LED String Animation

PO5\_LSAN

**Software Requirements Specification Document**

Document status

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Author | Date | Status |
| v.06 | Mohanad Sallam | 07/02/2020 | proposed |

Document history

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Author | Date | Change description |
| v.01 | Mohanad Sallam | 23/1/2020 | Create initial draft |
| v.02 | Mohanad Sallam  Sarah AbdelRahman | 29/01/2020 | Adding requirements |
| v.03 | Sarah Abdelrahman | 29/01/2020 | Adding requirements, System features and system interfaces |
| v.04 | Mohanad Sallam | 04/02/2020 | Removing Unused tittles,  Changing ID colors and Removing curly brackets |
| v.05 | Mohanad Sallam  Sarah AbdelRahman | 07/02/2020 | Updating requirements, System features and system interfaces |
| v.06 | Mohanad Sallam | 07/02/2020 | Update requirement 12 & 13, Removing system feature section. |
| v.07 | Sarah AbdelRahman | 07/02/2020 | Update block diagram |

Contents

[1.0 Introduction 3](#_Toc31977273)

[1.1 Purpose 3](#_Toc31977274)

[1.2 Project Description 3](#_Toc31977275)

[1.3 Block diagram 3](#_Toc31977276)

[2.0 The Overall Description 3](#_Toc31977277)

[2.1 User Needs 3](#_Toc31977278)

[2.2 Product perspective 4](#_Toc31977279)

[2.2.1 System interfaces 4](#_Toc31977280)

[2.2.2 Interfaces 4](#_Toc31977281)

[3.0 Specific Requirements 4](#_Toc31977282)

[3.1 Requirements Description 4](#_Toc31977283)

[3.2 Requirements Tables 6](#_Toc31977284)

# Introduction

## Purpose

This is a v.02 of the requirements specifications for a LED String Animation.

## Project Description

This project consists of strings of LEDs in a certain pattern. The LEDs turn on/off based on input signals. The LEDs structure consists of two parts Tail and TI. Each Part will be activated according to the corresponding switches.

At Startup Mode there are two options (Modes):

First mode: LEDs shall turn-on from L6 to L1, then from R1 to R6 and vice versa, and then all LEDs are ON and OFF.

Second mode: LEDS from R1 to R6 are ON LED by LED and also the left branch at the same time, and then repeat the scenario again.

## Block diagram



# 2.0 The Overall Description

## 2.1 User Needs

- Control the system through buttons

- Change the startup mode when needed

## 2.2 Product perspective

### 2.2.1 System interfaces

The system consists of 3 subsystems each has its own functionality:

1. Controls TI LEDs
2. Controls Tail LEDs
3. Sets the Startup mode

### 2.2.2 Interfaces

A unique signal is sent to the controller each controls one of the functionality.

# 3.0 Specific Requirements

## 3.1 Requirements Description

**[Req \_ SELECT WELCOME MODE \_PO5\_SRS \_ 001 \_ v01]**

A signal is sent from switch to the controller to determine the startup mode. If switch is on   
the first mode is selected and if the switch is off the second mode is selected.

(Req \_ SELECT WELCOME MODE \_PO5\_CYRS \_ 001 \_ v01)

**[Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 002\_ v01]**

The L leds will turn-on in the following sequence:

1. L6 will only turn-on for 200ms.
2. L5 will only turn-on for 200ms.
3. L4 will only turn-on for 200ms.
4. L3 will only turn-on for 200ms.
5. L2 will only turn-on for 200ms.
6. L1 will only turn-on for 200ms.

(Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01)

**[Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 003\_ v01]**

The R LEDs will turn-on in the following sequence:

1. R1 will only turn-on for 200ms.
2. R2 will only turn-on for 200ms.
3. R3 will only turn-on for 200ms.
4. R4 will only turn-on for 200ms.
5. R5 will only turn-on for 200ms.
6. R6 will only turn-on for 200ms.

(Req \_ SEQUENCE OF WELCOME MODE ONE\_PO5\_CYRS \_ 002 \_ v01)

**[Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 004\_ v01]**

All LEDs will turn-off for 200ms.

(Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01)

**[Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 005\_ v01]**

The R LEDs will turn-on in the following sequence:

1. R6 will only turn-on for 200ms.
2. R5 will only turn-on for 200ms.
3. R4 will only turn-on for 200ms.
4. R3 will only turn-on for 200ms.
5. R2 will only turn-on for 200ms.
6. R1 will only turn-on for 200ms.

(Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01)

**[Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 006\_ v01]**

The L leds will turn-on in the following sequence:

1. L1 will only turn-on for 200ms.
2. L2 will only turn-on for 200ms.
3. L3 will only turn-on for 200ms.
4. L4 will only turn-on for 200ms.
5. L5 will only turn-on for 200ms.
6. L6 will only turn-on for 200ms.

(Req SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01)

**[Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 007\_ v01]**

All LEDs will turn-off for 200ms.

(Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01)

**[Req SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 008\_ v01]**

All LEDs will turn-on for 300ms.

(Req SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01)

**[Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 009\_ v01]**

All LEDs will turn-off.

(Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01)

**[Req \_ SEQUENCE OF WELCOME MODE TWO \_PO5\_SRS \_ 010\_ v01]**

The L leds and R LEDs will turn-on in the following sequence:

1. L1 and R1 will only turn-on for 200ms.
2. L2 and R2 will only turn-on for 200ms.
3. L3 and R3 will only turn-on for 200ms.
4. L4 and R4 will only turn-on for 200ms.
5. L5 and R5 will only turn-on for 200ms.
6. L6 and R6 will only turn-on for 200ms.

(Req \_ SEQUENCE OF WELCOME MODE TWO ONE \_PO5\_CYRS \_ 003 \_ v01)

**[Req \_ SEQUENCE OF TAIL FUNCTION \_PO5\_SRS \_ 011\_ v01]**

Tail switch will determine the Tail LED’s status. If the Tail switch is pressed, the tail LEDs will turn-on and if tail switch is released, the Tail LEDs will turn-off.

(Req \_ SEQUENCE OF TAIL FUNCTION \_PO5\_CYRS \_ 004 \_ v01)

**[Req \_ SEQUENCE OF TI FUNCTION RIGHT \_PO5\_SRS \_ 012\_ v02]**

The right TI switch will turn-on the R LEDs based on the following sequence:

1. R1 will only turn-on for 200ms.
2. R2 will only turn-on for 200ms.
3. R3 will only turn-on for 200ms.
4. R4 will only turn-on for 200ms.
5. R5 will only turn-on for 200ms.
6. R6 will only turn-on for 200ms.

And repeat the scenario till the switch is released.

(Req \_ SEQUENCE OF TI FUNCTION RIGHT \_PO5\_CYRS \_ 005 \_ v01)

**[Req \_ SEQUENCE OF TI FUNCTION LEFT \_PO5\_SRS \_ 013\_ v02]**

The left TI switch will turn-on the L LEDs based on the following sequence:

1. L1 will only turn-on for 200ms.
2. L2 will only turn-on for 200ms.
3. L3 will only turn-on for 200ms.
4. L4 will only turn-on for 200ms.
5. L5 will only turn-on for 200ms.
6. L6 will only turn-on for 200ms.

And repeat the scenario till the switch is released.

(Req \_ SEQUENCE OF TI FUNCTION LEFT\_PO5\_CYRS \_ 006 \_ v01)

