Electronics 1

Electronics for Interactive Media Design

Les6

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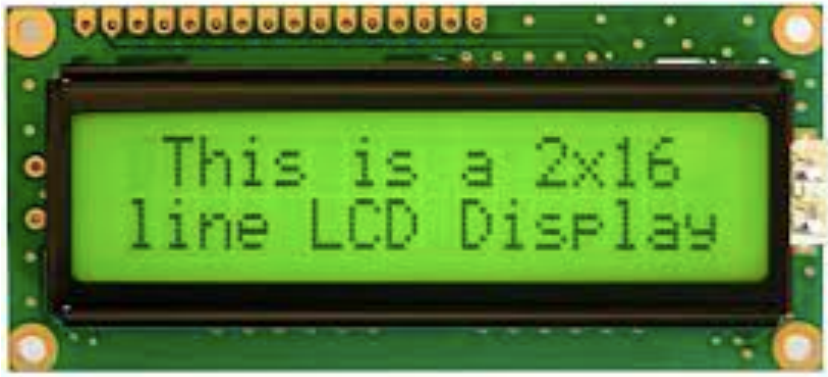
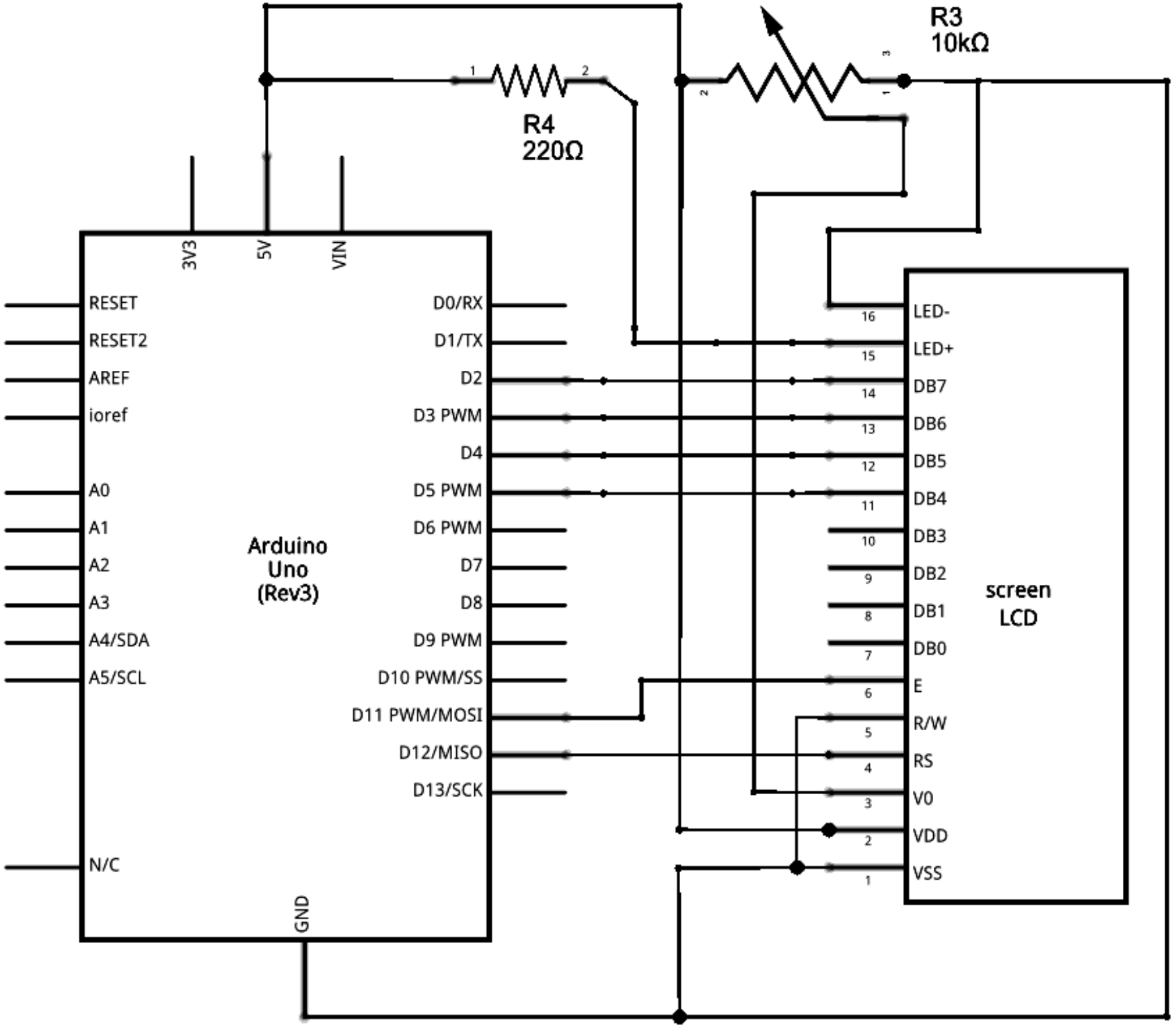
LCD - CHIP

