Laboratory 1: Input Interfacing with the MSP432 Using Interrupts

EGR-326

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Contents

1 Objective

The purpose of this laboratory is to develop a program for the MSP432 microcontroller that interfaces with pushbutton switches to control a red-green-blue (RGB) light-emitting diode (LED), utlize a debouncing method to have percice button inputs, and to use multiple pushbuttons to carry out functions.

2 Materials

2.1 Apparatus

1. Digital Multi-Meter
2. DC Power Supply

2.2 Components

1. $2x$ Pushbuttons
2. 100Ω Resistor
3. Common Cathode RGB LED
4. MSP432R Microcontroller
5. Breadboard
6. Assorted Wires

2.3 Software

1. Code-Composer Studio (CCS)

3 Libraries

Before we started creating the functional part of this laboratory, MSP432 libaries were created to make interfacing with the MSP432 much easier in the future.

3.1 pinsInit Library

3.1.1 Purpose

The purpose of this library is to create functions to make initlizing pins as GPIOs with pullup or pulldown resistors much easier by calling one simple function.

3.1.2 Header File

```
1  /*
2  * pinsInint.h
3  *
4  *  Created on: Sep 2, 2022
5  *      Author: jtluk
6  */
7
```

```
#ifndef PINSININT_H_
#define PINSININT_H_
#include <stdint.h>
#include "msp.h"

typedef enum port2Pins_t
{
    pin0,
    pin1,
    pin2,
    pin3,
    pin4,
    pin5,
    pin6,
    pin7,
}port2Pins_t;

typedef enum port2IO_t
{
    input,
    output,
}port2IO_t;

typedef enum port2GPIOConfig_t
{
   pullup,
   pulldown,
}port2GPIOConfig_t;

typedef struct port2GPIO_t
{
    port2Pins_t e_IOpinNumber;
    port2GPIOConfig_t e_GPIOType;
    port2GPIOConfig_t e_IO;
}port2GPIO_t;

void vpinsInit_GPIO(port2GPIO_t * s_userGPIO_ptr, port2Pins_t e_userPin,
   port2IO_t e_userPortIO, port2GPIOConfig_t e_userGPIO);
static void vPrv_pinsInit_InitIO(port2Pins_t e_userPin, port2IO_t
   e_userPortIO);
static void vPrv_pinsInit_InitConfig(port2Pins_t e_userPin,
   port2GPIOConfig_t e_userGPIO);

#endif /* PINSININT_H_ */
```

4 Procedure

4.1 Part I – Sequencing colors of a RGB LED using a pushbutton switch

4.2 Description

Part one of this laboratory consisted of creating a program to control a RGB LED using the MSP432R microcontroller and a pushbutton for user input. On reset, all LEDs should be off. On the first button press, the red LED should be turned on, on the second press, the green LED should turn on and the red LED should turn off. on the third button press, the blue LED should turn on and the green LED should turn off, after the forth button press, the cycle continues starting back at the red LED.