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Link to my repository in GitHub

https://github.com/Konecny343/Digital-electronics-2

1) Preparation tasks

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

Push button	PC0 [A0] voltage (calculated)	PC0 [A0] voltage (measured)	ADC value (calculated)	ADC value (measured)
Right	0 V	0 V	0	0
Up	0,495 V	0,49 V	101	101
Down	1,202 V	1,20 V	246	245
Left	1,970 V	1,96 V	403	402
Select	3,182 V	3,18 V	651	650
none	5 V	4,99 V	1023	1022

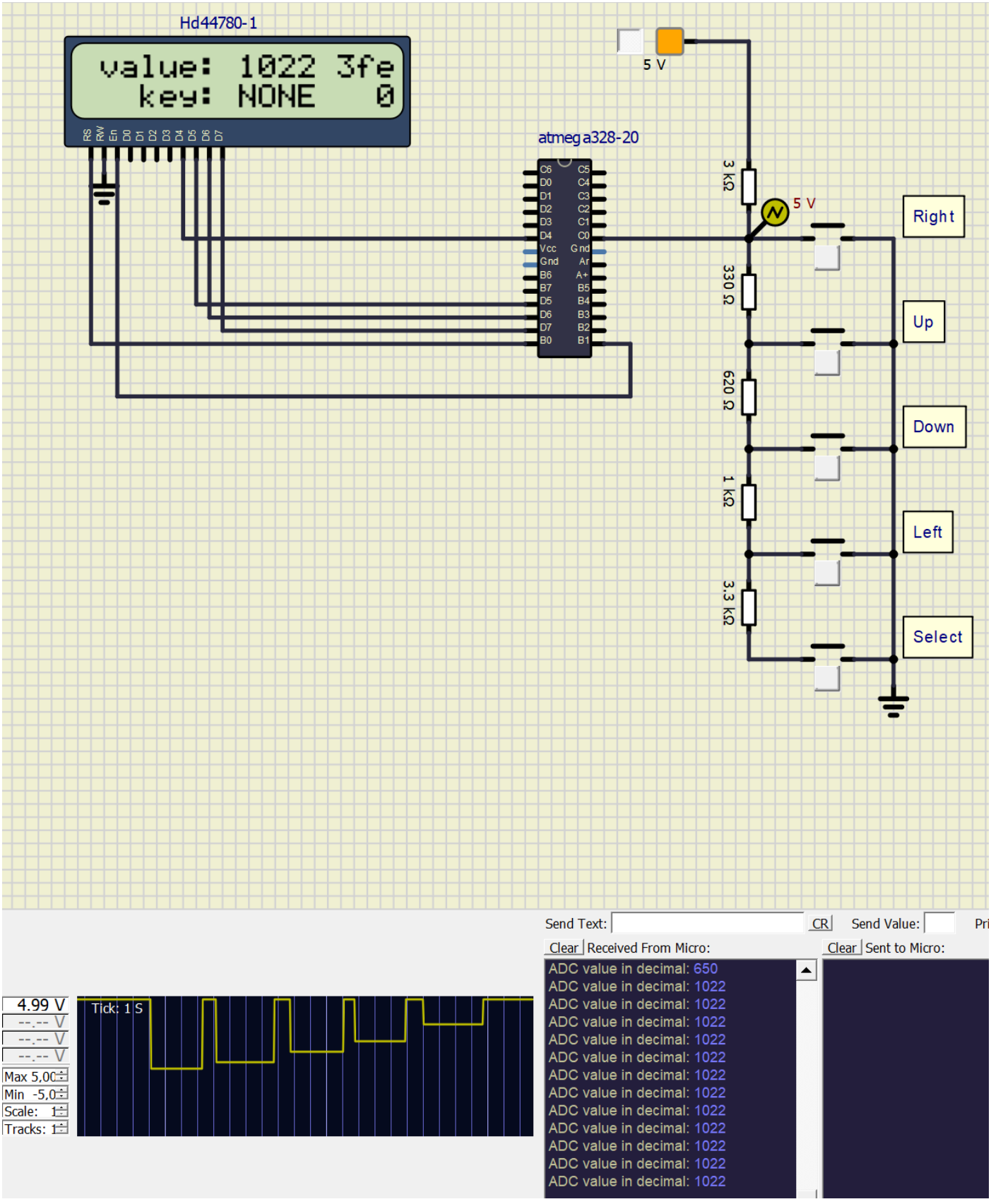
2) ADC

Listing of `ADC_vect` from file `main.c`

```
ISR(ADC_vect)
{
    uint16_t value = ADC;
    char lcd_string[8] = "        ";

       // Clear decimal and hex positions
       lcd_gotoxy(8, 0);
       lcd_puts(lcd_string);

       // Print ADC value on LCD in decimal
       itoa(value, lcd_string, 10);
       lcd_gotoxy(8, 0);
       lcd_puts(lcd_string);

       if (value < 700)
       {
              // Send data through UART
              uart_puts("ADC value in decimal: ");
              uart_puts(lcd_string);
              uart_puts("\r\n");
       }

       // Print ADC value on LCD in hex
       itoa(value, lcd_string, 16);
       lcd_gotoxy(13, 0);
       lcd_puts(lcd_string);

       // Clear key positions
       lcd_gotoxy(8, 1);
       lcd_puts("      ");
       lcd_gotoxy(8, 1);

       // Print key
       if (value > 1000)
       {
              lcd_puts("NONE");
       }

       if (value < 70)
       {
              lcd_puts("RIGHT");
       }

       if (value > 70 && value < 200)
       {
              lcd_puts("UP");
       }

       if (value > 200 && value < 370)
       {
              lcd_puts("DOWN");
       }

       if (value > 370 && value < 600)
       {
              lcd_puts("LEFT");
       }
```

