**PO5\_LED STRING ANIMATION**

# 1. Table History:

|  |  |  |  |
| --- | --- | --- | --- |
| **Author** | **Version** | **Date** | **Change Description** |
| Walid Adel | 1.0 | 23/1/2020 | Initial Creation |
| Youssef Kamal | 1.1 | 25/1/2020 | Changing Status section as mentioned in review sheet. |
| Walid Adel | 1.2 | 29/1/2020 | Added a Block diagram prototype, Microcontroller parametrics and pins connections |
| Mohanad Sallam | 1.3 | 4/2/2020 | Removing unused tittles |

# 2. Document Status:

|  |  |  |  |
| --- | --- | --- | --- |
| **Author** | **Version** | **Date** | **Status** |
| Mohanad Sallam | 1.3 | 4/2/2020 | Draft |

# 3. Table of Content:

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# 4. 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 be 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.

# 5. Requirements:

### 5.1 Block Diagram



### 5.2 MICROCONTOLLER & PINS

**Microcontroller Parametrics:**

|  |  |
| --- | --- |
| **Name** | **Value** |
| Program Memory Type | Flash |
| Program Memory Size (KB) | 32 |
| CPU Speed (MIPS/DMIPS) | 16 |
| SRAM (B) | 2048 |
| Data EEPROM/HEF (bytes) | 1024 |
| Digital Communication Peripherals | 1-UART, 1-SPI, 1-I2C |
| Capture/Compare/PWM Peripherals | 1 Input Capture, 1 CCP, 4PWM |
| Timers | 2 x 8-bit, 1 x 16-bit |
| Number of Comparators | 1 |
| Temperature Range (°C) | -40 to 85 |
| Operating Voltage Range (V) | 4.5 to 5.5V |
| Pin Count | 40 |

**Microcontroller Brief Description:**

|  |  |
| --- | --- |
| **Microcontroller Describtion** | The high-performance, low-power Microchip 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, 54/69 general purpose I/O lines, 32 general purpose working registers, a JTAG interface for boundary-scan and on-chip debugging/programming, three flexible timer/counters with compare modes, internal and external interrupts,serial programmable USART, a universal serial interface (USI) with start condition detector, an 8-channel 10-bit A/D converter, programmable watchdog timer with internal oscillator, SPI serial port, and five software selectable power saving modes. The device operates between 1.8-5.5 volts.  By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed |

**PINS Connection:**

|  |  |  |
| --- | --- | --- |
| **PIN NUMBER** | **PIN DESCRIPTION** | **CONNECTION** |
| 1 | PB0 | LED L\_TAIL\_1 |
| 2 | PB1 | LED L\_TAIL\_2 |
| 3 | PB2 | LED L\_TAIL\_3 |
| 4 | PB3 | LED L\_TAIL\_4 |
| 5 | PB4 | LED L\_TAIL\_5 |
| 6 | PB5 | LED L\_TAIL\_6 |
| 7 | PB6 | TRI STATE TI\_SWITCH |
| 8 | PB7 | TRI STATE TI\_SWITCH |
| 9 | RESET | - |
| 10 | VCC | +5V |
| 11 | GND | 0V |
| 12 | XTAL2 | - |
| 13 | XTAL1 | - |
| 14 | PD0 | R\_TAIL\_1 |
| 15 | PD1 | R\_TAIL\_2 |
| 16 | PD2 | R\_TAIL\_3 |
| 17 | PD3 | R\_TAIL\_4 |
| 18 | PD4 | R\_TAIL\_5 |
| 19 | PD5 | R\_TAIL\_6 |
| 20 | PD6 | - |
| 21 | PD7 | PUSH BUTTON TAIL\_PB |
| 22 | PC0 | LED R1 |
| 23 | PC1 | LED R2 |
| 24 | PC2 | LED R3 |
| 25 | PC3 | LED R4 |
| 26 | PC4 | LED R5 |
| 27 | PC5 | LED R6 |
| 28 | PC6 | - |
| 29 | PC7 | - |
| 30 | AVCC | - |
| 31 | GND | 0V |
| 32 | AREF | - |
| 33 | PA7 | - |
| 34 | PA6 | - |
| 35 | PA5 | LED L6 |
| 36 | PA4 | LED L5 |
| 37 | PA3 | LED L4 |
| 38 | PA2 | LED L3 |
| 39 | PA1 | LED L2 |
| 40 | PA0 | LED L1 |