USART CODES

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* - LIBRARIES

```
#include <avr/io.h>
#include <util/delay.h>
#include "USART.h"
#include <util/setbaud.h>
```

1- INITIALIZE

```
void initUSART(void) {

    UBRR0H = UBRRH_VALUE;   // Set baud rate
    UBRR0L = UBRRL_VALUE;   // defined in setbaud.h

#if USE_2X                  // set double speed
    UCSR0A |= (1 << U2X0);

#else
    UCSR0A &= ~(1 << U2X0);

#endif

    UCSR0B = (1 << TXEN0) | (1 << RXEN0); // Enable transmit receive
    UCSR0C = (1 << UCSZ01) | (1 << UCSZ00); // 8 bit data
}
```

2- TRANSMIT A BYTE

```
void transmitByte(uint8_t data) {

    loop_until_bit_is_set(UCSR0A, UDRE0);

    UDR0 = data;
}
```

3- RECEIVE A BYTE

```
uint8_t receiveByte (void) {

        loop_until_bit_is_set(UCSR0A, RXC0);

        return UDR0;

}
```

4- TRANSMIT STRING

```
void printString ( const char myStr[]) {

        uint8_t i =0;

        while ( myStr[i]) {

                transmitByte (myStr[i]);

                i++;

        }
}
```

5- Ex LOOPBACK COMMUNICATION

```
#include <binaryMacro.h>
#include <macros.h>
#include <pinDefines.h>
#include <portpins.h>
#include <USART.c>
#include <avr/io.h>
#include <util/delay.h>
```

} libraries

```
int main (void){

        char serialChar;
```

```
char    serialChar;
initUSART();
printString("Hello Computer! \r\n");
printString(" This is AVR! \r\n");

while(1) {

        serialChar = receiveByte();

        transmitByte(serialChar);

}
return 0;
}
```

6- Ex LED PROGRAM

libraries

```
int main(void){
        char serialChar;
        DDRD = 0xFF;
        initUSART();
        printString("Hello computer. \r\n");
        printString(" This is AVR! \r\n");
while (1) {
        printString("Enter a number between 2 and 7. \r\n");
        printString("I will turn on the corresponding LED. \r\n");

        serialChar = receiveByte();
        transmitChar(serialChar);
        printString("\n");

        if ((serialChar < '2') | (serialChar > '7')) {

                printString("out of range \r\n");
                PORTD = 0x00;

}
```

```
            else {

                serialChar = serialChar - '0';
                PORTD = (1 << serialChar);
            }
        }
        return 0;
}
```