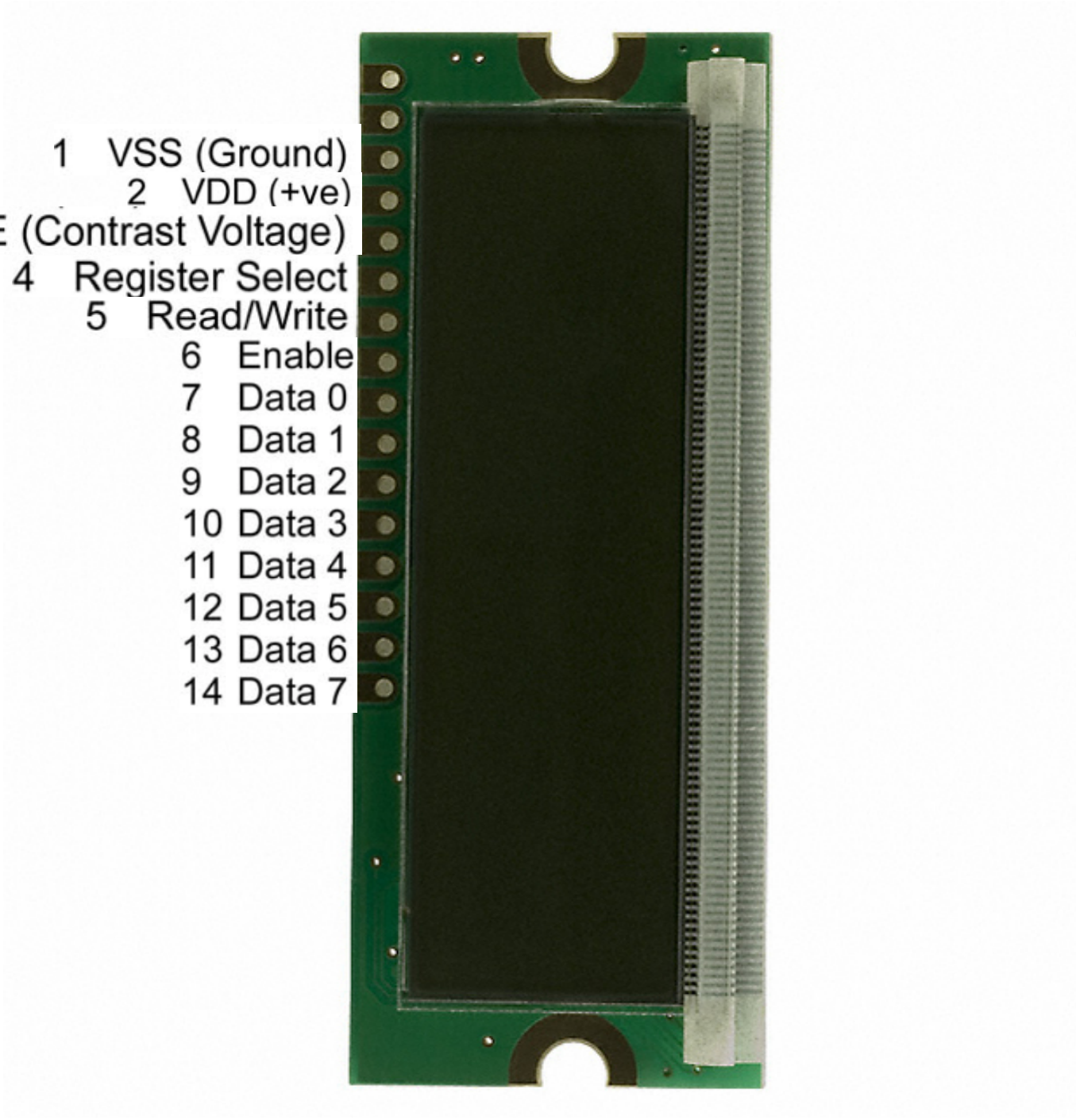
Hitachi HD44780 chip

https://www.sparkfun.com/datasheets/LCD/HD44780.pdf



1 VSS (Ground)
2 VDD (+ve)
3 VE (Contrast Voltage)
4 Register Select
5 Read/Write
6 Enable
7 Data 0
8 Data 1
9 Data 2
10 Data 3
11 Data 4
12 Data 5
13 Data 6
14 Data 7
15 Backlight Anode (+ve)
16 Backligt Cathode (Ground)


R3
10kΩ
R4
220Ω
3V3
5V
VIN
RESET
RESET2
AREF
ioref
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
GND
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
Arduino
Uno
(Rev3)
LED-
LED+
DB7
DB6
DB5
DB4
DB3
DB2
DB1
DB0
E
R/W
