



Liquid Crystal Display

KU1202 Pengantar Rekayasa dan Desain

K-20

Sekolah Teknik Elektro dan Informatika
Institut Teknologi Bandung

Overview

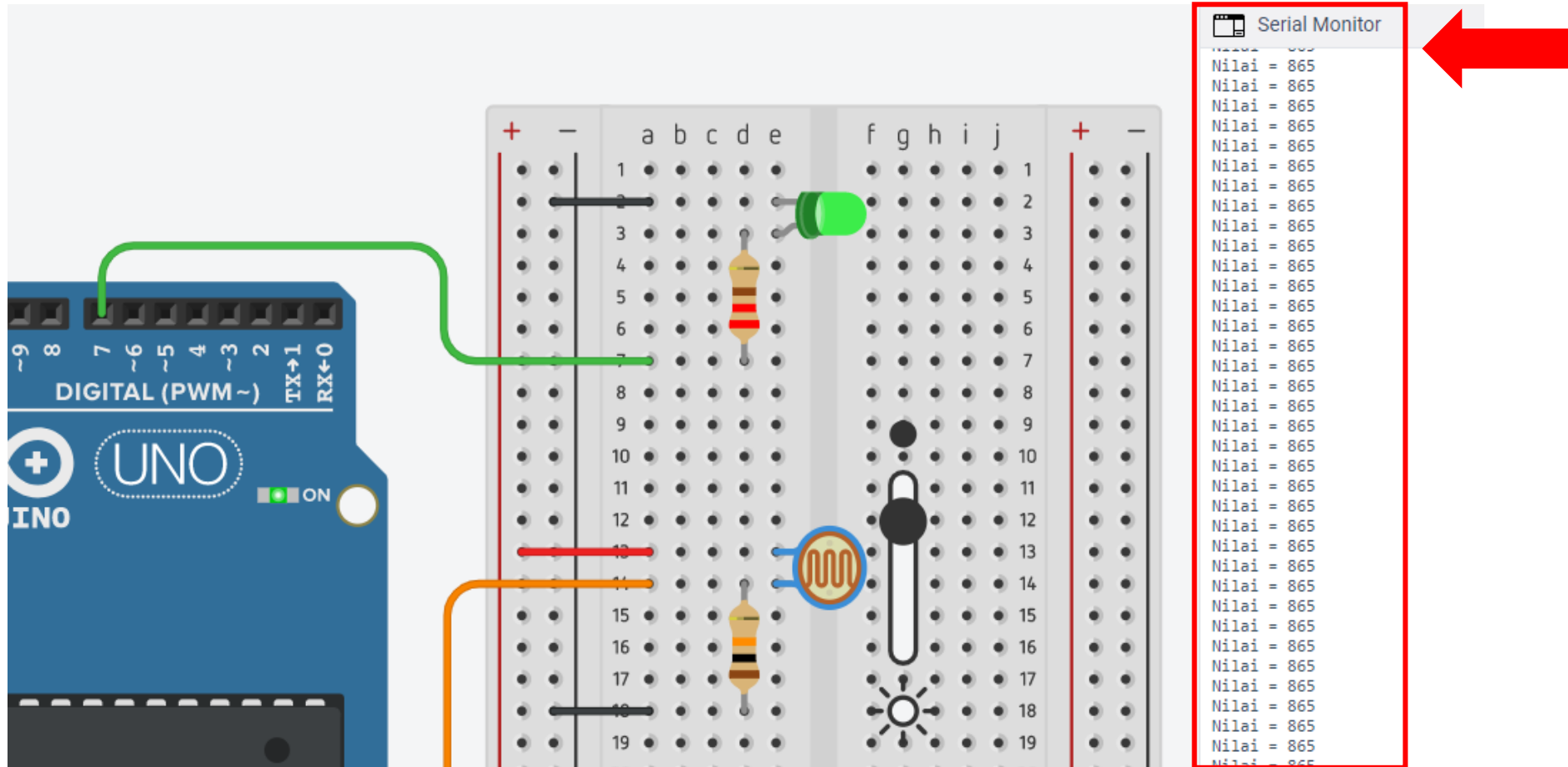
- Liquid Crystal Display (LCD)
- LCD and Sensor

