# Dancing Stickman

## Project's assumption

I wanted to create a party atmosphere with my project. This means light sequences, music and dancing characters.

We have at our disposal an Arduino Uno with a keypad shield, which covers all the pins. Therefore, I switched the initial approach from using LEDs and a speaker/buzzer for the party atmosphere to blinking the diodes in the lcd display and playing music with the help of Matlab and UART communication.
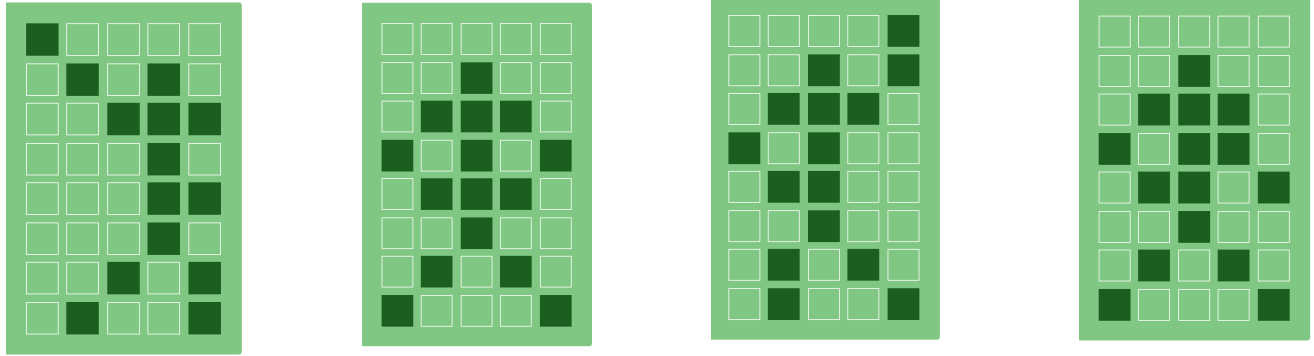
## Simulide schematic
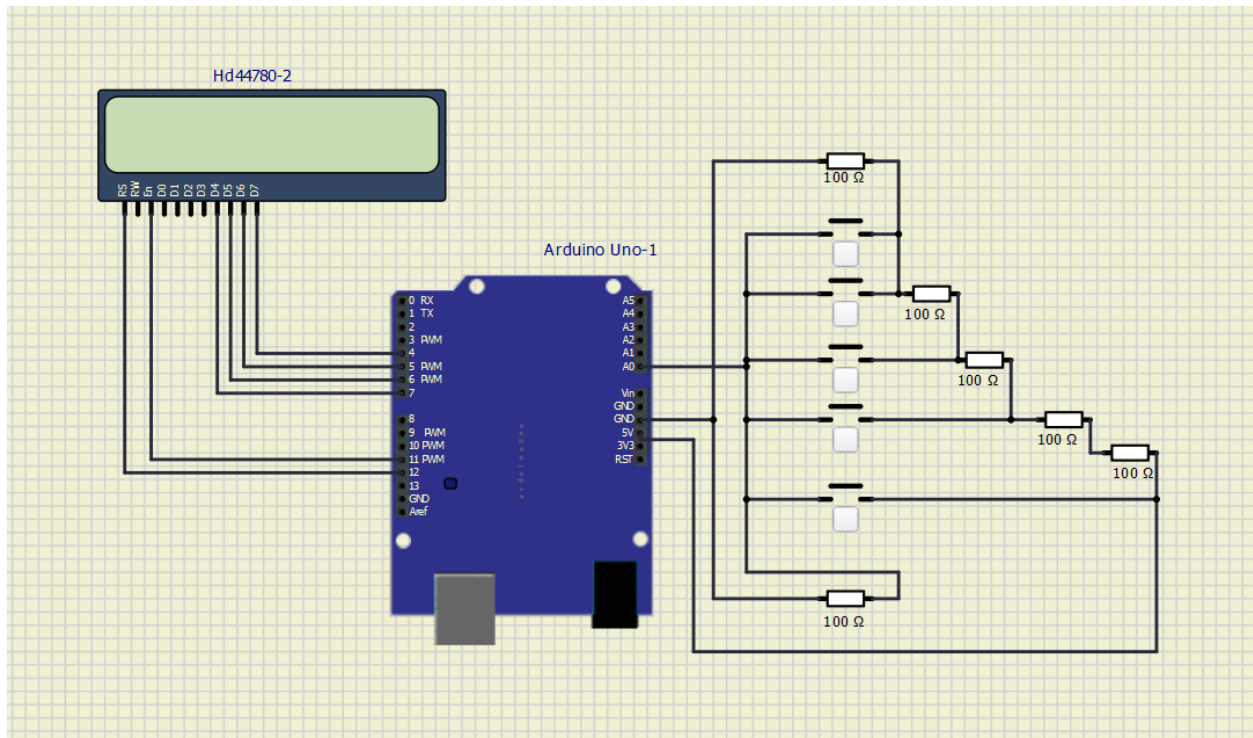


The left part represents the screen connections of the shield and the right part the buttons connection (through a voltage divider).

## Implementation

1. Display

    To be displayed on the LCD screen, I created 4 characters which will run in a sequence ( also with some movement in position of cursor):

They are created as byte arrays ( one character has 5x8 cells) in this manner and displayed alternatively from position 0 on screen or 1 with one space in between characters:

```
byte Fig1[] = {
        B10000,
        B01010,
        B00111,
        B00010,
        B00011,
        B00010,
        B00101,
        B01001
};
```

```
// 1. display blinking diode
if ((PIND & 1<<PIND3)){     // 00001
        PORTB ^= (1 << PORTB2);
        _delay_ms(100);
}
```

Also regarding the display, I used the code in Lab 8 to blink the diodes in the screen.

