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SAFETY ALERT SYSTEM USING ANDROID SMARTPHONE VIA INTERNET CONNECTIVITY

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ABSTRACT

This paper describes an android smartphone application that uses the GPS system located inside the smartphone. The apps will enable the system to check for unsafety area and then turn off the online communication of the device automatically. By using Google Map that accessed through internet connectivity and then try to locate potential unsafety area before turn off the online communication for the smartphone thus disabled the usage of smartphone when entering unsafety area such as petrol stations or hazardous places. This paper concentrates only at the implementation of the system using android smartphone device and successfully creating an alert system.

Keywords: safety, location based, alert system, android phone.

INTRODUCTION

Safety Alert system has been recognized as one of the public safety alert system that allow certain devices such as smartphone or any mobile devices to receive text-messages alert based on graphical unit installed. In modern days, technology always becoming the main factor in contributing to human better lifestyle and efficient energy usage on earth (De Vilmorin, Vanheeghe et al. 2000; Kawachi and Suzuki, 2000; Iske, Jager et al. 2004; Pavlov, Ruser et al. 2007; Zhang, Kim et al. 2007; Kasaei and Kasaei, 2011; Weller and Zachmann, 2011; (ACM), 2012; Jin, Gosangi et al. 2012; Schulman, Lee et al. 2013; Leeds 2014). The technology could help to inform or perhaps notify corresponding people surrounding to avoid any misfortune that might occurs within the specific area of targeted (Mirtich, 1998; Tang, Lee et al. 2009; Jia, Sucan et al. 2013). In this project, we describes our current work on using smartphone devices powered with Android operating system together Graphical Positioning System circuit to create an alert system instead of text-message like system (Ehmann and Lin, 2001; Faure, Barbier et al. 2008; Wang, Li et al. 2010).

Based on Figure-1, the system will show the Google Map to show the user's current location and the current latitude and longitude. The system will keep on updating the location of the user. Even the system is paused and back to the phone main menu, the system will be turned on again and work in background every 10 seconds.

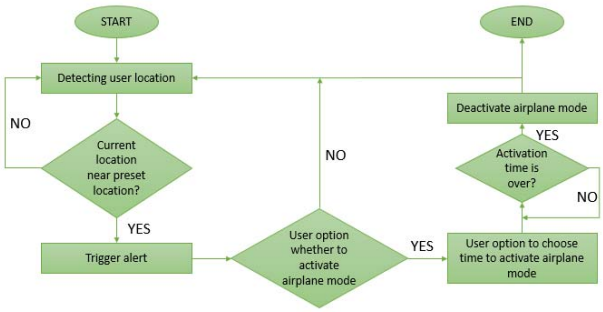

Figure-1. The process flow of the software.

When the user is near the present location (danger area), the system will trigger an alert notification with a buzzing alarm to tell user that he or she is in the danger area that usage of phone is prohibited. The alert notification is all about a pop-up menu asking users to choose whether to activate airplane mode or not. This is a counter-measure to overcome if misalarm happens since the accuracy of GPS is varied from every phone. If the user chooses to activate airplane mode, another pop-up menu will appear and ask for the time to activate airplane mode. The options are 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 minutes, and 30 minutes. Said if the user chooses for 5 minutes, the phone will automatically change back to normal phone mode. This helps the phone to gain back the communication function in case the user forgets to turn it back on. If the user is still in that area after 5 minutes, the airplane mode is deactivated and the system will be continuing to detect the current location of user. The system will immediately know the user is in the danger area again, alert notification will be fired up and the buzzing alarm will alert the user.

a) Hardware development

The hardware part will be the solar charger for the alert system. It supplies the electricity to the alert system continuously to sustain the power-consuming GPS alert system. Therefore it is best used in the car when driving. The alert system will be supplied with electrical energy generated from the solar panel directly after regulating the voltage by the voltage regulator LM317. The overall circuit will be designed by using Proteus 7.7 SP2 and fabricated upon success. Then, the hardware will be tested to ensure that it is functioning as desired. This Proteus software has features like professional schematic capture and Printed Circuit Board (PCB) design providing automated component placement, track routing, design validation and other functions. It makes the users to convert the circuit designed easily into a PCB layout so that etching can be done to produce the PCB.

b) Designing the solar charger circuit

The solar charger circuit shown in Figure-2 produces a stable voltage of 5V to charge up the phone attached in the safety alert system via USB. The solar panel will give an output voltage of 6V to the circuit. The output voltage will be connected to the input of the voltage regulator. The voltage regulator LM317T will convert it into 5V by controlling the 2KΩ potentiometer. Next, the output of the voltage regulator will be connected to the USB female connector pin out.

