**MINISTRY OF EDUCATION AND TRAINING**



**FPT UNIVERSITY**

Capstone Project Document

**Health Support Tracking System**

|  |  |
| --- | --- |
| **Group 2** | |
| **Group members** | Ha Kim Quy – QuyHKSE61160  Tran Dang Quan – QuanTDSE60878  Phan Nhat Anh – AnhPNSE90158  Man Huynh Khuong - KhuongMHSE61148  Nguyen Duy Khuong – Khuongnd60493 |
| **Supervisor** | Mr. Kieu Trong Khanh |
| **Ext. Supervisor** | N/A |
| **Capstone Project code** | HSTS |

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# Definitions, Acronyms, and Abbreviations

|  |  |  |
| --- | --- | --- |
| **No.** | **Abbreviation & Acronym** | **Definition** |
| 1 | BLE | Bluetooth Low Energy |
|  |  |  |

# Introduction

## Project Information

- Project name: **Health Support Tracking System**

- Project Code: **HSTS**

- Product Type: **Mobile Application, Website**

- Start Date: **September 07th, 2015**

- End Date: **December 12th, 2015**

## Introduction

In modern society, the people worry about their health. The fat is the most important problems. The doctor diagnoses the patient with medicine and exercises. However, the patient uses medicine without exercises or forgets using medicine that cause problem in effective treatment. Besides, some patient need to be followed and updated treatment after a period. Patient need to consult in time to treatment.

The smart activity wristband appear providing functional with tracking workouts, calories burned, step. Besides, that device can synchronize bluetooth and automatically to the computer and over 150 leading smart phones.

So, this system will help doctor tracking practice information of patient, then doctor will setup new treatment for patient. We will remind patient use medicine, do exercise. Doctor can make appointment to patient. Patients do not need waste time to meet doctor. Patient’s treatment will update day by day follow what they do.

## Current Situation

When someone need to track their practice, they will choose one wristband and install suitable mobile application for manage this device. Every day, people walk, run… then the mobile app will collect data and display out to screen. Next day, the device will reset data and it will count again. Some device support to store data at stock’s server.

## Problem Definition

Below are the advantages and disadvantages of some activity and healthy tracking applications and on Android smartphone:

* Advantages.
  + Easy and fast tracking information like number of step, calories burned.
  + Have a group use that app to practice together.
* Disadvantages:
  + Do not have participation of doctor.
  + Only support for one smartphone or one wristband.
  + Cannot suggestion the treatment or exercises.
  + Cannot notify to doctor, patients.
  + Unusable regiment in treatment.
  + Display unusable information.

## Proposed Solution

The application uses a combination between a smart phone and a wristband device to gather the patient’s number of steps, calories burned, and others. Basing on the collected data, the doctor makes the treatment decision within system suggestion. The system will collect data from patient to propose the suggestion to the doctor, then doctor will make treatment decision.

### Feature functions

* The nurse can input the basic information of patient.
* The doctor can agree to treat or not.
* When doctor agree the treatment, the system will allow the patient to access account from mobile device.
* The mobile application can collect patient’s data and send to server every day.
* The system compares it with standard regimen, then suggest for doctor.
* The doctor can view, edit and approve the regimen.
* The patient can receive treatment plan, notification from doctor.
* The system will remind the patient what he/she should do following treatment plan every day.
* The doctor can make the next appointment schedule.
* The patient can see current information of wristband, history and edit their information.

### Advantages and disadvantages

* Advantages:
  + The system provides for doctor pieces of tracking information to make treatment plan more effectively.
  + The patient will receive doctor’s treatment suggestions frequently.
  + The patient never forgets to use medicines or does others because this system will remind them.
* Disadvantages:
  + The doctor must have the personal computer and internet connection to access tracking information.
  + This system only used with people from 20 - 60 ages and does not have special diseases.
  + The patient also must have a suitable smartphone with wristband device and internet connection to send information as well as receive treatment plan.
  + The patient must always use mobile application and wristband in the right way. In some cases, the patient is unnecessary to use wristband (for example: the flu). If not the system will collect wrong data and the treatment may be worse...

## Functional Requirements

Function requirements of the system are listed as below:

### Nurse.

* Nurse creates patient profile before patient meet doctor.
* Nurse will assign patient to suitable doctor.

### Doctor.

* Doctor can view patient’s medical history.
* Doctor can view treatment suggestion provided by system.
* Doctor can edit treatment, do treatment.
* Doctor can make appointment.

### Admin.

* Admin can manage nurse, doctor and patient account.
* Admin can manage supported devices, such as add new device specification to database.

