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AUTOMATIC HUMAN FREE FALL DETECTION USING ANDROID

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Abstract: ***Where the person needs immediate medical assistance and often crashes, accidents caused by the free fall position. Alerting the appropriate authorities, such as the types of situations can be very important. Smart phone and tablets commercially available electronic devices in common use, such as the free fall detection system. An Android smart phone with a built-in three-axis accelerometer is based is used. Using data obtained from the displacement-based methods of detecting the acceleration of free fall is analyzed. So we developed an Android app, free fall detection. Android smart phones without the need for any additional sensors are generally used and so it falls detection provides a feasible and cost-effective solution.***

1. INTRODUCTION

Android is an operating system, middleware and key applications for the mobile devices have a software stack. Android by Google and the Open Handset Alliance based on the Linux operating system and developed a software platform and operating system for mobile devices. It utilizes Google-developed Java libraries that allows a Java-like language to write managed code, but does not support programs developed in native code.

Unveiling Android platform on 5-November- 2007 was announced with the founding Open Handset Alliance, a consortium of 34 Hardware, software and telecom Companies devoted to advancing open Standards for mobile devices. When published in 2008, most of the Android platform will be made available under the Apache license free- and open-source software Etc. Due to medical problems such as road accidents, accidents fell from the stairs and getting in unconscious condition is often accompanied with a free fall. Senior figures, balance and reaction common. As per statistics, more than 11 million people fall every year. In the year 2005, United States alone recorded. Unintentional falls resulted in estimated 56,423 hospitalizations and 7,946 related deaths. Many of these deaths occur because the victim remains immobile on the Time deteriorates and hence free fall is more ground for a long period of time, condition typically known as “long-lie”. Living with the fear of long-lie or falling immobile on the ground for long period of time, can result in ones deteriorating mental health, isolation and general degradation of quality of living.

Image recognition: Image recognition can be used to detect fall condition by placing cameras at overhead positions, thereafter tracking and learning movement patterns. The system becomes adaptive to the locations where a single human enters the room and remains stationary (conditions of sitting on chair, lying on bed etc.). Common paths from point of entry to inactive areas are then remembered. If the person turns inactive and did not react to the fall condition, then fall condition is detected and alerted.

Recognition by acceleration threshold: This system detects fall condition by analyzing acceleration data from an accelerometer. If the amplitude of the acceleration crosses the lower and upper thresholds and if there is a change in position, then fall condition is detected.

2. OBJECTIVE

Smart, a new open source mobile phone platform, Android has become one popular cell phone systems. Embedded Linux operating system running on the main controller and manages tri-axial accelerometer, gyroscopic sensor to detect the fall of the various locations and coverage of the wireless network anywhere at any time via the Android smart phone to give a warning.

3. EXISTING SYSTEM

There is always a serious medical and social problem of a declining, aging population. Falls detect and predict the human body using the three-axis accelerations, a hidden Markov model (Piyasena) based method was proposed. Using three-axis accelerometer, a wearable human motion detection device designed to detect and stem the three-axis accelerometer that cannot be predicted on the basis of the falls, which is realized. But this method is less accurate; there are a lot of disadvantages. It's designed for a particular system, so the cost has risen. The system is designed with the patient more comfortable. So the user is scheduled to be comfortable, which is designed to pass on the benefits of the existing system.

4. PROPOSED SYSTEM

In proposed system detection mechanism, free fall condition is detected using commonly available electronics devices. An android application is created and it is installed in the android smart phone. If any fall occurs to the user this application will detect the fall, Using tri- axial accelerometer and give alert to user’s neighbor through call or sms. Android is the open source

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operating system and the embedded linux operating system on the main controller, manages tri-axial accelerometer, Gyroscope sensor and detects the fall with location and give the alert.

The proposed system overcomes the disadvantages in the existing system. The cost is reduced because separate hardware designing is not needed; absence of sensor networking, the user is not comfortable with the hardware it is uneasy to handle. So in the proposed system a smart phone is used as a fall detector with reduced android application cost and user comfortable.

