2DX4: Digital Signals

Lab #1

Instructor: Drs. Bruce, Haddara, Hranilovic, and Shira

Lab TAs: Abdallah Ghazy

(TA MACID1), Tau Rasethuntsa

(TA MACID2)

Tianze Zhang L01 – zhant22

As a future member of the engineering profession, the student is responsible for performing he required work in an honest manner, without plagiarism and cheating. Submitting this work with my name and student number is a statement and understanding that this work is my own and adheres to the Academic Integrity Policy of McMaster University and the Code of Conduct of the Professional Engineers of Ontario. Submitted by [Tianze Zhang, zhant22, 400208135]

Milestone 1

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

; Name: tianze zhang; Put your name here for labs

; Student Number: 400208135

; Lab Section: l01

; Description of Code: This code allows User LED D3 To Turn On (Put a brief description of your code)

; Last Modified: January 22nd 2021

; Original: Copyright 2014 by Jonathan W. Valvano, valvano@mail.utexas.edu

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

;ADDRESS DEFINTIONS

;The EQU directive gives a symbolic name to a numeric constant, a register-relative value or a program-relative value

SYSCTL\_RCGCGPIO\_R EQU 0x400FE608 ;General-Purpose Input/Output Run Mode Clock Gating Control Register (RCGCGPIO Register)

GPIO\_PORTN\_DIR\_R EQU 0x40064400 ;GPIO Port N Direction Register address p1202 of the reference manual

GPIO\_PORTN\_DEN\_R EQU 0x4006451C ;GPIO Port N Digital Enable Register address

GPIO\_PORTN\_DATA\_R EQU 0x400643FC ;GPIO Port N Data Register address WE ARE ACESS ALL 8 BITS, IN STUDIO 0 P21

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

;Do not alter this section

AREA |.text|, CODE, READONLY, ALIGN=2 ;code in flash ROM

THUMB ;specifies using Thumb instructions

EXPORT Start

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

;Define Functions in your code here

;The function Port F\_Init to configures the GPIO Port F Pin 4 for Digital Output

PortN\_Init

; STEP 1

LDR R1, =SYSCTL\_RCGCGPIO\_R ;Loads the memory address of RCGCGPIO into register 1(R1); R1 = 0x400FE608

LDR R0, [R1] ;Put the contents of the memory address of RCGCGPIO into register 0 (R0), R0 = 0x00000000

ORR R0,R0, #0x1000 ;Performs a bitwise OR operation with the contents of R0 and 0x1000 and stores it back into R0, R0 = 0x1000

;the bit of N is R12, which is 10^12, covert to hex, it is 0x1000. p326 in the TRM

STR R0, [R1] ;Stores R0 contents into contents of the address located in R1,RCGCGPIO now has Ox1000 stored in it

NOP ;Waiting for GPIO Port F to be enabled

NOP ;Waiting for GPIO Port F to be enabled

; STEP 5

LDR R1, =GPIO\_PORTN\_DIR\_R ;Load the memory address of the GPIO Port N DIR Register into register 1 (R1), R1 = 0x40064400

LDR R0, [R1] ;Put the contents of the memory address of GPIO Port N DIR Register in R0, R0 = 0x00000000

ORR R0,R0, #0x1 ;Perform a bitwise OR operation with the contents of R0 with 0x10 and put the contents into R0 , R0 = 0x1

STR R0, [R1] ;Stores R0 contents into contents of the address located in R1; GPIO Port N Direction Register now has 0x1 stored in it

; STEP 7

LDR R1, =GPIO\_PORTN\_DEN\_R ;Load the memory addess of the GPIO Port N DEN Register into register 1 (R1), R1 = 0x4006451C

LDR R0, [R1] ;Put the contents of the memory address of GPIO Port F DEN Register in register 0 (R0,), R0 = 0x00000000

ORR R0, R0, #0x1 ;Perform a bitwise OR operation with the contents of R0 with 0x10 and put the contents into R0, R0 = 0x1

STR R0, [R1] ;Stores R0 contents into contents of the address located in R1; GPIO Port F DEN Register now has 0x1 stored in it

BX LR ;return

LED\_ON

LDR R1, =GPIO\_PORTN\_DATA\_R ;Load the memory addess of the GPIO Port N DATA Register into register 1 (R1), R1 = 0x400643FC

ORR R0,R0, #0x1 ;Perform a bitwise OR operation with the contents of R0 with 0x10 and put the contents into R0, R0 = 0x1

STR R0, [R1] ;Stores R0 contents into contents of the address located in R1; GPIO Port F DEN Register now has 0x1 stored in it

BX LR ;We have turned on the led port N D2. so we use BX to return to the return address LR holds

LED\_OFF

LDR R1, =GPIO\_PORTN\_DATA\_R

LDR R0, =0x0 ;we use 0x0 to low the led.

STR R0, [R1] ;the rest of the code remian same as above.

BX LR

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

Start

BL PortN\_Init ;The BL instruction is like a function call

loop BL LED\_ON ; call the LED ON function.

LDR R2, =0x1FFFFF ;load R2 as 0xFFFFF for the waiting time.

wait1 NOP ; waiting time for the led on

SUBS R2,R2,#0x1 ; Substact 0x1 from the value stored in R2

BNE wait1

BL LED\_OFF ;repet what we have above, but call the LED OFF function.

