

# Lab Assignment 7-uart

Masauso Lungu 209533

## 1. Preparation tasks

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

Push button	PC0[A0] voltage	ADC value (calculated)	ADC value (measured)
Right	0 V	0	0
Up	0.495 V	101	101
Down	1.202 V	246	245
Left	1.97 V	403	402
Select	3.18 V	651	650
none	5 V	1023	1022

## 2. ADC:

a) Listing of ADC\_vect interrupt routine with complete code for sending data to the LCD/UART and identification of the pressed button.

```
/* ----- */
/**
 * ISR starts when ADC completes the conversion. Display value on LCD
 * and send it to UART.
 */
ISR(ADC_vect)
{
    uint16_t value = 0;
    char lcd_string[8];

    value = ADC; // Copy ADC result to 16-bit variable

    // Convert to string in decimal
    itoa(value, lcd_string, 10);
    lcd_gotoxy(7,0);
    lcd_puts(" ");
    lcd_gotoxy(7,0);
    lcd_puts(lcd_string);
}
```

```

// Send data through UART
if (value < 700)
{
    uart_puts("ADC value in decimal: ");
    uart_puts(lcd_string);
    uart_puts("\r\n"); // put cursor to beginning of current line or next line
}

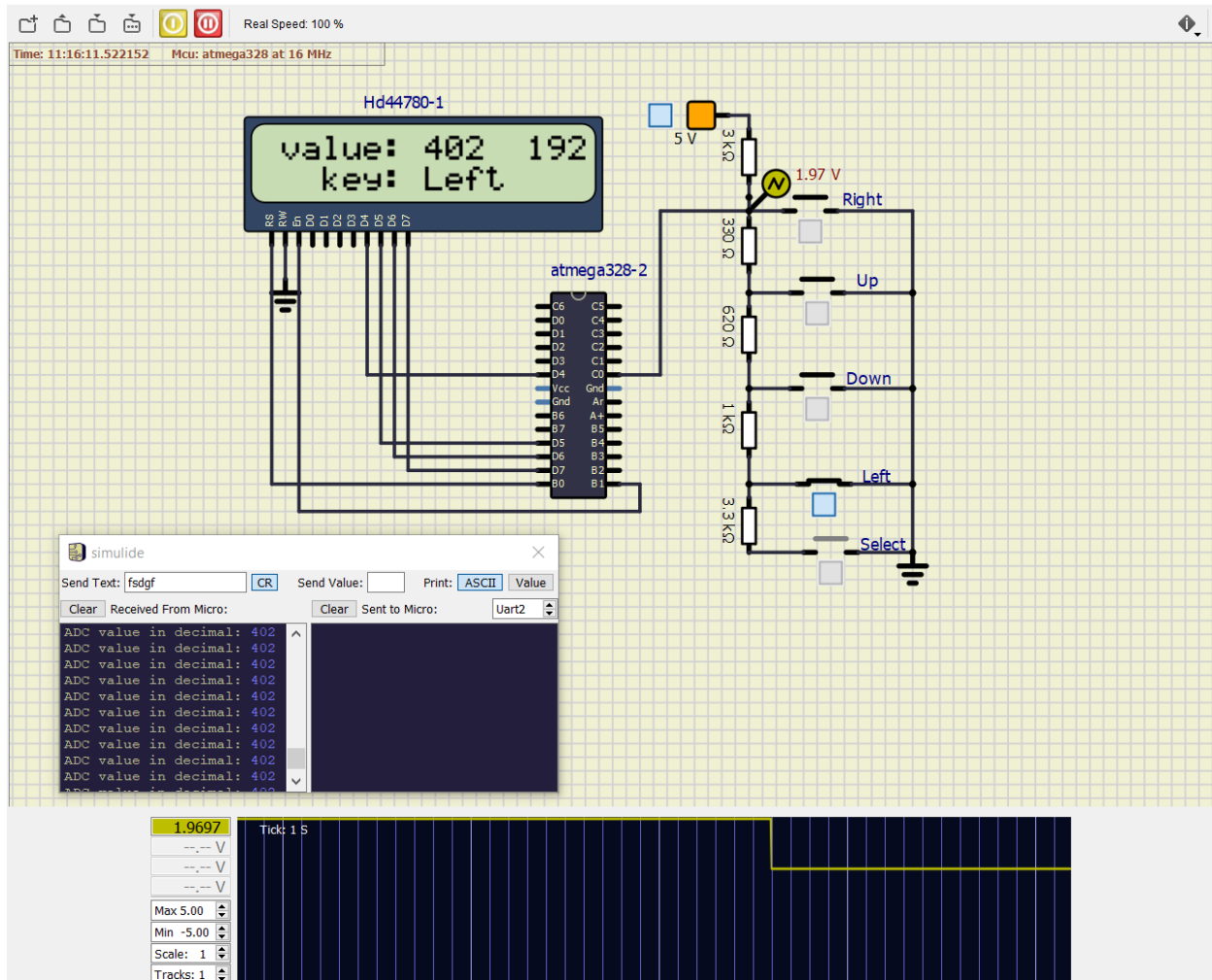
// Convert to string in hex
itoa(value, lcd_string, 16);
lcd_gotoxy(13,0);
lcd_puts("    ");
lcd_gotoxy(13,0);
lcd_puts(lcd_string);

//Displaying the identity of the button pressed
if(value >= 1016)
{
    lcd_gotoxy(7, 1);
    lcd_puts("    ");
    lcd_gotoxy(7, 1);
    lcd_puts("None");
}
else if(value == 0)
{
    lcd_gotoxy(7, 1);
    lcd_puts("    ");
    lcd_gotoxy(7, 1);
    lcd_puts("Right");
}
else if(value == 101)
{
    lcd_gotoxy(7, 1);
    lcd_puts("    ");
    lcd_gotoxy(7, 1);
    lcd_puts("Up");
}
else if(value == 245 )
{
    lcd_gotoxy(7, 1);
    lcd_puts("    ");
    lcd_gotoxy(7, 1);
    lcd_puts("Down");
}
else if(value == 402)
{
    lcd_gotoxy(7, 1);
    lcd_puts("    ");
    lcd_gotoxy(7, 1);
    lcd_puts("Left");
}
else if(value == 650)
{
    lcd_gotoxy(7, 1);
    lcd_puts("    ");
    lcd_gotoxy(7, 1);
    lcd_puts("Select");
}

