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# Document Version

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Update | Name | Date | Version |
| 1. | Initial version |  |  | 1.0 |
| 2. | Updated Requirements and specs | Tony | 11/8/2024 | 2.0 |

# Purpose

## Intended Audience

This SRS document describes the System Requirements and Software Design for an Automated Gardening system, and the target audience is Government Officials In line with the Singapore government’s “30 by 30” goal to produce 30% of food locally in Singapore by 2030

## 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

Monitoring Services

Counter measure services

Dashboard

Automated Gardening System

Mobile Phone

Plant

To tell user about that the  
countermeasure system

Is online.

## System Architecture



Servo/DC

Motor

Fan

Ambient Temperature sensor

SPI\_ADC\_CH01

LCD

I2C

**Raspberry Pi Development Board**

UV Light

(LED)

EC Level

Sensor

Light Intensity  
Sensor

Relative Humidity Sensor

pH level Sensor

Flask

Dashboard

## Functional Requirements

### Dashboard

Flask and Socketio

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-01 | Retrieve Sensor Data from RPI |
| REQ-02 | Dynamic Update from dashboard |
| REQ-03 | Visual Warnings when temperature or pH level too High/Low |

A screenshot of a computer

Description automatically generated

A chart with a line on it

Description automatically generated

### Function pH

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-04 | Registering of Input of pH levels from Keypad |
| REQ-05 | Display and Upload of ph Value Data |

Start

REQ - 04

Input pH levels using the keypad

Display pH levels in screen

&

Upload data to Flask

REQ - 05

### Function Temperature

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-06 | Measuring Temperature via sensor |
| REQ-07 | Display temperature on LCD & Upload of data to flask dashboard |
| REQ-08 | Temperature Detection of above 25 degrees |
| REQ-09 | Fan activation upon temperature exceed |

Start

REQ - 06

Temperature sensor measure temperature

Temperature >25°C

REQ - 07

The fan will be off

The fan will be activated.

Display temperature in screen

&

Upload data to Flask

REQ - 08

**N**

**Y**

DC motor switches on

DC motor switches off

REQ - 09

REQ - 09

### Function Humidity

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-10 | Sensor Measure Humidity, Display and upload data to flask dashboard |

Start

Humidity sensor measure humidity

Humidity sensor measure humidity

REQ – 10

Display humidity in screen

&

Upload data to Flask

### 2.3.4. Function Light Intensity

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ-11 | Measurement of light intensity using sensor |
| REQ-12 | LUX measurement on LCD and data uploaded to flask server |
| REQ-13 | UV light activation when lux is lower than 4 lux |

Start

LDR measure Light Intensity

REQ - 11

LDR measure Light Intensity

REQ - 12

Display Light Intensity in screen

&

Upload data to Flask

Lux < 4

The LED will be activated.

**Y**

**N**

The LED will be switched off

REQ - 13

REQ - 13

REQ - 13

### Function Electrical Conductivity (EC)

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ - 14 | EC level measurement via sensor |
| REQ-15 | Display EC data on LCD display and upload data to flask server |
| REQ-16 | Verify if EC values fall between 1.0 – 2.5 |
| REQ-17 | Servo motor to dispense solution if EC values is out of range |

Start

REQ - 14

Potentiometer   
changes

Does EC levels fall between 1.0 and 2.5

REQ - 15

Solution will be dispensed into the plants

Display electrical conductivity in screen & Upload data to Flask

Solution will not be dispensed into the plants

Servo Motor remains at 0 degrees to not let solution out

**N**

**Y**

Servo Motor turns 90 degrees to let solution out

REQ - 16

REQ - 17

REQ - 17

## Non-Functional Requirements

### Non-Functional Requirement

|  |  |
| --- | --- |
| **REQ\_ID** | **Requirement** |
| REQ - 18 | Displays the dashboard on the mobile application |
| REQ - 19 | From REQ – 18, when the pH levels display is clicked, a more detailed representation of the pH levels would be shown on a new page (Changes over time with values, etc.). |
| REQ - 20 | From REQ – 18, when the Temperature display is clicked, a more detailed representation of the Temperature (Changes over time with values, etc.) and when was the fan switched on would be shown on a new page. |
| REQ – 21 | From REQ – 18, when the Humidity display is clicked, a more detailed representation of the Humidity (Changes over time, etc.) would be shown on a new page. |
| REQ - 22 | From REQ – 18, when the Light Intensity display is clicked, a more detailed representation of the Light Intensity (Changes over time, etc.) and at what time was the LED lit up would be shown on a new page. |
| REQ - 23 | From REQ – 18, when the Electrical Conductivity (EC) levels display is clicked, a more detailed representation of the EC levels (Changes over time, etc.) and when was the solution dispensed into the plants would be shown on a new page. |

# Software Architecture

## Static Software Architecture

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

**Light Intensity**

**EC**

**Relative humidity tempeRelative humidity**

**Application Layer**

**Hardware Abstraction Layer (HAL)**

**ADC**

**Keypad**

**NFC**

**Servo**

**Tempsens**

**RainSens**

**PH levels**

**BlackCoffee**

**Light intensity**

**Temperature**

**HotWater**

**EC levels**

**BlackCoffee**

**Light intensity**