Lab Assignment 7-uart

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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:

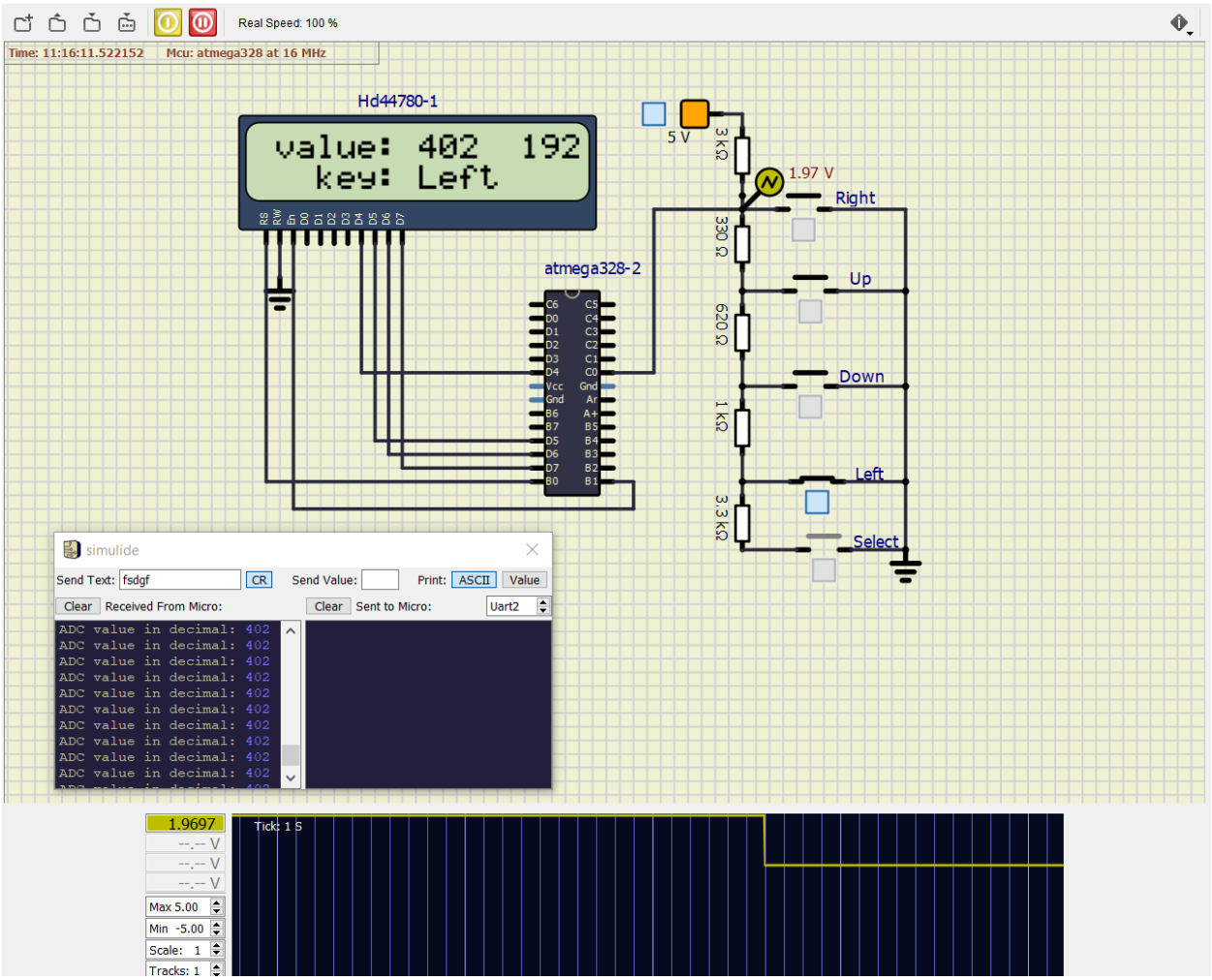
a) Listing of `ADC_vect` interrupt routine with complete code for sending data to the LCD/UART and identification of the pressed button.

```
/* ------------------------------------------------------------------*/
/**
 * ISR starts when ADC complets 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");
```

