**(SRS)**

LED String Animation

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# **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.

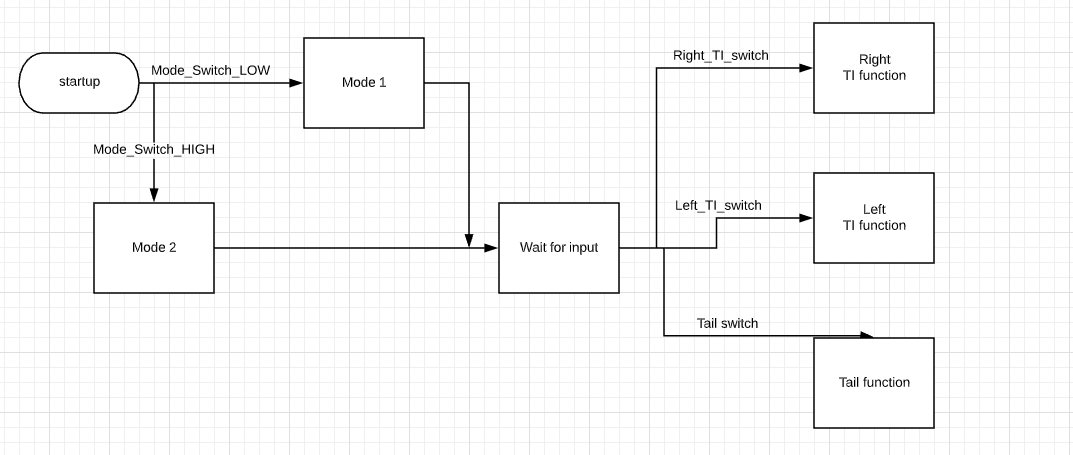


Figure 2: Block Diagram of overall system

# **Feature Description**

## **Start Up Requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_Start welcome mode 1/2\_01-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_01\_V01  Covers\_ PO5\_LSAN\_ CYRS\_02\_V01 |
| Description | SW shall read the mode switch status. | | |
| Inputs | Mode-Switch-connected pin value (High/Low). | Outputs | Switch Status (Pressed/Released). |
| Test Scope | ITD/VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_Start welcome mode 1\_01-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_01\_V01 |
| Description | SW shall set 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 | ITD/VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_Start welcome mode 1\_02-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_01\_V01 |
| Description | SW shall start **MODE 1** which is to switch on the 12 pins one by one from 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 | ITD/VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_Start welcome mode 2\_01-V02 | Covers | Covers\_ PO5\_LSAN\_ CYRS\_02\_V01 |
| Description | SW shall reset 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 | ITD/VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_Start welcome mode 2\_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 | ITD/VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

## **Tail Function Requirements**

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_Tail function(ON/OFF)\_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 | ITD/VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

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

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_Tail function ON\_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 | ITD/VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

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

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_Tail function OFF\_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 | ITD/VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

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

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_Right Turn Indicator On\_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 | ITD/VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_Right Turn Indicator On\_02-V01 | Covers | Req\_ PO5\_LSAN\_ LED STRING ANIMATION\_05\_V01 |
| Description | If the signal is HIGH, 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) > …,etc. Turn off Leds Repeat. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Right LEDs |
| Test Scope | ITD/VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Description | Wait until the signal is changed. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Right LEDs |
| Test Scope | ITD/VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ LED STRING ANIMATION\_05\_V02 | Covers | Req\_ PO5\_LSAN\_ SRS\_Right Turn Indicator On\_02-V01 |
| Description | If the signal is LOW, then Right pins TI animation shall be deactivated. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Right LEDs |
| Test Scope | ITD/VTD | | |
| Author | Hesham – Mahmoud Gamal | Date | 20/02/2020 |

|  |  |  |  |
| --- | --- | --- | --- |
| Req\_ID | Req\_ PO5\_LSAN\_ SRS\_Left Turn Indicator On\_01-V01 | Covers | Req\_ PO5\_LSAN\_ LED STRING ANIMATION\_05\_V03 |
| Description | SW shall read the left TI switch pin status. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Start Function |
| Test Scope | ITD/VTD | | |
| 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\_V03 |
| Description | If the signal is HIGH, 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) > …,etc. Turn off Leds Repeat. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Left LEDs |
| Test Scope | ITD/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. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Left LEDs |
| Test Scope | ITD/VTD | | |
| 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, then Left pins TI animation shall be deactivated. | | |
| Inputs | TI Switch Status (Pressed). | Outputs | Left LEDs |
| Test Scope | ITD/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 |