SOFE 3490U-001
Software Project Management
Lab 2

Fall Monitor

Github group No-(Group 101)

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Introduction
Fall monitor is an automatic fall detection system that enables health and safety officers to attend to the elderly, disabled and other citizens of Ontario, if a fall occurs and no motion detected. Fall detection systems usually focus on developing a fall detection device using wearable sensors that can be integrated into watches, shoes, belts, etc. to detect if a fall has occurred. The device uses an accelerometer to track any changes in a person's acceleration. The performance metric of fall detection systems includes precision like true positive, true negative, false positive rate. When it detects too fast of an acceleration or no motion for a long period after a fall, it sends out signal to the health and safety officers. It uses a cellular modem and the built-in GPS system to track where the client is, and sends a call for client's medical information. The fall monitor will contain safety measures and emergency protocols that are required in case of a fall.

Problem
The reason for choosing Fall Monitor as our topic is to deal with the increasing numbers of accidents that happen to the senior citizens and people with disability especially. The motive is to use this device and hopefully decrease the number, and provide the right assistance to the ones in need.

Scope
An ideal device must be easy to navigate from the stage of activation by senior citizens and people with disabilities, so a simple interface must be used in the development process.

Objective
The main objective of fall monitor is to enable pervasive monitoring of physical activities and behaviours in clients, where it helps to achieve an autonomous caretaking system.
1. Device is able to detect when a fall occurs, using a motion sensor
2. Cloud server database should automatically update the fallen users record, when a fall event occurs
3. Device should be able to read some of the vital signs of the patient i.e. heart rate, blood pressure, blood oxygen saturation, temperature, posture and physical activities.
4. Device comes in form of wearable sensors that can be integrated into watches, shoes, belts etc.
5. The system also includes the design and evaluation of user interfaces such as smartphone applications for fall prevention intervention and educating subjects on fall risk factors.
6. Timeline
   - Prototype by end of 1st month with most functionality implemented but not to accuriances/performance metric standards.
   - Prototype by the end of 2nd month with all functionality implemented but not to accuracy/performance metric standards.

- Prototype by end of 3rd month with all functionality implemented to all accuracy/performance standards.
- Months 3-6 live trail with <100 people.
- Month 7, develop product into final deliverable version, making minor adjustments from data learned from the trial.
- Month 8 Final product delivery.

Objective Measurement
1. Fall detection accuracy should be 95% or higher
2. Call should be placed to emergency services within 15 seconds of fall detection
3. GPS should have 5m accuracy or better
4. Fallen users records should update immediately when fall event occurs
5. Vital signs should be accurate with 10% and sample every 30s or less

Success Measures:
- The use of this device decreases the death rate due to fall incidents in Ontario.
- Reduce in call time; officers should be able to attend to the clients in a shorter period of time than if the person was to be found or place a call themselves.
- Device is cost effective in terms of development, in order to be free for senior citizens and the disabled.
- Using process metric to measure the adherence to fall prevention strategies
- Device is reliable and accurate in terms of the information is is providing to the safety officers, i.e. GPS coordinates.

Required Infrastructure
- Body sensor containing accelerometer and cellular modem with GPS.
- Software on the body sensors to detect falls and contact cloud server in the event of a fall event (using TCP/IP)
- Cloud server for sensor to call home to, with access to a phone line or pbx to place 911 calls in the event of fall.
- Cloud server needs to handle incoming fall events and match the device id with the medical records, then forward the information to 911 so emergency services can assist the fallen device holder.
- Database containing information on device holder, such as medical information, location, device number, history of fall events.