### Patient.

Patient only uses a mobile application:

* Patient can view treatment plan.
* Patient can be remind to use medicine, do exercises… every day.
* Patient can view appointment.
* Patient can send a simple notice to doctor.

## Role and Responsibility

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Full Name | Role | Position | Contact |
| 1 | Kieu Trong Khanh | Project Manager | Instructor | khanhkt@fpt.edu.vn |
| 2 | Ha Kim Quy | Developer | Leader | quyhkse61160@fpt.edu.vn |
| 3 | Tran Dang Quan | Developer | Member | quantdse60878@fpt.edu.vn |
| 4 | Phan Nhat Anh | Developer | Member | anhpnse90158@fpt.edu.vn |
| 5 | Man Huynh Khuong | Developer | Member | khuongmhse61148@fpt.edu.vn |
| 6 | Nguyen Duy Khuong | Developer | Member | Khuongnd60493@fpt.edu.vn |

Table 1 Roles and Responsibility

# Software Project Management Plan

## Problem Definition

### Name of this Capstone Project

Heal Support Tracking System (HSTS).

### Problem Abstract

At the moment, there is no system can connect between doctor and patient effectively in Vietnam. Large hospitals can manage their patient’s profile very good, but they have not provided the doctor a good way to track their patient actively yet. The patient also do treatment following doctor’s guide without necessary support. Sometime, they forget to use medicine or miss the appointment, etc. Therefore, the effect of treatment is very low. For a common disease like fat, the treatment require patient having to use medicine and do exercise every day. However if they do exercise over guideline, they may be cause an unexpected problem when do exercise in high frequency.

For the goal that improving the treatment, we provide a system to make more communication between doctor and patient. By collecting patient’s information every day, the doctor can make the treatment more effectively. For example, the doctor can change the medicine immediately. The patient can save their time because they can receive newest medicine over a message or a notification. The patient also will be remind to meet appointment with doctor, etc.

### Project Overview

#### Current Situation

Below are the problems encountered in this project:

* **Security**: The medical treatment of a lot of diseases is the privacy asset of hospitals so we are difficult to access these documents.
* **Medical knowledge**: This project requires member have enough medical knowledge about treatments, common diseases and process. We cost a lot of time for research about these knowledge.
* **Technique**: Some manufacturer do not use standard of bluetooth developer.
* **Absent of the team member**: team members can get sick or unexpected problems.
* **Server crash**: all the needed data is stored in the server. So if server crash, all the patient cannot access treatment plan. The nurse and the doctor is same.

#### The Proposed System

According to technologies researched, we found that wristband is a good solution for tracking fat patient’s activity. We use basic feature of a wristband to supply the doctor all necessary information about patient’s activity every day. Therefore, the doctor can give a suggestion to patient, or make change to the treatment plan.

We also build a high available webserver to maintain the main system to work 24/7 to make sure that if mobile applications need access to the information there will be always available.

We assign responsibility in vertical to make sure if any member in this problem cannot continue to work in our team there will be the least harmful to the project processes.

Our system includes two main subsystems: an online website for the doctor, the nurse and admin, a mobile application for the patient.

##### Mobile Application

This application is used by patient, include below functions:

* Show treatment which accepted by doctor.
* Remind using medicine, doing exercises, appointment with doctor.
* Collect data from wristband and send to server.

##### Web Application

For nurse:

* Create new patient history.
* Assign patient to doctor.

For doctor:

* View treatment suggested by system.
* Edit treatment.
* Do treatment.
* Make appointment.
* View history of patient.
* Send notification, message to patient.
* Manage standard regimen.

For administrator:

* Manage user account.
* Manage supported device.

#### Boundaries of the System

This system is used for a patient in the age from 20 to 60 years old only. Especially, we recommended that our system is focus on common and easy to treat diseases, such as: flu, fat, etc. Any complex and difficult to treat disease, require more human resources or high technology equipment, such as cancer, HIV/AIDS… is no support in this system.

