**MINISTRY OF EDUCATION AND TRAINING**

**FPT UNIVERSITY**

Capstone Project Document

The Traffic Sign Recognition and Training

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

-Ho Chi Minh City, 01/2014-

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***ACKNOWLEDGEMENTS***

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# Definitions, Acronyms, and Abbreviations

|  |  |
| --- | --- |
| RSM | Roll System Mobile |
| Face Detection | **Face detection** is a computer technology that determines the locations and sizes of human faces in arbitrary (digital) images. It detects facial features and ignores anything else, such as buildings, trees and bodies.  <http://en.wikipedia.org/wiki/Face_detection> |
| Face Recognition | Face recognition is the task of identifying an already detected object as a **KNOWN or UNKNOWN face**, and in more advanced cases, **telling EXACTLY WHO'S face it is**! |

# Report No.2 Software Project Management Plan

## Problem Definition

### Name of this Capstone Project

The Traffic Sign Recognition and Training (TSRT)

### Problem Abstract

Now a day, the traffic system is expand more than before. Beside that the traffic sign use to control traffic is developed to help people when join in the traffic. In Vietnam, we have more than 200 traffic signs, this may cause the difficult to people when meet a new traffic sign. On the other hand, internet and smartphone is more popular in Vietnam. Now it’s easy to have a smartphone with internet connection. That is the reason we want to build a system to help people find information about any traffic sign easily. So people can know more about the sign and traffic rule in each traffic sign, help them join in traffic easier and safer.

### Project Overview

#### The Current System

Below are some current system:

* Search using book:

+ Advantages: clearly, accurate information.

+ Disadvantages: slow and not update regularly.

* Current application:

+ Advantage: update regularly, easy to use.

+ Disadvantages: few information (just have basic information about traffic sign), search slow.

* Using internet:

+ Advantages: provide updated information.

+ Disadvantages: search slowly, need internet connection, too many useless information.

#### The Proposed System

* Develop a recognition system that support auto detect and recognize traffic sign using smartphone’s camera.
* Support more information about the traffic sign: penalty fee, view history.
* Support user learn traffic sign.

##### Web

* Admin can setup system, manage account

##### Mobile

* The mobile version also allow guest to register a new account.
* The user or guest can take a photo of traffic sign to make auto search about its information.
* In case the result is wrong, user or guest can send a report about this result.
* Allow user to add search result into favorite list for learning purpose.

#### Boundaries of the System

* The system is intended for almost Vietnam’s land traffic sign.
* Using in normal weather condition (sunny, cloudy,...) and traffic sign must be in good state (In original shape, isn’t covered by other objects,..)
* The system is intended for learning purpose only.
* The language of the system is Vietnamese
* The complete product includes:

+ The website, for admin, staff, user and guest to interactive with the system.

* + Mobile Application for user and guest.
* + All the process involved document.

#### Development Environment

##### Hardware requirements

**For server**

|  |  |  |
| --- | --- | --- |
| Windows | Minimum Requirements | Recommended |
| Internet Connection | 4Mbps | 8 Mbps |
| Operating System | Ubuntu 12 | Ubuntu 13.x |
| Computer Processor | Intel® Core 2 Duo | Intel® Core(TM) i5 CPU , M 460 @ 2.53GHz |
| Computer Memory | 1GB RAM | 3GB or more |

Table 1: Hardware Requirement for Server

**For Web User**

|  |  |  |
| --- | --- | --- |
| Web | Minimum Requirements | Recommended |
| Internet Connection | 2Mbps | 4Mbps |
| Web Browser | Chrome 20 | Chrome 31 |

Table 2: Hardware Requirement for Web User

**For Mobile User**

|  |  |  |
| --- | --- | --- |
| Mobile | Minimum Requirements | Recommended |
| Internet Connection | 2Mbps | 4Mbps |
| Operating System | Android 4.0 or later version | Android 4.4 |
| Hardware | Touchscreen, Camera 3.0 MP or above | Touchscreen, Camera 5.0 MP or above |
| Memory | 512 MB or more | 1 GB or more |

Table 3: Hardware Requirement for Mobile User

##### Software requirements

* Microsoft Windows 7 Service Pack 1, Ubuntu 13: operating system and platform for development.
* MySql
* StarUML: used to create models and diagrams
* Skype: used for communication and meeting
* Visual Studio 2012: used to implement recognition module.
* Eclipse Juno 4.4, Android SDK 22.0.5, ADT 22.0.5 & JDK 7u25: used to implement mobile application.
* Google Code & TortoiseSVN: used for source control.

