Chapter 3 – Hardware Interfacing

Communication: USART

```
//asynchronous operation using polling
#include <avr/io.h>
void init_usart(unsigned long baud){
   unsigned int ubrr;
   //Set baud rate, baud=Fosc/(16*(UBRR+1))
 //Set baud rate, baud=Fosc/(8*(UBRR+1)) (2X mode)
   ubrr=(unsigned int)(F_CPU/8/baud)-1;
   UBRR0H = (unsigned char)(ubrr>>8);
   UBRR0L = (unsigned char)ubrr;
   //Double the USART Transmission Speed
   //to reduce speed error
   UCSR0A = (1<<U2X0);
   // Enable transmitter and receiver.
   UCSR0B = (1<<TXEN0)|(1<<RXEN0);
   //Set frame to 8data, 2stop bit
   UCSR0C = (1<<USBS0)|(1<<UCSZ1)|(1<<UCSZ0);
}
```

```
void putUSART(unsigned char c){
   // Wait for empty transmit buffer.
   while(!(UCSR0A & (1<<UDRE0)) );
   UDR0=c;
}
unsigned char getUSART(void){
   // Wait for data to be received.
   while (!(UCSR0A&(1<<RXC0)));
   //no checking error bits.
   return UDR0;
}

int main(void){
   init_usart(115200);
   while(1){
 //read from terminal then send back.
      putUSART(getUSART());
   }
}
```