#### Development Environment

##### Hardware requirements

* For continuous integrating server:

|  |  |  |
| --- | --- | --- |
| Hardware | Minimum Requirements | Recommended |
| Internet Connection | 512Kbps | 4 Mbps |
| Operating System | Ubuntu Server 12 LTS | Ubuntu Server 14.04.2 LTS |
| Computer Processor | Intel® Pentium II | Intel® Core(TM) i5 CPU , M 460 @ 2.53GHz |
| Computer Memory | 128MB of RAM (tính lại số sau) | 4GB of RAM or more |

Table 3 Hardware requirement for continuous integrating server

* For web development:

|  |  |  |
| --- | --- | --- |
| Hardware | Minimum Requirements | Recommended |
| Internet Connection | 512Kbps | 8 Mbps |
| Operating System | Windows Vista, 7, 8 | Windows 7, 8 |
| Computer Processor | 1 GHz | Intel® Core(TM) i5 CPU , M 460 @ 2.53GHz |
| Computer Memory | 1GB of RAM | 4GB of RAM or more |

Table 4 Hardware requirement for web development

* For mobile development:

|  |  |  |
| --- | --- | --- |
| Hardware | Minimum Requirements | Recommended |
| Internet Connection | 512Kbps | Wi-Fi Connection 12MB |
| Operating System | Android 4.3 | Android 4.4.2 |
| Hardware | BLE supported | BLE supported |
| Memory | 512 MB of RAM (tính lại số sau) | 1GB of RAM or more |

Table 5 Hardware requirement for mobile development

##### Software requirements

- MySQL Server 5.6: used for creating and manage the database for system.

- IntelliJ IDEA 14.1.4: used for implementing website and web service.

* Android Studio 1.3.2: used for implementing Android mobile application.

- Github server: used for storing source codes, documents.

- SourceTree 1.6.20: used for version control.

- Software Ideas Modeler 8: used for creating models and diagrams.

## Project organization

### Software Process Model

This project is developed under waterfall model. We apply customized waterfall model to capable with current situation in our team. We choose this model because the following reasons:

* This is a big project with clear requirement.
* Based on researches and clarify standard regimen of diseases are stable, clear, fixed and well understood by all team members.
* This project use BLE technology, which we have standard in bluetooth developer and android support.



Figure 1 Modified Waterfall Development Model

Reference: Page 30, chapter 2, Software process model, SOFTWARE ENGINEERING 9th Edition, by Ian Sommerville

### Roles and responsibility

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Full name** | **Role in Group** | **Responsibilities** |
| **1** | Kieu Trong Khanh | Supervisor/Project Manager | * Specify user requirement * Control the development process * Give out technique and business analysis support |
| **2** | Ha Kim Quy | Team leader, BA, DEV, Tester | * Managing process * Clarifying requirements * Prepare documents * GUI Design * Designing database * Coding * Create test plan * Testing |
| **3** | Tran Dang Quan | BA, DEV, Tester | * Clarifying requirements * Prepare documents * GUI Design * Designing database * Coding * Create test plan * Testing |
| **4** | Phan Nhat Anh | BA, DEV, Tester | * Clarifying requirements * Prepare documents * GUI Design * Designing database * Coding * Create test plan * Testing |
| **5** | Man Huynh Khuong | BA, DEV, Tester | * Clarifying requirements * Prepare documents * GUI Design * Designing database * Coding * Create test plan * Testing |

Table 4 Roles and Responsibility Details

### Tools and Techniques

|  |  |
| --- | --- |
| Tool / Technique | Name / version |
| Frontend | HTML, CSS, JavaScript, jQuery, Bootstrap |
| Backend | JavaEE, Spring, Hibernate |
| Web server | Apache Tomcat 7 |
| Development tool | IntelliJ IDEA 14.1.4 |
| DBMS | MySQL 5.6 |
| Source control | SourceTree 1.6.20 |
| Modeling tool | Software Ideas Modeler |
| Document tool | Microsoft Word 2013 |

## Project Management Plan model

### Software development life cycle

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Phase** | **Description** | **Deliverables** | **Resource needed** | **Dependencies and**  **Constrains** | **Risks** |
| **Requirement Analysis** | - Collect requirements from customer.  -Identify and clarify requirements for the system in general. | -Introduction of proposed system.  -Software requirement specification.  -Project Task Plan.  - Prototypes | 20 man- days | N/A | - Missing requirement  - Unclear scope of  project  - Lack of member share  of understand |
| **Design** | - Architecture design for the system  - Detail design using top-down break down  - Choose Architecture style | - Software Design Document  - Base code structure  - Technology notes | 20 man- days | Depend on  “Requirement  Analysis” | - Lack of experience.  - Not fulfil requirement. |
| **Implementation** | - Coding system core functions and other feature with GUI  - Unit test | - Main user’s functions on mobile and website  - Unit test document | 50 man- days | Depend on “Design”. | - Lack of experience and knowledge.  - Human mistake. |
| **Testing** | - Integration test the system  - Alpha test  - Correct bugs  - Beta test  - Acceptance test | - Test document  - Defect log | 20 man- days | Depend on  “Implementation” | - Lack of experience  - Missing test case |
| **Maintenance** | - Deploy on sever and mobile | - Installation guide  - User Manual | 10 man- days | Depend on  “Testing” | - Lack of experience. |