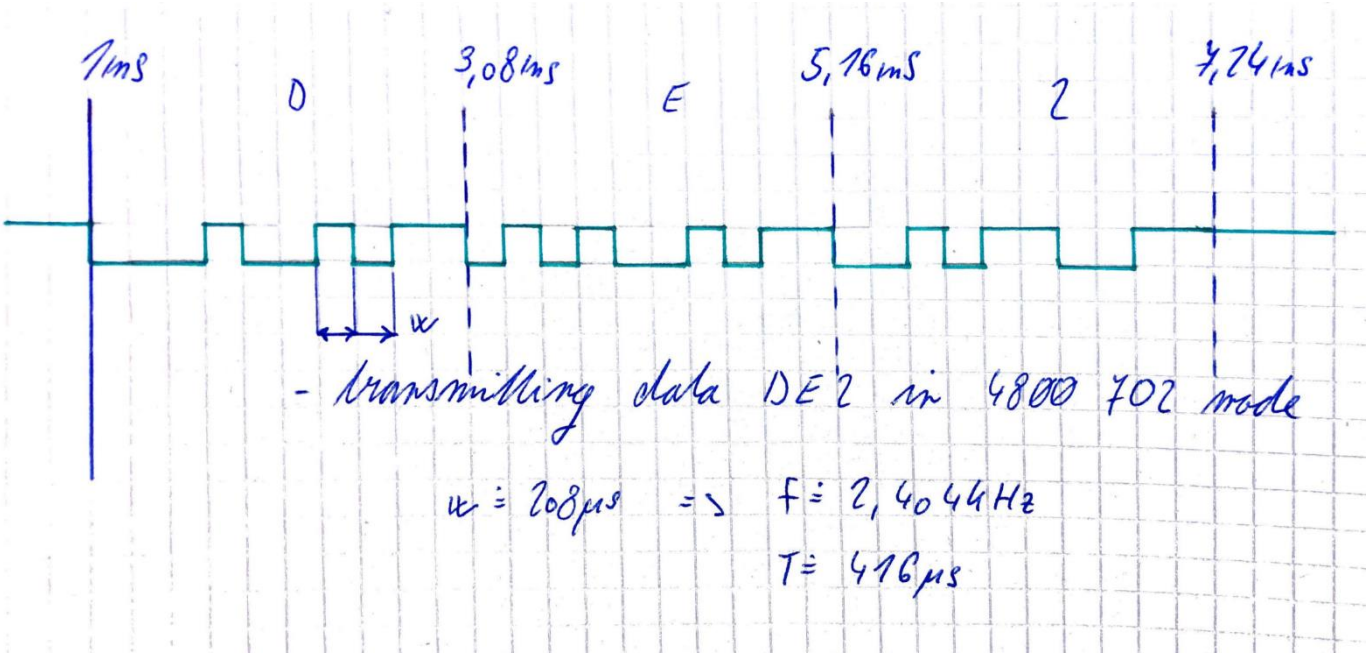
```
        if (value > 600 && value < 1000)
        {
                lcd_puts("SELECT");
        }

        // Code for calculating and displaying parity bit
        if (value > 1000)
        {
                int parity = 0;
                itoa(parity, lcd_string, 10);
                lcd_gotoxy(15,1);
                lcd_puts(lcd_string);
        }
        else
        {
                int memory[32];
                int i = 0, j, parity = 0;

                while (value > 0)
                {
                        memory[i] = value % 2;
                        value = value/2;
                        i++;
                }

                for (j = i - 1; j > 0; j--)
                if(memory[j] == 1)
                {
                        parity++;
                }
                else
                {
                        parity = 0;
                }

                itoa(parity, lcd_string, 10);
                lcd_gotoxy(15,1);
                lcd_puts(lcd_string);
        }
}
```

Screenshot of SimulIDE circuit when ¨Power Circuit¨ is applied



3) UART

- transmitting data DE2 in 4800 7O2 mode



Listing of code for calculating and displaying parity bit from file `main.c`

```
// Code for calculating and displaying parity bit
	if (value > 1000)
	{
		int parity = 0;
		itoa(parity, lcd_string, 10);
		lcd_gotoxy(15,1);
		lcd_puts(lcd_string);
	}
	else
	{
		int memory[32];
		int i = 0, j, parity = 0;

		while (value > 0)
		{
			memory[i] = value % 2;
			value = value/2;
			i++;
		}

		for (j = i - 1; j > 0; j--)
		if(memory[j] == 1)
		{
			parity++;
		}
		else
		{
			parity = 0;
		}

		itoa(parity, lcd_string, 10);
		lcd_gotoxy(15,1);
		lcd_puts(lcd_string);
	}
```