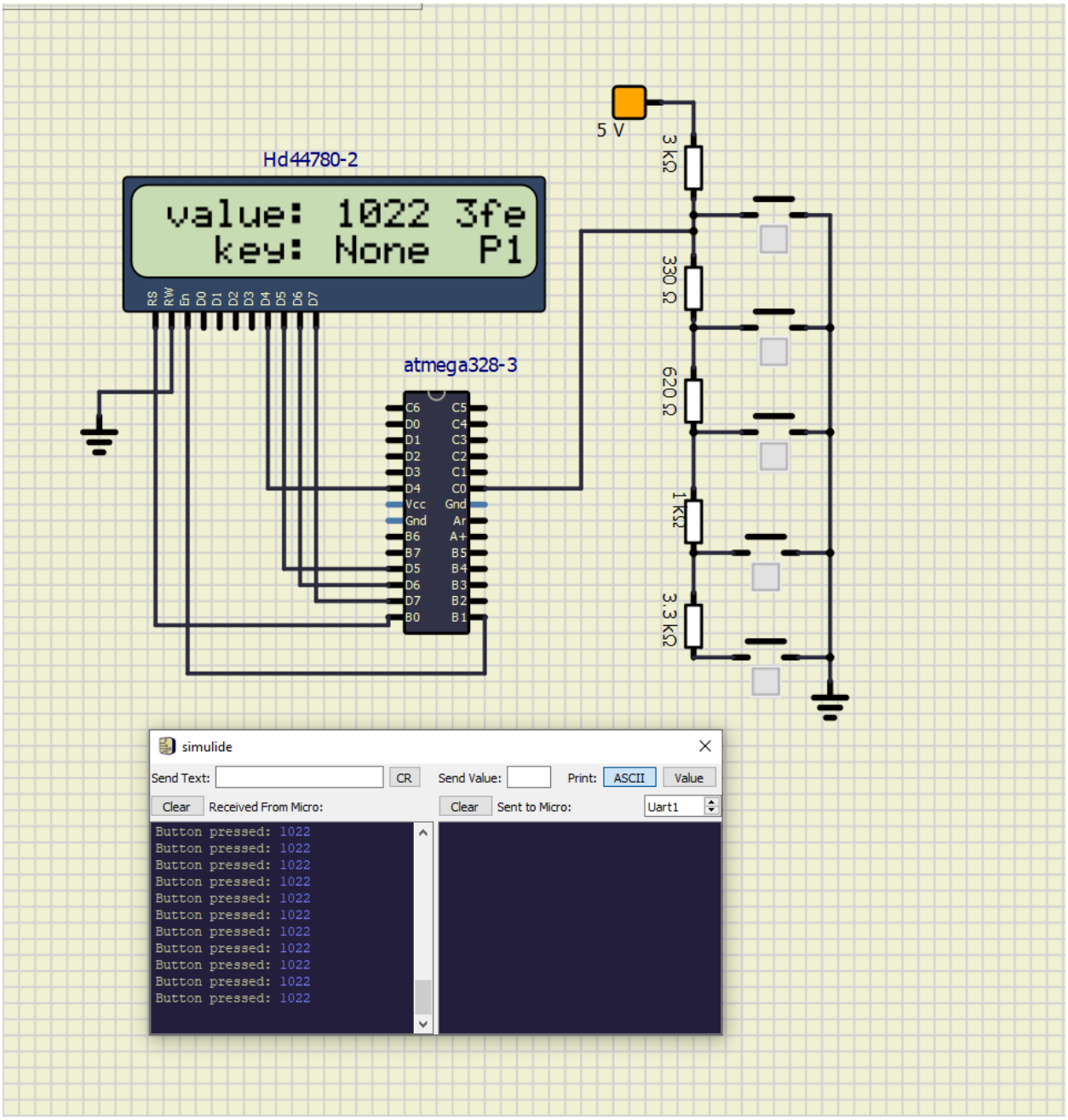
DE2 UART Jiří Vitouš

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	1.970 V	403	402
Select	3.1818	651	650
none	5	1023	1022

