



Faculty of Engineering and Applied Science

SOFE 3490U Software Project Management

Lab 2 Report

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Selected Topic

The government is concerned with the increasing cases of death of seniors and persons with a disability resulting from falls. Therefore, it has decided to invest in an automatic fall detection system to enable health and safety officers to respond faster to incidents of falls. The fall detector uses sensors worn on the neck or any part of the body to detect if a fall has occurred and places a call to an agent if the client remained motionless or could not stand up for a period. The agent takes the call and uses the client information and a GPS coordinate supplied by the call to inform the emergency officers that an emergency has occurred. The agent supplies the client's medical information and gives them the GPS coordinates. The government will provide this device free of charge to seniors (aged 65+) and persons with disability residents in Ontario with a valid health card. The cost of this investment is offset by selling it to other people that do not fall into this category. The government has given you the contract to design this fall detection system and an accompanying website where people supply their information and verify their eligibility for a free device or not. The eligibility criteria use the residential address, age, health card number and government aid information to categorize clients. The hardware has a sensor and communication module that can communicate with each other via any of Bluetooth, infrared or ZigBee protocols. You have to state why you chose any of the communication protocols over the other.

Project Description

Eldery falls resulting in death are becoming more and more relevant. Everyone is affected by elder mobility issues, and we hope to use the Fall Monitoring Program to ease the minds of elders and their loved ones. The Fall Monitoring Program will be worn on any part of the users body, and alert an agent to send help. We chose this project because we believe it is a pressing issue, and instantly had many ideas of different implementations. According to WebMD, "Nearly 25,000 people 75 and older died as a result of falls in 2016" [1]. This leaves 25,000 families grieving over a death that could have been prevented. Seniors are waiting too long for responders or are unable to call for help, resulting in complications that could lead to death. We want to enable seniors with an emergency alert system, and to decrease response time. This in turn will increase the chances of surviving falls. The end goal will be to ease the worries of elderly and their loved ones, with confidence to live independent lives.

Project Objectives

While working on this project, we have 5 main objectives. We first need to accurately locate the tracking device and the users' location in their home. This will ensure that first responders have an accurate understanding of the situation and do not have to spend time searching for the user in their home if a situation was to occur. If the user is unconscious, the device needs to alert first responders as early as possible. The device will need to be able to

sense unconsciousness to a high degree of accuracy. Alerting first responders when the user is not unconscious would be an unnecessary waste of time and resources. As seniors and persons with disabilities have a limited income, this service needs to be free for seniors (65+) and those with disabilities. Some information that we will need to collect in order for this service to work properly includes users' addresses, ages, and government aid information. With this information we can ensure that our devices will be setup in accordance with the users' preferences and personalized data so that it works specifically for them. We will also work with the government to ensure that proper access is guaranteed to those who need it. The government will check the eligibility of users as we cannot request access to users' health card information directly. The overall goal of this project is to reduce the number of deaths that occur from falls in the household. Future possibilities could see deployment of these devices in nursing homes, long term care centres, and retirement homes to strengthen the level of care in those facilities and to help reduce the reliance on human caretakers if a situation was to occur.

Measures of Success

To make sure that the project has a profitable outcome, measures of success need to be defined. These outcomes need to be defined now to ensure that nothing is missed in the development period. A minimum of five objects should provide a solid backbone to the coding development process. Each process needs to be clearly defined and describe how they are being met in detail to aid development.

The device should be able to be tracked within 5 meters of use, this is met with the use of GPS locations sent during the use of said device. The use of GPS satisfies this condition because of the current accuracy of the technology, one could also implement more accurate location services, although unnecessary. The device should also be able to contact authorities in a quick and efficient manner, this should be done in a manner to reduce the amount of time needed to contact emergency medical services and decrease dispatch time. Product is provided free to seniors to reduce the amount of falls in said age group as to encourage use of the device and aids in product awareness. The device must contain either a local or remote database that stores users inputted data. The final measure is that over a 2 year span falling deaths in the 65+ age group is reduced.

Infrastructure

The infrastructure that we will need to implement for this project ranges in terms of scale and operation. We will first need a call centre to ensure that there is always a point of contact for both users and first responders. These call centres will act as a liaison between these parties. We will also need a web hosting service to showcase our product and demonstrate the use cases. This will help us to market the device and allow for increased potential sales and market share. As for the device itself, it will need to include an accelerometer, GPS, wireless connection to the internet/cellular networks, Bluetooth, infrared,

ZigBee protocols and relative space sensors to function as intended. These sensors will all work in tandem with the onboard software that will constantly monitor all the input data and take the appropriate action at all times.

Future improvements to infrastructure would be required as the user base grows. Call centres, along with the web hosting service will need to be upgraded in terms of handling overall capacity. The software on the devices should have the ability to wirelessly accept updates. This will also allow us to improve the accuracy of fall detection and be able to better predict situational outcomes. Machine learning models can be deployed to further enhance this ability as well.

Conclusion

Through the use of the fall monitoring system, we aim to reduce the number of deaths and serious accidents that occur from falls within a users' home. The service will be offered free of charge to those over the age of 65 and to those with disabilities. The service will be deployed quickly and have minimal setup required. Once we have obtained the required information about a user, we can have the device with the user within a few days.

References

- [1] Reinberg, Steven. "Falls Are Increasingly Lethal for Older Americans." *WebMD*, WebMD, 4 June 2019, www.webmd.com/healthy-aging/news/20190604/study-older-americans-are-dying-more-from-falls#1