Introduction

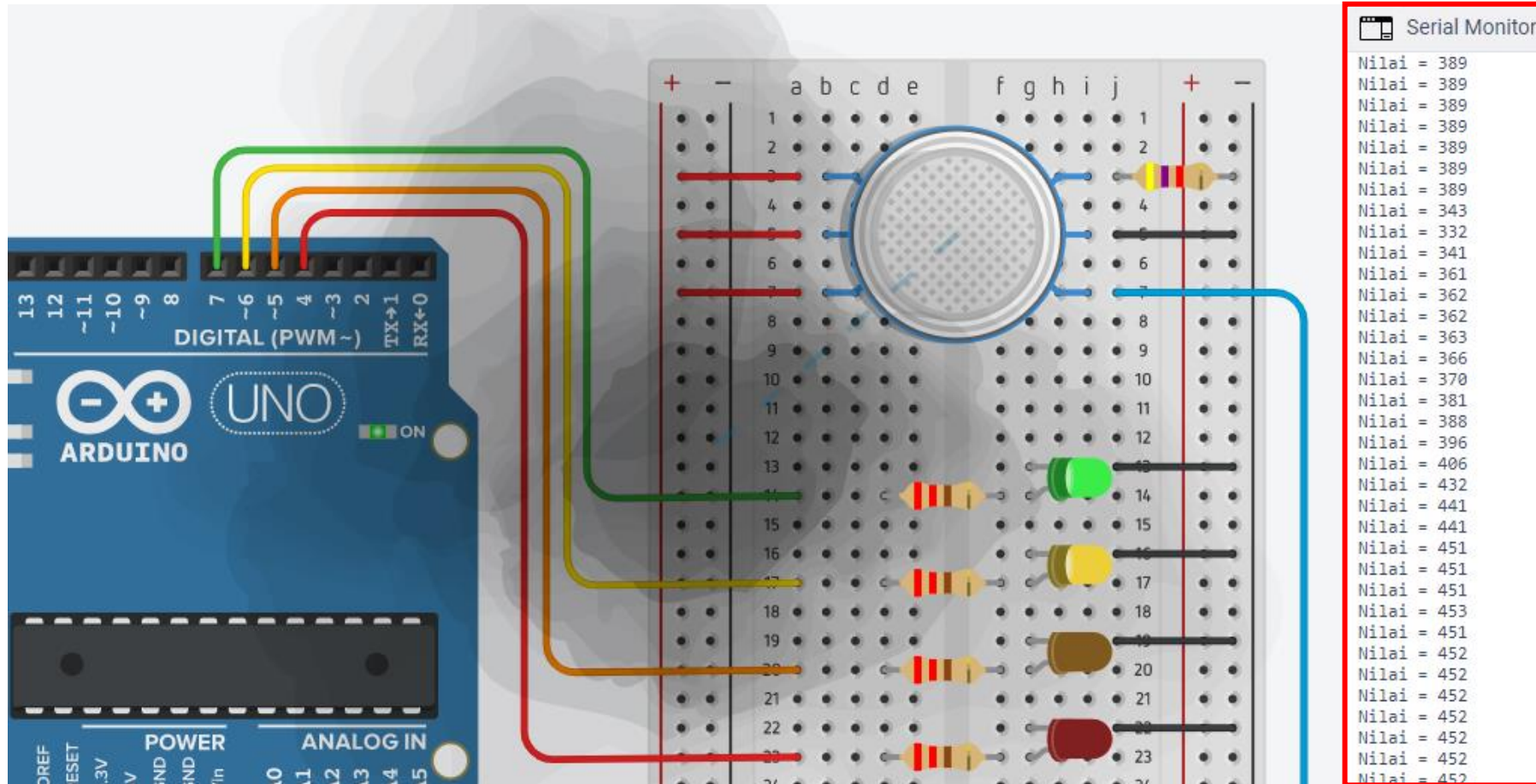




Photoresistor



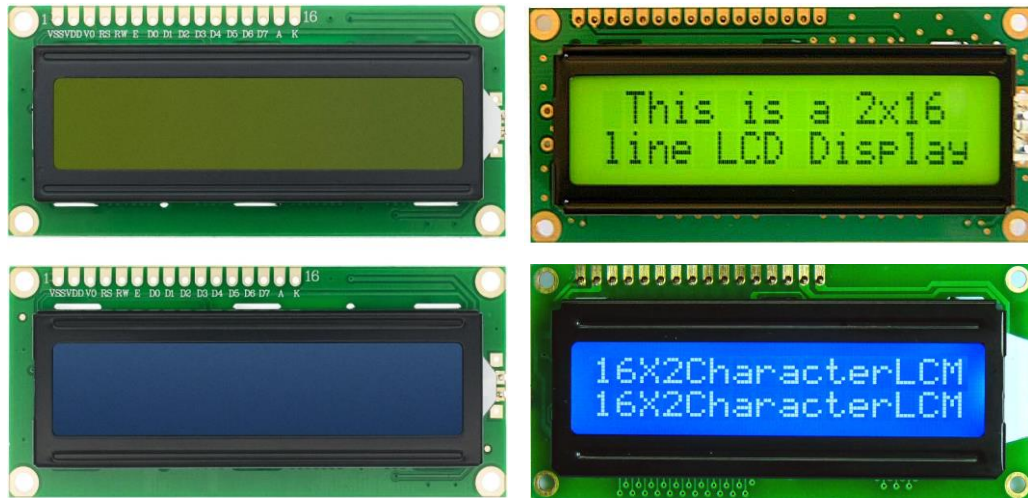
Gas Sensor



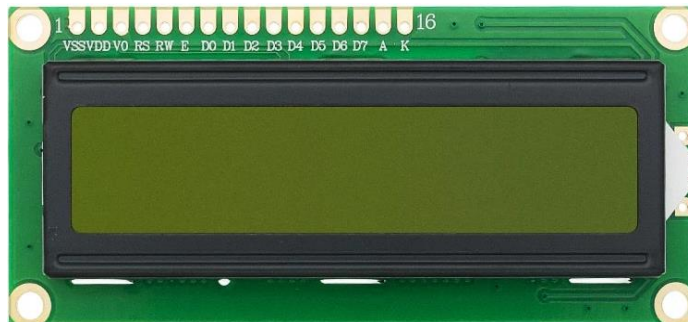
Liquid Crystal Display

LCD 16x2

LCD



Pinout



Sumber: <https://components101.com/displays/16x2-lcd-pinout-datasheet>

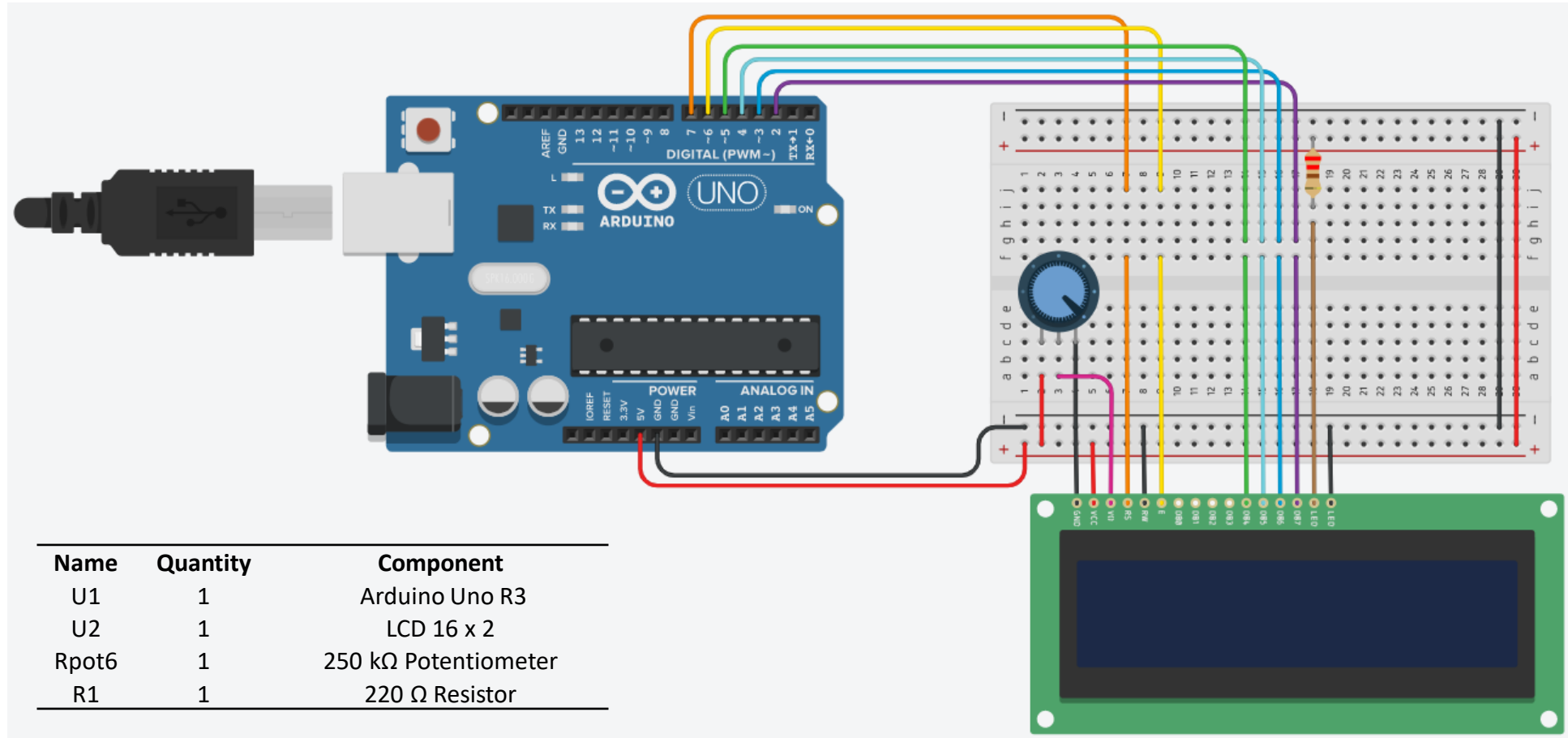
Pin no.	Symbol	External connection	Function
1	Vss	Power supply	Signal ground for LCM
2	V _{DD}		Power supply for logic for LCM
3	V ₀		Contrast adjust
4	RS	MPU	Register select signal
5	R/W	MPU	Read/write select signal
6	E	MPU	Operation (data read/write) enable signal
7~10	DB0~DB3	MPU	Four low order bi-directional three-state data bus lines. Used for data transfer between the MPU and the LCM. These four are not used during 4-bit operation.
11~14	DB4~DB7	MPU	Four high order bi-directional three-state data bus lines. Used for data transfer between the MPU
15	LED+	LED BKL power supply	Power supply for BKL
16	LED-		Power supply for BKL

