Lab 7: ADC and UART serial communication

- Table with voltage divider, calculated, and measured ADC values for all buttons.

Push button	PC0[A0] voltage	ADC value (calculated)
Right	0 V	0
Up	0.495 V	101
Down	1,20 V	245
Left	1,97 V	403
Select	3,17 V	648
none	5 V	1023

- Listing of ADC_vect interrupt routine with complete code for sending data to the LCD/UART and identification of the pressed button.

```c
ISR(ADC_vect)
{
    // WRITE YOUR CODE HERE

    uint16_t value = 0;
    char lcd_string[4] = "0000";

    value = ADC;                     // Copy ADC result to 16-bit variable
    itoa(value, lcd_string, 10);     // Convert decimal value to string

    lcd_clrscr();
    lcd_gotoxy(1, 0); lcd_puts("value:");
    lcd_gotoxy(3, 1); lcd_puts("key:");


    if(value == 1022){

        lcd_gotoxy(8, 0); lcd_puts(lcd_string);  // Put ADC value in decimal
        lcd_gotoxy(13,0); lcd_puts("3FE");    // Put ADC value in hexadecimal
        lcd_gotoxy(8, 1); lcd_puts("none   ");   // Put button name here
        uart_puts("none");

    }else if(value == 650){
```

```c
        lcd_gotoxy(8, 0); lcd_puts(lcd_string)  // Put ADC value in decimal
        lcd_gotoxy(13,0); lcd_puts("28A");// Put ADC value in hexadecimal
        lcd_gotoxy(8, 1); lcd_puts("Select  ");// Put button name here
        uart_puts("Select");

    }else if(value == 402){

        lcd_gotoxy(8, 0); lcd_puts(lcd_string); // Put ADC value in decimal
        lcd_gotoxy(13,0); lcd_puts("192");   // Put ADC value in hexadecimal
