**Software Requirements Specification**

**DevOps Group 3**

**Team Members: Harene d/o Pandi Raj (p2315788)**

**Ezell Low Qing Wei (p2315618)**

**Edward Ti Zhi Hao (p2220400)**

**Lim Jia Ning Vera (p2209278)**

Table of Contents

[1. Purpose 2](#_Toc14127)

[1.1. Intended Audience 2](#_Toc14128)

[1.2. Intended Use 2](#_Toc14129)

[1.3. Scope 2](#_Toc14130)

[1.4. Definitions and Acronyms 2](#_Toc14131)

[2. Overall System Description 3](#_Toc14132)

[2.1. Use Case Diagrams 3](#_Toc14133)

[2.2. System Architecture 4](#_Toc14134)

[2.3. Functional Requirements 5](#_Toc14135)

[2.3.1. Start Up and Main Menu 5](#_Toc14136)

2.3.2. Log in to website and start the car ..................................................................................... 8

2.3.3. Lock/Unlock car door and aircon control ........................................................................... 9

2.3.4. Car Theft Warning ………………………………………………………………………………………………………… 11

2.3.5. Remote Access .................................................................................................................. 13

2.3.6. Authentication Services ..................................................................................................... 14

2.4. Non-Functional Requirements ................................................................................................. 15

2.4.1. Power Management ......................................................................................................... 15

1. Software Architecture .................................................................................................................... 16

3.1. Static Software Architecture ..................................................................................................... 16

# Purpose

## Intended Audience

This SRS document describes the System Requirements and Software Design for a Vehicle Security and Telematics System and the target audience are System and Software Engineers working on the development of this project.

## Intended Use

The SRS defines the overall System Architecture and Requirements as well as the Software

Architecture and Design. This document also contains the definition of the System Requirements which shall be used as the input for System Test cases and Software Unit Test cases.

## Scope

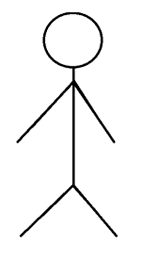
## Definitions and Acronyms

|  |  |
| --- | --- |
| **Acronym** | **Description** |
| IR | Infra Red |
| LED | Light Emitting Diode |
| NFC | Near Field Communication |
| SW | Software |
| HW | Hardware |

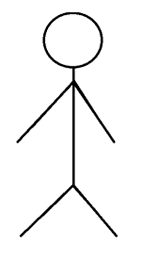
# Overall System Description

## Use Case Diagrams

Vehicle Security System



User



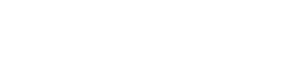
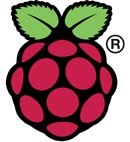
Website

## System Architecture

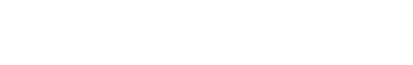
The System Architecture

User interface

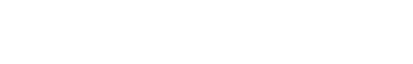
(website)