Exercise #1

LCD 16x2

Format Nama Desain: 13_NIM_01, contoh: 13_16520999_01

Circuit Design



Program Design

- **Program**: LCD
- **Input**: -
- **Output**: tulisan “hello world” dan hitungan waktu pada LCD 16x2
- **Process**: -

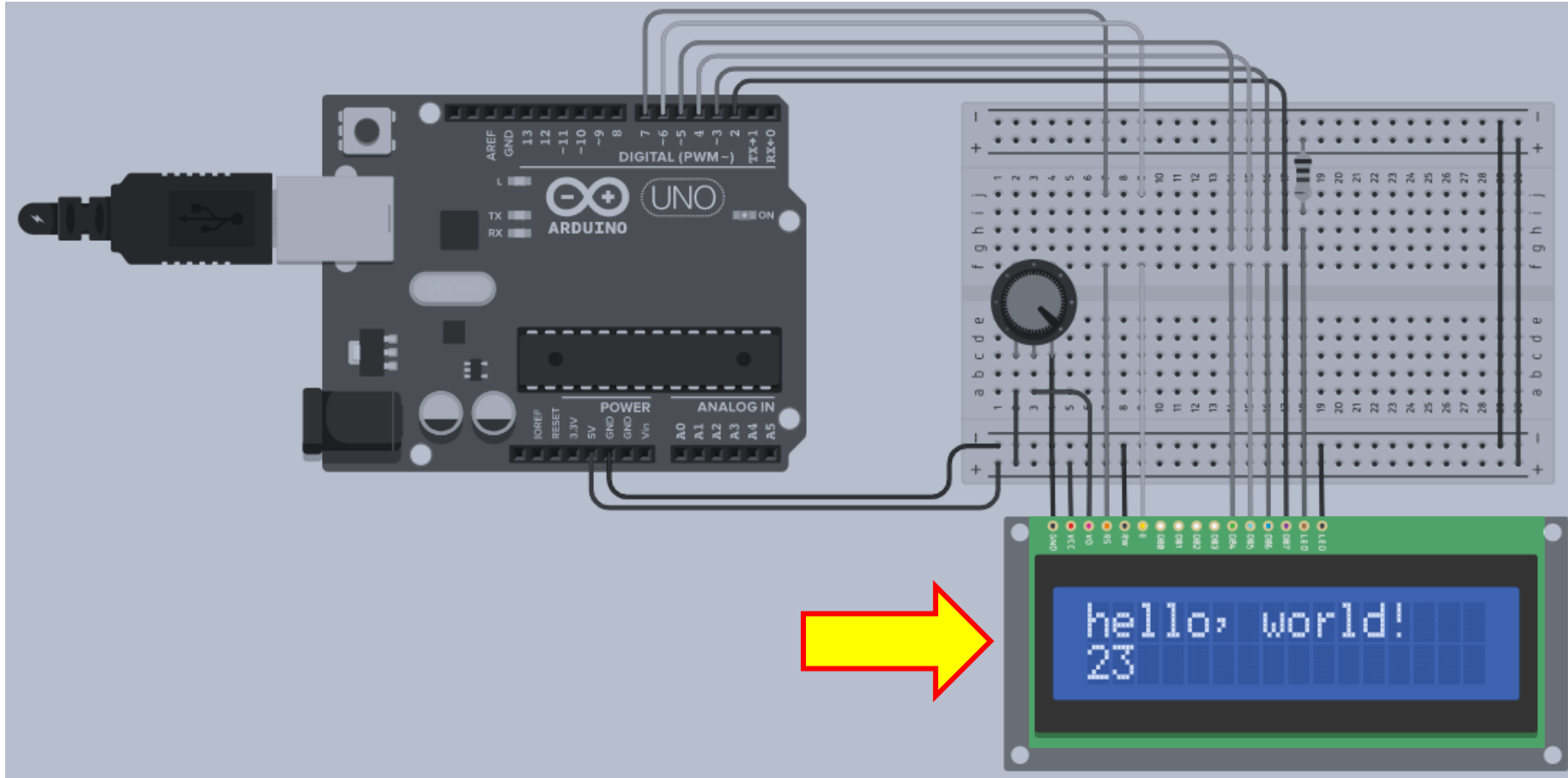
Code



```
1 #include <LiquidCrystal.h>
2 LiquidCrystal lcd(7, 6, 5, 4, 3, 2);    // pin Arduino yang terhubung ke LCD
3
4 void setup() {
5     lcd.begin(16, 2);                  // atur jumlah kolom dan baris LCD
6     lcd.print("hello, world!");        // menampilkan tulisan pada LCD
7 }
8
9 void loop() {
10    lcd.setCursor(0, 1);                // atur kursor ke kolom 0 baris 1
11    lcd.print(millis() / 1000);         // menampilkan waktu (dalam detik)
12 }
```