RS
V0
VDD
VSS
screen
LCD


1 VSS (Ground)
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4 Register Select
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7 Data 0
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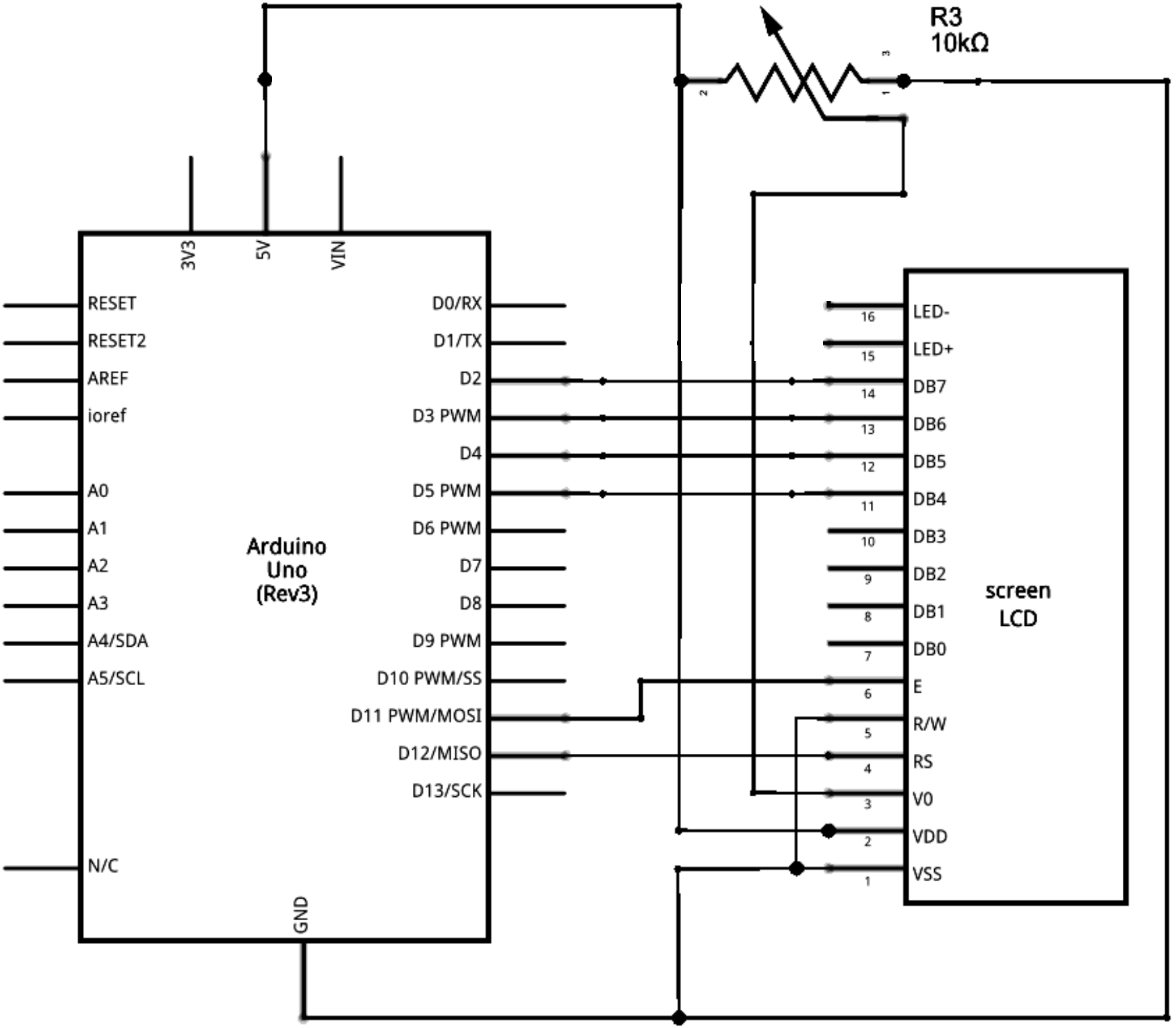
R3
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D4
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D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
Arduino
Uno
(Rev3)
LED-
LED+
DB7
DB6
DB5
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DB1
DB0
E
R/W
RS
V0
VDD
VSS
screen
LCD

