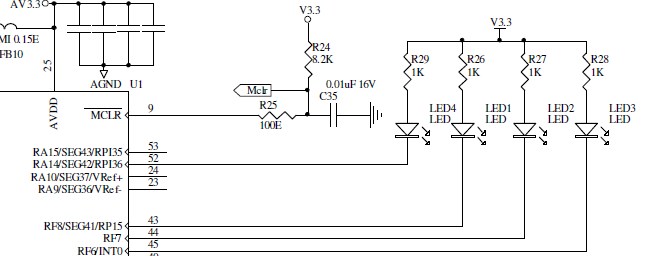
**Autonomous Tractor Safety System**

**Objective 1.0** To demonstrate four blinking LEDs in ATSS PCB board

****

**TRISF** DATA DIRECTION REGISTER F: 0x0000

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| TRISF15 | TRISF14 | TRISF13 | TRISF12 | TRISF11 | TRISF10 | TRISF9 | TRISF8 |
| I/O | I/O | I/O | I/O | I/O | I/O | I/O | I/O |
|  |  |  |  |  |  |  | 0 |
|  |  |  |  |  |  |  | Output |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| TRISF7 | TRISF6 | TRISF5 | TRISF4 | TRISF3 | TRISF2 | TRISF1 | TRISF0 |
| I/O | I/O | I/O | I/O | I/O | I/O | I/O | I/O |
| 0 | 0 |  |  |  |  |  |  |
| Output | Output |  |  |  |  |  |  |

**TRISA** DATA DIRECTION REGISTER A: 0x0000

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| TRISA15 | TRISA14 | TRISA13 | TRISA12 | TRISA11 | TRISA10 | TRISA9 | TRISA8 |
| I/O | I/O | I/O | I/O | I/O | I/O | I/O | I/O |
|  | 0 |  |  |  |  |  |  |
|  | Output |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| TRISA7 | TRISA6 | TRISA5 | TRISA4 | TRISA3 | TRISA2 | TRISA1 | TRISA0 |
| I/O | I/O | I/O | I/O | I/O | I/O | I/O | I/O |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

**LATF** OUTPUT LATCH REGISTER F: 0x01C0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| LATF15 | LATF14 | LATF13 | LATF12 | LATF11 | LATF10 | LATF9 | LATF8 |
| I/O | I/O | I/O | I/O | I/O | I/O | I/O | I/O |
|  |  |  |  |  |  |  | 1 |
|  |  |  |  |  |  |  | LED1 off |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| LATF7 | LATF6 | LATF5 | LATF4 | LATF3 | LATF2 | LATF1 | LATF0 |
| I/O | I/O | I/O | I/O | I/O | I/O | I/O | I/O |
| 1 | 1 |  |  |  |  |  |  |
| LED2 off | LED3 off |  |  |  |  |  |  |

**LATA** OUTPUT LATCH REGISTER A: 0x4000

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| LATAF15 | LATA14 | LATA13 | LATA12 | LATA11 | LATA10 | LATA9 | LATA8 |
| I/O | I/O | I/O | I/O | I/O | I/O | I/O | I/O |
|  | 1 |  |  |  |  |  |  |
|  | LED4 off |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| LATA7 | LATA6 | LATA5 | LATA4 | LATA3 | LATA2 | LATA1 | LATA0 |
| I/O | I/O | I/O | I/O | I/O | I/O | I/O | I/O |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

**T1CON** TIMER1 (16 BIT) CONTROL REGISTER: 0x8030

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| TON | - | TSIDL | - | - | - | TIECS1 | TIECS0 |
| TIMER1 ON |  | T1 STOP IN IDLE MODE |  |  |  | TMR1 EXTENDED CLKC SRC SELECT (WHEN TCS = 1) | |
| 1 | - | 0 | - | - | - | 0 | 0 |
| T1 START |  | T1 CONTINUES IN IDLE MODE |  |  |  | IGNORE | IGNORE |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| - | TGATE | TCKPS1 | TCKPS0 | - | TSYNC | TCS | - |
|  | T1 GATED TIME ACCUM EN | T1 PRESCALE SELECT | |  | T1 EXT CLK SYNC (WHEN TCS = 1) | T1 CLK SRC SELECT |  |
| - | 0 | 1 | 1 | - | 0 | 0 | - |
|  | DISABLE | T1 PRESCALE 1:256 | |  |  | INT CLK (Fosc/2) |  |

**Delay subroutine** Quarter second delay between the LED ON and OFF states so that it is discernible

Oscillator frequency, Fosc = 32MHz, Instruction cycle frequency, Fcy = Fosc/2

Tdelay required = 256 ms = (2/Fosc) \* PreScale \* DELAY;

DELAY = 16000 for Fosc = 32 MHz, prescale = 256

**Code Prg01.c**

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Source code file: Prg01.c

Author, version, date: PSS ver 1.0 01.11.24

Program function: Blinking LEDs RF8 LED1 RF7 LED2 RF6 LED3 RA14 LED4

Simulation: PIC24FJ128GA308 MCU, MPLAB X IDE ver 6.05, XC16 ver 2.10

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

#include <libpic30.h>

// Instruction cycle Fcy = Fosc/2

uint16\_t DELAY **=** 16000**;** // Tdelay = 256 ms = (2/Fosc) \* PreScale \* DELAY;

// DELAY = 16000 for Fosc = 32 MHz, prescale = 256

void initializeLeds **(**void**);**

void blinkLeds **(**void**);**

int main**()**

**{**

initializeLeds**();**

**while** **(**1**)** blinkLeds**();**

**}**

void initializeLeds **(**void**)**

**{**

TRISA **=** 0x0000**;** // RA14 is set in output mode

TRISF **=** 0x0000**;** // RF6, RF7, RF8 are set in output mode

LATF **=** 0x01C0**;** // Set all LEDs LOW initially

LATA **=** 0x4000**;** // All the LEDS are in common cathode configuration

T1CON **=** 0x8030**;** // TON(1), TCKPS(11) : Prescale 1:256,

// TSIDL(0), TGATE(0), TSYNC(0), TCS(0)

TMR1 **=** 0x0000**;**

**}**

void blinkLeds **(**void**)**

**{**

LATF **=** **~**0x01C0**;** // All the four LEDs are turned ON

LATA **=** **~**0x4000**;**

delay**();** // Quarter of a second delay

LATF **=** 0x01C0**;** // All the four LEDs are turned OFF

LATA **=** 0x4000**;**

delay**();**

**}**

void delay**(**void**)**

**{**

**while** **(**TMR1 **<** DELAY**);**

TMR1 **=** 0**;**

**}**