Format Nama: **13_NIM_01.ino**, contoh: **13_16520999_01.ino**

Simulation

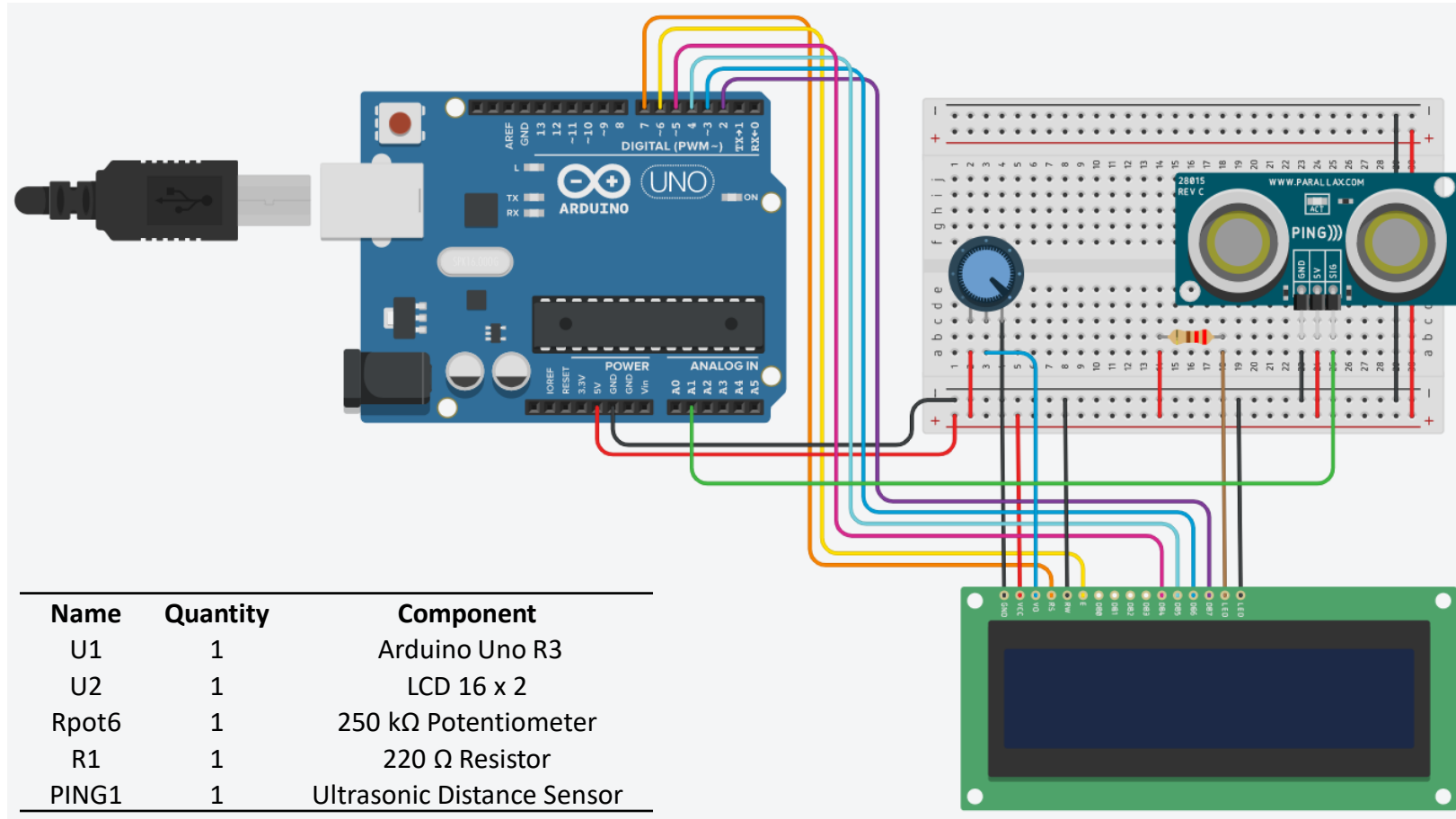


Exercise #2

LCD and Ultrasonic Sensor

Format Nama Desain: 13_NIM_02, contoh: 13_16520999_02

Circuit Design



Program Design

- **Program**: Pengukur Jarak
- **Input**: Ultrasonic Sensor
- **Output**: Tampilan nilai jarak pada LCD 16x2
- **Process**:
 - Baca hasil pengukuran sensor
 - Menampilkan nilai jarak pada LCD

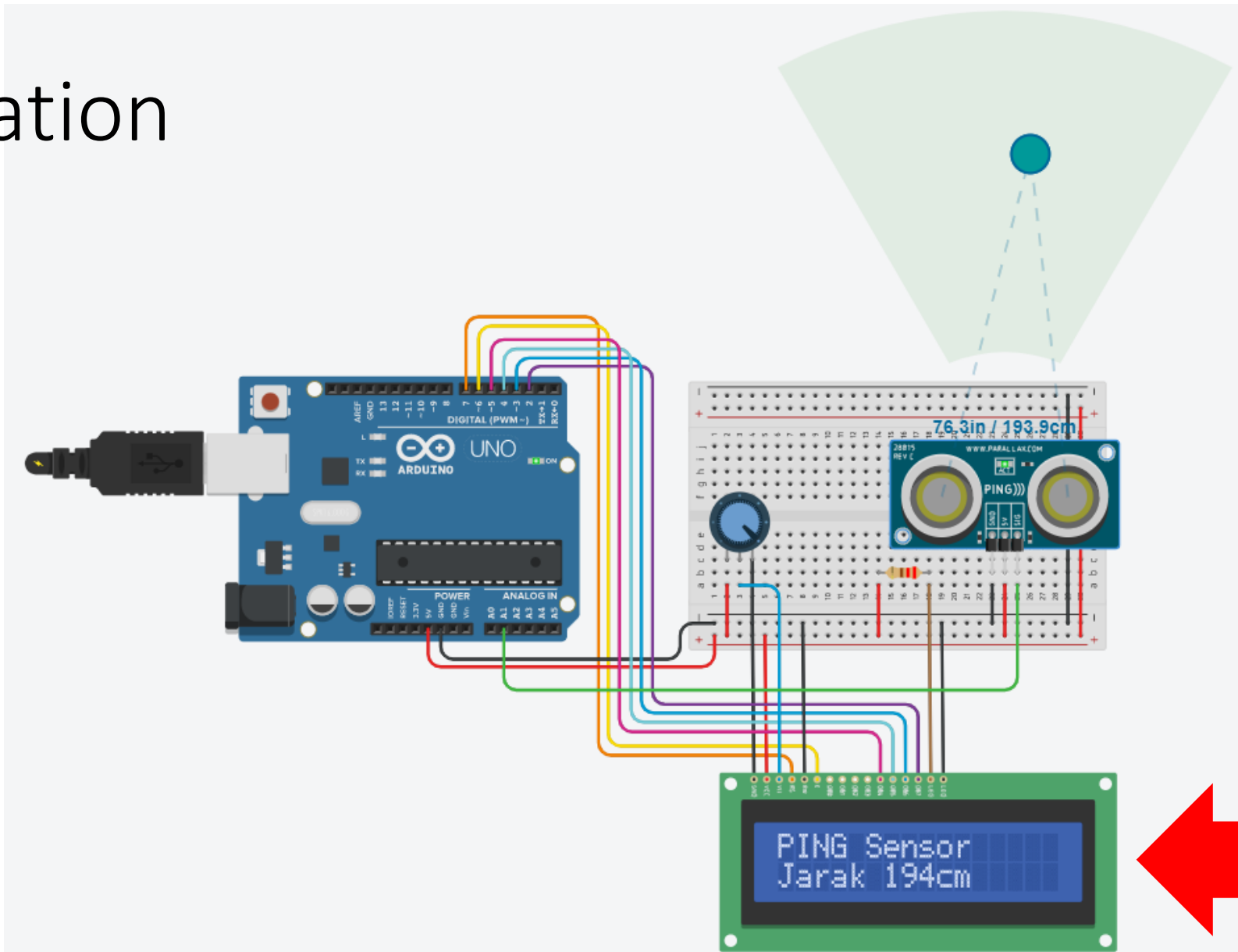
Code



```
1 #include <LiquidCrystal.h>
2 LiquidCrystal lcd(7, 6, 5, 4, 3, 2);           // pin Arduino terhubung LCD
3 const int ping_Pin = A1;                     // pin Arduino terhubung Ultrasonic Sensor
4 long dur, cm;                                // simpan nilai durasi dan jarak (cm)
5
6 void setup() {
7     lcd.begin(16, 2);                         // atur jumlah kolom dan baris LCD
8     lcd.print("PING Sensor");
9 }
10
11 void loop() {
12     cm = read_sensor_ultrasonic();
13
14     /* Print to LCD */
15     lcd.setCursor(0,1);                       // atur kursor ke kolom 0 baris 1
16     lcd.print("Jarak ");
17     lcd.setCursor(6,1);                       // atur kursor ke kolom 6 baris 1
18     lcd.print(cm);                             // cetak nilai jarak
19     print_unit_cm(cm);                         // cetak satuan (cm)
20 }
```