5. PROJECT DESCRIPTION

The main objective of the project is a new open-source smart mobile phone platform. Android has become one of the popular cell phone systems. Embedded Linux operating system runs on the main controller and manages tri-axial accelerometer, gyroscope variety of sensor and detect the fall with location and give alert from anywhere at any time via android smart phone under the coverage of wireless network.

With advancements in mobile technology, smart phone prices have reduced significantly resulting in smart phones becoming easily affordable for all. Most of these smart phones have an in-built accelerometer which is generally used for user interaction and orientation detection. Same accelerometer can be re-used for fall detection, eliminating the need of any additional hardware or sensors and thereby reducing the cost involved.

5.1 BLOCK DIAGRAM DESCRIPTION

The Figure.1 is fully shows the entire block diagram of the project. Android devices have a built in accelerometer which gives acceleration values along the three axes. It measures acceleration in the frame of reference of device in free fall. If the phone is dropped freely, it will register an acceleration reading of 0 on all axes. So in case of fall condition accelerometer will give reading of 0 or close to 0. As soon as close to 0 values are received from the accelerometer it is then analyzed by displacement based algorithm to verify free fall condition.

If fall is detected the accelerometer will register the value, if the value registered is less than the default value, then it resets its value. If the value detected is more than the default value, then the alert will occur with delay. The notification about the fall goes the neighbour of the person who got into the accident. Where the displacement algorithm is used.

BLOCK DAIGRAM

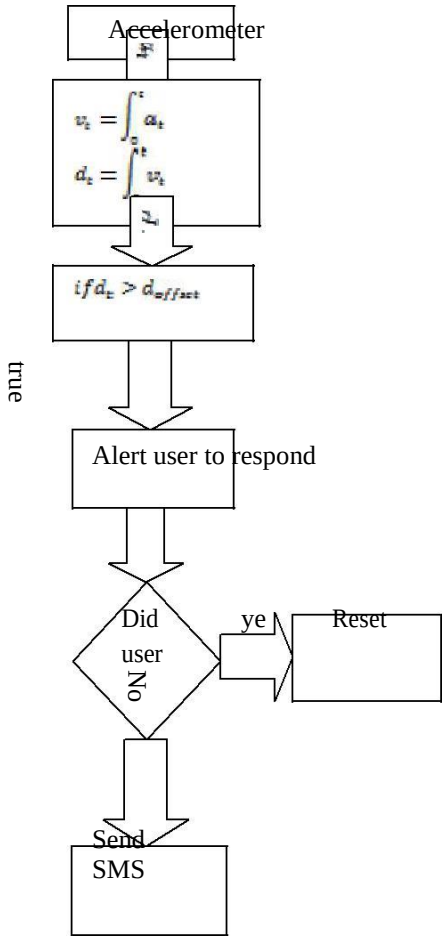

Figure.1 Block diagram for system

5.2 SOFTWARE DESCRIPTION

- ECLIPSE JUNO
- ADT (android development tool kit)
- JDK (java development tool kit) SDK

5.2.1 INTRODUCTION TO ECLIPSE SOFTWARE:

Eclipse is an integrated development environment (IDE). It contains a base workspace and an extensible plug-in system for customizing the environment. Written mostly in Java, Eclipse can be used to develop applications. By means of various plug-ins, Eclipse may also be used to develop applications in other programming languages: C, C++, COBOL, and FORTRAN. Development environments include the Eclipse Java development tools (JDT) for Java and Scala, Eclipse CDT for C/C++ and Eclipse PDT for PHP, among others.

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COMPONENTS USED IN ANDROID APPLICATION

Table.1 Components used in android application

COMPONENTS	DESCRIPTION
ACTIVITY	They dictate the UI and handle the user interaction to the smart phone screen
SERVICES	They handle background processing associated with an application.
CONTENT PROVIDERS	They handle data and database management issues

ADDITIONAL COMPONENTS

Table.2 Other components used in android app

COMPONENTS	DESCRIPTION
FRAGMENTS	Represents a behavior or a portion of user interface in an Activity
VIEWS	UI elements that are drawn onscreen including buttons, lists forms etc.
LAYOUTS	View hierarchies that control screen format and appearance of the views.
INTENTS	Messages wiring components together. Messages receive and send
RESOURCES	External elements, such as strings, constants and draw able pictures.
MANIFEST	Configuration files for the application.