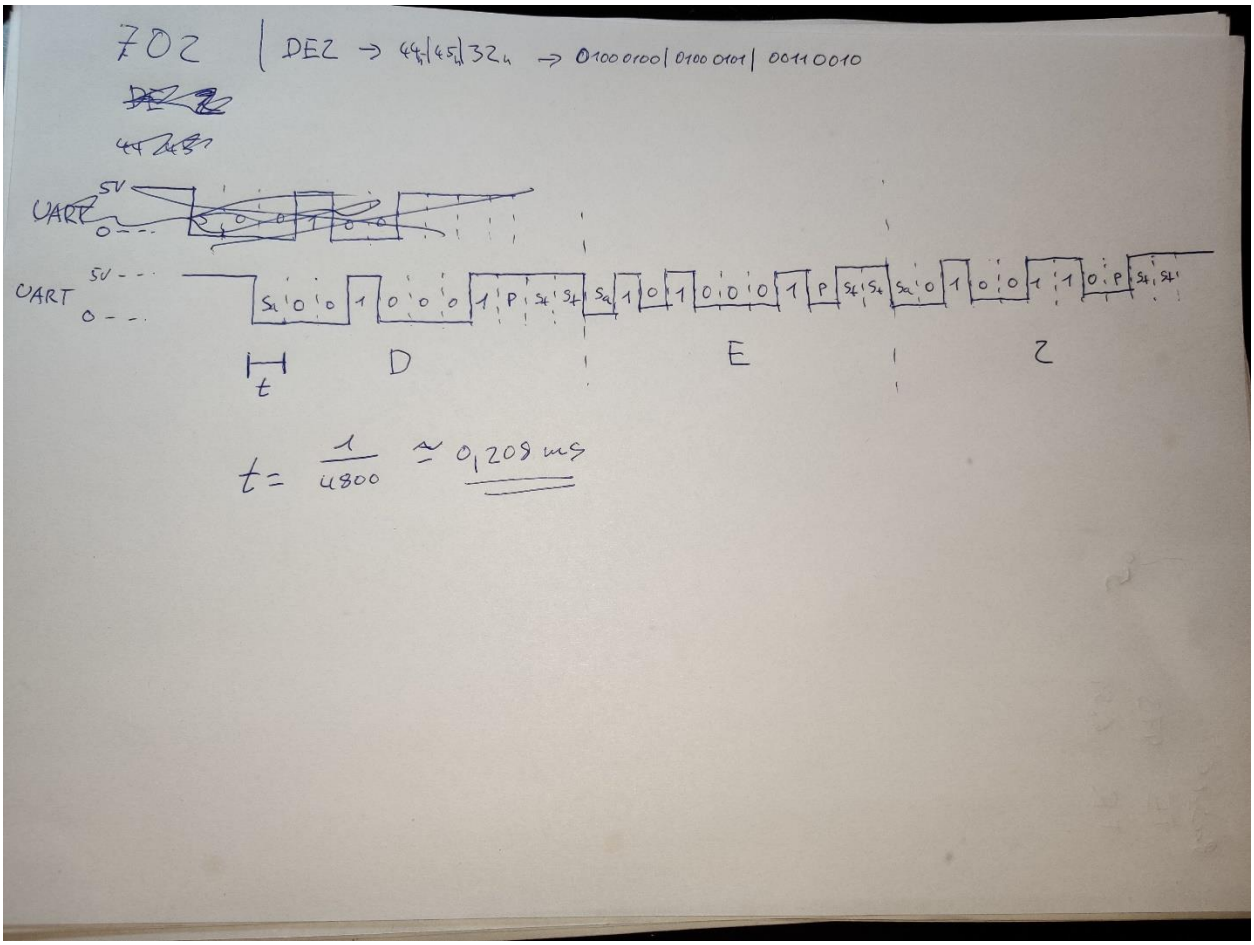
Function name	Function parameters	Description	Example
uart_init	UART_BAUD_SELECT(9600, F_CPU)	Initialize UART to 8N1 and set baudrate to 9600 Bd	uart_init(UART_BAUD_SELECT(9600, F_CPU));
uart_getc	none	Get char from input buffer	uint8_t c= uart_getc();
uart_putc	char	Put character into output buffer to send	uart_putc('c');
uart_puts	const char*	Put character array one by one into output buffer	uart_puts("Ahoj");