LDR R2, =0x1FFFFF

wait2 NOP ;Put the contents of the memory address of GPIO Port F DATA Register 0 (R0), R0 = 0x00000000

SUBS R2, R2, #0x1

BNE wait2

B loop ;

ALIGN

END

<https://drive.google.com/file/d/1jIPyfZjCoPhIIYfH7JBnpS9Oj8C4tn8i/view?usp=sharing>

# milestone2

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

; Name: tianze zhang; Put your name here for labs

; Student Number: 400208135

; Lab Section: l01

; Description of Code: This code allows User LED D3 To Turn On (Put a brief description of your code)

; Last Modified: January 22nd 2021

; Original: Copyright 2014 by Jonathan W. Valvano, valvano@mail.utexas.edu

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

;ADDRESS DEFINTIONS

;The EQU directive gives a symbolic name to a numeric constant, a register-relative value or a program-relative value

SYSCTL\_RCGCGPIO\_R EQU 0x400FE608 ;General-Purpose Input/Output Run Mode Clock Gating Control Register (RCGCGPIO Register)

GPIO\_PORTN\_DIR\_R EQU 0x40064400 ;GPIO Port N Direction Register address p1202 of the reference manual

GPIO\_PORTN\_DEN\_R EQU 0x4006451C ;GPIO Port N Digital Enable Register address

GPIO\_PORTN\_DATA\_R EQU 0x400643FC ;GPIO Port N Data Register address WE ARE ACESS ALL 8 BITS, IN STUDIO 0 P21

GPIO\_PORTM\_DIR\_R EQU 0x40063400 ;GPIO Port M Direction Register address p1202 of the reference manual

GPIO\_PORTM\_DEN\_R EQU 0x4006351C ;GPIO Port M Digital Enable Register address

GPIO\_PORTM\_DATA\_R EQU 0x400633FC ;GPIO Port M Data Register address WE ARE A

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

;Do not alter this section

AREA |.text|, CODE, READONLY, ALIGN=2 ;code in flash ROM

THUMB ;specifies using Thumb instructions

EXPORT Start

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

;Define Functions in your code here

;The function Port F\_Init to configures the GPIO Port F Pin 4 for Digital Output

PortN\_Init

; STEP 1

LDR R1, =SYSCTL\_RCGCGPIO\_R ;Loads the memory address of RCGCGPIO into register 1(R1); R1 = 0x400FE608

LDR R0, [R1] ;Put the contents of the memory address of RCGCGPIO into register 0 (R0), R0 = 0x00000000

ORR R0,R0, #0x1000 ;Performs a bitwise OR operation with the contents of R0 and 0x20 and stores it back into R0, R0 = 0x20

;the bit of N is R12, which is 10^12, covert to hex, it is 0x1000. p326 in the TRM

STR R0, [R1] ;Stores R0 contents into contents of the address located in R1,RCGCGPIO now has Ox20 stored in it

NOP ;Waiting for GPIO Port F to be enabled

NOP

NOP ;Waiting for GPIO Port F to be enabled

NOP

; STEP 5

LDR R1, =GPIO\_PORTN\_DIR\_R ;Load the memory address of the GPIO Port F DIR Register into register 1 (R1), R1 = 0x4005D400

LDR R0, [R1] ;Put the contents of the memory address of GPIO Port F DIR Register in R0, R0 = 0x00000000

ORR R0,R0, #0x1 ;Perform a bitwise OR operation with the contents of R0 with 0x10 and put the contents into R0 , R0 = 0x10

STR R0, [R1]

; STEP 7

LDR R1, =GPIO\_PORTN\_DEN\_R ;Load the memory addess of the GPIO Port F DEN Register into register 1 (R1), R1 = 0x4005D51C

LDR R0, [R1] ;Put the contents of the memory address of GPIO Port F DEN Register in register 0 (R0,), R0 = 0x00000000

ORR R0, R0, #0x1 ;Perform a bitwise OR operation with the contents of R0 with 0x10 and put the contents into R0, R0 = 0x10

STR R0, [R1] ;Stores R0 contents into contents of the address located in R1; GPIO Port F DEN Register now has 0x10 stored in it

;return

;Stores R0 contents into contents of the address located in R1; GPIO Port F Direction Register now has 0x10 stored in it

BX LR

PortM\_Init

LDR R1, =GPIO\_PORTM\_DIR\_R

LDR R0, [R1]

BIC R0, #0x1

STR R0, [R1]

LDR R1, =GPIO\_PORTM\_DIR\_R

LDR R0, [R1]

ORR R0, R0,#0x1

STR R0, [R1]

; STEP 7

LDR R1, =GPIO\_PORTM\_DEN\_R ;Load the memory addess of the GPIO Port F DEN Register into register 1 (R1), R1 = 0x4005D51C

LDR R0, [R1] ;Put the contents of the memory address of GPIO Port F DEN Register in register 0 (R0,), R0 = 0x00000000

ORR R0, R0, #0x1 ;Perform a bitwise OR operation with the contents of R0 with 0x10 and put the contents into R0, R0 = 0x10

STR R0, [R1]

BX LR

LED\_ON

LDR R1, =GPIO\_PORTN\_DATA\_R ;Load the memory addess of the GPIO Port N DATA Register into register 1 (R1), R1 = 0x400643FC

ORR R0,R0, #0x1 ;Perform a bitwise OR operation with the contents of R0 with 0x10 and put the contents into R0, R0 = 0x1

STR R0, [R1] ;Stores R0 contents into contents of the address located in R1; GPIO Port F DEN Register now has 0x1 stored in it

BX LR ;We have turned on the led port N D2. so we use BX to return to the return address LR holds

LED\_OFF

LDR R1, =GPIO\_PORTN\_DATA\_R

LDR R0, =0x0 ;we use 0x0 to low the led.

STR R0, [R1] ;the rest of the code remian same as above.

BX LR

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

Start

BL PortN\_Init

BL PortM\_Init

loop LDR

CMP

BEQ LED\_ON

BEQ LED\_OFF

B loop

ALIGN

END

I am not able to run the milestone 2, I just put all the works I have done before the lab section ends.