ebook

LCD1602 Display Keypad Shield

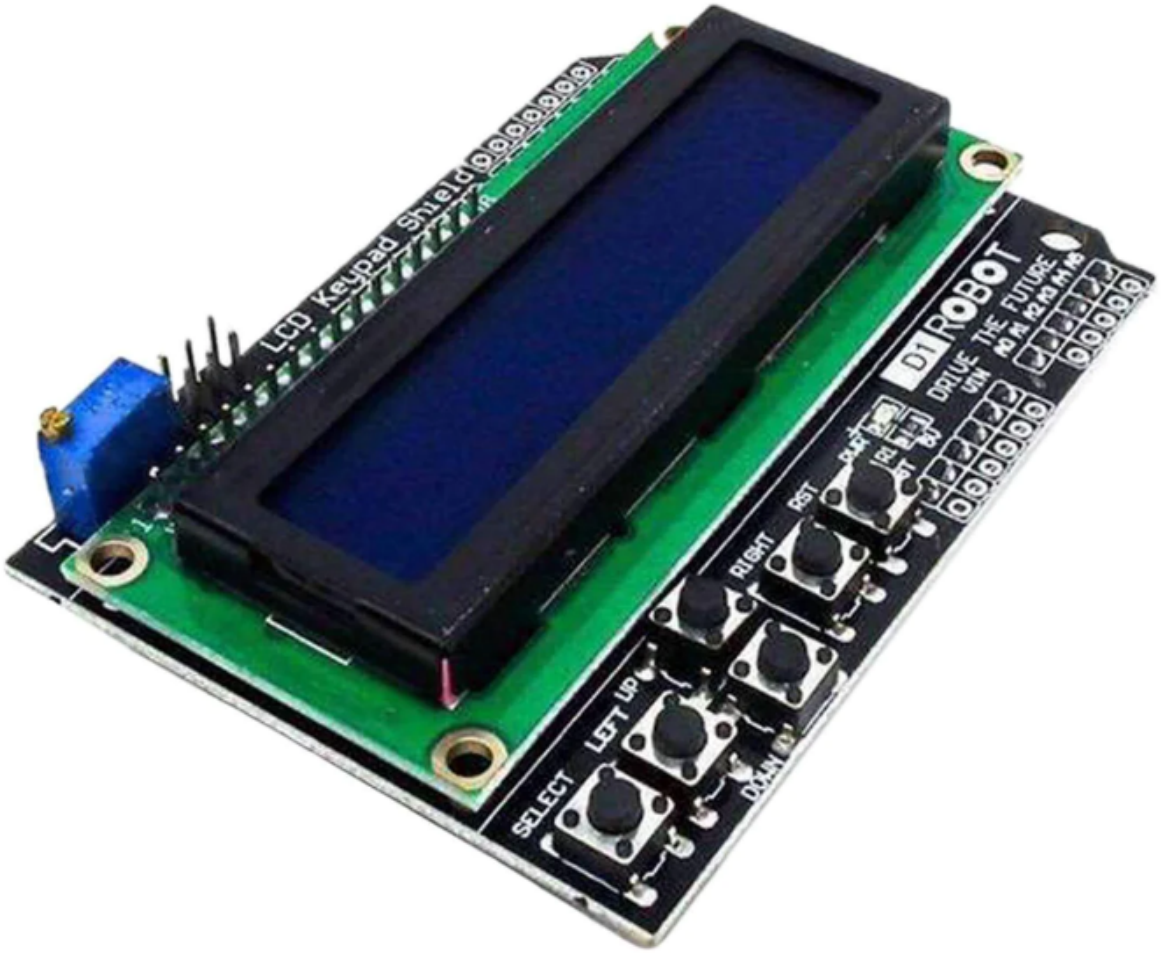


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Introduction

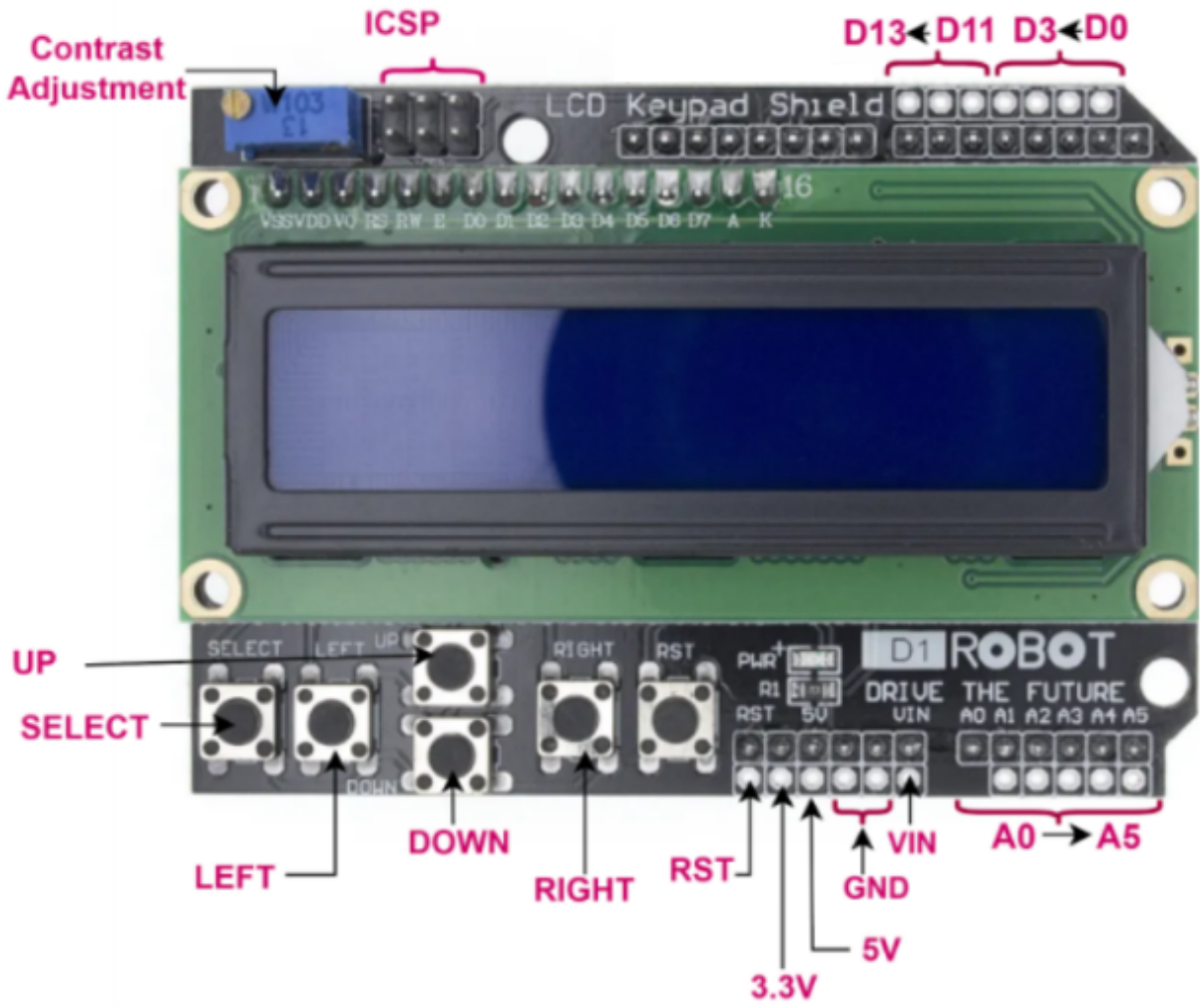
The LCD Keypad shield module consists of a commonly used 1602 LCD mounted on top of a circuit board that holds the keys, and which takes a subset of the LCD connections and makes them available to the header pins on the underside of the circuit board. I understand this board is intended to be mounted on top of an Arduino Uno or similar and provides the right pin layout for it to work in that environment.

On the following pages, we will introduce you to how to use and how to set-up this handy device.

Features

LCD Model	1602
shield type	display keypad
size	80 mm x 58 mm
WEIGHT	0,070kg
