

Bangladesh University of Engineering and Technology

Department of Computer Science and Engineering

CSE 316 July 2022

Microprocessors, Microcontrollers, and Embedded Systems Sessional

Experiment 4

UART Communication Between ATmega32 and Arduino

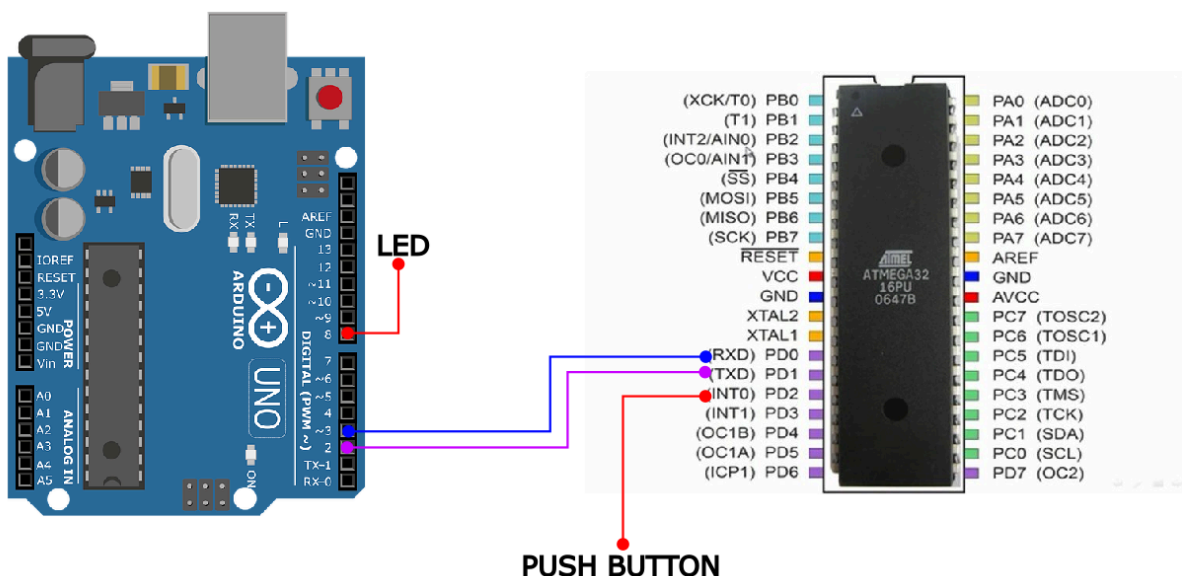
GOAL:

To understand the basic working principle of UART and external interrupt.

EXPERIMENTAL TOOLS AND MATERIALS: ATmega32, USBASP programmer, Arduino UNO, Trainer Board, Wires, LED, Push Button.

BASIC DESCRIPTION:

In this experiment, you will have to turn on a LED connected to Arduino UNO depending on a push button connected to ATmega32. ATmega32 will send the state of the push button to Arduino UNO using UART communication.



UART (Arduino Atmega) Basics:

Use the following code snippets for Atmega32 to send characters every 1 second.

```
#define F_CPU 1000000

#include <avr/io.h>
#include <util/delay.h>

void uart_init()
{
    UCSRA = 0b00000010;
    UCSRB = 0b00011000;
    UCSRC = 0b10000110;

    UBRRH = 0;
    UBRRL = 12;
}

void uart_send(unsigned char data){
    while ((UCSRA & (1<<UDRE)) == 0x00);
    UDR = data;
}

unsigned char uart_receive(void){
    while ((UCSRA & (1<<RXC)) == 0x00);
    return UDR;
}

int main(void)
{
    uart_init();
    _delay_ms(1000);
    while(1)
    {
        for(char c = 'a'; c <= 'z'; c++) {
            uart_send(c);
            _delay_ms(1000);
        }
    }
}
```

Use the following code snippet for Arduino UNO to read the characters and print them on the Serial Monitor continuously.

```
#include<SoftwareSerial.h>

SoftwareSerial SUART(2, 3); //RX = DPin-2; TX = DPin-3

void setup() {
    Serial.begin(9600);
    SUART.begin(9600);
}

void loop() {
    byte n = SUART.available();
    if (n != 0)
    {
        char x = SUART.read();
        Serial.print(x);
    }
}
```

PROCEDURE:

1. Establish serial communication between Atmega32 and ArduinoUNO.
2. Connect a push button to Atmega32.
3. Connect a LED to ArduinoUNO.
4. With the press of the button, send a character from Atmega32 to ArduinoUNO. You must handle button logic with an external interrupt.
5. Upon receiving the character, Arduino UNO should toggle the LED.

MISC:

1. You should be prepared to communicate at any baud rate assigned during the experiment.
2. Study the provided code snippets. You must be able to modify them on demand.