```

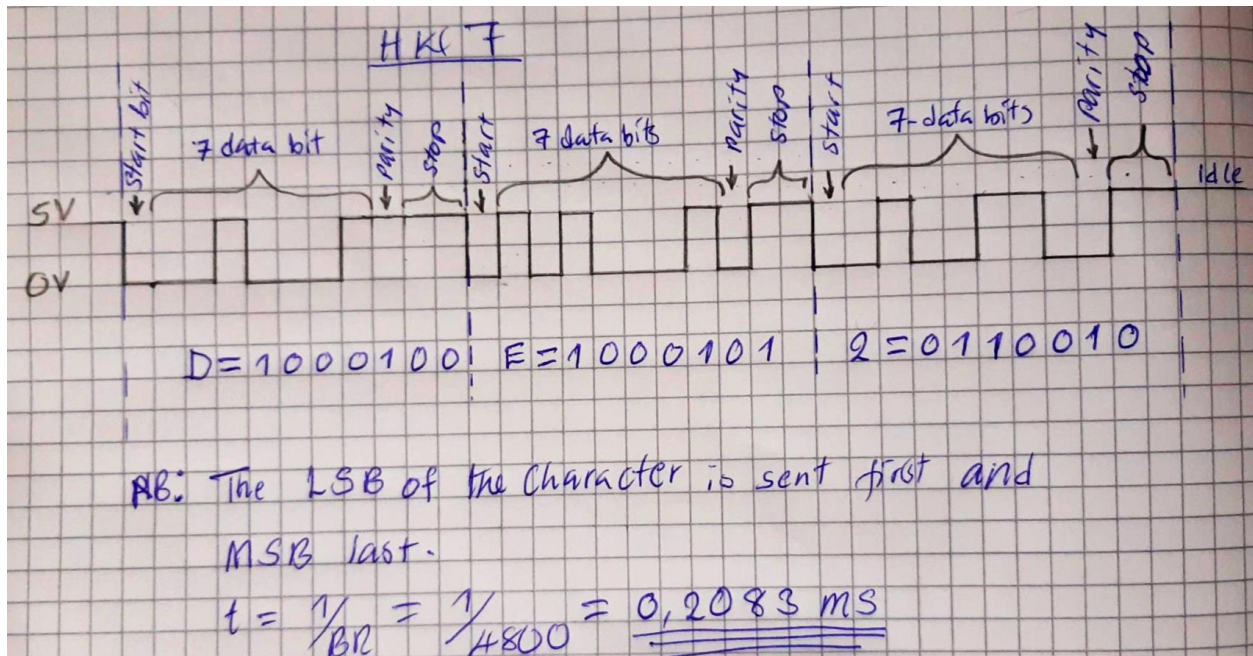
```
}  
  
}
```

b) Screenshot of SimulIDE circuit when "Power Circuit" is applied.



### 3. UART

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



b) Listing of code for calculating/displaying parity bit.

```
//Parity bit evaluation (odd parity)
if(value %2==0)
{
    lcd_gotoxy(14,1);
    lcd_putc('1');
}
else
{
    lcd_gotoxy(14,1);
    lcd_putc('0');
}
```

[Link to github repository](https://github.com/Masauso-L/Digital-electronics-2/tree/master/Labs/07-uart)

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