## Project organization

### Software Process Model

Project is developed under agile model.

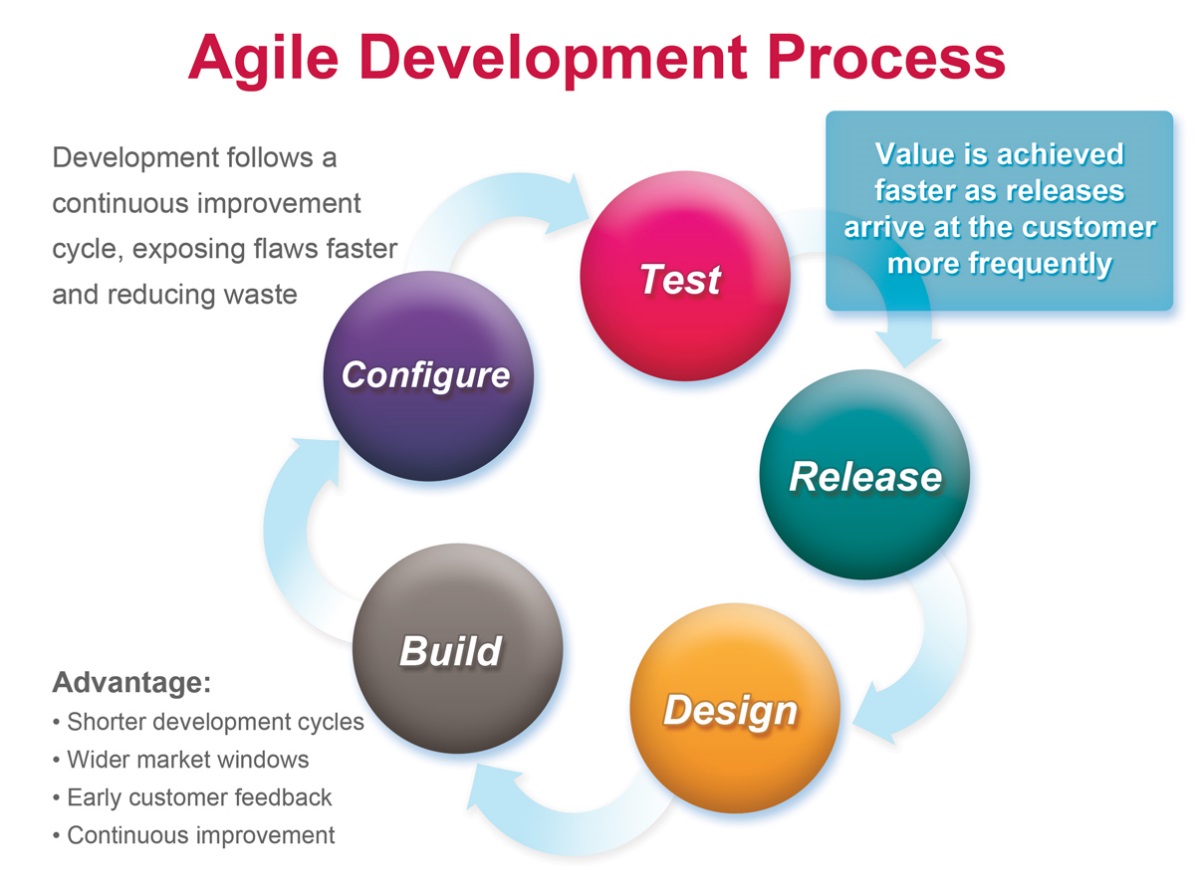


Figure 1: Agile Development Model

### Roles and responsibilities

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Full name** | **Role in Group** | **Responsibilities** |
| **1** | Kiều Trọng Khánh | Project manager | * Specify user requirement * Control the development process * Give out technique and business analysis support |
| **2** | Mai Văn Tân | Team Leader, BA, DEV, Tester | * Managing process * Designing database * Clarifying requirements * Prepare documents * GUI Design * Create test plan * Coding * Testing |
| **3** | Bùi Việt Phong | Team Member, BA, DEV, Tester | * Designing database * Clarifying requirements * Prepare documents * GUI Design * Create test plan * Coding * Testing |
| **4** | Hồ Đắc Nghĩa | Team Member, BA, DEV, Tester | * Designing database * Clarifying requirements * Prepare documents * GUI Design * Create test plan * Coding * Testing |
| **5** | Trần Lê Tuấn | Team Member, BA, DEV, Tester | * Designing database * Clarifying requirements * Prepare documents * GUI Design * Create test plan * Coding * Testing |

Table 4: Roles and Responsibility Details

### Tools and Techniques

- Front-end technologies: HTML5, CSS3, JavaScript, jQuery, AJAX.

