**MINISTRY OF EDUCATION AND TRAINING**



**FPT UNIVERSITY**

Capstone Project Document

**Health Support Tracking System**

|  |  |
| --- | --- |
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| **Ext. Supervisor** | N/A |
| **Capstone Project code** | HSTS |

-Ho Chi Minh City, 09/09/2015-

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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 suggests 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.

### Staff.

* Staff 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:

* **Collect requirement**: 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.
* **Technique**: Some manufacturer do not use standard of bluetooth developer.
* **Absent of the team member**: team members can get sick or unexpected problems.

#### The Proposed System

With some friendship and relationship, we found some standard regimen of diseases. It had helped us control scope, requirement.

To resolve medical knowledge problem. We found our friend to help us understand some standard regimen, which we found. When we understand about some regimen we can make a common field data have to have in a standard regimen.

With technique problem we had bought one wristband and research about BLE technology, GATT service. After research, we had found some common information to help us find data of wristband.

##### 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.

For staff:

* 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 not supported 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 | 1GB of RAM | 4GB of RAM or more |

Table 2 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 | 2GB of RAM | 4GB of RAM or more |

Table 3 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 | 1GB of RAM or more |

Table 4 Hardware requirement for mobile development

##### Software requirements

.

|  |  |
| --- | --- |
| Tools | Uses |
| 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 |
| 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 |

Table 5 Software requirement for this project

## 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 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 6 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 7 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 8 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 9 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, AnhPN, KhuongMH |
| **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 10 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 11 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 12 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.

Using Java Code Convention From:

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

# Software Requirement Specification

## User Requirement Specification

### Doctor requirement

Doctor is user who uses service of system. The doctor can use some following functions:

* View patient’s medical history
* Make prescription
* Manage regiment
  + Insert regimen.
  + Update regimen.
  + Delete regimen.

### Staff requirement

Staff is people who works directly with system to help system can support for multiple wristband:

* Manage supported device
  + Add device
  + Update device
  + Delete device

### Patient requirement

Patient is people who use service of system. The patient can use some following functions::

* Send notify to doctor
* Setup new profile

### Admin requirement

Admin is people who manages account. Administrator can use some following functions:

* Manage account includes:
* Remove account
* Add account
* Update account
  + 1. **Nurse requirement**

Nurse is user who uses service of system. The doctor can use some following functions:

* Create patient’s profile
* Update patient’s profile

## System Requirement Specification

### External Interface Requirement

#### User interface

* The user interface uses Vietnamese language in android app and English language in web app.
* Use consistent palette of colors between the text and the background.
* The user interface displays best on 1024x768-screen size.

#### Hardware Interface

* Android Smartphone with BLE support and android 4.3 or above.

#### Software Interface

* Web application: work with Firefox (v30 or above), Chromes (v14 or above), Internet Explorer (v10 or above) browse.
* Mobile application: Android operating system (v 4.3 or above).

#### Communication Protocol

* Use HTTP protocol 1.1 for communication between the web browser and the web server.
* Use HTTP protocol 1.1 for communication between the mobile application and the web service.

### System Overview Use Case

### List of Use Case

## Software System Attribute

### Usability

#### Graphic User Interface

All the texts, labels and alerts of android app will be written by Vietnamese and web app will be written by English.

#### Usability

The system usability is easy to use that will need less than 1 days of training for doctor, nurse and staff to use system. We support partient can use this system and does not training more.

#### Installation

User can follow installation and manual guide for installation. If there are any problems, user cans contacnts developer for help.

### Reliability

* System notification success rate is less than 2 failed notifications per 1000 sent.
* Android app will collect data of patient and sent to server anytime have Internet.
* Web service API response success rate is less than 2 failed requests per 10000 requests.

### Availability

### Security

* All input data are validated before saving to database.
* All privacy information of patient is encrypted to ensure security.
* Users is authentication/authorization for all users when they login to the system.

### Maintainability

* System is separated into modules.

### Portability

* Admin, staff, nurse and doctor can use application on every OS supported web browser.
* Patient can use mobile application on every Android smartphone that have version greater than 4.3, bluetooth 4.0

### Performance

* Requests from web application are responded in less than 10 seconeds at 8 Mbps bandwidth speed.
* Mobile application tracking data of wristband every 10 second and get treatment from server less than 1 minute at 8 Mbps bandwidth speed.