on radio-frequency identification (RFID) of Mobile based Services which will alert healthcareunits and precisely to the emergency support system that monitors and maps the location and status of emergency resources, including area hospitals, ambulances, and rescue teams.

Keywords: radio-frequency identification (RFID), smartphones, emergency support system, mobile based services, disaster management, information technology

1. INTRODUCTION

Emergency never comes with prior intimation and in real world scenarios, detecting such emergencies & reporting them is real challenge. As per Indian governments ministry of road transport and highways departments report during the calendar year 2010, there were close to 5 lakhs road accidents in India, which resulted in more than 1.3 lakhs deaths and inflicted injuries on 5.2 lakhs persons. These numbers translate into one road accident every minute, and one road accident death every 4 minutes. Unfortunately more than half the victims are in the economically active age group of 25-65 years. The loss of main bread winner can be disastrous. (*Source: Government of India, Ministry of road transport and highways, transport research wing, New Delhi*).RFID is a wireless sensing technology based on electromagnetic signal detection [J. F. McCarthy, 2003], [A. Nogee, 2004].The expected benefits for

emergency medical care with RFID technology are: 1. positions of healthcare workers and patients are known at all times via constant long-distance RFID detection; 2. emergency alarm messages from patients can be received by healthcare workers at any time and any place via smartphone.

New medical sensor technologies using RFID are expected to give smartphones increasing opportunities to be used for medical purposes, thanks to its light weight and portability [Appstore, 2013], [GooglePlay Market, 2012], [H. Alemdar, 2010], [P. S. Pandian, 2008]. Car accidents are a leading cause of fatalities[Zack Fulkerson, 2013]. Automated comprehensive emergency support system can play a vital role to save lives and economize time to reach emergency responders [T. Drabek, 1985], [H. Champion, 2004], [W. Evanco, 1996].The main advantage and strength of the new system comes from the Mobile Web Services technology that would be used in the system[Sandeep Chatterjee, 2004]. This technology can overcomes any problems of interoperability between systems running different applications based on different programming languages on different platforms [Samir El-Masri, 2005].

2. PROBLEM STATEMENT

Person in emergency will not be in position to inform rescue team on fly and wait for their help; perhaps he/she attempts to escape if they are conscious and know about emergency. More dangerous situations occur when person is unconscious or not able to take action against emergency for example physically handicapped person or old age citizen who can't step down immediately from emergency place.

3. PROPOSED IDEA

We are proposing the real time system which reports emergency automatically and also records the sufficient data like person in emergency, location, time and type of emergency and communicate this message to outside world with help of wireless channels.

4. SYSTEM DESIGN& METHODOLOGY

Electronic Sensors will be placed in observation areas which consist of sensor and microcontroller that transmits the signals/data parameter immediately after the detection of emergency. These signals are RFID signals. RFID communication is precise one at low cost, easily available with smart phones and have good coverage of 10 to 100 meter range depends on the RFID class underlined with smart phone and deployed sensors. Smart phones in range are installed with special designed software "Ayushi" supposedto collect that data transmitted by sensors and record for further use. "Ayushi" is also responsible for transmitting the same data along with other information like person in emergency, location, time and type of emergency to respective centralized website over GPRS. Smartphone in built with "Ayushi" application raises the attention of passers-by and seek help in case of accident. Figure 1 elucidates after turning on the alarm, the smartphone screen will keep flashing and