- Back-end: Website: MVC3

- Web Service: Axis2

- Mobile App: Android - Java.

- Web Server: Tomcat 7.0.

- Database Management System: MySql

## Project Management Plan

### Iteration

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Phase**  **/Iteration** | **Description** | **Deliverables** | **Resource needed** | **Dependencies and Constrains** | **Risks** |
| **Preliminary Investigation or Analysis** | - Study similar existing systems.  -Identify and clarify requirements for the system in general. | -Introduction of proposed system.  -Main functions.  -Project Iteration Plan. | 30 man-days | N/A | Project may  not be feasible  for developing  because lack of technologies  and/or data |
| **Traffic Sign Detect & Recognize** | - Study traffic sign detect and recognize algorithm.  - Implement, testing and statistic result.  - Optimize algorithm. | Traffic sign detect and recognize console app. | 25 man-days | N/A | Lack of experience.  The implemented algorithm is not the best.  Lack of test data |
| **Web Service Implement** | -Create and deploy the web service on server. Provide RestFul service. | Web service |  | Depend on “**Traffic Sign Detect & Recognize**” | Lack of experience on making and deploying web service. |
| **Web Application** |  |  |  | Depend on “**Web Service Implement**” | Lack of experience on Android development. |
| **Mobile Application** | - Study Android development.  - Implement and testing application.  - Fix bug and optimize app. | Mobile application run on android device. |  | Depend on “**Web Service Implement**” | Lack of experience on Android development. |

Table 4: Iteration

### Iteration Detail

#### Phase 1: Preliminary Investigation or Analysis

|  |  |  |
| --- | --- | --- |
| **Task** | **Description** | **Author** |
| **1. Identifying and studying existing systems** | Find which systems currently provide similar service, their strengths and weakness. | TanMV, PhongBV, NghiaHD, TuanTL |
| **2. Identifying and clarifying main functions.** | Define which main functions system should provide. | TanMV, PhongBV, NghiaHD, TuanTL |
| **3. Introduction.** | Complete Introduction Report. | TanMV, PhongBV, NghiaHD, TuanTL |
| **4. Project Management**  **Plan.** | Prepare Project  Management Plan. | TanMV |
| **5. Website Prototype.** | Build a prototype of proposed system (Website). | TuanTL |
| **6. Mobile Prototype.** | Build a prototype of proposed system (Mobile App). | PhongBV |
| **7. Design diagram.** | Design diagram. | TanMV, PhongBV, NghiaHD, TuanTL |

Table 5: Phase 1: Preliminary Investigation or Analysis

#### Phase 2: Traffic Sign Detect & Recognize

|  |  |  |
| --- | --- | --- |
| **Task** | **Description** | **Author** |
| **1. Identifying Requirement and Planning** | Which feature this function  should have and how to  implement. | TanMV |
| **2. Studying Traffic Sign Detection & Recognition Algorithm** | Studying algorithm, implement by using library OpenCV | TanMV |
| **3. Extract Face from Image** | Find the traffic sign in images, extract them for later use | TanMV |
| **4. Recognize Face** | From the input traffic sign, find out what the traffic sign belong to | TanMV |
| **5. Optimize** | Optimize the implement for more performance and accuracy | TanMV |
| **6. Implement GUI** | Create the interface for extracting and storing traffic sign | TanMV |
| **7. Testing** | Test system behavior and  performance  Test user behavior and  performance | TanMV, PhongBV, NghiaHD, TuanTL |
| **8. Document** | Adding SRS, SDD,  Installation Guide, Manual  Guide | TanMV, PhongBV, NghiaHD, TuanTL |