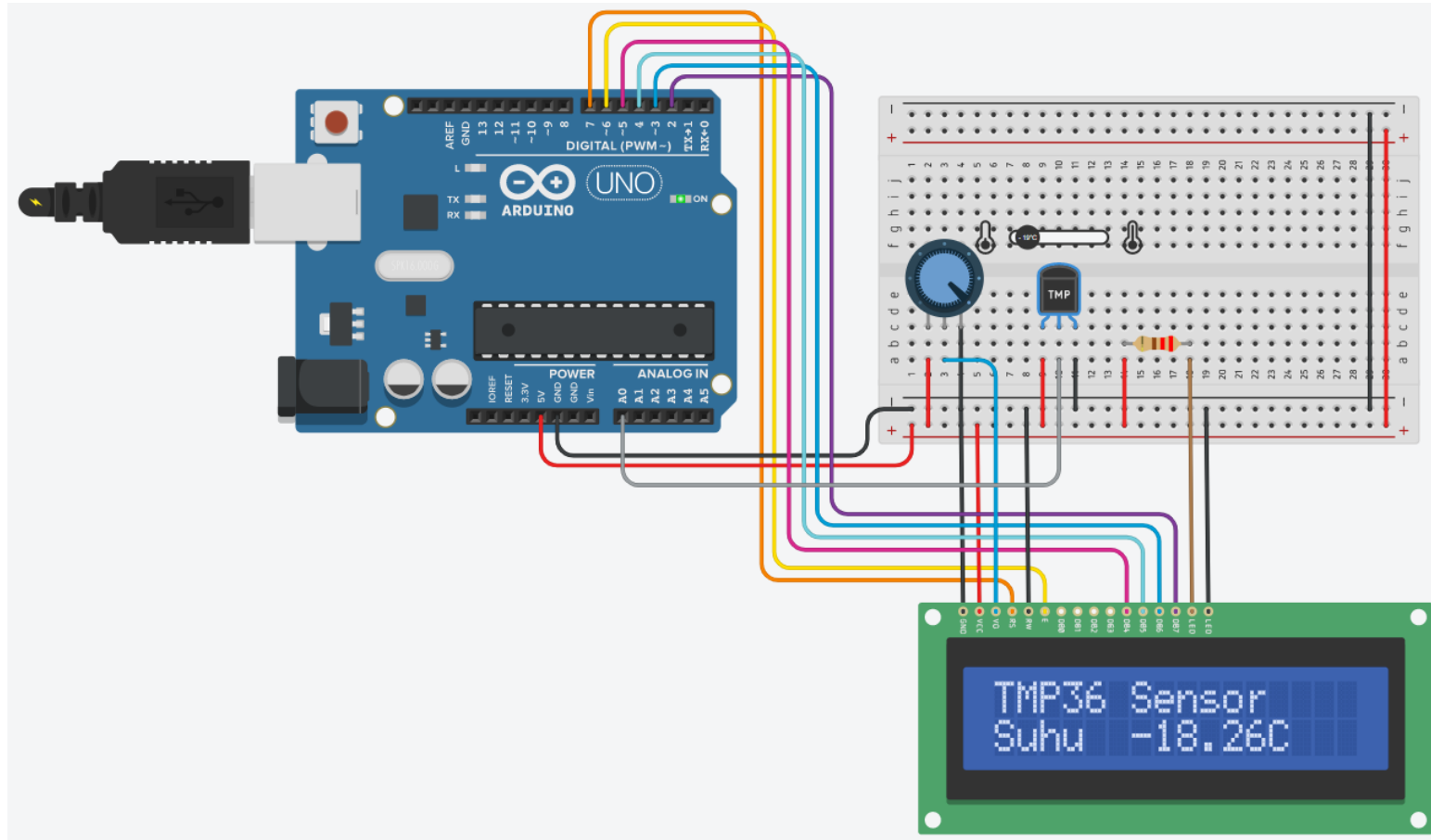
Format Nama: **13_NIM_02.ino**, contoh: **13_16520999_02.ino**