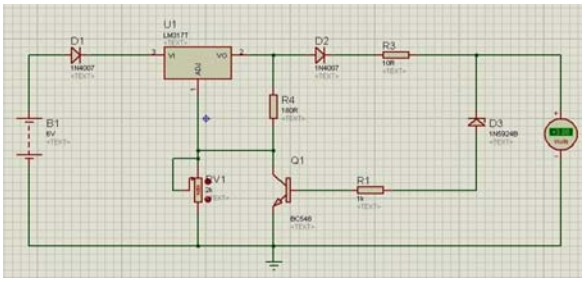

Figure-2. The schematic diagram for solar charger.

Figure-2,3and 4 shows the complete circuit for the solar charger circuit. The size of the circuit is measured to be of 6.5cm height and 5cm width. With such a small size, the circuit is portable to place at any places.

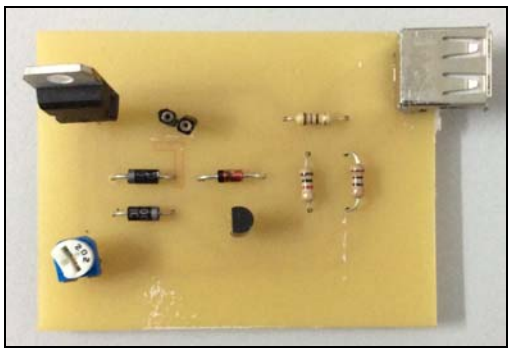

Figure-3. The PCB front view for solar charger circuit.

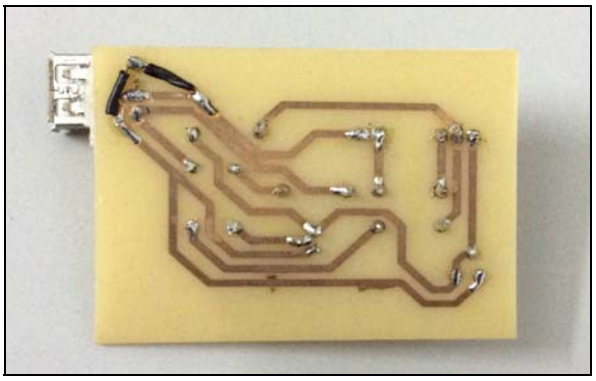

Figure-4. The PCB back view for solar charger circuit.

The Apps

This safety alert system is utilizing the GPS and internet data. The internet data is needed to show the Google Map to show the user's current location whereas the GPS is used to detect the current latitude and longitude of the user. The system will keep on updating the location of the user. Even the system is paused and back to the phone main menu, the system will be turned on again and work in background every 10 seconds. Figure-5 shows the mobile application main GUI. It can show the current location of the user and its latitude and longitude.

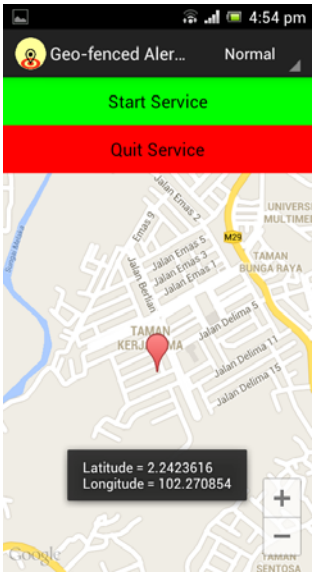

Figure-5. Main GUI of the location-based safety alert system.

Figure-6 shows that when the user is near the present location (danger area), the system will trigger an alert notification with a buzzing alarm to tell user that he or she is in the danger area that usage of phone is prohibited. The alert notification is all about a pop-up menu asking users to choose whether to activate airplane mode or not. This is a counter-measure to overcome if misalarm happens since the accuracy of GPS is varied

from every phone. If the user chooses to activate airplane mode, another pop-up menu will appear and ask for the time to activate airplane mode. The options are 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 minutes, and 30 minutes. Said if the user chooses for 10 minutes, the phone will automatically change back to normal phone mode. This helps the phone to gain back the communication function in case the user forgets to turn it back on. Figure-7 shows the time chooser option menu for the safety alert system. Figure-8 shows the phone is in airplane mode by seeing at the aero plane icon on the status bar.

