



Mini Lab

Project 6

# LCD SCREEN

## PROJECT N° 6: LCD display

Learn how to create a program to write words on the display of the Mini Lab with these two exercises.

### EXERCISES INDEX:

- Exercise 6.1: Write words on the LDC display
- Exercise 6.2: Indicate the light and temperature measured on the display

### **Exercise 6.1:** Write words on the LDC display

Learn how to program in order to write words on the LCD display of the Mini Lab.

**DIFFICULTY LEVEL:** Advanced.

**DURATION OF THE EXERCISE:** 45 min.

**MATERIALS:**

- LCD display
- Computer

The Mini Lab will have to be built according to the instructions manual.



**LCD DISPLAY with I2C**

### **What is an LCD display?**

LCD is the acronym of Liquid Crystal Display. It's a thin and flat display composed by a number of colored or monochrome pixels placed in front of a light source or reflective.

There are different types of displays, depending on the number of lines and columns it has. The LCD display included in the Mini Lab kit has 16 columns and 2 lines.

### **PROGRAMMING CODE:**

You can do this project using Arduino or a visual programming software by blocks compatible. Below you will find the necessary code.

#### **Arduino Code**

1. Download and install the Arduino IDE program.
2. In order to program the LCD display with Arduino IDE in Windows, you need to add a library. You can do it by following the steps indicated in this

link.

3. Once you have installed the library, copy the following program in it:

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h> // LIBRARY FOR THE LCD
DISPLAY

LiquidCrystal_I2C lcd(0x27, 16, 2); // CONFIGURATION
OF THE LCD DISPLAY

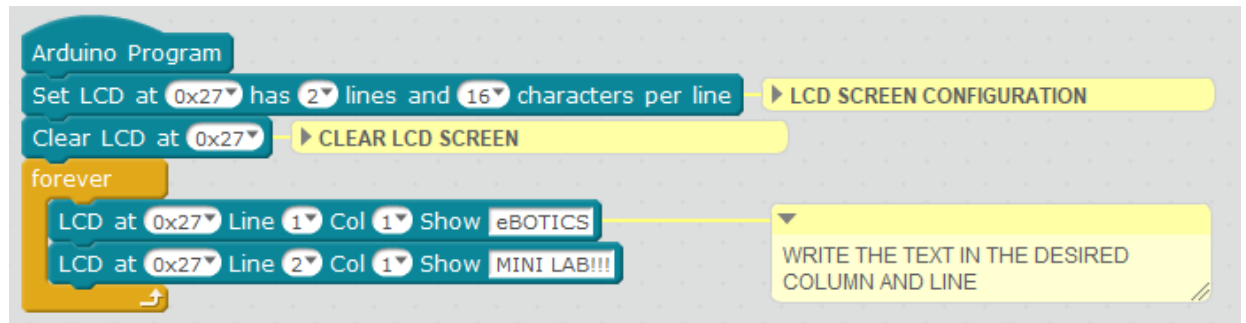
void setup() {
  // CLEAN THE LCD DISPLAY
  lcd.begin(); // INITIALIZE THE LCD SCREEN
  lcd.clear(); // CLEAN THE LCD DISPLAY
}