Simulation

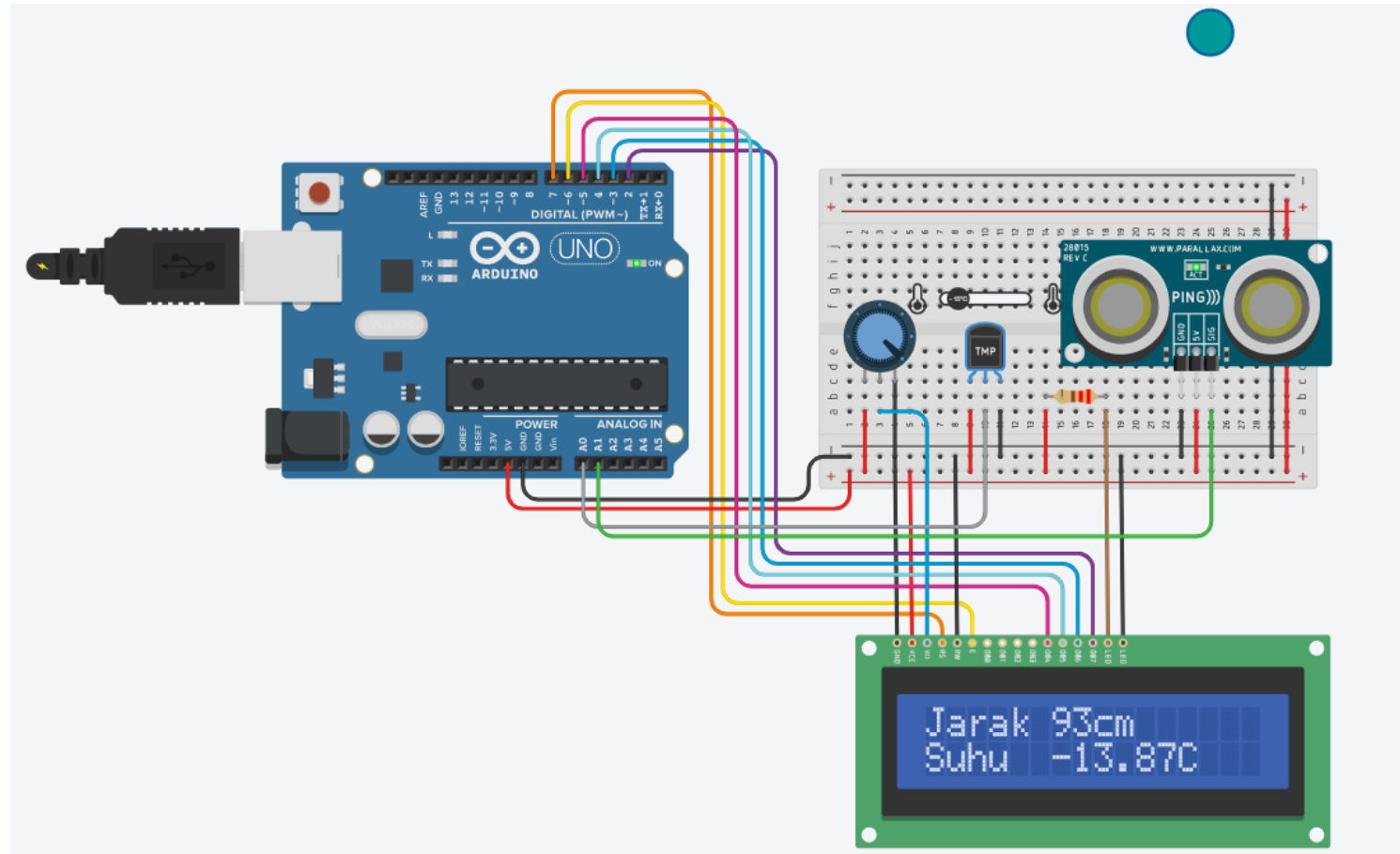


Others

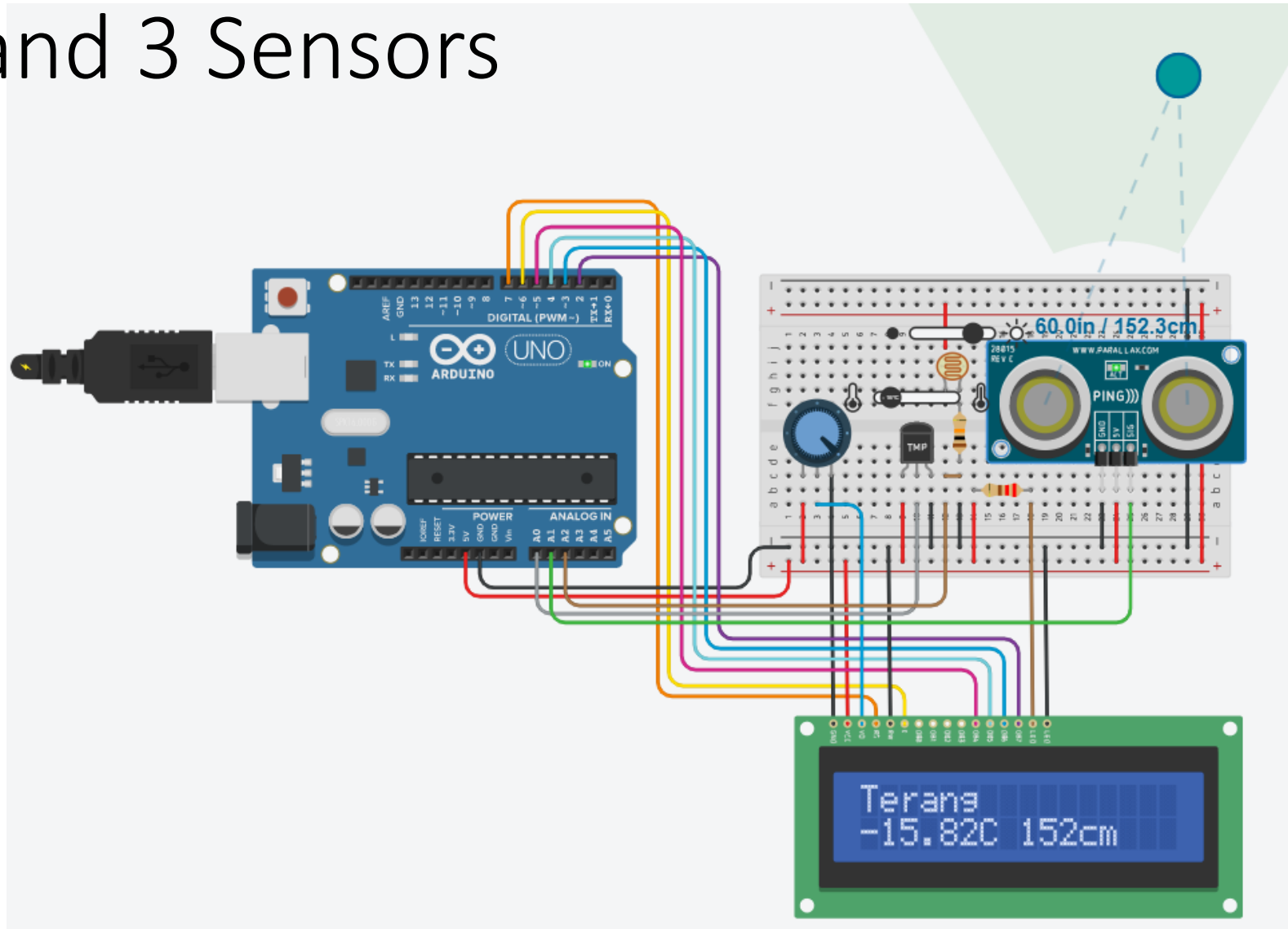
Temperature Sensor (LCD)



