**(SRS)**

LED String Animation

Contents

[**1.** **Document History** 3](#_Toc33138863)

[**1.1.** **Revision History Table** 3](#_Toc33138864)

[**1.2.** **Current** **Document** **Status** 3](#_Toc33138865)

[**2.** **Project Description** 3](#_Toc33138866)

[**3.** **Block Diagram** 4](#_Toc33138867)

[**4.** **Feature Description** 5](#_Toc33138868)

[**4.1.** **Start Up Requirements** 5](#_Toc33138869)

[**4.2.** **Tail Function Requirements** 8](#_Toc33138870)

[**4.3. Turn Indicator (TI) Requirements** 10](#_Toc33138871)

[**5.** **Reference Documents Table** 13](#_Toc33138872)

# **Document History**

## **Revision History Table**

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Author | Date | Change |
| 1.0 | Hesham - Mahmoud Gamal - Mark | 06/02/2020 | Initial Creation |
| 1.1 | Hesham - Mahmoud Gamal | 20/02/2020 | * Document Name changed. * Adding tables for all requirements. * Removing redundant requirements. * Updating revision history table, status table and reference tables. |

## **1.2 Current Document Status**

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Status | Author | **Date** |
| 1.0 | Draft | Hesham - Mahmoud Gamal - Mark | 06/02/2020 |
| 1.1 | Draft | Hesham - Mahmoud Gamal | 20/02/2020 |

# **Project Description**

The project is composed of 3 sets of LED Strings Simulating the animation of LEDs in a Car, One set is named “Tail” and it simulates the animation of car’s back LEDs while the other 2 sets are named “Left TI” and “Right TI” is simulating the animation of left and right turn indicator in a car.

Each one of the 3 functions operates based on input signals coming from 3 switches named “Tail Switch”, “Left TI” and “Right TI” respectively in addition to “Welcome Mode” which shall operates one of 2 different modes based on the status of the mode switch. System layout is as shown in **Figure 1** below.



Figure 1: layout of the system

# **Block Diagram**

The following **Figure 2** is describing the block diagram of the overall system.

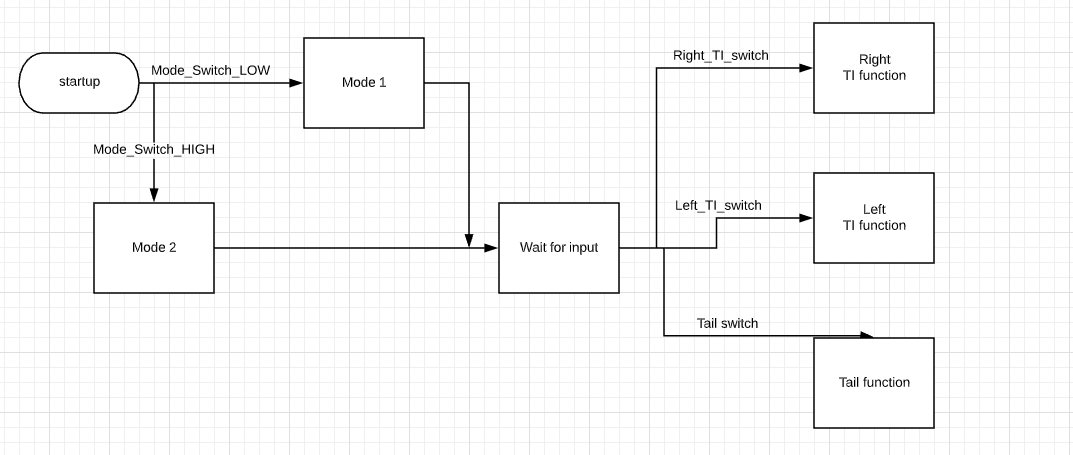


Figure 2: Block Diagram of overall system

# **Feature Description**

## **Start Up Requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_LED\_String\_1/2\_01-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_01\_V01  Covers\_ PO5\_LSAN\_ CYRS\_02\_V01 |
| Description | SW shall read the mode of the switch status. | | |
| Inputs | Mode-Switch-connected pin value (High/Low). | Outputs | Switch Status (Pressed/Released). |
| Test Scope | UTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_1\_01-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_01\_V01 |
| Description | SW shall set Mode Switch flag to TRUE to start the MODE 1 function if the switch is pressed. | | |
| Inputs | Mode Switch Status (Pressed). | Outputs | Mode Switch Flag (TRUE). |
| Test Scope | UTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_1\_02-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_01\_V01 |
| Description | SW shall start **MODE 1** which is to switch on L6 to L1, then from R1 to R6 and vice versa. Then they all should switch on and off. A small delay of **200 ms** shall be inserted between each change to be noticeable and smooth. | | |
| Inputs | Mode Switch Flag (TRUE). | Outputs | LEDs Welcome Mode1 is activated. |
| Test Scope | UTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_\_01-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_02\_V01 |
| Description | SW shall reset Mode Switch flag to FALSE to start the MODE 2 function if the switch is released. | | |
| Inputs | Mode Switch Status (released). | Outputs | Mode Switch Flag (FALSE). |
| Test Scope | UTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_\_02-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_02\_V01 |
| Description | SW shall start **MODE 2** which is to switch on the 12 pins one by one from L1 to L6, simultaneously with R1 to R6. Then repeat this scenario again. A small delay of **200ms** shall be inserted between each change to be noticeable and smooth. | | |
| Inputs | Mode Switch Flag (FALSE). | Outputs | LEDs Welcome Mode2 is activated. |
| Test Scope | UTD & VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

