Group 08 FallPrevention

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Chapter 1

Introduction

Damage from falling is the main cause for hospitalization among the elderly. In addition to the enormous costs incurred to society, falling is also the cause of great personal tragedy. As the use of computational devices becomes more common, it seems natural to examine how such devices can contribute to preventing such accidents.

This project is a cooperation between SINTEF and a group of students at NTNU for the course IT2901. Its goal is to develop a model for risk level of movement based on common sensors found in Android smart phones, and build a API to make the model accessible for third-party developers.

1.0.1 Group introduction

The group consists of 5 members, four of which were from Norwegian University of Science and Technology, and the remaining student was an exchange student from Germany (Insert school here). The members had experience with programming and project development with the languages java and c, but little experience with Android applications.

1.0.2 Customer introduction

The customer was "Selskapet for INdustriell og TEknisk Forskning ved norges tekniske hoegskole", or SINTEF for short. The person representing SINTEF

was Babak A. Farshchian, Adjunct Associate Professor at NTNU.

Chapter 2

Requirements

The requirements for the different parts of the project was about the requirements for the application, the underlying model and content provider, and the documentation for the model and content provider.

2.1 Initial requirements

According to the project description, the following should be developed:

- A model of physical movements based on common movement sensors found in Android smart phones.

- An Android content provider that stores and makes available the data in this model through an Application Programming Interface(API).

- An example application that can visualize this data.

2.2 Understanding the requirements

The group entered the project with a narrow understanding of what should be done, because the description was very general. Hence the general description, a meeting with the customer was arranged to get a broader explanation of what the project contains.

The meeting served its purpose and filled in a lot of holes that was missing from the official description:

- The development process in question uses a iterative approach. This essentially means that the requirements expands as the time goes, and to define the requirements from the beginning is impossible. This choice was made in collaboration with the customer.

- The team at SINTEF got a wide range of experts to help the group with health-specific features, e.g. making the algorithms to recognize movements.

- The customer expected weekly meetings with the whole group present, and that goals had been achieved before each meeting. At each meeting a new goal until was set.

Chapter 3

Alternative solutions

This is where we mention where some alternative solutions to the problems we are tasked to solve. In particular describing the programs mentioned in the report written by Filip that is placed on Google drive and called "Alternative Solutions Report" or something similar.

3.1 Edmondo

3.2 Pedometer

This is an app which focuses on giving the phone a pedometer function. This means to measure the number of steps taken while wearing the phone. An open source app with a GPLv3 license that was compatible with the Apache 2.0 license used by the group. The app uses the same sensors that was needed to make the Fall-Prevention app work, and was therefore a good tool to learn and understand how such a thing could be done on Android. The licence compatability also means that anything of interest can be copied or studied as needed.

3.3 GPS Status

Chapter 4

Project Management

4.1 Terms

Here follows a description of terms that are useful to understand how the project management functioned.

Sprint is a period in which work is planned and done. It has a duration of one week. At the end of each spring the group is updated on progress achieved, and set goals for the next sprint.

4.2 Development process

The customer favoured the use of an iterative approach to the development process, where every sprint added a new layer of functionality, either to the application or the underlying model. Each sprint lasted for a period of 1-2 weeks, and the exact content was worked out in collaboration with the customer. Short term plans were favored over longer plans, due to the flexibility provided. While this made formulating definite goals for the final product difficult, the customer and the group were in agreement that due to the research intensive nature of the project, a high degree of flexibility was required.

It was decided by the developers that the developers would have online meetings twice a week and an offline meeting once a week. The working

hours were set to not less than 20 hours a week, but the developers were free to choose when to work themselves.

4.3   Team Roles and Organization

There was not much place for specific roles among the group, as it was a small group, and the project required that all the members were capable and willing to work at all the tasks. Roles that were set for the group were therefore mainly organizers, so that one person was to keep awareness of what work needed to be completed in a particular domain:

Group Leader Elias was made organizer, and getting the responsibilities of reminding the group of what to do.

Document-organizer Johannes was tasked with organizing documentation and distributing the work of writing the report to the group.

4.4   Management Tools

Trello was a collaboration tool with the ability to create interactive kanban boards online. This use of this tool was to allow the group to coordinate tasks that were to be done, and the progress on the tasks, and which members were to work on which task.

It's learning was used to distribute information that was not time -critical, with a message board being used. It's learning would not send messages when a new topic or message appeared, so it's use for time-critical messages or making sure that everyone would read it was limited.

Email was used for time-critical communication, and for information that needed feedback swiftly, often within the same day.