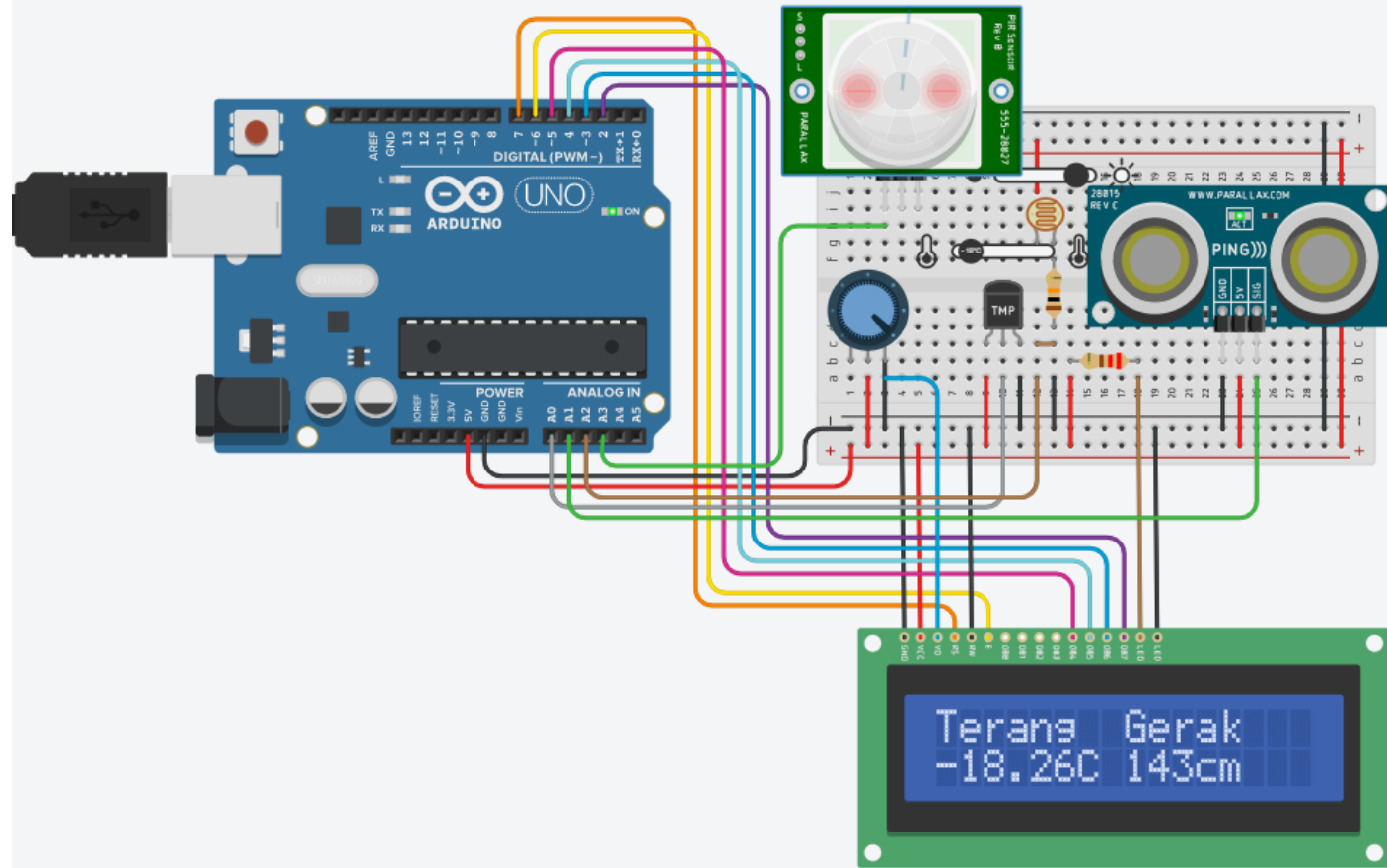
LCD and 2 Sensors



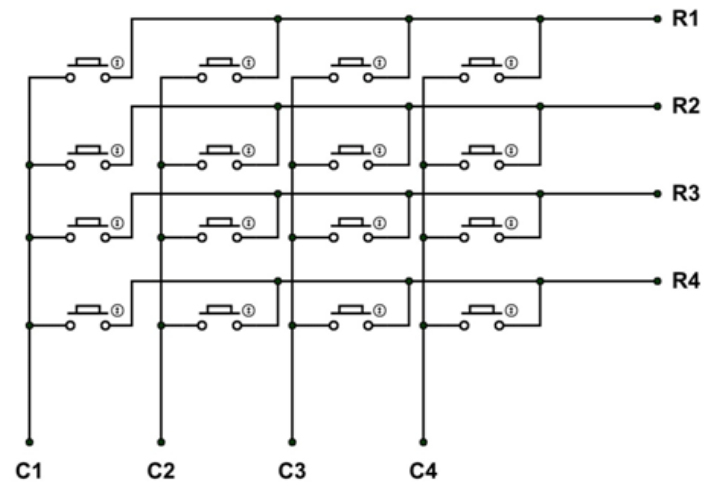
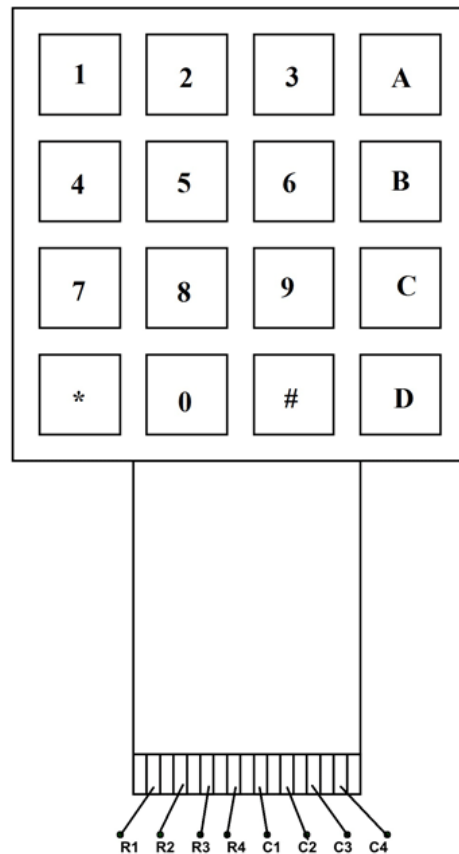
LCD and 3 Sensors