## 3.2 Requirements Tables

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | Req \_ SELECT WELCOME MODE \_PO5\_SRS \_ 001 \_ v01 | | |
| **Covers** | Req \_ SELECT WELCOME MODE \_PO5\_CYRS \_ 001 \_ v01 | **Test Scope** | ITD |
| **Input** | Switch Signal | **Output** | Mode |
| **Description** | To select startup mode:  - If switch is on the first mode is selected.  - If the switch is off the second mode is selected. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 002 \_ v01 | | |
| **Covers** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01 | **Test Scope** | ITD |
| **Input** | None | **Output** | L LEDs sequence |
| **Description** | Turn-on L LEDs in the following sequence:   1. L6 will only turn-on for 200ms. 2. L5 will only turn-on for 200ms. 3. L4 will only turn-on for 200ms. 4. L3 will only turn-on for 200ms. 5. L2 will only turn-on for 200ms. 6. L1 will only turn-on for 200ms. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 003 \_ v01 | | |
| **Covers** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01 | **Test Scope** | ITD |
| **Input** | None | **Output** | R LEDs sequence |
| **Description** | Turn-on R LEDs in the following sequence:   1. R1 will only turn-on for 200ms. 2. R2 will only turn-on for 200ms. 3. R3 will only turn-on for 200ms. 4. R4 will only turn-on for 200ms. 5. R5 will only turn-on for 200ms. 6. R6 will only turn-on for 200ms. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 004 \_ v01 | | |
| **Covers** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01 | **Test Scope** | ITD |
| **Input** | None | **Output** | Turn-off LEDs |
| **Description** | Turn-off all LEDs for 200ms. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 005 \_ v01 | | |
| **Covers** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01 | **Test Scope** | ITD |
| **Input** | None | **Output** | R LEDs sequence |
| **Description** | Turn-on R LEDs in the following sequence:   1. R6 will only turn-on for 200ms. 2. R5 will only turn-on for 200ms. 3. R4 will only turn-on for 200ms. 4. R3 will only turn-on for 200ms. 5. R2 will only turn-on for 200ms. 6. R1 will only turn-on for 200ms. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 006 \_ v01 | | |
| **Covers** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01 | **Test Scope** | ITD |
| **Input** | None | **Output** | L LEDs sequence |
| **Description** | Turn-on L LEDs in the following sequence:   1. L1 will only turn-on for 200ms. 2. L2 will only turn-on for 200ms. 3. L3 will only turn-on for 200ms. 4. L4 will only turn-on for 200ms. 5. L5 will only turn-on for 200ms. 6. L6 will only turn-on for 200ms. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 007 \_ v01 | | |
| **Covers** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01 | **Test Scope** | ITD |
| **Input** | None | **Output** | Turn-off LEDs |
| **Description** | Turn-off all LEDs for 200ms. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 008 \_ v01 | | |
| **Covers** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01 | **Test Scope** | ITD |
| **Input** | None | **Output** | Turn-off LEDs |
| **Description** | Turn-on all LEDs for 300ms. | | |
| **Req ID** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_SRS \_ 009 \_ v01 | | |
| **Covers** | Req \_ SEQUENCE OF WELCOME MODE ONE \_PO5\_CYRS \_ 002 \_ v01 | **Test Scope** | ITD |
| **Input** | None | **Output** | Turn-off LEDs |
| **Description** | Turn-off all LEDs. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | Req \_ SEQUENCE OF WELCOME MODE TWO \_PO5\_SRS \_ 010 \_ v01 | | |
| **Covers** | Req \_ SEQUENCE OF WELCOME MODE TWO \_PO5\_CYRS \_ 003 \_ v01 | **Test Scope** | ITD |
| **Input** | None | **Output** | L LEDs and R LEDs sequence |
| **Description** | Turn-on L LEDs in the following sequence:   1. L1 and R1 will only turn-on for 200ms. 2. L2 and R2 will only turn-on for 200ms. 3. L3 and R3 will only turn-on for 200ms. 4. L4 and R4 will only turn-on for 200ms. 5. L5 and R5 will only turn-on for 200ms. 6. L6 and R6 will only turn-on for 200ms. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | Req \_ SEQUENCE OF TAIL FUNCTION \_PO5\_SRS \_ 011 \_ v01 | | |
| **Covers** | Req \_ SEQUENCE OF TAIL FUNCTION \_PO5\_CYRS \_ 004 \_ v01 | **Test Scope** | ITD |
| **Input** | Tail Switch Signal | **Output** | Tail LEDs status |
| **Description** | To select startup mode:  - If the Tail switch is pressed, the tail LEDs will turn-on.  - If tail switch is released, the Tail LEDs will turn-off. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | Req \_ SEQUENCE OF TI FUNCTION RIGHT \_PO5\_SRS \_ 012 \_ v02 | | |
| **Covers** | Req \_ SEQUENCE OF TI FUNCTION RIGHT \_PO5\_CYRS \_ 005 \_ v01 | **Test Scope** | ITD |
| **Input** | TI Right Switch Signal | **Output** | R LEDs status |
| **Description** | * If right TI switch is pressed, Turn-on the R LEDs based on the following sequence:  1. R1 will only turn-on for 200ms. 2. R2 will only turn-on for 200ms. 3. R3 will only turn-on for 200ms. 4. R4 will only turn-on for 200ms. 5. R5 will only turn-on for 200ms. 6. R6 will only turn-on for 200ms. 7. Repeat.  * If right TI switch is released, The R LED pattern will stop. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | Req \_ SEQUENCE OF TI FUNCTION LEFT \_PO5\_SRS \_ 013 \_ v02 | | |
| **Covers** | Req \_ SEQUENCE OF TI FUNCTION LEFT \_PO5\_CYRS \_ 006 \_ v01 | **Test Scope** | ITD |
| **Input** | TI Left Switch Signal | **Output** | L LEDs status |
| **Description** | * If left TI switch is pressed, Turn-on the L LEDs based on the following sequence:  1. L1 will only turn-on for 200ms. 2. L2 will only turn-on for 200ms. 3. L3 will only turn-on for 200ms. 4. L4 will only turn-on for 200ms. 5. L5 will only turn-on for 200ms. 6. L6 will only turn-on for 200ms. 7. Repeat.  * If left TI switch is released The L LED pattern will stop. | | |