Project 2

“Communication between Two Tiva c Through UART protocol”

Worked on it all of :

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First of all , Serial communication is a way of dealing with microcontrollers themselves ,serial means that sending the data bit by bit and validate this data with start and stop bit , you may use parity bit or not .

That was a brief of UART protocol , protocol means a way of communication .

this project is divided into to parts through the two tivas , the First Tiva is interfaced with Character LCD module ,Potentiometer and using two internal push .

the second Tiva is interfaced with Stepper motor ,internal LED and the internal Temperature sensor .

PART1 in the project is to receive the reading of temperature sensor and display it in the LCD periodically “if changed” , and sends the level of the potentiometer to the second tiva to change the level of the brightness if changed and finally to take the input of switches and sends proper letter to rotate the stepper motor

PART2 to communicate to the first tiva and take a proper letter to rotate the stepper ,send the temperature reading and receive the level of brightness and operate the LED according to it .

API used in this project :

First Tiva APIs:

SW2_Init():this is used to initialize the second internal push button as Digital input

SW1_Init():this is used to initialize the second internal push button as Digital input

Init_ADC(): this Function is to initialize the ADC and takes analog input from push buttons and then send it to the second tiva to control the internal LED

LCD_init_V2(): this function initializes the LCD module and declare it's Pins as digital output ,sends the important commands at beginning and get it ready to work

UART5_Iterrupt_Init():this function is used to operate the UART5 module and initialize the interrupt as Receiving only

initQeue(): instead of using UART internal FIFO , it was a good idea to make tailored one to keep all the data received and maintain it from corruption due to high speed of sending/receiving .

SendSample(): this method is used to start conversion of the ADC then return the sample to be send after that .

UART5_printChar(char): this function sends a character through the UART5 module .

__enable_irq() : this is an internally known function used to enable global interrupts

ptintStringg(char*): this method used to print a string of chars in the LCD takes string ,starting position and the length

display_num(char): this function takes a number and print it in the LCD

delay_milli(char): used to make a delay with milliseconds

read_send2(): this function is used to read the value of the switches and sends the suitable char according to the pressed switch

UART5_Handler(): this function is used to put the pre-descried action to be done if the receiving interrupt made ,after taking the proper action ,flag is reset.

Second Tiva APIs:

init_stepper_motor():this is used to initialize the Stepper motor pins and get ready to rotate.

initPin() : this is used to initialize pins after declaring it as a pin data type ,predefined .

pwm_initt() : this initializes the PWM module to take a certain level and operate the LED according to it.

ADC_Init(): this initializes the ADC module to send the temperature sensor and send it through the UART

UART5_Iterrupt_Init(): this initializes the UART5 module and enable as receiving interrupt .

Uart0_Init(): this is to initialize the UART0 for evaluation and testing only with terminal “putty “

MCAL_DIO file:

Definitions:

```
#define INPUT 1

#define OUTPUT 0

#define HIGH 1

#define LOW 0
```

Structures:

Pin:

Int pinNum, char portIndex, _Bool ioState

Functions:

Pin initPin(char portIndex, int pinNum ,_Bool ioState)

-initializes a pin as DIO given its port index and pin number and i/o state and returns an object of struct Pin, example

(Pin blue = initPin('f', 2 , OUTPUT);)

void setPin(Pin *pin, unsigned char out);

-sets the output of a pin to HIGH or LOW ,does not do anything if pin is initialized as input, example

(setPin(&blue , HIGH);)

unsigned char readPin(Pin *pin);

-reads the value of a Pin returns either HIGH or LOW, returns -1 if pin is initialized as OUTPUT.

void setPins(Pin *pin, unsigned char out , int length);

-sets multiple pins , takes in a pointer to an array of Pins, the value to be set on them and the length of the array.