LCD - LIBRARY

https://www.arduino.cc/en/Reference/LiquidCrystal

LiquidCrystal library for driving LCD displays based on the HD44780 chip.

Most text LCDs supplied for use with Arduino will be compatible with the Hitachi HD44780 controller. If you are not sure about your con- troller, check the data sheet to see if it is a 44780 or compatible.

```
#include “LiquidCrystal.h"

LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
```

LCD - PINS

A register select (RS) pin that controls where in the LCD's memory you're writing data to. You can select either the data register, which holds what goes on the screen, or an instruction register, which is where the LCD's controller looks for instructions on what to do next.

A Read/Write (R/W) pin that selects reading mode or writing mode

An Enable pin that enables writing to the registers

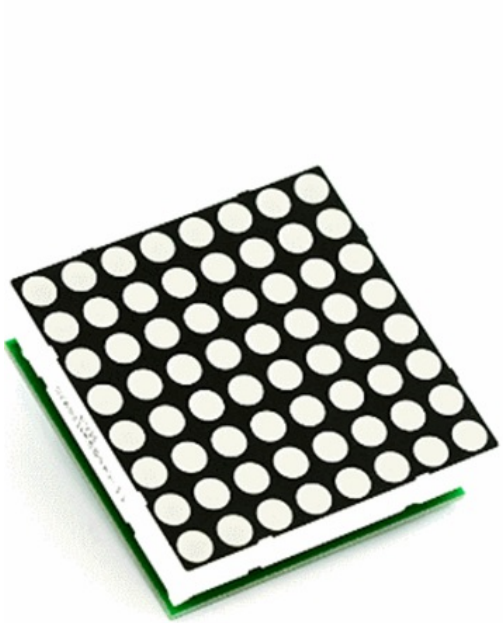
8 data pins (D0 -D7). The states of these pins (high or low) are the bits that you're writing to a register when you write, or the values you're reading when you read.

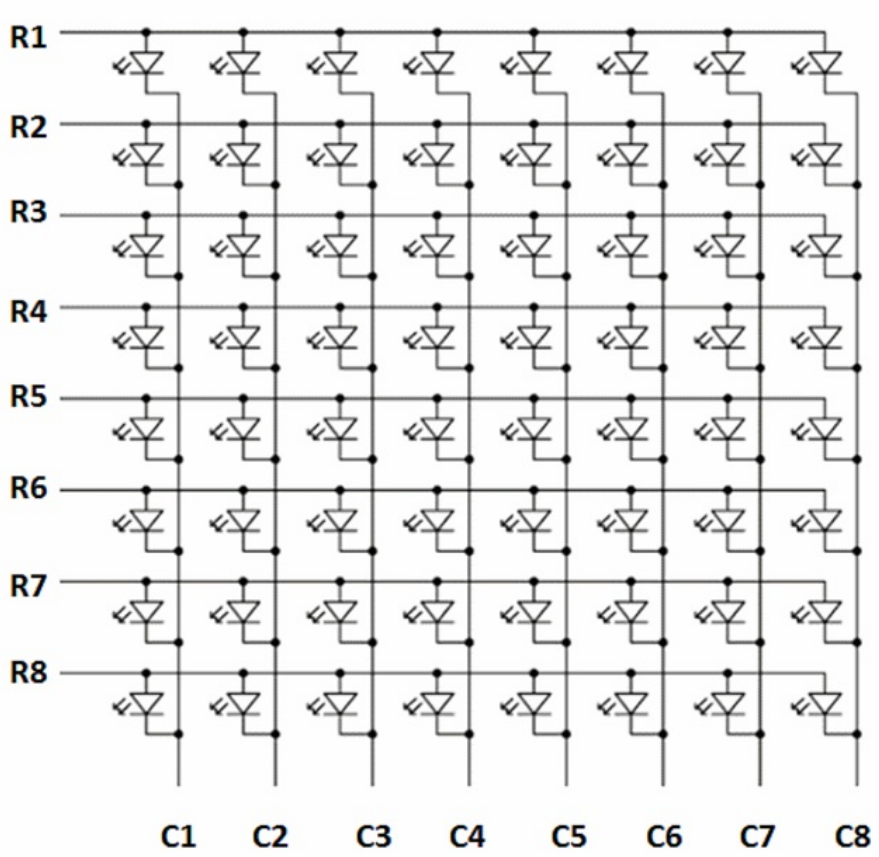
There's also a display constrast pin (Vo), power supply pins (+5V and Gnd) and LED Backlight (Bklt+ and BKlt-) pins that you can use to power the LCD, control the display contrast, and turn on and off the LED backlight, respectively.