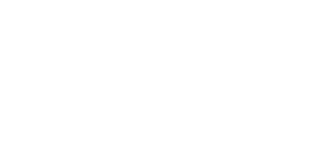
DC Motor



Buzzer



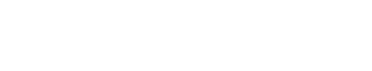
Temperature and Humidity Sensor



RFID

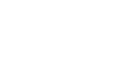
Card

Reader

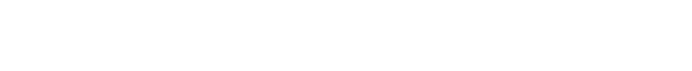


SPI\_

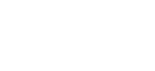
ADC\_CH01



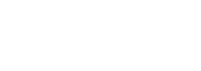
I2C



**Raspberry Pi Development Board**

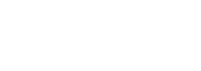


GPIO



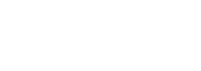
GPIO

23



GPIO

26



GPIO

24

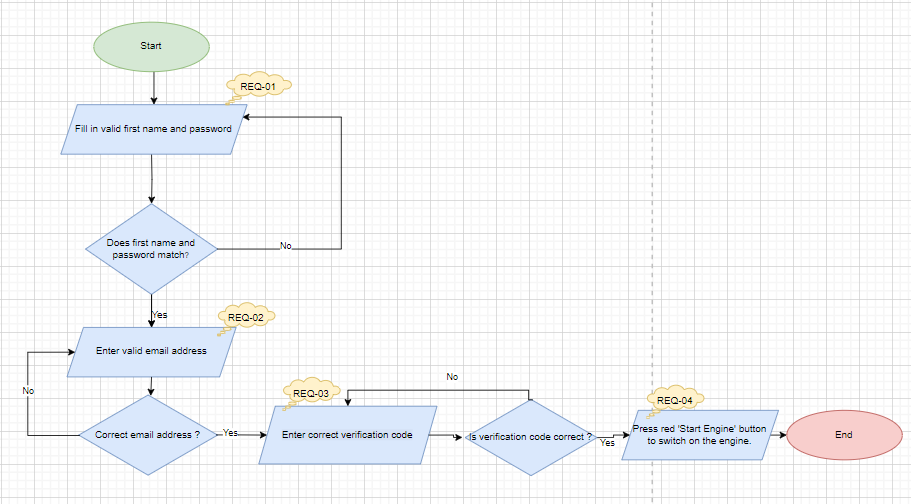
## Functional Requirements

### Start Up and Main Menu

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-01 | When the website is accessed for the first time, it will show a sign up page.  “Email Address: ”  “First name: ”  “Password: ”  “Password (Confirm): ”  “Verification Code:” |
| REQ-02 | Once the sign up page is filled in, the website redirects to the login page.  “Email address: ”  “Password: ” |
| REQ-03 | If users’ email address and password is typed correctly, a verification code will be sent to their email, and will be prompted to enter the verification code.    “Verification Code:” |
| REQ-04 | When the car app is first logged in, the user can press the red button “start engine” to switch on the engine. |
| REQ-05 | If the “start engine” button is pressed, the following menu options will be displayed on the web interface.    “Car Temperature: “  “Fuel level: “  “Theft Warning: Not Triggered ”  “Car door: Lock, Unlock”  “Air conditioning Temperature:” |
| REQ-06 | In the main menu defined in REQ-05, if the option “Lock” is selected, the web interface should display in red,  “Lock” |
| REQ-07 | In the main menu defined in REQ-05, if the option “Unlock” is selected, the web interface should display in red  “Unlock” |
| REQ-08 | In the main menu defined in REQ-08, the desired temperature entered, will be displayed on the web interface and LED turns on to a certain brightness.  “Airconditioning temperature \_\_\_\_\_ ” |
| REQ-09 | In the main menu defined in REQ-05, if all doors of the car are locked and the door is forcefully opened, it will trigger the car alarm to sound and the web interface should display the menu options with the new following text:  “Car Temperature: “  “Fuel level: “  “Theft Warning: Triggered ”  “Car door: Lock, Unlock”  “Air conditioning Temperature: ” |
| REQ-10 | In the main menu defined in REQ-05, if the option “Enter” is selected for car temperature, the web interface should display the current car temperature  “29 degrees” |
| REQ-11 | In the main menu defined in REQ-05, if the option “Enter” is selected for fuel level, the web interface should display the current car fuel level.  “High” |

### Log in to website and starting the car

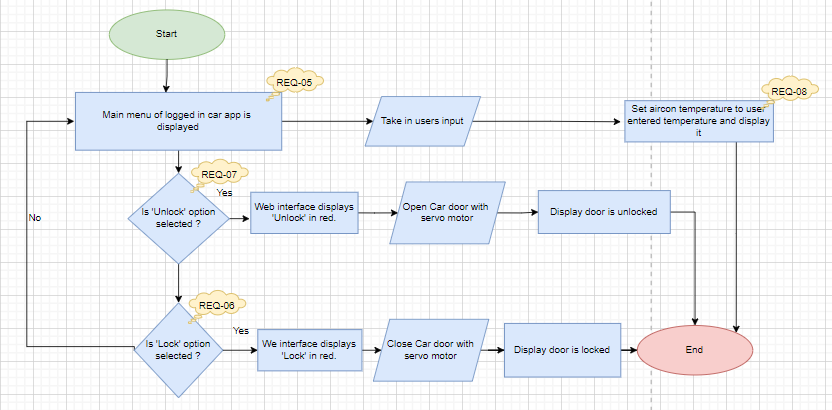
|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-02 | When the website is accessed, it will show a login page.  “Email address: ”  “Password: ” |
| REQ-03 | If users’ email address and password is typed correctly, a verification code will be sent to their email, and will be prompted to enter the verification code.    “Verification Code:” |
| REQ-04 | When the car app is first logged in, the user can press the red button “start engine” to switch on the engine. |



**Figure 1**

2.3.3 Lock/Unlock car door and aircon control

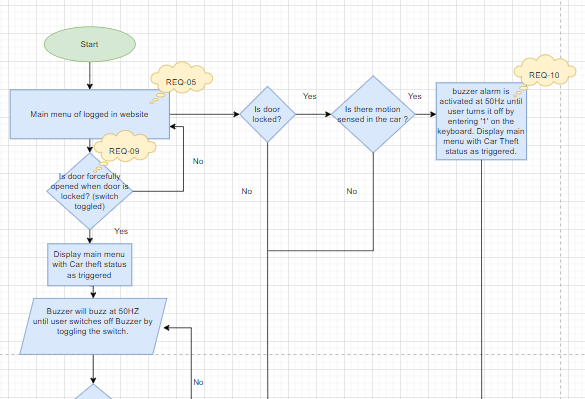
|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-05 | In the main menu defined in REQ-04, if the option “start engine” is selected on the keyboard, then the following menu shall be displayed on the web interface.    “Car Temperature: “  “Fuel level: “  “Theft Warning: Not Triggered ”  “Car door: Lock, Unlock”  “Air conditioning Temperature: ” |
| REQ-06 | In the main menu defined in REQ-05, if the option “Lock” is selected, the web interface should display in red,  “Lock” |
| REQ-07 | In the main menu defined in REQ-05, if the option “Unlock” is selected, the web interface should display in red  “Unlock” |
| REQ-08 | In the main menu defined in REQ-08, the desired temperature entered, will be displayed on the web interface and LED turns on to display a certain brightness.  “Airconditioning temperature \_\_\_\_\_ ” |