Operating voltage	5V
Operating Current	2.0mA
Display capacity	16 character x 2 line
Extended available	I/O pins
slots available for connecting analog sensors	there are 5
Back Light	blue
Character Color	white

LCD Display Overview:



-Connections 4, 5, 6, 7, 8, 9 and are used for the LCD interface:

- D4-D7 -> LCD Data transmission
- D8 -> Register Select (choose Data or Signal Display)
- D9 -> Enable pin (starts data read/write)

- **The push buttons** (UP/DOWN/LEFT/RIGHT/SELECT buttons) are read in via a resistor network at analog input pin A0.

-**The contrast** of the display can be adjusted By a potentiometer.

- **The RST button** can be used to reset the Arduino program

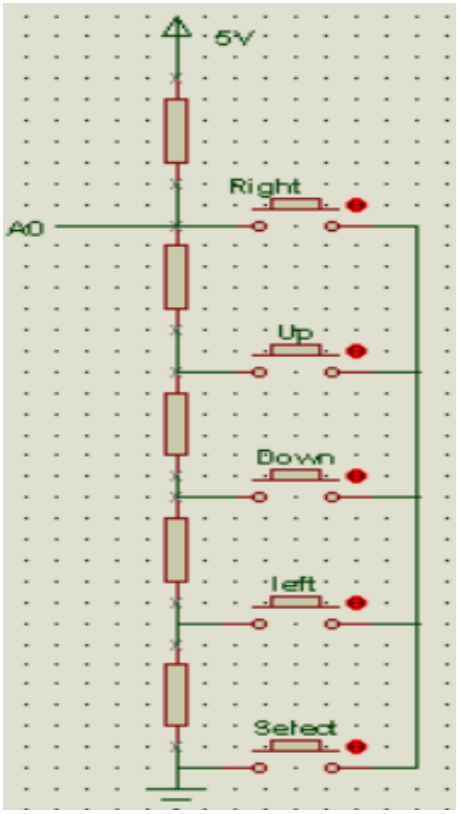
-**ICSP**:IN Circuit Serial programming**(**5V,MOSI(D11),RST,