The Hitachi-compatible LCDs can be controlled in two modes: 4-bit or 8-bit. The 4-bit mode requires seven I/O pins from the Arduino, while the 8-bit mode requires 11 pins. For displaying text on the screen, you can do most everything in 4-bit mode.

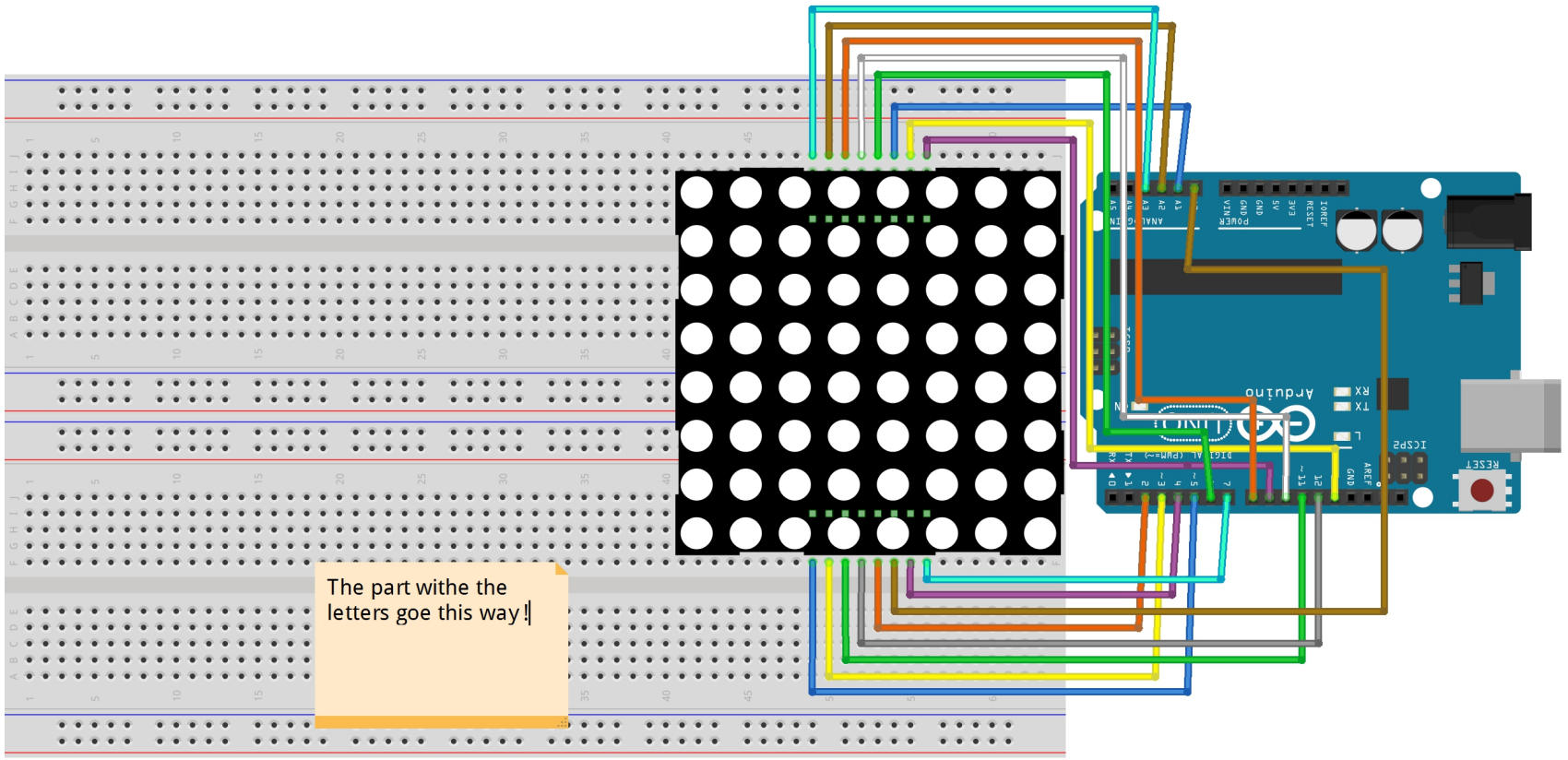
Led Matrix 8x8

https://www.sparkfun.com/datasheets/LCD/HD44780.pdf