play a loud alarm sound. Meanwhile, the system will send an automated SMS to pre-set emergency contact person indicating the current location of the user and keep uploading current location to the online server.
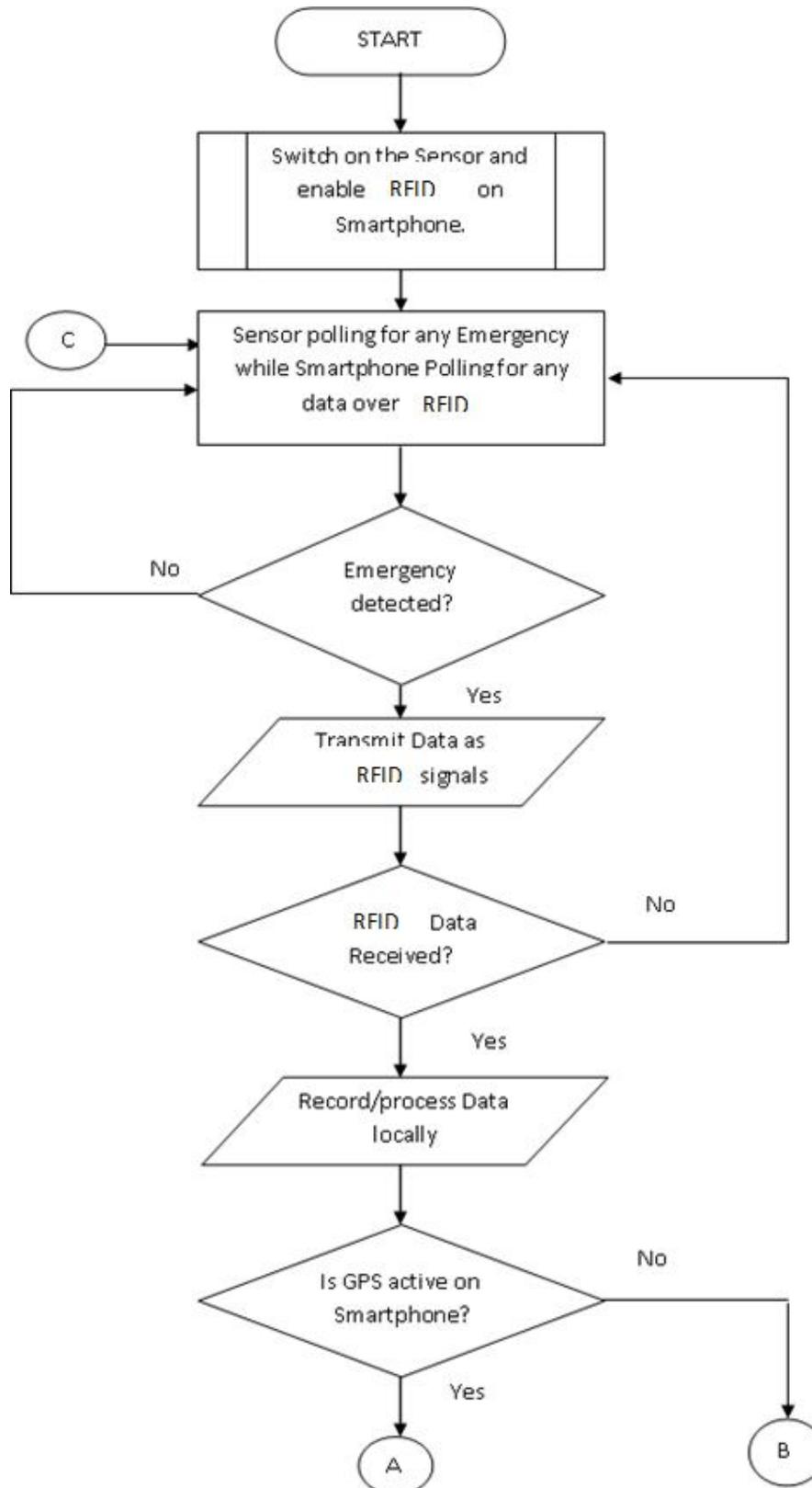

Figure 1.*Components of Alarm System in connection*

4.1 Application Flowchart:

Figure 2 explains about the data flow in application. As shown, initialization and pairing between the sensor device and Smartphone is done at first level. Both devices are in standby mode and listening to their particular signal to catch and report emergency. Sensor device is supposed to detect emergency first and then transfer the RFID signals to Smartphone. These signals are noting but the emergency type codes. System will have some set of predefined emergency type code, like – 1 for fire, 2 for gas leak, 3 for Collision etc. Once Smartphone get emergency code via RFID, it fetches the location details with help of GPS on handset. As collective information is has, try to send this emergency in three different ways.