LCD and 4 Sensors



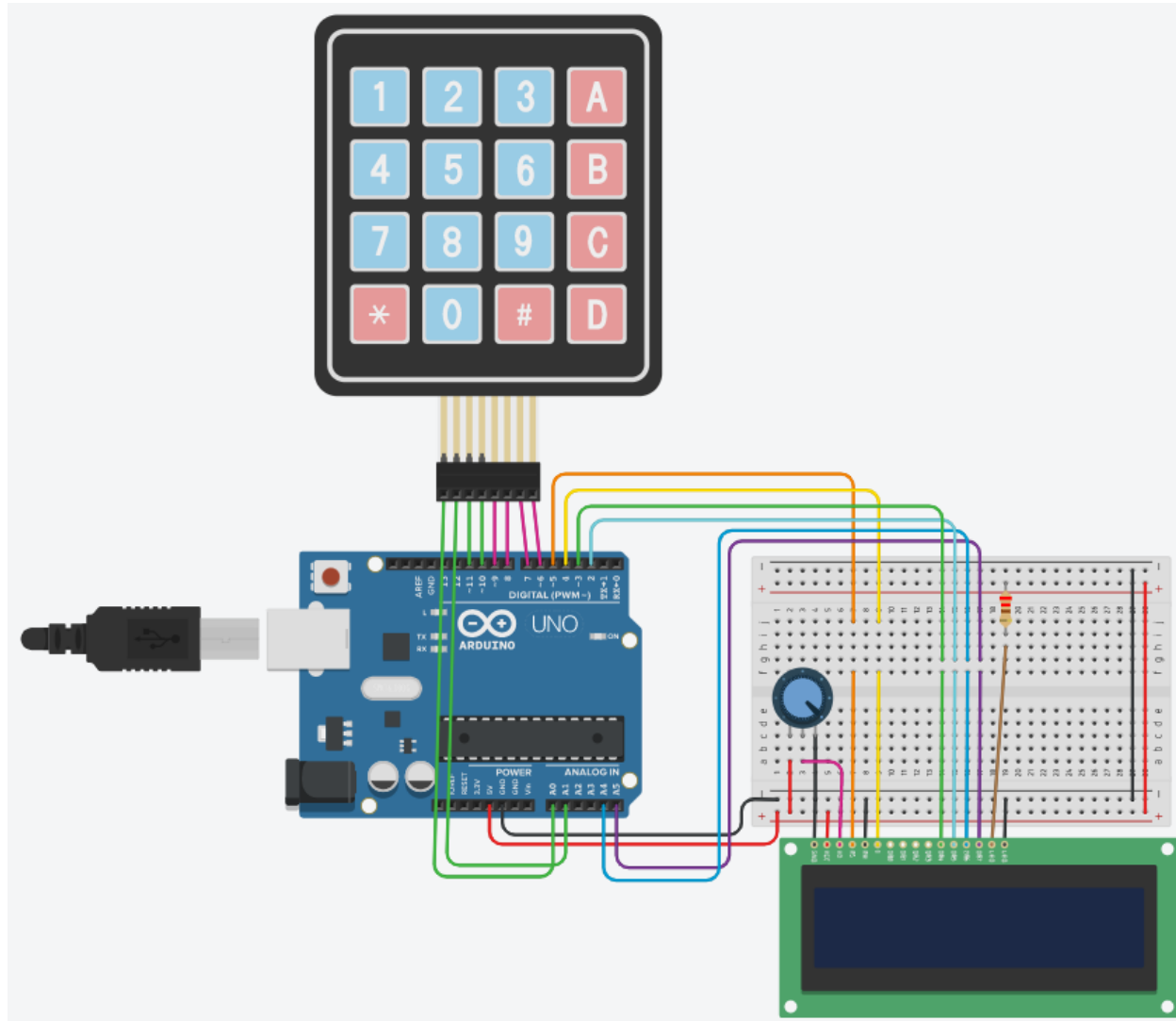
Keypad



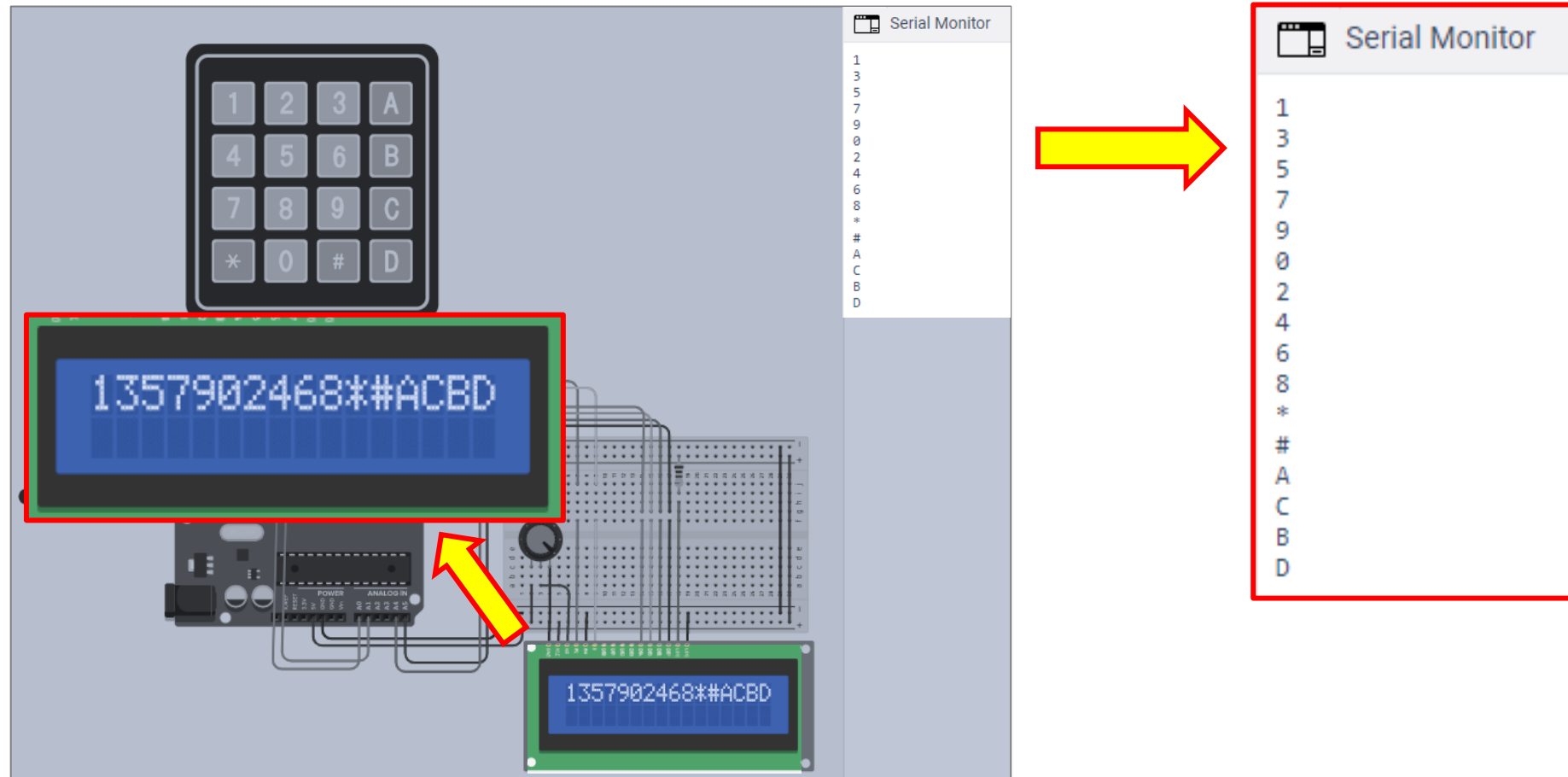
Sumber: <https://components101.com/misc/4x4-keypad-module-pinout-configuration-features-datasheet>

LCD and Keypad

Name	Quantity	Component
U1	1	Arduino Uno R3
U2	1	LCD 16 x 2
Rpot6	1	250 k Ω Potentiometer
R1	1	220 Ω Resistor
KEYPAD1	1	Keypad 4x4



LCD and Keypad (Simulation)



Penutup

Kesimpulan

- LCD: perangkat untuk menghasilkan gambar/tulisan yang dapat dilihat.
- LCD dapat digunakan untuk:
 - Menampilkan informasi yang dibutuhkan pengguna
 - Menampilkan nilai bacaan dari sensor

Terima Kasih