Table 6: Phase 2: Traffic Sign Detect & Recognize

#### Phase 3: Web Service Implement

|  |  |  |
| --- | --- | --- |
| **Task** | **Description** | **Author** |
| **1. Identifying Requirement and Planning** | Which feature this function should have and how to implement. | TanMV, PhongBV, NghiaHD, TuanTL |
| **2. Study Web service development** | Studying the create and use web service | NghiaHD |
| **3. Register** | Allow guest to register | NghiaHD |
| **4. Login** | Allow user to login | NghiaHD |
| **5. Traffic Sign Recognize From Submit Image** | - Receive submit image, process, return result back to client. | NghiaHD |
| **6. Manage Account** | - Allow admin to add/edit/delete account. | NghiaHD |
| **7. Configure System** | - Allow admin to configure system. | NghiaHD |
| **8. Training Traffic Sign** | - Allow staff to add/edit/delete traffic sign. | NghiaHD |
| **9. Manage Report** | - Allow staff to manage report.  - User can send report | NghiaHD |
| **10. List History** | - Allow user to view/delete search history. | NghiaHD |
| **11. Favorite** | - Allow user to view/delete favorite items. | NghiaHD |
| **12. Manual Search** | - Allow user or guest view/search traffic sign by category. | NghiaHD |
| **13. Testing** | Test system behavior and  performance  Test user behavior and  performance | TanMV, PhongBV, NghiaHD, TuanTL |
| **14. Document** | Adding SRS, SDD,  Installation Guide, Manual  Guide | TanMV, PhongBV, NghiaHD, TuanTL |

Table 7: Phase 3: Student Management

#### Phase 4: Web Application

|  |  |  |
| --- | --- | --- |
| **Task** | **Description** | **Author** |
| **1. Identifying Requirement and Planning** | Which feature this function should have and how to implement. | TanMV, PhongBV, NghiaHD, TuanTL |
| **2. Study Web** | Studying the create web | TuanTL |
| **3. Register** | Allow guest to register | TuanTL |
| **4. Login** | Allow user to login | TuanTL |
| **5. Upload Image** | - Allow user upload image for recognize. | TuanTL |
| **6. Manage Account** | - Allow admin to add/edit/delete account. | TuanTL |
| **7. Configure System** | - Allow admin to configure system. | TuanTL |
| **8. Training Traffic Sign** | - Allow staff to add/edit/delete traffic sign. | TuanTL |
| **9. Manage Report** | - Allow staff to manage report.  - User can send report | TuanTL |
| **10. List History** | - Allow user to view/delete search history. | TuanTL |
| **11. Favorite** | - Allow user to view/delete favorite items. | TuanTL |
| **12. Manual Search** | - Allow user or guest view/search traffic sign by category. | TuanTL |
| **13. Testing** | Test system behavior and  performance  Test user behavior and  performance | TanMV, PhongBV, NghiaHD, TuanTL |
| **14. Document** | Adding SRS, SDD,  Installation Guide, Manual  Guide | TanMV, PhongBV, NghiaHD, TuanTL |

Table 8: Phase 4: Web Application

#### Phase 5: Mobile Application

|  |  |  |
| --- | --- | --- |
| **Task** | **Description** | **Author** |
| **1. Identifying Requirement and Planning** | Which feature this function should have and how to implement. | TanMV, PhongBV, NghiaHD, TuanTL |
| **2. Study Mobile development** | Studying the create and use web service | PhongBV |
| **3. Register** | Allow guest to register | PhongBV |
| **4. Login** | Allow user to login | PhongBV |
| **5. Traffic Sign Recognize From Taken Image** | - Receive submit image, process, return result back to client. | PhongBV |
| **6. Send Report** | - User can send report | PhongBV |
| **7. List History** | - Allow user to view/delete search history. | PhongBV |
| **8. Favorite** | - Allow user to view/delete favorite items. | PhongBV |
| **9. Manual Search** | - Allow user or guest view/search traffic sign by category. | PhongBV |
| **10. Testing** | Test system behavior and  performance  Test user behavior and  performance | TanMV, PhongBV, NghiaHD, TuanTL |
| **11. Document** | Adding SRS, SDD,  Installation Guide, Manual  Guide | TanMV, PhongBV, NghiaHD, TuanTL |

Table 9: Phase 5: Mobile Application

### All Meeting Minutes

Refer to Meeting Minutes folder.

## Coding Convention

Java: Using to develop Android App, website and Web service.

Summary:

* Naming Convention.
* Indentation.
* Declaration.
* Code Examples

Follow “Code Conventions for the Java TM Programming Language, by Sun Microsystems, rev April 20, 1999”.

C++ Using to develop website and web service.

Summary:

* Naming Convention.
* Layout Convention.
* Commenting Convention.
* Language Guidelines

Using C# Code Convention From:

<http://msdn.microsoft.com/en-us/library/vstudio/ff926074.aspx>