**Figure 2**

2.3.4 Car theft warning

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-05 | In the main menu defined in REQ-04, if the option “start engine” is selected on the keyboard, then the following menu shall be displayed on the web interface.    “Car Temperature: “  “Fuel level: “  “Theft Warning: Not Triggered ”  “Car door: Lock, Unlock”  “Air conditioning Temperature: ” |
| REQ-09 | In the main menu defined in REQ-05, if all doors of the car are locked and the door is forcefully opened, it will trigger the car alarm to sound and the web interface should display the menu options with the new following text:  “Car Temperature: “  “Fuel level: “  “Theft Warning: Triggered ”  “Car door: Lock, Unlock”  “Air conditioning Temperature: ” |
| REQ-10 (extra implementation) | In the main menu defined in REQ-05, if all the doors of the car are locked and there is movement detected inside the car, it will trigger the car alarm to sound and the web interface should display the menu options with the new following text:    “Car Temperature: “  “Fuel level: “  “Theft Warning: Triggered ”  “Car door: Lock, Unlock”  “Air conditioning Temperature: ” |



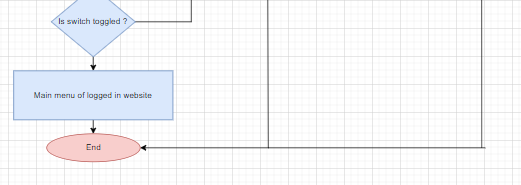


Figure 3

2.3.5 Remote Access

The Vehicle Security and Telematics System supports “Remote Access” to monitor vehicle functions, set events, and control remotely.

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-02 | Implement user authentication using login credentials (email address and password) for accessing the vehicle remotely. |
| REQ-03 | Support Two-Factor Authentication (2FA) for enhanced security during login. |
| REQ-04 to 11 | Enable remote control functionalities for the driver website, including:   * REQ-04: Starting the car engine. * REQ-05: Displaying main menu. * REQ-06 & 07: Controlling door ‘Lock’ & ‘Unlock’ status. * REQ-08: Controlling air conditioning. * REQ-09 &10: Car break in triggers. * REQ-11 & 12: Monitoring car fuel status and car temperature. |
| REQ-04 | Start the car engine |
| REQ-05 | Display the whole main menu. |
| REQ-06 | Controlling door ‘Lock’ status. |
| REQ-07 | Controlling door ‘Unlock’ status. |
| REQ-08 | Control the air conditioning temperature in the car. |
| REQ-09 | Implement an alarm system that triggers when any door is forcefully opened while all doors are locked. Notify the user via their smartphone on a website of a possible theft attempt. |
| REQ-10 | Extra implementation of alarm system that instead triggers when there is motion detected inside the car while all the doors are locked. Notify the user via their smartphone on a website of a possible theft attempt. |
| REQ-11 | Monitor the current fuel status of the car. |
| REQ-12 | Monitor the current temperature of the car. |
| REQ-13 | Enable the sharing of the vehicle with at least two different drivers using separate RFID cards. |
| REQ-04 ?? | Require RFID authentication for starting the car engine. Each vehicle supports a maximum of three registered RFID cards at any time. |

2.3.6 Authentication Services

In the car application, user authentication is required before accessing its functionalities. This involves a two-step authentication process to ensure user identity verification.

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-01 | Upon launching the web application: The web interface shall display a sign up screen prompting users to enter their credentials.  The sign up screen shall include fields for first name, password, confirm password, email address and verification code. |
| REQ- 02 | After signing up, the web interface shall display a login screen prompting users to enter their credentials.  The login screen shall include fields for email address and password. |
| REQ- 03 | If users’ email address and password is typed correctly, a verification code will be sent to their email, and will be prompted to enter the verification code.    “Verification Code:” |

2.4. Non-Functional Requirements

1. Software Architecture

3.1. Static Software Architecture

The Software Architecture defines the various Software Components that are developed to realize the implementation of the system requirements.

tempandhumidity\_checker.py

fuel.py



**Application**

**Layer**

DoorForcedOpen.py

Username\_checker.py

password\_checker.py

EngineStarter.py

TempandHumidityaircon.py

DoorLock\_Unlock.py

**Hardware Abstraction Layer (HAL)**

DHT11

Thermostat

Wifi

LED

Moisture Sensor

RFID cards

Servo motor

Buzzer