void loop() {
  // WRITE ON LCD DISPLAY
  lcd.setCursor(0, 0); // WRITE ON THE LINE 1 COLUMN
  0
  lcd.print("MINI LAB"); // CONTENT TO WRITE ON THE
DISPLAY
  lcd.setCursor(0, 8); // WRITE ON THE LINE 2 COLUMN
  0
  lcd.print("eBOTICS"); // CONTENT TO WRITE ON THE
DISPLAY
}
```

4. Configure and upload the code, following the indications on the Mini Lab First Steps guide.
5. Check that the BTL/USB switch on the Build&Code 4in1 board is set to USB, to upload the code correctly.

### **Code for the visual programming software by blocks compatible**

1. Download and install the program.
2. In order to program the LCD display with the visual programming software by blocks you need to install the extension LCD I2C PACK de Wu Xin in the program. Follow the steps indicated in the following link.
3. Once you have installed the extension, copy the following code:



\*Note that every time you charge a new program and the content on the screen changes, you will have to restart the Build&Code 4in1 board.

4. Configure and upload the code, following the indications on the Mini Lab First Steps guide.
5. Check that the BTL/USB switch on the Build&Code 4in1 board is set to USB, to upload the code correctly.

### **RESULT OF THE EXERCISE:**

When pressing the button, the buzzer will make a sound and when you stop pressing the buzzer, the button will stop making the sound.

**Exercise 6.2:** Indicate the light and temperature measured on the display

Learn to program the LCD display for it to indicate the light measured by the light sensor and the temperature of the servomotor.

**DIFFICULTY LEVEL:** Advanced.

**DURATION OF THE EXERCISE:** 45 min.

### **MATERIALS:**

- LCD screen
- 1 Servomotor
- 1 Analog Light Sensor
- 1 USB - Micro USB cable
- Computer

The Mini Lab will have to be built according to the instructions manual.



LCD DISPLAY with I2C



SERVOMOTOR



ANALOG LIGHT SENSOR

## PROGRAMMING CODE:

You can do this project using the Arduino, Bitbloq and other visual programming software by blocks compatible. Below you will find the necessary code.

### Arduino Code

1. Download and install the Arduino IDE program. It is available for Windows, Mac OS and Linux.
2. Open the Arduino program and copy the following program in it:

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h> // LIBRARY FOR THE LCD
DISPLAY
#include <Servo.h> LIBRARY FOR THE SERVOMOTOR

LiquidCrystal_I2C lcd(0x27, 16, 2); // CONFIGURATION
OF THE LCD DISPLAY
Servo motor; // VARIABLE OF THE SERVOMOTOR
int pot = 0, pinpot = A1; //VARIABLE PINS OF THE
POTENTIOMETER
float degree; // DEGREES VARIABLE OF THE SERVOMOTOR
int pinlight = A0, luz; // LDR PIN AND VARIABLE

void setup() {
  // CLEAN LCD DISPLAY
  lcd.begin(); // INITIALIZATION OF THE LCD DISPLAY
  lcd.clear(); // CLEAN LCD DISPLAY
  //CONFIGURATION OF THE SERVOMOTOR
  motor.attach (9);
}

void loop() {
  // DO THE TURN OF THE POTENTIOMETER WITH THE
DEGREES OF THE SERVOMOTOR
```

```

    pot = analogRead (pinpot); // READ THE VALUE OF THE
    POTENTIOMETER
    degree = map (pot, 0,1023, 0, 180); // SCALATE THE
    VALUES OF THE POTENTIOMETER WITH THE DEGREES OF THE
    SERVOMOTOR
    if ( degree <= 10)
    {
        motor.write (10);
    }
    else
    {
        motor.write (degree);
    }
    //READ THE LIGHT INTENSITY OF THE LIGHT SENSOR
    luz = analogRead( pinlight); // READING THE LIGHT
    INTENSITY OF THE LIGHT SENSOR
    // WRITE ON THE LCD DISPLAY
    lcd.setCursor(0, 0); // WRITE ON LINE 1 COLUMN 0
    lcd.print("S.Luz = "); // CONTENT TO WRITE ON THE
    DISPLAY
    lcd.print(luz); // CONTENT OF THE LIGHT SENSOR
    lcd.setCursor(0, 8); // WRITE ON LINE 2 COLUMN 0
    lcd.print("Grados M = "); // CONTENT TO WRITE ON
    THE DISPLAY
    lcd.print(degree); // SERVOMOTOR DEGREES
}

```

3. Configure and upload the code, following the indications on the Mini Lab First Steps guide.
4. Check that the BTL/USB switch on the Build&Code 4in1 board is set to USB, to upload the code correctly.

### **Code for the visual programming software by blocks compatible**

1. Download and install the program.
2. Open the software and copy the following code. Use the following image as a guide:

```

Arduino Program
Set LCD at 0x27 has 2 lines and 16 characters per line
Clear LCD at 0x27
forever
  set DEGREE_SERVOMOTOR to read analog pin (A) 1 / 5.7
  if DEGREE_SERVOMOTOR < 11 then
    set servo pin 9 angle as 10
  else
    set servo pin 9 angle as DEGREE_SERVOMOTOR
  LCD at 0x27 Line 1 Col 1 Show S.Luz =
  LCD at 0x27 Line 1 Col 9 Show read analog pin (A) 0
  LCD at 0x27 Line 2 Col 1 Show Degree M =
  LCD at 0x27 Line 2 Col 12 Show DEGREE_SERVOMOTOR

```

3. Configure and upload the code, following the indications on the Mini Lab First Steps guide.
4. Check that the BTL/USB switch on the Build&Code 4in1 board is set to USB, to upload the code correctly.

**RESULT OF THE EXERCISE:**

The LDC display will show the reading of the LDR light sensor and the constant position in degrees of the servomotor.

With the program you have created, besides showing permanent text, the display will also show text that is constantly changing.