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| Wearable Medical Device Data Ingestion and Analysis Software Requirements Specification |
| CPE 656/658 Software Studio |
| Timothy R. Wilkins  Whit J. Sisulak  Glen L. Riden  James J. Duggan IV |

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Requirements Specification

# Introduction

## Purpose

The purpose of this document is to define the software requirements specification for Wearable Medical Device software projects. In addition, this document describes the scope, design constraints, and interfaces of the system. The intended audience for this document includes system developers, testers, customers, and any other stakeholders.

## Scope

In the sections below an overview will be given for the two pieces of software that will be required to fulfill the requirements proposed by our customer.

### Data Collection

The data collection portion of this project will consist of the following. There are two different medical devices to be used for this project that record various types of data. The data provided by these devices consists of different file formats, and the data is different from device to device. The software will have to determine the contents of each file and how to process them. Due to how long data transfers take to download the data from a device, there may be a need to convert the data from a binary format to another format in order to speed up the process of getting data off the device. The software needs to able to take in files provided by the medical devices and be able to translate them in a way where they can be stored in a database. The software needs to run in the background of a PC and wait for files that need to be processed. The software will have to interact with a database to insert the data that has been processed in order for the data to be stored for later analysis. The software should allow for some basic configuration such as designating a folder on the PC to be a listener. Files moved or copied into this folder will be processed by the software when they are added. The software should have the ability to process multiple files if more than one is placed into the processing folder at a time.

### Data Analysis

Data analysis software needs to be created to analyze the data that is captured from the data collection tool mentioned above. This piece of software will be a separate stand-alone web application. The software needs to perform data analysis over different intervals of time such as one week, one month, etc. There will need to be some way to manage user access to the various medical data that has been inserted into the database that this software will access. Below are some proposed data analysis ideas that can be incorporated into the project.

* Simple Moving Average
* Data correlation discovery between the multiple devices.
* Possibly determine when an individual moves from walking to running or simply being able to identify the activities that were being performed while the data was being captured.

The data analysis possibilities will likely not fully be realized until the project team understands the different types of data that are available. Also, there will need to be collaboration with the customer for additions or changes to the data measurements provided by this software. The web application will have to have different levels of user access which will be defined later in this document.

## Definitions, Acronyms, and Abbreviations

## References

* IEEE Recommended Practice for Software Requirements Specifications (IEEE Std 830-1998)

## Overview

The remainder of this requirements specification document addresses specific system requirements, constraints, and design specifications, as well as process plans and methods for the requirements specifications team.

# Overall Description



## Product Perspective

## Product Functions

## User Characteristics

## Constraints

## Assumptions and Dependencies

# Specific Requirements



## Functional Requirements

### The system shall provide user authentication.

#### The system shall require unique usernames for each registered user.

##### The system shall require a validated email address.

##### The system shall send out a verification email to the user's email address after registration.

###### The verification email shall have a verify email button that when clicked updates the user's account to active.

##### The system will prevent the user from accessing the system or uploading data to the system until the user's email address has been verified.

#### The system shall require a secure password.

##### The password shall follow Microsoft secure password guidelines.

#### The system shall give the user the opportunity to save user credentials for future use so they do not have to entered every time a file is processed.

#### The system shall have the ability to log out of a user's account.

#### The system shall have a utility for retrieving a forgotten username or password.

### The system shall provide the ability to process medical device data files.

#### The system shall provide the ability to select a directory to process files.

#### The system shall provide the ability to drag and drop files into the tool for processing.

#### The system shall not process data that is not medical data.

##### The system shall only process medical data from the listed devices.

#### The system shall process medical data from the Zephyr Device.

##### The system shall process Zephyr ECG data.

##### The system shall process Zephyr Heart Rate RR interval data.

##### The system shall process Zephyr Accelerometer data.

##### The system shall process Zephyr Breathing BB interval data.

##### The system shall process all data provided by the Zephyr summary report.

##### They system shall process .csv and .dat files provided by the Zephyr device.

#### The system shall process medical data from the Basis Peak Device.

##### The system shall process all the data provided by the Basis Peak summary report.

##### The system shall process the .csv file provided by the Basis Peak device.

### The system shall connect to a database.

#### The system shall upload processed data to a database.

#### The system shall provide an error message if the connection to the database is unsuccessful.

#### The system shall prompt for user log in when attempting to upload data to the database.

### The system shall be installed with a setup executable script.

#### The installation shall prompt the user for an installation path.

##### The installation shall provide a default installation path.

#### The installation shall prompt the user for a desktop icon.

#### The installation shall prompt the user for a quick launch icon.

#### The installation shall allow the user to abort the installation process.

## Non-Functional Requirements

### The system shall run on Windows Operating Systems

#### The software shall run on Windows 7.

### The system shall use a SQL database.

### The system shall require a server to be connected to a reliable network with an internet connection.

Appendices

# Appendix A: Use Cases

This section represents use case diagrams for the functions defined in the requirements specification for the two pieces of software needed to complete this project.