Led Matrix 8x8 - schematic



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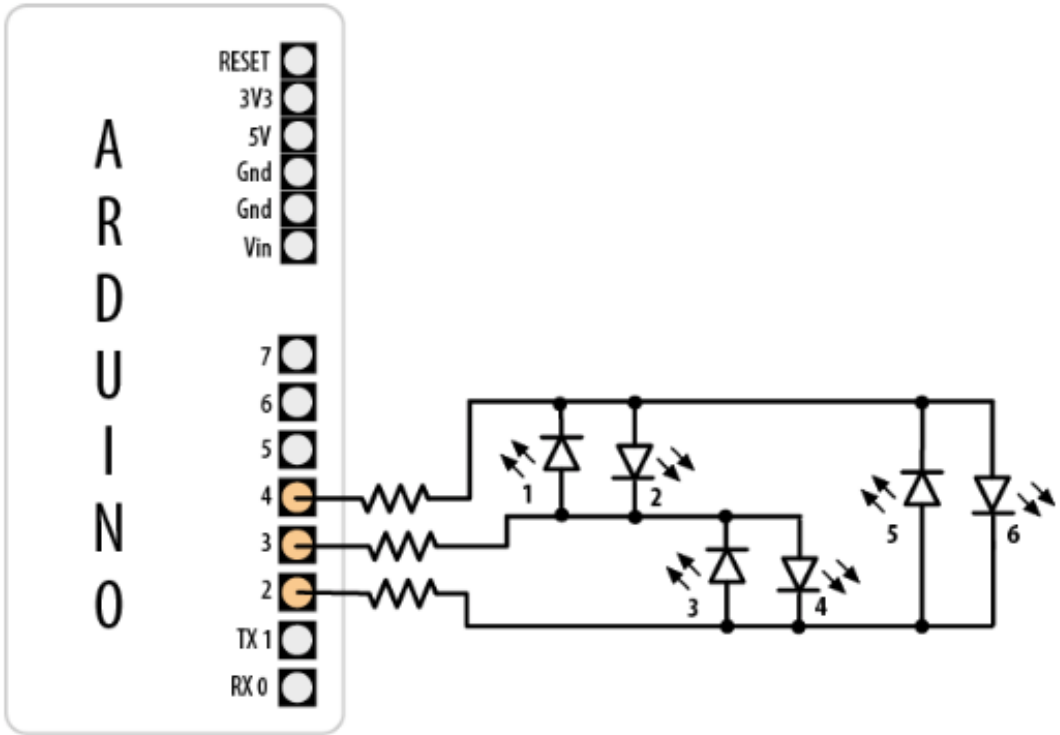


. NUMBER OF LEDS = NUMBER OF PINS * (NUMBER OF PINS-1)

Matrix

https://create.arduino.cc/projecthub/igorF2/controlling-an-led-matrix-with-arduino-uno-0a9e94

https://create.arduino.cc/projecthub/SAnwandter1/programming-8x8-led-matrix-23475a