2. Button interaction

The functionality that I assigned for the buttons is:

RIGHT – stop the party: music, blinking and dancing.

UP – change music to previous song.

DOWN – change music to next song.

LEFT – same as right.

SELECT – play music.

We already know from the schematic that we have all buttons connected to pin A0 and there is a voltage divider to differentiate which button was pressed.

I used this voltage reference for the buttons:

```
RIGHT        0
UP           131
DOWN         306
LEFT         480
SELECT       721
```

When one of the buttons is detected as pushed, the program sends the respective message through UART.

3. UART Communication

   In parallel, the Matlab code 'listens' to the UART transmission and when it gets a certain message it fulfills the music action: play, stop, next song, previous song.

Code for UART connection in Matlab:

```
device = serialport("COM6",9600);
configureTerminator(device,"CR/LF");
flush(device);
```
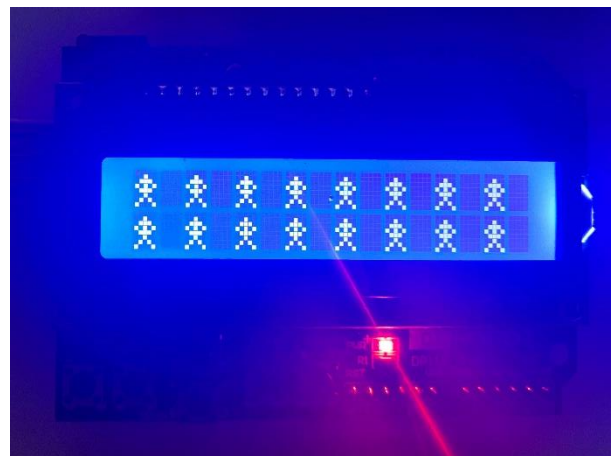
Code for playing music in Matlab:

```
function music = getMusic(filename)
    [y,Fs] = audioread(filename);
    music = audioplayer(y,Fs);
end
```

## Functionality – pictures

Because of the blinking code it is pretty hard to capture with a phone all the positions due to overexposure or underexposure.
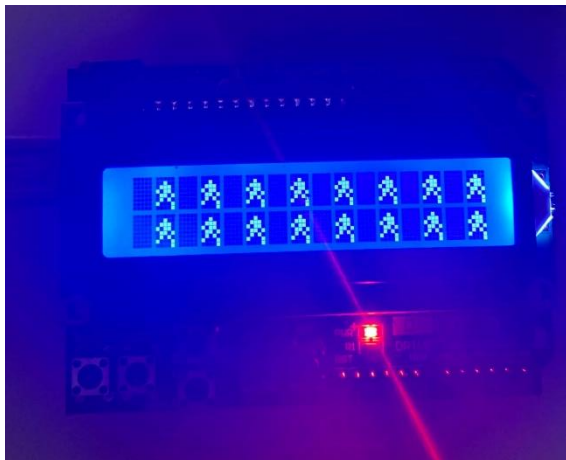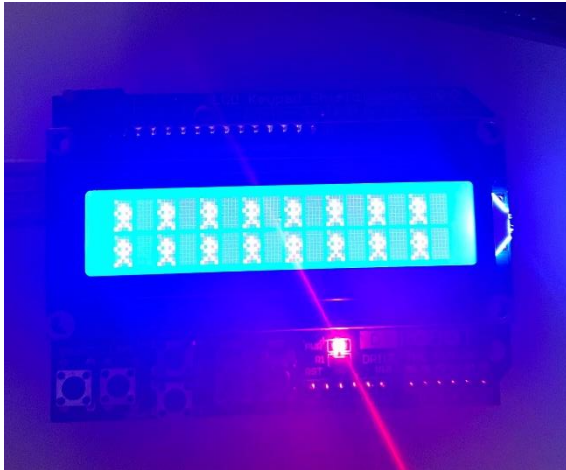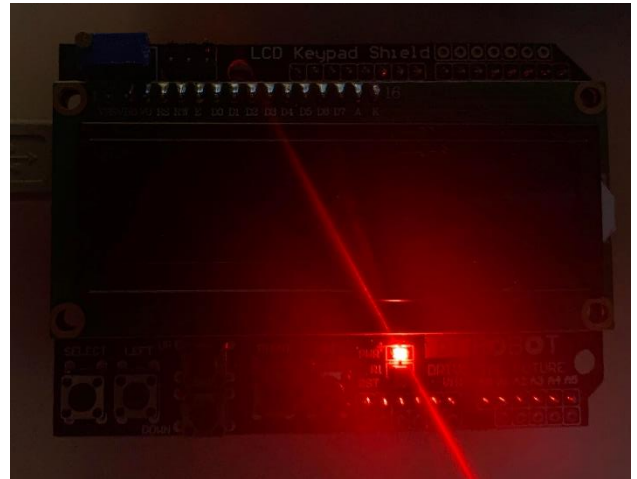


- Position 4 -



- Position 2 –

- Between positions -                                    - Screen blinking -





## Source code
https://github.com/monica-utiu/PartyStickman.git

## Summary

In conclusion, we have used the screen to display our characters and to blink it, mimicking a dance and a lights show. We also used the buttons and the UART communication to control the music played for our party. The code regarding UART is present both in the Arduino program and the Matlab program that helps us play music from the laptop.

The libraries used studied through the semester are HD44780.h and uart_buffer.h, whilst other libraries used are Arduino.h, avr/io.h and LiquidCrystal.h .