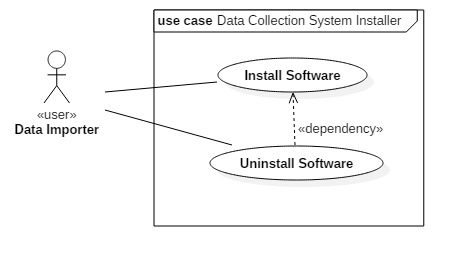


Figure A-1: Data Collection System Installer

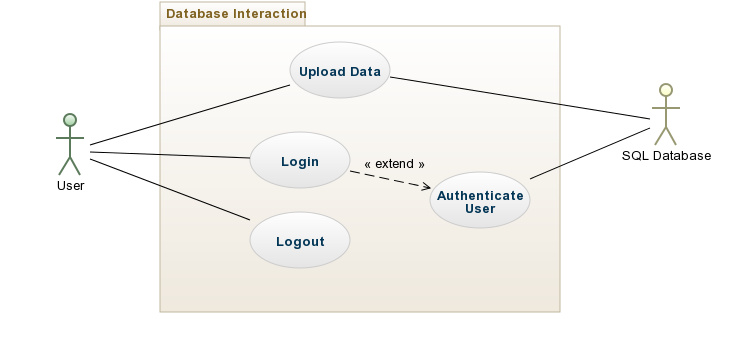


Figure A-2: Database Interaction

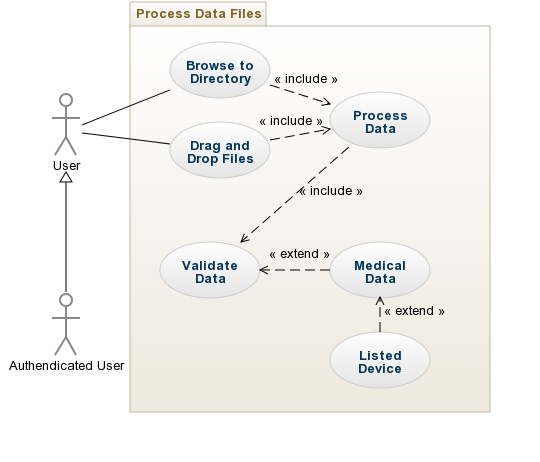


Figure A-3: Process Data Files

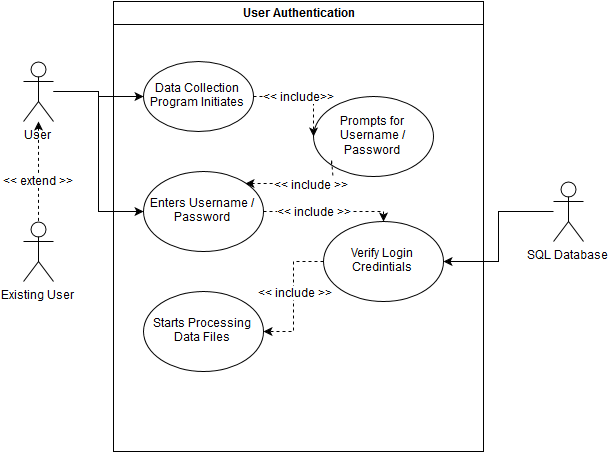


Figure A-4: User Authentication

# Appendix B: Sequence Diagrams

This section represents sequence diagrams for the functions defined in the requirements specification for the two pieces of software needed to complete this project.

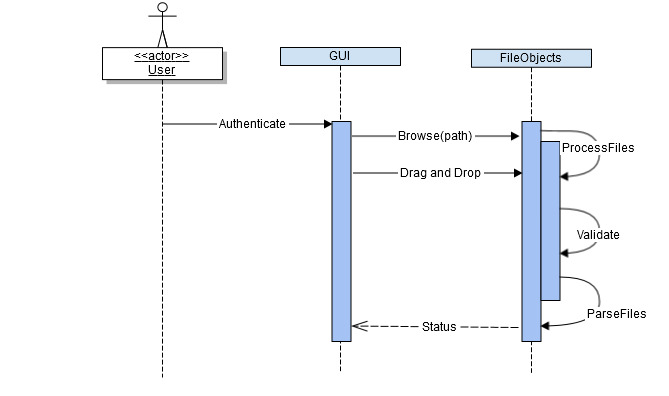


Figure B-1 Drag and Drop Data Processing

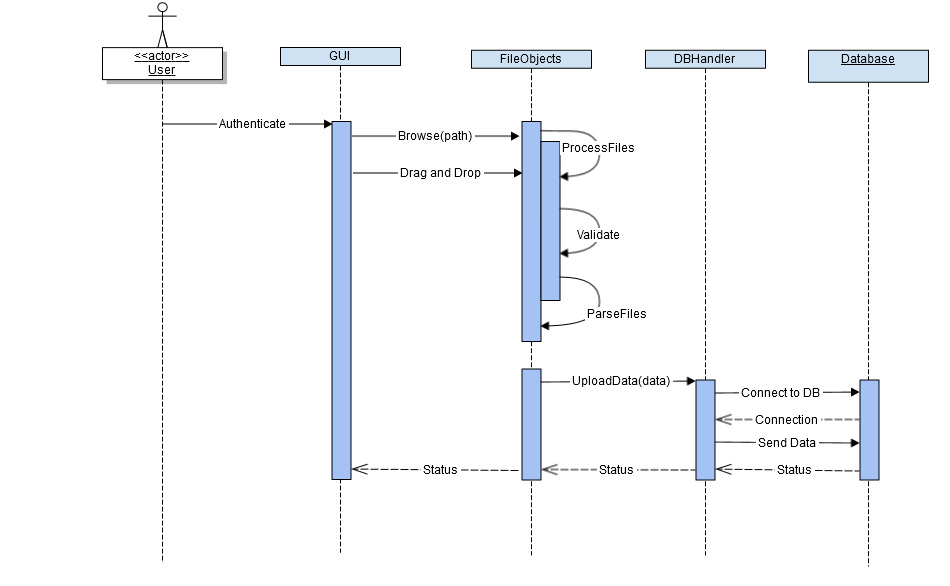


Figure B-2: Directory Processing