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iFall-An Android Application for Fall Monitoring and Response

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Abstract: *Injuries due to falls are among the leading causes of hospitalization in elderly persons, often resulting in a rapid decline in quality of life or death. Rapid response can improve the patients outcome, but this is often lacking when the injured person lives alone and the nature of the injury complicates calling for help. This project presents an alert system for fall detection using common commercially available electronic devices to both detect the fall and alert authorities. We use an Android based smart phone with an integrated tri-axial accelerometer. Data from the accelerometer is evaluated with several threshold based algorithms and position data to determine a fall. The threshold is adaptive based on user provided parameters such as: height, weight, and level of activity. The algorithm adapts to unique movements that a phone experiences as opposed to similar systems which require users to mount accelerometers to their chest or trunk. If a fall is suspected a notification is raised requiring the user's response. If the user does not respond, the system alerts pre-specified social contacts with an informational message via SMS. If a contact responds the system commits an audible notification, automatically connects, and enables the speakerphone. If a social contact confirms a fall, an appropriate emergency service is alerted. Our system provides a realizable, cost effective solution to fall detection using a simple graphical interface while not overwhelming the user with uncomfortable sensors.*

Keywords: Android Application

I. INTRODUCTION

Injuries due to falls are among the leading causes of hospitalization in elderly persons, often resulting in a rapid decline in quality of life or death. Rapid response can improve the patients outcome, but this is often lacking when the injured person lives alone and the nature of the injury complicates calling for help.

This project presents an alert system for fall detection using common commercially available electronic devices to both detect the fall and alert authorities. We use an Android based smart phone with an integrated tri-axial accelerometer.

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Our system provides a realizable, cost effective solution to fall detection using a simple graphical interface while not overwhelming the user with uncomfortable sensors.

Number of false positives means greater adoption by emergency services. The importance of the cell phone in everyday life decreases the chances of being forgotten. Everyday interaction with the phone makes the interface more familiar to the user. A cell phone is also less intrusive than dedicated devices.

Here we are using Android based smart phone which is available in the market. Thus we are also integrating the

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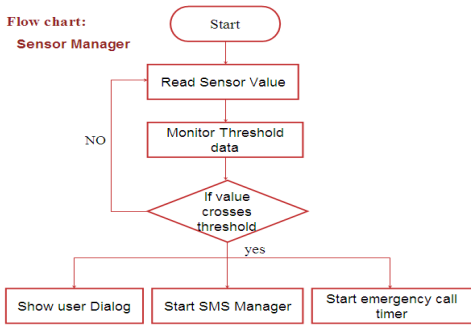
advantages of Android in our application. Every Android phone has the accelerometer embedded in it, which enables us to detect the fall in all 3 axis. Android is very secure software stack for mobiles and is very reliable. Thus making our project very reliable. The familiar interface, non-intrusiveness, and affordability leads to less rejection from users. By combining cheap hardware and open source software, we hope to provide a realistic solution to the elderly fall problem.

II. METHODOLOGY

2.1 Sensor Manager Module

Sensor-measures a physical quantity and converts it into signal. We use accelerometer which is embedded in cellular phones. When the accelerometer senses the fall, the application is started.



2.2 Threshold Manager Module

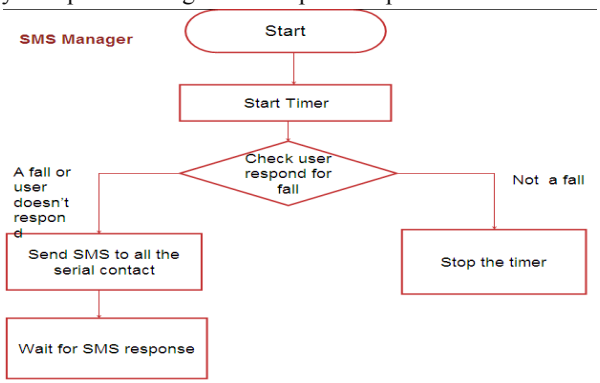
A threshold is a test of some variable against some value. Report is generated when a value exceeds threshold. The user has the ability to set the threshold value. The value is compared with readings of accelerometer. If the value exceeds the specified value, fall is detected.

2.3 Contact Manager Module

Add contact and delete contact options are available. More than one social contact can be added to the list. When fall is detected, the message is sent to all contacts one by one.

2.4 SMS Manager Module

Texting exchange of messages over a network. After a fall, SMS requesting for help with a password is sent to all social contact numbers. A reply is expected along with the specified password.



2.5 Timer Manager Module

Used to manage a set of logical timers. If the user doesn't respond for the pop-up, it is considers it as fall. If the specified time is elapsed, call is made to emergency contact.

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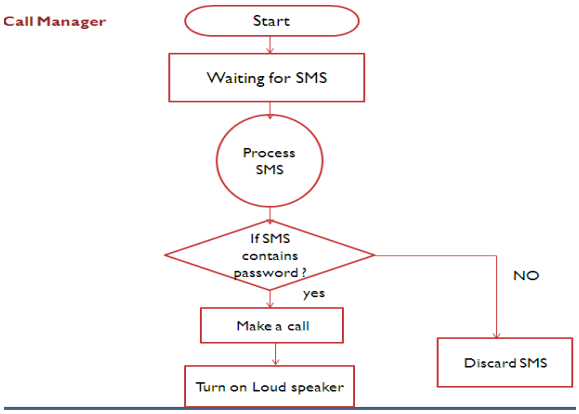
2.6 Reply Verification Module

When a fall is detected, message is sent to the social contact specified by the user. The replied message is checked for a password. If the message contains the valid password and is sent by same contact, a call is made. Otherwise the message is discarded.

2.7 Call Manager Module

If the password is valid, call is made to that social contact. Speaker phone is activated. If none reply or if the specified time is elapsed, call is made to the emergency contact.



III. CONCLUSION

- Provides a viable solution to fall detection.
- Fall detection algorithms make the system highly reliable.
- Integrating the advantages of Android.
- The familiar interface, non-intrusiveness, and affordability leads to less rejection from users.
- Proposes a low priced system that suits all requirements

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