Github was used to share code, and to describe and mark issues found in the code when problems were discovered. The relevant issues could then be discussed on the website

Chapter 5

Development Environment

5.1 LaTex

LaTeX was used to write this report. LaTeX is a typesetting language, with support for varied formatting, including images and including other document. It

5.2 Github

It was requested that the group would use the tool Github to share code and perform version control. Github had browser-based interfaces and downloadable clients, meaning all the members of the group could make use of it.

5.3 Eclipse with Android Development Tools Plugin

The demands from the Integrated Development Enviroment(IDE) was as following:

- Had support for programming applications for Android

- Was understood by at least some members of the team

To fill these requirements, and because there was plenty of tutorials that could be found, the group decided to use the Eclipse IDE, with add-on's to more easily code and deploy towards Android.

5.4

Chapter 6

Implementation

6.1 Plans

Nearing the end of every spring, the customer and group agreed upon the content of the following sprint. This list is in Figure A.2

6.2 Architecture

The application is made in a way that is common for all android applications. This means that

User interface is described in xml layout files that is called in java code. Strings and resources is placed in a separate folder and file, to be accessed by the code as needed. This is to separate content and layout in the UI.

Appendix A

Appendix

Appendix content goes here.

A.1 Mockups

After the second meeting with the customer, the group had a sketch that was to be used as a starting point for the mock-up application.
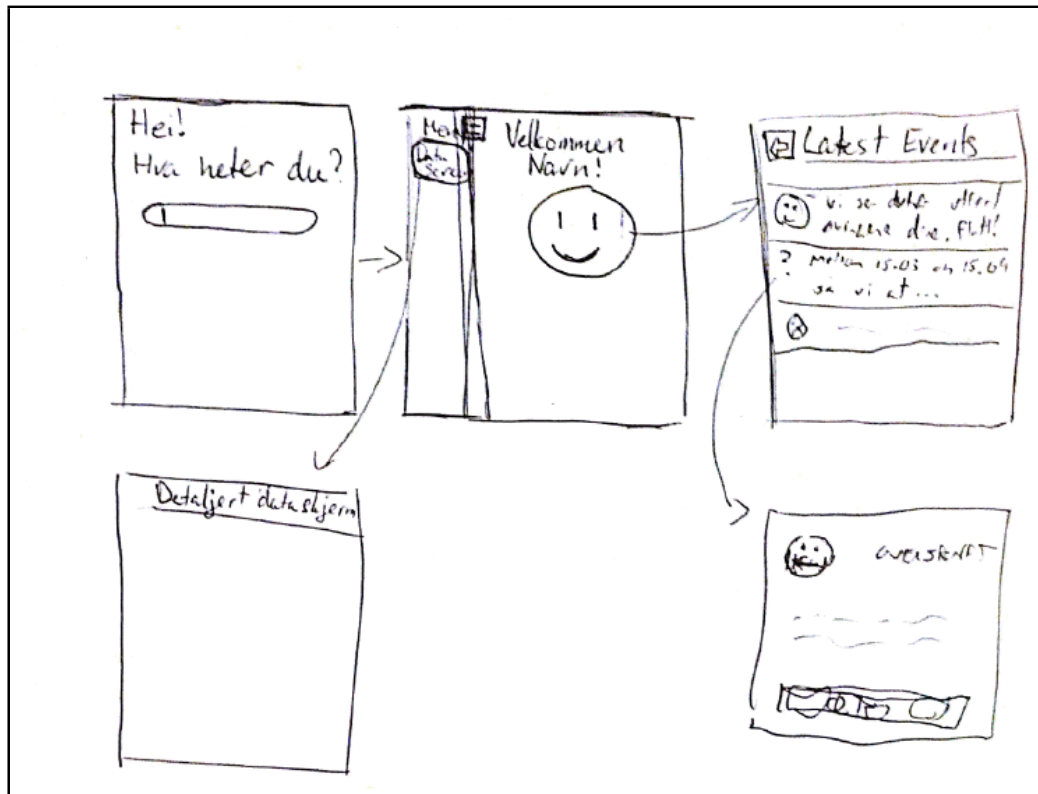
Figure A.1: A mockup of the program flow, text is just scribbling

A.2   Reports

A.2.1   Meeting summaries

Regular status reports was a part of necessary documentation. Of particular importance was reports to the supervisor, and reports done to the other group members.

Figure A.2: Short summary of work done sorted by sprint

Sprint nr.	Date	Summary
Sprint 1:	03.02.13 - 08.02.13	Developing user stories and paper prototypes of the GUI.
Sprint 2:	08.02.13 - 15.02.13	Developing a mock-up application demonstrating the GUI.
Sprint 3:	15.02.13 - 22.02.13	Improving UI and functionality for the prototype, researching medicinal factors.
Sprint 4:	22.02.13 - 01.03.13	Improving secondary functionality for the prototype (settings, statistics, relatives screens),researching content-providers and alternative solutions.