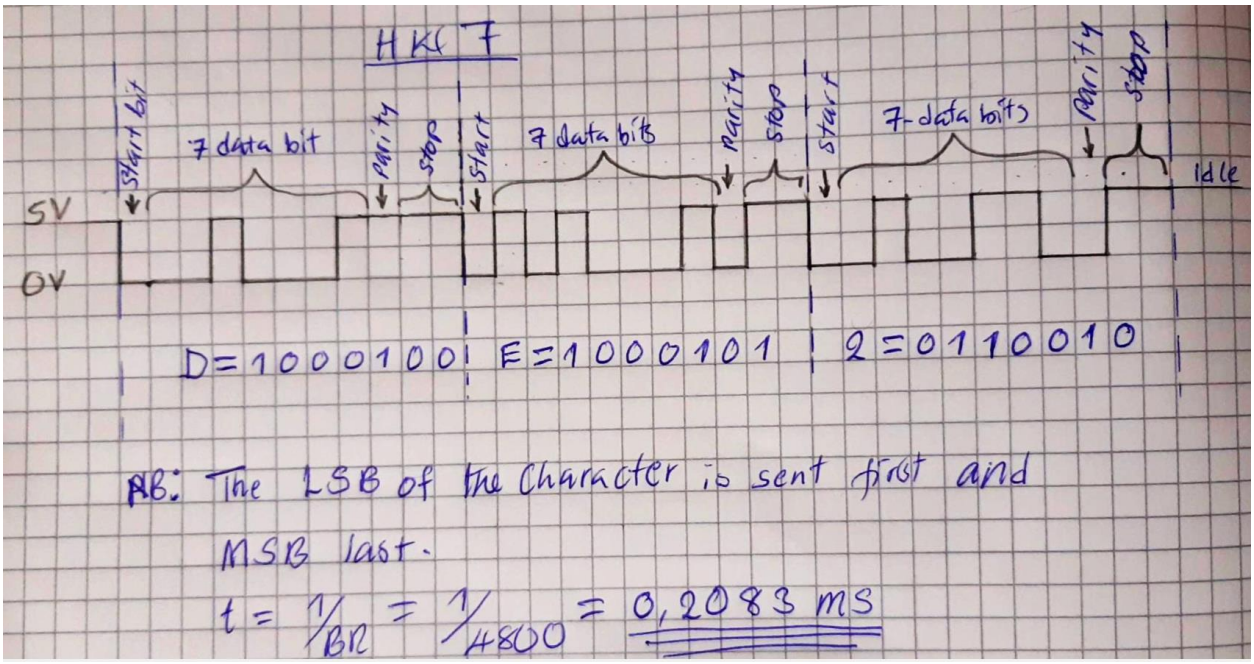
```
        }
}
```

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



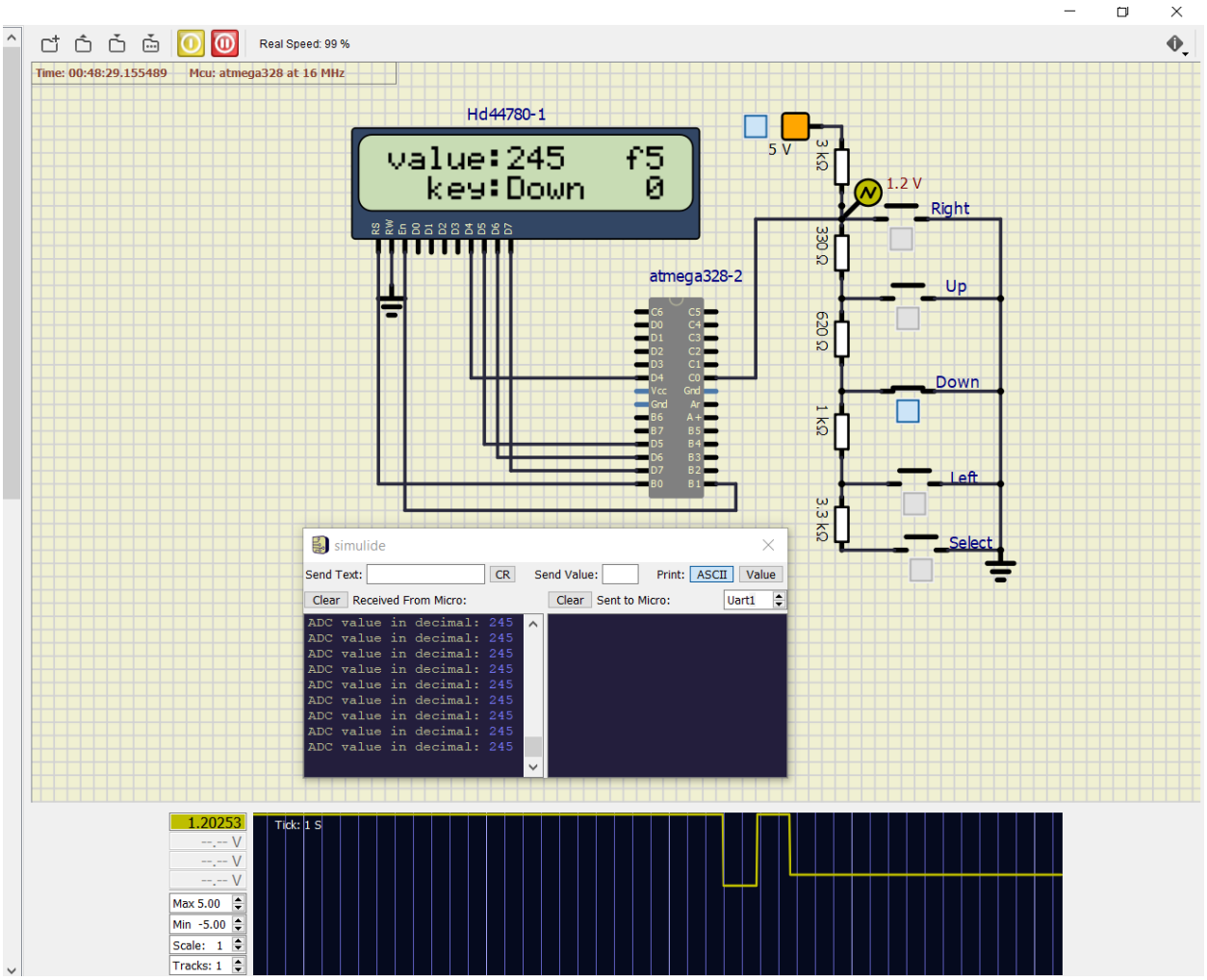
3. UART

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