Table 5 Software Development Life Cycle Detail

### Phase Detail

#### Phase 1: Requirement Analysis

|  |  |  |
| --- | --- | --- |
| **Task** | **Description** | **Author** |
| **1. Collect requirements** | Find which systems currently provide similar service, their strengths and weakness. | QuyHK, QuanTD, AnhPN, KhuongMH |
| **2. Identify and clarify main functions.** | Define which main functions system should provide. | QuyHK, QuanTD, AnhPN, KhuongMH |
| **3. Create System**  **Introduction.** | Complete Introduction Report. | QuyHK |
| **4. Software Project**  **Management Plan.** | Prepare Project Management Plan. | QuyHK |
| **5. Prototype.** | Build a prototype of proposed system (Website/Mobile). | QuyHK, AnhPN, KhuongMH |
| **6. SRS** | Create SRS document. | QuyHk, QuanTD, AnhPN, KhuongMH |

Table 6 Phase 1: Requirement Analysis

#### Phase 2: Design

|  |  |  |
| --- | --- | --- |
| **Task** | **Description** | **Author** |
| **1. Detailed Design** | Compare new document with existed documents of system. | QuyHK, QuanTD, AnhPN, KhuongMH |
| **2. Database Design** | Based on parsed data to recommendation.  Based on other needs to recommendation. | QuyHK, QuanTD, AnhPN, KhuongMH |
| **3. Technology research** | BLE, Gatt Service. | QuyHK |
| **4. Design Document** | Create software design document | QuyHK, Quan TD, AnhPN, KhuongMH |

Table 7 Phase 2: Design

#### Phase 3: Implementation

|  |  |  |
| --- | --- | --- |
| **Task** | **Description** | **Author** |
| **1. Front-end web functions** | Implement front-end functions on web | AnhPN |
| **2. Front-end mobile functions** | Implement front-end functions on mobile | QuyHK, KhuongMH |
| **3. Back-end web functions** | Implement back-end functions on web | QuanTD, |
| **4. Mobile functions** | Implement mobile application | QuyHK |
| **5. Unit testing** | Write test case and testing for web functions | QuanTD, AnhPN, KhuongMH |
| Write test case and testing for mobile functions | QuyHK |

Table 8 Phase 3: Implementation

#### Phase 4: Testing

|  |  |  |
| --- | --- | --- |
| **Task** | **Description** | **Author** |
| **1. Integration testing** | Write test case and testing systems | QuyHK, AnhPN, KhuongMH, QuanTD |
| **2. Alpha testing** | Do alpha test with customer | QuyHk, AnhPN, KhuongMH, QuanTD |

Table 9 Phase 4: Testing

#### Phase 5: Maintenance

|  |  |  |
| --- | --- | --- |
| **Task** | **Description** | **Author** |
| **1. Installation guide** | Write installation guide | QuyHK |
| **2. User Manual** | Write user manual | QuanTD, KhuongMH, AnhPN |

Table 10 Phase 5: Maintenance

**3.3 All Meeting Minutes**

Refer to Meeting Minutes folder.

## Coding Convention

Java: Using to develop website.

Summary:

* Naming Convention:
  + Variable names should be short yet meaningful. The choice of a variable name should be designed to indicate to the casual observer the intent of its use.
  + Methods should be verbs, in mixed case with the first letter lowercase, with the first letter of each internal word capitalized.
* Declarations Convention:
  + One declaration per line is recommended since it encourages commenting.
  + When coding Java classes and interfaces, the following formatting rules should be followed:
    - No space between a method name and the parenthesis "(" starting its parameter list.
    - Open brace "{" appears at the end of the same line as the declaration statement.
    - Open brace "{" appears at the end of the same line as the declaration statement.
* Commenting Convention:
  + Doc comments describe Java classes, interfaces, constructors, methods, and fields. Each doc comment is set inside the comment delimiters /\*\*...\*/, with one comment per class, interface, or member.
  + Block comments are used to provide descriptions of files, methods, data structures and algorithms. Block comments may be used at the beginning of each file and before each method.
  + Training comments is a very short comments can appear on the same line as the code they describe, but should be shifted far enough to separate them from the statements. Using Java Code Convention From:

<http://www.oracle.com/technetwork/java/codeconvtoc-136057.html>