MISO(D12),SCK(D13),GND**)**

How to Read the Keys?

In this shield, all 5 keys are connected to the analog pin 0 to save on digital pins. So we should use ADC to read them. When you press a key, it returns a value to the A0 pin according to the internal resistive splitting circuit, which identifies the type of the key.

Key	A0 value
SELECT	555-->790
LEFT	380→555
DOWN	195→380
UP	50→195
RIGHT	0→50



LCD16 Display Keypad Shield applications:

the LCD16 Display Keypad Shield used in a variety of applications,including:

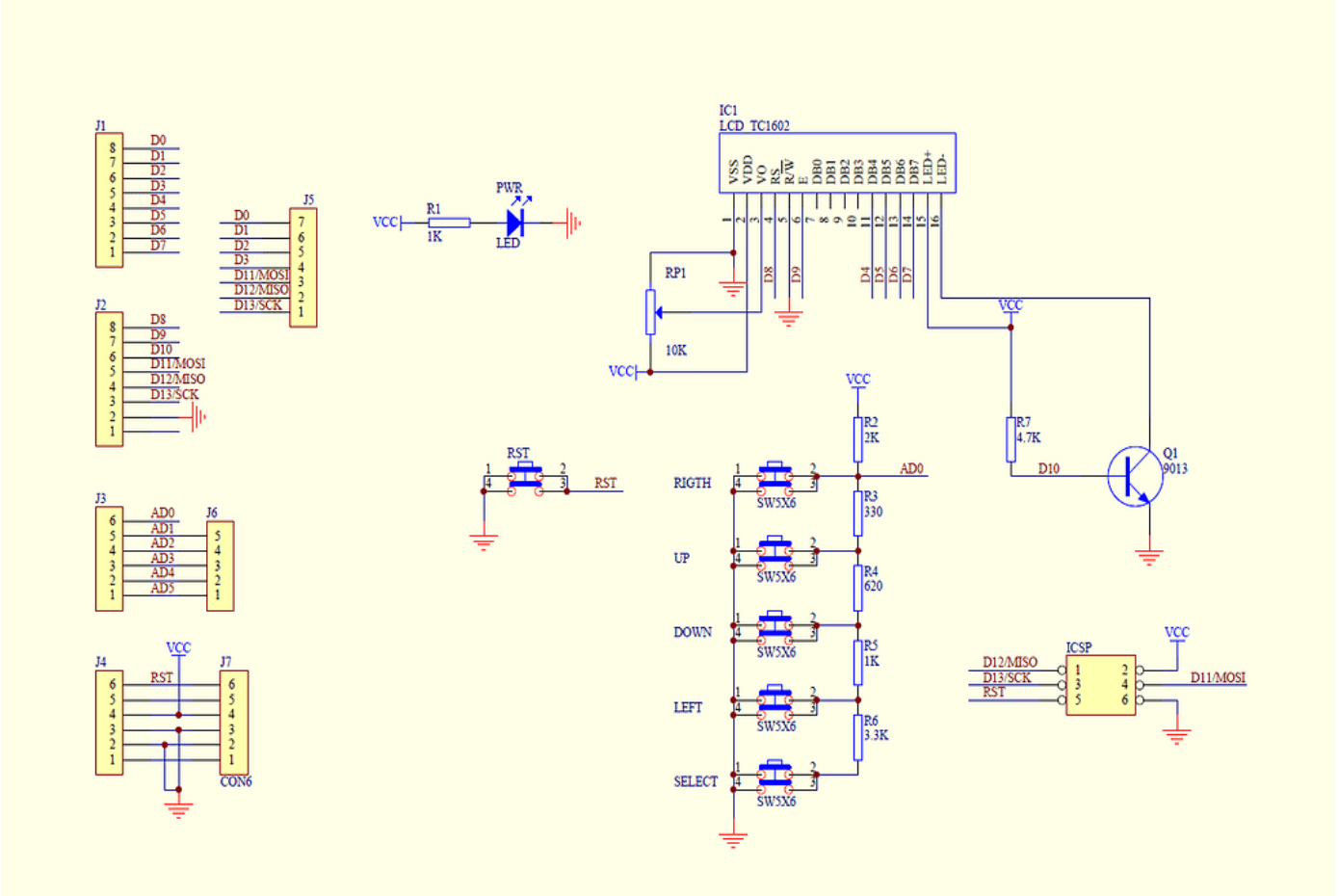
Data Display: The 1602 module is often used to display data in real-time, such as temperature readings, sensor values, or system status information.