        lcd_gotoxy(8, 1); lcd_puts("Left    ");    // Put button name here
        uart_puts("Left");

    }else if(value == 245){

        lcd_gotoxy(8, 0); lcd_puts(lcd_string); // Put ADC value in decimal
        lcd_gotoxy(13,0); lcd_puts("F5"); // Put ADC value in hexadecimal
        lcd_gotoxy(8, 1); lcd_puts("Down    "); // Put button name here
        uart_puts("Down");

    }else if(value == 101){

        lcd_gotoxy(8, 0); lcd_puts(lcd_string); // Put ADC value in decimal
        lcd_gotoxy(13,0); lcd_puts("65"); // Put ADC value in hexadecimal
        lcd_gotoxy(8, 1); lcd_puts("Up     ");   // Put button name here
        uart_puts("Up");

    }else{

        lcd_gotoxy(8, 0); lcd_puts(lcd_string); // Put ADC value in decimal
        lcd_gotoxy(13,0); lcd_puts("00");   // Put ADC value in hexadecimal
        lcd_gotoxy(8, 1); lcd_puts("Right    "); // Put button name here
        uart_puts("Right");
    }

}
```
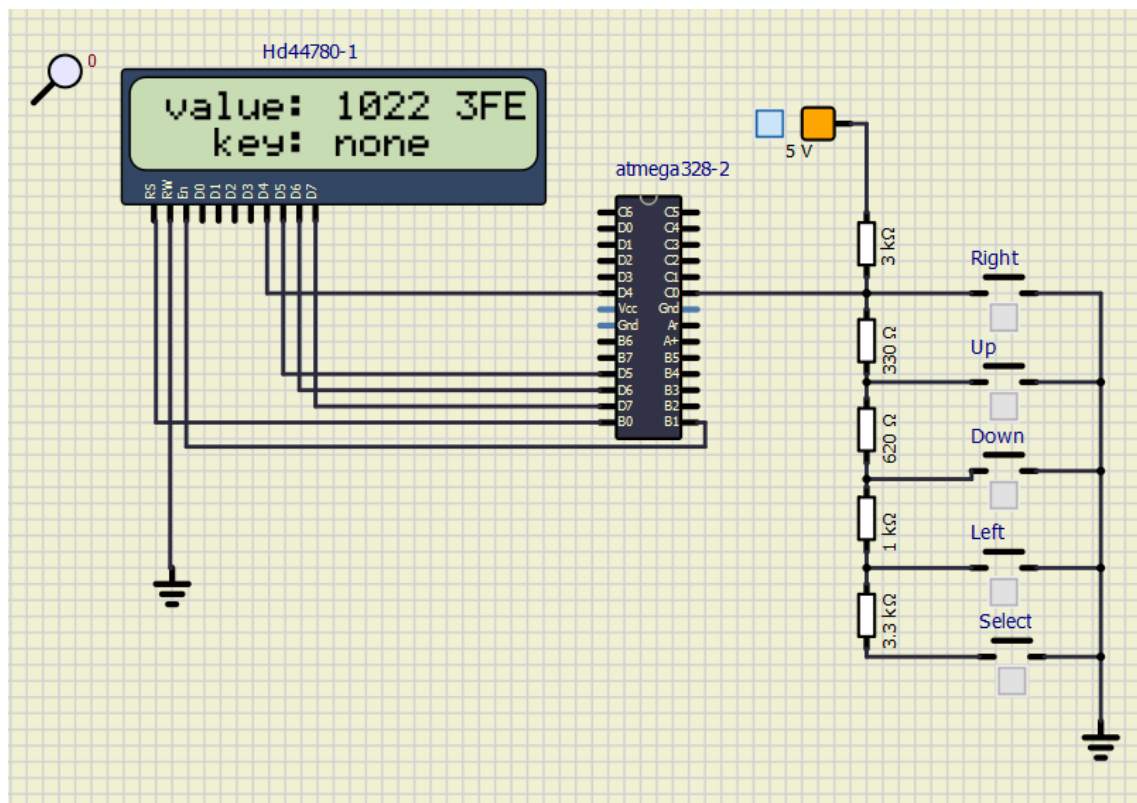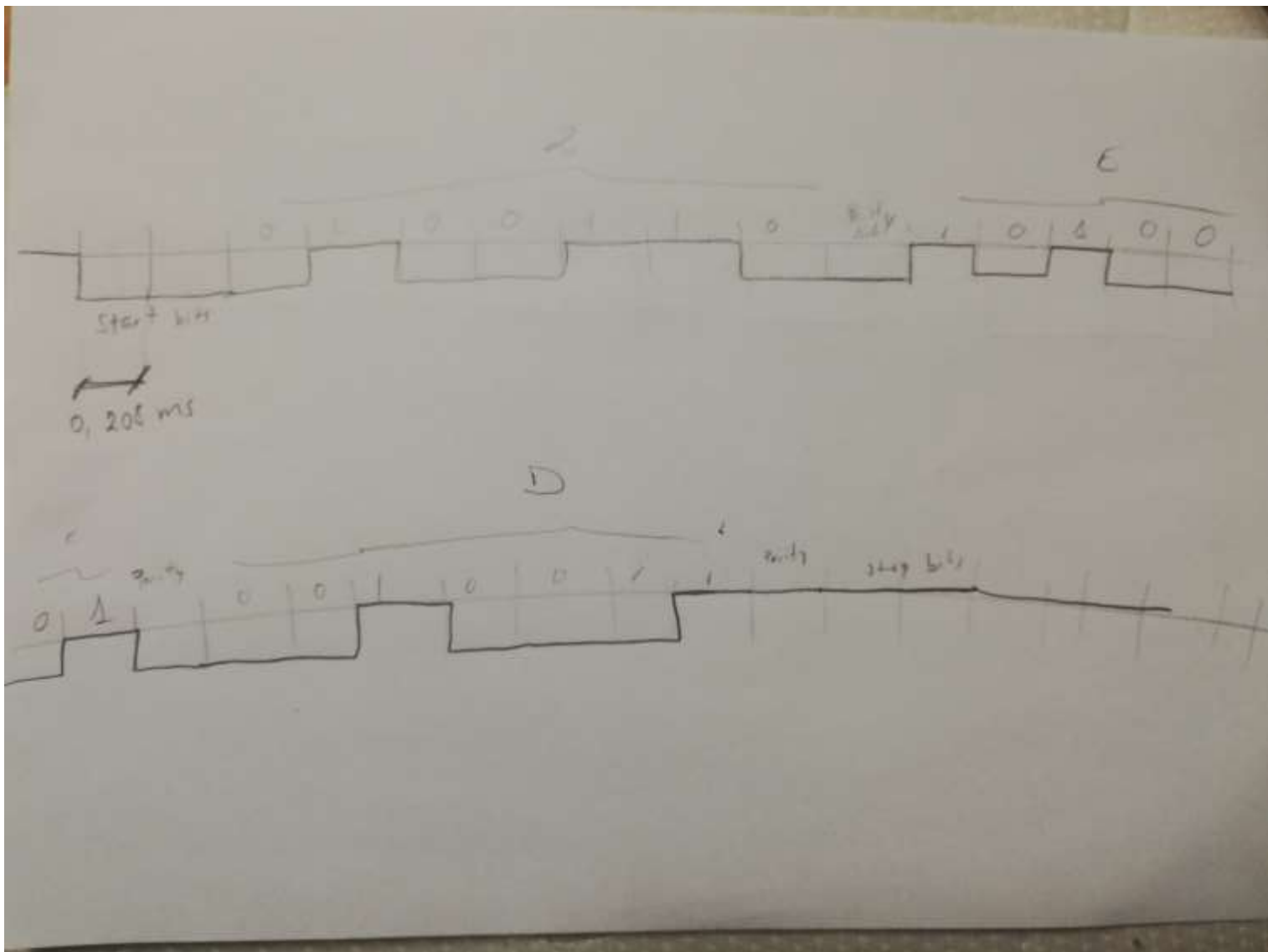
- (Hand-drawn) picture of UART signal when transmitting data DE2 in 4800 7O2 mode (7 data bits, odd parity, 2 stop bits, 4800 Bd)

- Listing of code for calculating/displaying parity bit.

```c
uint8_t c;
uint8_t inc;
uint8_t par = 0;
char lcd_string[1] = "0";


c = uart_getc();
if (c != '\0') {          // Data available from UART
        if (c == '1') {     // Key '1' received
        inc++;
        }
}

if(inc%2 == 0){
        par = 1;
}else{
        par = 0;
}


itoa(par, lcd_string, 10);
lcd_gotoxy(8, 0); lcd_puts(lcd_string);
```