Operation	Register(s)	Bit(s)	Description
Voltage reference	ADMUX	REFS1:0	01: AVcc voltage reference, 5V
Input channel	ADMUX	MUX3:0	0000: ADC0, 0001: ADC1, ...
ADC enable	ADCSRA	ADEN	Zapnout ADC
Start conversion	ADCSRA	ADSC	Začít s konverzí vstupní úrovně napětí na dignitální reprezentaci
ADC interrupt enable	ADCSRA	ADIE	Umožnit přerušení
ADC clock prescaler	ADCSRA	ADPS2:0	000: Division factor 2, 001: 2, 010: 4, ...
ADC result	ADLAR	ADC9:0	Hodnota po konverzi


Hd44780-2
value: 1022 3fe
key: None P1
RS RW En D0 D1 D2 D3 D4 D5 D6 D7
atmega328-3
C6 C5
D0 C4
D1 C3
D2 C2
D3 C1
D4 C0
Vcc Gnd
Gnd Ar
B6 A+
B7 B5
D5 B4
D6 B3
D7 B2
B0 B1
5 V
3 kΩ
330 Ω
620 Ω
1 kΩ
3.3 kΩ
simulide
Send Text:
CR
Send Value:
Print:
ASCII
Value
Clear
Received From Micro:
Clear
Sent to Micro:
Uart1
Button pressed: 1022
Button pressed: 1022
Button pressed: 1022
Button pressed: 1022
Button pressed: 1022
Button pressed: 1022
Button pressed: 1022
Button pressed: 1022
Button pressed: 1022
Button pressed: 1022
Button pressed: 1022

```
ISR(ADC_vect)
{
	uint16_t value = 0;
	char lcd_string[4] = "0000";


	value = ADC;				// Copy ADC result to 16-bit variable
	itoa(value, lcd_string, 10);		// Convert to string in decimal
	lcd_gotoxy(8, 0);			// set cursor to position 'a'
	lcd_puts("    ");			// clear space for new number
	lcd_gotoxy(8, 0);			// set cursor to position 'a'
	lcd_puts(lcd_string);			// send string

	uart_puts("Button pressed: ");		//send text preceding value
	uart_puts(lcd_string);			// send character string over UART (value
of adc)
	uart_puts("\n");			// end line

	lcd_gotoxy(13, 0);			// set cursor to position 'b'
	lcd_puts("   ");			// clear space for new number
	lcd_gotoxy(13, 0);			// set cursor to position 'b'

	itoa(value, lcd_string, 16);		// Convert to string in hex
	lcd_puts(lcd_string);			// send string


	// code for printing button name pressed
	if(value<50)
	{
		lcd_gotoxy(8, 1);
		lcd_puts("      ");
		lcd_gotoxy(8, 1);
		lcd_puts("Right");
	}
	else if((value>=50) & (value < 170))
	{
		lcd_gotoxy(8, 1);
		lcd_puts("      ");
		lcd_gotoxy(8, 1);
		lcd_puts("Up");
	}
	else if((value>=170) & (value < 350))
	{
		lcd_gotoxy(8, 1);
		lcd_puts("      ");
		lcd_gotoxy(8, 1);
		lcd_puts("Down");
	}
	else if((value>=350) & (value < 500))
	{
		lcd_gotoxy(8, 1);
		lcd_puts("      ");
		lcd_gotoxy(8, 1);
		lcd_puts("Left");
	}
	else if((value>=500) & (value < 800))
	{
		lcd_gotoxy(8, 1);
```

```
                lcd_puts("      ");
                lcd_gotoxy(8, 1);
                lcd_puts("Select");
        }
        else
        {
                lcd_gotoxy(8, 1);
                lcd_puts("      ");
                lcd_gotoxy(8, 1);
                lcd_puts("None");
        }


// parity bit computation for even parity of whole “value”, if odd then add parity^=1;

        uint8_t parity=0;

        for(uint8_t i=0;i<16;i++)          // go through the whole length of “value”
        {
                parity^= (value & 0x01);   // parity XOR (if last bit is one)
                value>>=1;                 // bit shift value right
        }

        lcd_gotoxy(15, 1);                 // move to some free location
        if(parity==1)                      // decide if parity bit is zero or one
        lcd_putc('1');                     // put parity bit onto display
        else
        lcd_putc('0');                     // put parity bit onto display


}
```


702 | DEZ → 44 | 45 | 32 → 01000100 | 01000101 | 00110010
UART
5V
0
UART
5V
0
H
t
D
E
Z
$t = \frac{1}{4800} \approx 0{,}209\ ms$