6. RESULTS FROM ANDROID MOBILE

Figure.2 shows the iconic representation of the android Application in the screenshot. The application which was created is display in the smart phone like this.

Figure.2 Iconic representation of application

Figure.3 Graphical representation of the main menu

Figure.3 shows graphical representation of the main menu, the screen is used to collect the basic inputs about the patient, along with that the person to be alerted can enter his/her mobile number. In necessary conditions the mobile number will receive an alert with the patient and location information.

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Figure.4 Accelerometer reading

Figure.4 shows the accelerometer while it is reading the value when the application is start to operate the application listen to the accelerometer reading in x, y and z axis. If a sudden fall is detected the default value is greater than the accelerometer, then the alert will occur.

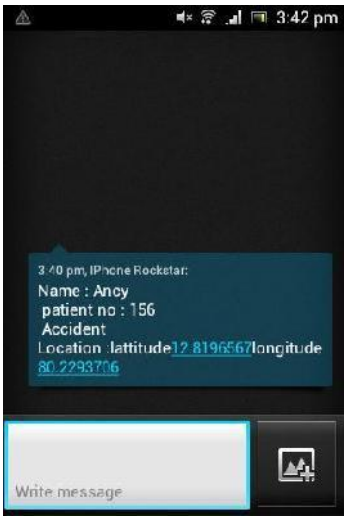

Figure.5 Alert through SMS to pre-specified contact

Figure.5 shows the information alert sent to the contact person registered in application and configured in our system. .This sms contains information about the patient and also the location of the accident in the form of longitude and latitude.

7. CONCLUSION

A cost effective fall detection mechanism is proposed in common commercially available in electronic devices without the need of any additional hardware. The false positives are greatly reduced by analyzing data obtained from accelerometer with displacement based algorithm and prompting the user for touch or voice. If there would be any false positive escaping out of the displacement based algorithm, it would then be filtered out by the user prompt, thereby effectively yielding little or no false positives. Using cheap hardware and open source software stack, we propose a system for complete monitoring as well as response system in case of fall condition. Mobile phone has become a vital part of every ones daily life and are more widely used than any sensor. Mobile phones will be accepted more widely and comfortably as the free fall detection device than any other similar hardware or sensors. Here is doesn't need any sensors, cameras to watch and monitor the persons where as it is purely based on Android Smart phone application.

Appendix

```
public static boolean isSupported()
        {
                if (supported == null)
              {
                      if     (safe.getContext()
!= null)
                      {
                              sensorManager
= (SensorManager) safe.getContext().
        getSystemService(Context.SENSOR
_SERVICE);
List<Sensor> sensors   =   sensorManager.getSensorList(

Sensor.TYPE_ACCELEROMETER)

;
                              supported = new
  Boolean(sensors.size() > 0);
                      }
                      else
                      {
                              supported        =
Boolean.FALSE;
                      }
              }
               return supported;
        }
        public static void configure(int threshold, int
interval)
        {
        AccelerometerManager.threshold = threshold;

        AccelerometerManager.interval = interval;
        }
```

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```
        public static void
startListening(AccelerometerListener shakeListener)
        {
                sensorManager = (SensorManager)
safe.getContext().
        getSystemService(Context.SENSOR _SERVICE);
                List<Sensor> sensors =
sensorManager.getSensorList(
        Sensor.TYPE_ACCELEROMETER)
;
                if (sensors.size() > 0)
                {
                        sensor                  =
sensors.get(0);
                        running =
sensorManager.registerListener(sensorEvent Listener, sensor,
SensorManager.SENSOR_DELAY_GAME)
;
                        listener                =
 shakeListener;
                }
        }
```

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