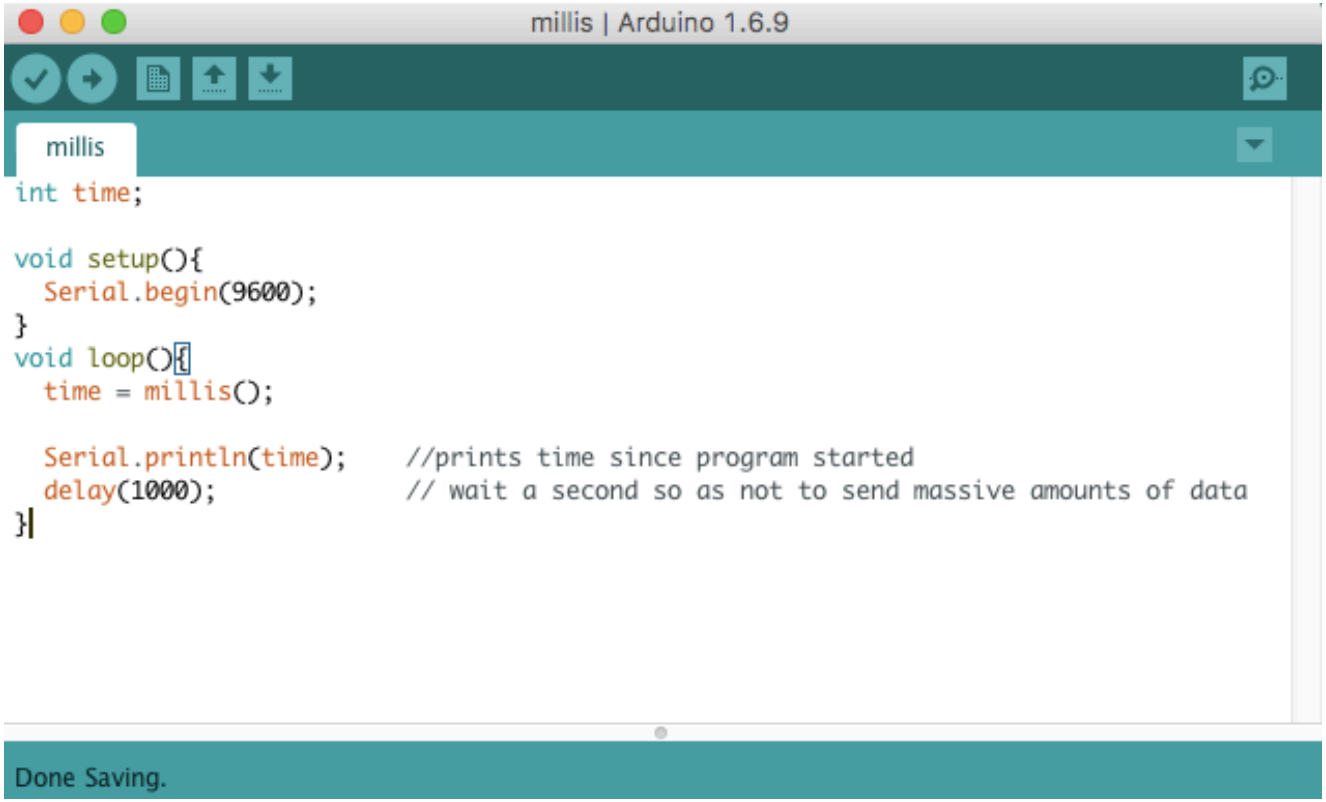
https://create.arduino.cc/projecthub/search?q=led+matrix+8x8&type=BaseArticle

Millis()

Syntax:

```
millis();
```

Returns the number of milliseconds since the Arduino board began running the current program. This number will overflow (go back to zero), after approximately 50 days.



Assignment

- Develop an interactive project that includes three parts:
  - at least one input device
  - at least one output device
  - A micro-controller

If you are planning to implement the mentioned three parts in a semester project of another course, I consider it valid also for my course.

If you develop a specific semester project for the course “Electronics”:
- make a “Useless and/or Annoying Machine”
  Ex:
  Useless machine: https://www.youtube.com/watch?v=Z86V_ICUCD4The
  Wake-Up machine: https://www.youtube.com/watch?v=61FaYVGVY_I
- the semester can be a group project, group of 2 people.

Sources and Licence

Crystal Liquid Display
https://www.sparkfun.com/tutorials/251
https://www.arduino.cc/en/Tutorial/HelloWorld
Arduino Cookbook, O'Reilly, Michael Margolis
Chapter 11 Using Displays, pag. 333