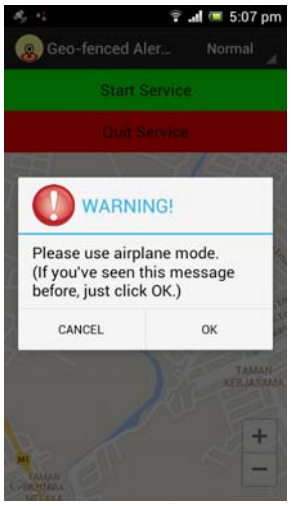

Figure-6. Notification is being triggered upon entering the petrol station.

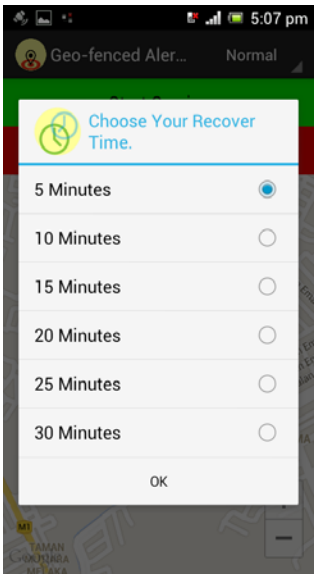

Figure-7. Time chooser option.

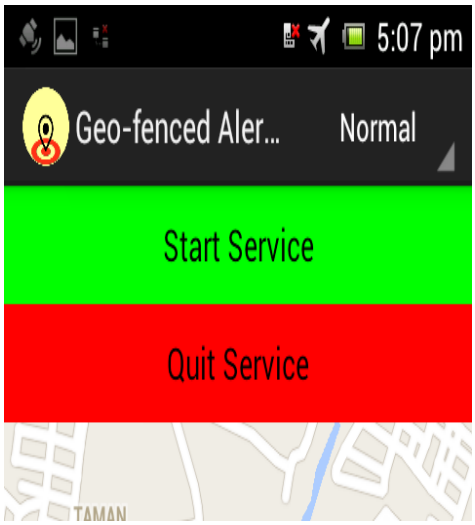

Figure-8. The airplane mode is activated.

Another case, if the user is still in that area after 10 minutes, the airplane mode is deactivated and the system will be continuing to detect the current location of user. The system will immediately know the user is in the danger area again, alert notification will be fired up and the buzzing alarm will alert the user.

Table-1 shows the comparison between the mobile phone detectors (hardware) and the location-based safety alert system (software). The hardware-based system is more towards active mode, as they are continuously searching for phone signal. However, the software-based system is more passive, as it depends on the user decision whether to follow the notification or not. The users must have a proper attitude and awareness on the safety issues.

c) Prototype of the project

Figure-9 shows the prototype of this project is built by using a plastic box. The size of the prototype is measured to be 16.5cm x 12cm (height x width) which fits the typical size of the car dashboard. The solar panel is placed on top of the plastic box. The solar charger circuit is placed inside the plastic box with the USB output pin exposed at a small opening of the box.

Table-1. Comparison between the systems.

	Hardware (Active)		**Software** (Passive)
Features	Wolfhound Cell Phone Detector	Mobile Phone Detector By Tan Chen Wei	LOCATION-BASED SAFETY ALERT SYSTEM USING ANDROID PHONE
Ability to Detect / Transmit Signal	Both	Both	N/A
Range of signal detection / location	Up to 5 meter	Up to 3 meter	Radius of ≈ 50 meter to 100 meter
Time needed for signal/ location Detection	30 minutes (signal)	Immediately (signal)	Immediately (location)
Sensitivity of Signal Detection	Randomly (Standby & Switch off mode)	Randomly (Standby mode)	Detects location
Is all phone signal can be detected?	Yes	Except iPhone, some models from Samsung	As long as it can be installed, it can tell the restricted location

Figure-9. The prototype for the location-based safety alert system.

CONCLUSIONS AND FUTURE WORK

This application is based on GPS system that will activate once the potential area has been detected. The system will turn into airplane mode after the user chooses the activation time for airplane mode. After the activation time, the phone will be turned back automatically to normal mode to gain back communication feature. The alert system utilizes the potential of GPS chip (where communication between the satellite and GPS chip is engaged) embedded in the smartphone throughout the application. Internet data is needed to show the Google Map. A solar charger is built to compensate the great power consumed by GPS chip.

At this moment, the safety alert system can only detect one particular location. In near future, multiple locations can be detected to make it become more practical. Any new targeted locations, for instance newly-built petrol station or hospital, their GPS location can be added by updating the database of the application. The users can just update the minor part of the extension instead of updating the whole application.

Internet data is still needed to show the Google Map, so that the user can know where he or she actually is. However, this is inconvenient to those users who are not the data plan subscriber. Thus, in future, an offline map may be introduced to save cost on the internet data plan of the mobile phone.

ACKNOWLEDGEMENTS

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