## **Tail Function Requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_\_01-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_03\_V01  Covers\_ PO5\_LSAN\_ CYRS\_04\_V01 |
| Description | SW shall read the tail switch status. | | |
| Inputs | Tail-Switch-connected pin value (High/Low). | Outputs | Tail Switch Status (Pressed/Released). |
| Test Scope | UTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_\_01-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_03\_V01 |
| Description | If the signal is HIGH from Tail Switch, then Tail flag shall be set to TRUE. | | |
| Inputs | Tail Switch Status (Pressed). | Outputs | Tail switch Flag (TRUE). |
| Test Scope | UTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_02-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_03\_V01 |
| Description | If the Tail flag has been set to TRUE, then Tail Pins shall be activated. | | |
| Inputs | Tail witch Flag (TRUE). | Outputs | Tail LEDs activated (ON). |
| Test Scope | UTD & VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_01-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_04\_V01 |
| Description | If the signal is LOW in the Tail switch Status, then Tail flag shall be set to FALSE. | | |
| Inputs | Tail Switch Status (released). | Outputs | Tail Switch Flag (FALSE). |
| Test Scope | UTD & VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_02-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_04\_V01 |
| Description | If the Tail flag has been set to FALSE, then Tail Pins shall be deactivated. | | |
| Inputs | Tail witch Flag (FALSE). | Outputs | Tail LEDs deactivated (OFF). |
| Test Scope | URD & VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

## **4.3. Turn Indicator (TI) Requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_01-V01 | Covers | Req\_ PO5\_LSAN\_ LED STRING ANIMATION\_05\_V01 |
| Description | SW shall read the right TI switch pin status. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Start Function |
| Test Scope | UTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_02-V01 | Covers | Req\_ PO5\_LSAN\_ LED STRING ANIMATION\_05\_V01 |
| Description | If the signal is HIGH in the TI switch right pin, then right pins TI animation shall be activated. R1 (100 ms) > R1+R2(100 ms) > R1+R2+R3(100 ms) > R1+R2+R3+R4(100 ms) > R1+R2+R3+R4+R5(100 ms) > R1+R2+R3+R4+R5+R6(100 ms) >Turn off LEDs >Repeat. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Right LEDs |
| Test Scope | UTD & VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_02-V01 | Covers | Req\_ PO5\_LSAN\_ LED STRING ANIMATION\_05\_V01 |
| Description | Wait until the signal from the TI Switch right pin is changed From HIGH to LOW. | | |
| Inputs | TI Switch Status (Pressed). | Inputs | TI Switch Status (Pressed). |
| Test Scope | UTD | | |
| Author | Hesham – Mahmoud Gamal | Author | Hesham – Mahmoud Gamal |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ LED\_String\_05\_V02 | Covers | Req\_ PO5\_LSAN\_ LED STRING ANIMATION\_05\_V03 |
| Description | If the signal is LOW in the TI switch right pin, then Right pins TI animation shall be deactivated. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Right LEDs |
| Test Scope | UTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_01-V01 | Covers | Req\_ PO5\_LSAN\_ LED STRING ANIMATION\_05\_V03 |
| Description | SW shall read the left TI switch left pin status. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Start Function |
| Test Scope | UTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ LED\_String\_02-V01 | Covers | Req\_ PO5\_LSAN\_ LED STRING ANIMATION\_05\_V03 |
| Description | If the signal is HIGH in the TI Switch Left pin, then right pins TI animation shall be activated. L1 (100 ms) > L1+L2(100 ms) > L1+L2+L3(100 ms) > L1+L2+L3+L4(100 ms) > L1+L2+L3+L4+L5(100 ms) > L1+L2+L3+L4+L5+L6(100 ms) > Turn off LEDs > Repeat. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Left LEDs |
| Test Scope | UTD & VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ Left Turn Indicator On\_03-V01 | Covers | Req\_ PO5\_LSAN\_ LED STRING ANIMATION\_05\_V03 |
| Description | Wait until the signal is changed in the TI switch left pin. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Left LEDs |
| Test Scope | UTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_ Left Turn Indicator On\_02-V01 | Covers | Req\_ PO5\_LSAN\_ LED STRING ANIMATION\_05\_V04 |
| Description | If the signal is LOW in the TI switch left pin, then Left pins TI animation shall be deactivated. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Left LEDs |
| Test Scope | UTD & VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

# **Reference Documents Table**

|  |  |  |  |
| --- | --- | --- | --- |
| Ref. number | Doc. Name | Version | Status |
| 1 | LED\_STRING\_ANIMATION\_CYRS | 1.6 | Proposed |
| 2 | LED\_String\_HSI | 1.6 | proposed |