IF GPRS is available and active on set THEN post the emergency on central website. IF telephone network is available THEN send text message to emergency help line.IF neither GPRS nor telephone network available for use THEN make satellite emergency call.
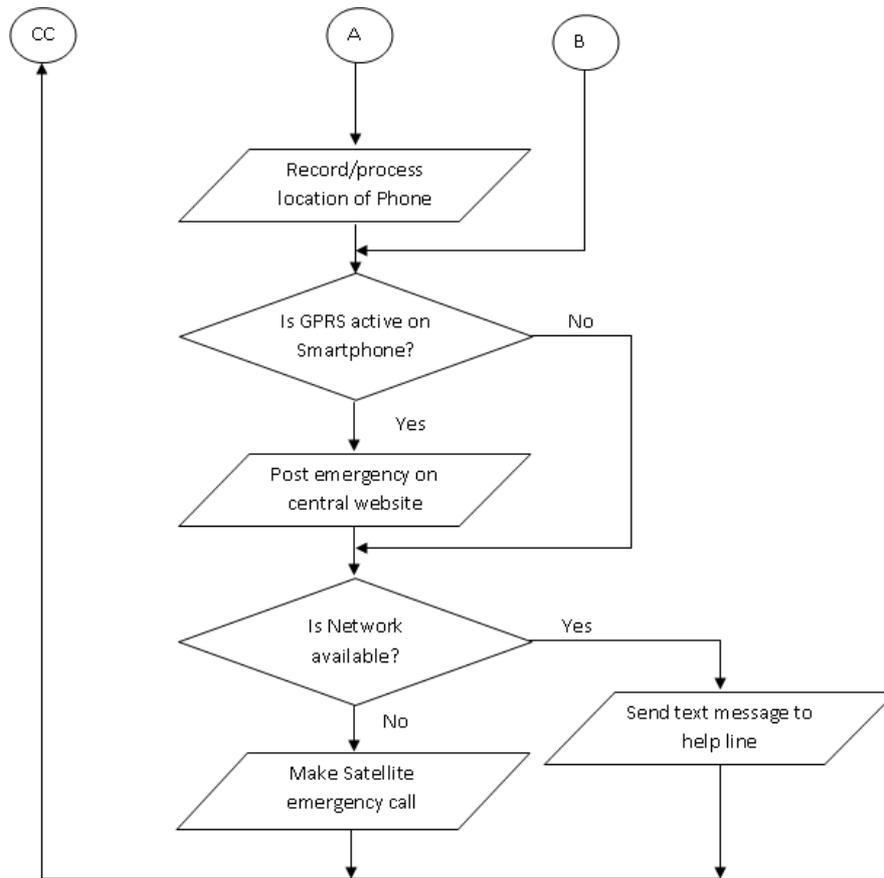
START

Switch on the Sensor and enable RFID on Smartphone.

C → Sensor polling for any Emergency while Smartphone Polling for any data over RFID

Emergency detected?

No

Yes

Transmit Data as RFID signals

RFID Data Received?

No

Yes

Record/process Data locally

Is GPS active on Smartphone?

No

Yes

A

B

Figure2. *Flowchart of Smartphone-Based Accident Detection System*

While this emergency call, we will convert all the information like location, emergency type etc. to speech with help of available text to speech built-in converter in smartphone and read out the emergency during that call. Hence this application will never fail to report emergency once it's detected and being sent to Smartphone. As to exchange data, we are making best use of short range wireless communication channel such as RFID and spreading the emergency indication to other world with another long-range communication channel with GPRS.

5. CONCLUSIONS

This paper, proposes a comprehensive emergency and medical assistance system based on web services and mobile web services. The implementation of this system will reduce dramatically the price and the time of current communication systems between all parties, mentioned above and the most important benefit is the automatic search carried out for the right and available service at a reduced time. The accuracy is also one of the great benefits the system can offer.

In the future, the proposed system will help to implement an ubiquitous healthcare environment for the elderly or for chronic heart disease patients.

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