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COMPE375

Lab 5

Our task for lab 5 was to use UART to scan the keypad to the corresponding ASCII character. I approached the lab using the skeleton code. Using the scan keypad method I used DDRB/D for set the input and outputs of the ports as either high or low nibble. This creates an output of the selected PIN to pressed represented as a 0. If there is a 0 in both PINB/D it corresponds to the row/column of the 4x4 keypad. Pressing the selected key would output a result of the ASCII character in the terminal.

**Source code:**

#define FOSC 16000000 //Clock Speed

#define BAUD 9600

#define MYUBRR FOSC/16/BAUD-1

#include <avr/io.h>

#include <util/delay.h>

#include <asf.h>

char scan\_keypad();

void USART\_Init(unsigned int ubrr);

void USART\_Transmit(unsigned char ch);

char scan\_keypad()

{

for (int col = 4; col < 8; col++)

{

PORTD |= 0xFF; //reset

PORTD &= ~(1<<col); //sets specific PORTD/PIN(col) to 0 and everything else 1.

for (int row = 0; row < 4; row++)

{

PORTB |= 0x0F; //reset

if (!(PINB & (1<<row)) && !(PIND & (1<<col))) //checks for 0's for the row and col

{

if (col == 4 && row == 0)

return '1';

else if (col == 4 && row == 1)

return '2';

else if (col == 4 && row == 2)

return '3';

else if (col == 4 && row == 3)

return 'A';

else if (col == 5 && row == 0)

return '4';

else if (col == 5 && row == 1)

return '5';

else if (col == 5 && row == 2)

return '6';

else if (col == 5 && row == 3)

return 'B';

else if (col == 6 && row == 0)

return '7';

else if (col == 6 && row == 1)

return '8';

else if (col == 6 && row == 2)

return '9';

else if (col == 6 && row == 3)

return 'C';

else if (col == 7 && row == 0)

return '\*';

else if (col == 7 && row == 1)

return '0';

else if (col == 7 && row == 2)

return '#';

else if (col == 7 && row == 3)

return 'D';

}

}

}

}

void USART\_Init(unsigned int ubrr)

{

/\*baud rate\*/

UBRR0H = (uint8\_t)(ubrr>>8);

UBRR0L = (uint8\_t)ubrr;

/\*receiver and transmitter\*/

UCSR0B = (1<<RXEN0)|(1<<TXEN0);

/\*frame format: 8data, 2stop bit\*/

UCSR0C = (3<<UCSZ00);

}

void USART\_Transmit(unsigned char ch)

{

/\* Wait for empty transmit buffer \*/

while (!(UCSR0A & (1<<UDRE0)));

UDR0 = ch; //This returns the char to the string

}

void main()

{

DDRB |= 0x00;

DDRD |= 0xF0;

PORTB |= 0x0F; //Low nibble

PORTD |= 0xF0; //High nibble

char key;

USART\_Init(MYUBRR);

while(1)

{

key = scan\_keypad();

USART\_Transmit(key);

\_delay\_ms(500);

}

}