**An Android Based Personal Security Application**

# Final Year Project Report



**TrackMe**



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Statement Of Originality

I declare that this project is my original work except where stated.

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Table Of Contents

Abstract 5

Acknowledgements 6

1. Introduction 7

1.1 Background 7

1.2 Project Objectives 8

1.3 Context 9

1.3.1 Android Development 9

1.3.2 Learn PHP 9

1. Server Setup with MySQL 9

2. Would find the application useful for socialising 9

2. State Of The Art Review 10

2.1 Technology Overview 10

GPS Considerations 10

Tracking Location 10

Fall Detection 10

Emergency Contacts 10

MySQLite 11

Database Server 11

PHP Project 11

2.2 Similar Applications 11

BSafe 11

Emergensee 12

3. Implementation Details 13

3.1 Mobile Application 13

Application Module 13

Activity Module 13

Services Module 13

Helper Module 13

UI 13

3.2 Database 13

3.3 Server-Side Scripting 14

4. Evaluation 14

4.1 Testing During Development 14

4.2 User Feedback 14

5. Conclusion 14

References 14

Appendices 15

Screenshots 15

Abstract

The aim of this project is to create a smartphone application that utilizes the unique capabilities of smartphones in order to aid the personal security for vulnerable adults and children.

The application was designed to utilise a smartphones inbuilt GPS and accelerometer to track the users location and detect scenarios in which the user may be in a vulnerable situation. This involved detection of scenarios such as a user physically falling, or veering outside a particular boundary when such behavior is unexpected. When possible (i.e. User device has Internet connectivity) a users location data is uploaded to a backend server where other users of the application can query their most recent location and time. The application also has the ability to send an emergency text message in the case of an emergency such as a fall being detected or a user travelling outside of a pre-defined boundary from their starting position.

The application was designed, developed and deployed on the Android platform using the Android Studio IDE.

The project also incorporates the use of both PHP and MySQL to develop the supporting backend remote database server.

The project meets the primary aims allowing periodic check-ins from a users smartphone, remote monitoring of device location, detection of lack of user movement and movement outside certain boundaries.

Acknowledgements

I would like to express sincere gratitude to all that helped me throughout the course of completing this project as without the continued support I would not have made nearly as much progress.

Firstly I would like to thank Dr. Desmond Chambers, my project supervisor, for keeping the project on track as well as providing helpful advice, suggestions & guidance, particularly regarding how the application should function, throughout the year.

I would also like to thank my friends and colleagues who participated in the testing process of the application throughout the development process.

And finally I would like the College of Engineering & Informatics, specifically the Discipline of Information Technology.

1. Introduction

# 1.1 Background

Personal security has always been a very important issue and no matter how adequate the personal security measures in place are it is always something that can be enhanced. Security is especially an issue for more vulnerable people such as younger children and the elderly. This is because of hazards such as getting lost, going missing or suffering a fall.

Over the last number of years there has been a staggering amount of missing people reported in Ireland alone. For example in 2013 there were approximately 7700 people reported missing and in 2014 there were approximately 9100 people reported missing. [4]

Injuries due to falls are commonplace especially among the elderly in our population. It is estimated the 1/3 people over 65 years old have a fall causing injury each year. [5]

~7000 people over 65 admitted to hospital with fall related injuries each year [6]

Advancements in smartphone capability -> possibility of enhanced security

With ICT advancements it is now possible to increase the level of personal security available to people.

Latest user location, boundary, emergency text/call

The idea of creating a smartphone application to aid personal security is not revolutionary and indeed there are already many existing implementations.

This project includes the implementation of many of the same features from existing personal security applications.

The problems outlined above inspired the core requirements of TrackMe.

# 1.2 Project Objectives

This project involved the creation of a fully functional android smartphone application and the application was designed to provide the end user with the following core features:

* Application tracks user location at a user-specified time interval.
* Track another users latest location update from server.
* Enable Fall Detection.
* Enable Boundary Detection from tracking start point.

These core features required the following to also be implemented in the project:

* Allowing application to upload location data to backend server (when possible i.e. Internet connection available on user device).
* Allowing application permission to access accelerometer, GPS, etc

save profile preferences for location tracking and fall detection

# 1.3 Context

Additional objectives and motivations for undertaking this project are as follows:

## 1.3.1 Android Development

I have always been interested in developing smartphones applications, especially for Android devices, but prior to undertaking this project I was always under too many time constraints to afford me the opportunity to attempt some Android development. I saw this project as a great opportunity to develop an application of my own and gain some knowledge about Android development.

## 1.3.2 Learn PHP

Throughout the completion of my degree I was never afforded the opportunity to undertake any development using PHP. I used this project as an opportunity to develop my knowledge of PHP by using it to complete server-side scripting.

## 1.3.3 MySQL Database

During the completion of my degree I have already gained some experience in the setup and administration of MySQL databases but I wanted to improve on my current level of proficiency by setting up a more complex backend server than I have used in previous projects.

## 1.3.4 Application Use

Having previously been in situations where I would have found an application such as TrackMe useful I believed that this project was interesting to see how I would be able people in scenarios where their personal security was compromised.

2. State Of The Art Review

# 2.1 Technology Overview

## GPS Considerations

Internet Connection

Geocoder

Latitude

Longitude

## Tracking Location

Geocoder

Location Listeners

Network

GPS

Mobile Data

Wifi

## Fall Detection

9.8 m.s

<1 >25

## Emergency Contacts

SOS Text Contact

## MySQLite

Phone Database

## Database Server

MySQL

## PHP Project

Volley Requests

Connectivity To Server

# 2.2 Similar Applications

## BSafe [3]

Social Personal Safety Network

Location Sharing

Location Tracking (Similar to TrackMe feature of TrackMe application)

Location Check-In

Check-In Timer

Fake Call Triggers

Guardian Alert Button



Figure ‑ BSafe Application

## Emergensee

Live streaming of video & audio

GPS location data

Preset timer for check-in

Text & email distress notifications

Incident recording capability

24/7 monitoring

Real-time precautionary escort

Pre-set safety contacts

3. Implementation Details

# 3.1 Mobile Application

Modularised application split into several modules

## Application Module

## Activity Module

## Services Module

## Helper Module

## UI

# 3.2 Database

# 3.3 Server-Side Scripting

PHP

4. Evaluation

# 4.1 Testing During Development

# 4.2 User Feedback

5. Conclusion

References

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[6] Thousands of elderly injured in falls . 2017. Thousands of elderly injured in falls . [ONLINE] Available at: <http://www.irishhealth.com/article.html?id=18209>.

Appendices

Screenshots