User Interfaces: The Keypad Shield provides a simple and intuitive way for users to interact with a project or device, making it an ideal choice for creating custom user interfaces.

Automation: The display module can be used to show the status and control of automated systems, such as home automation systems or industrial control systems.

Robotics: The LCD1602 Display Keypad Shield can be used to display information about a robot's movements and sensor readings, making it a useful tool for developing and testing robotics projects.

LCD Keypad Shield Schematic :



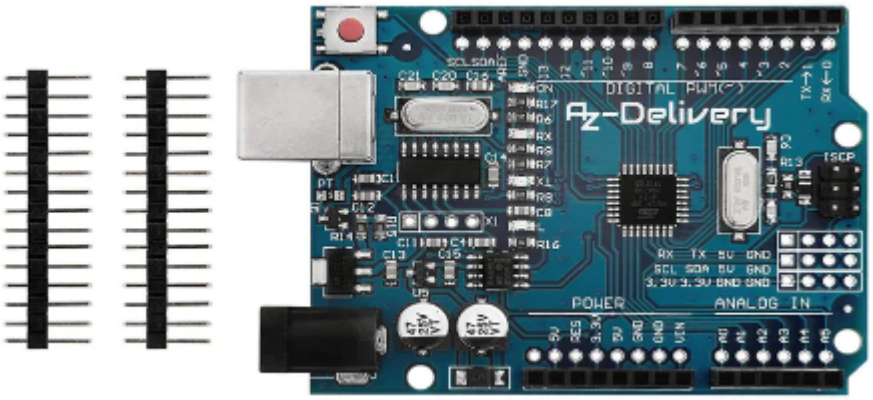
How to Use the LCD Keypad Shield ?

The uses of this module are very simple. In this section of this article, we will discuss how we can hook up a module and work with it, so first of all we need a setup which described below:

Setup for Development environment, we need :

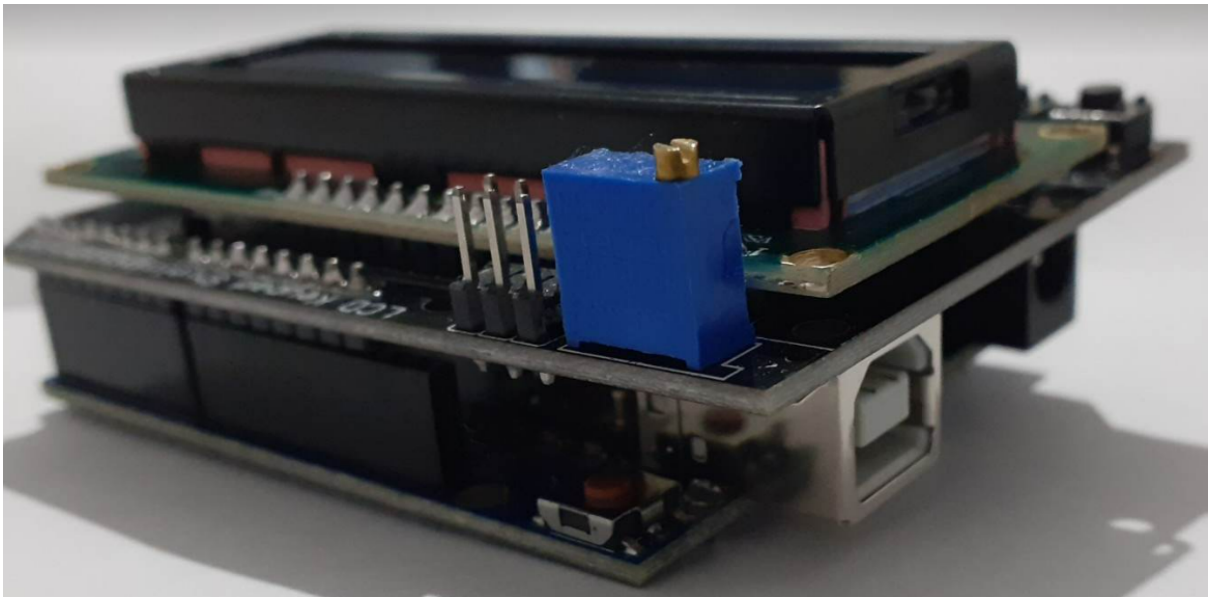
-Microcontroller Board

https://www.az-delivery.de/products/mikrocontroller-board



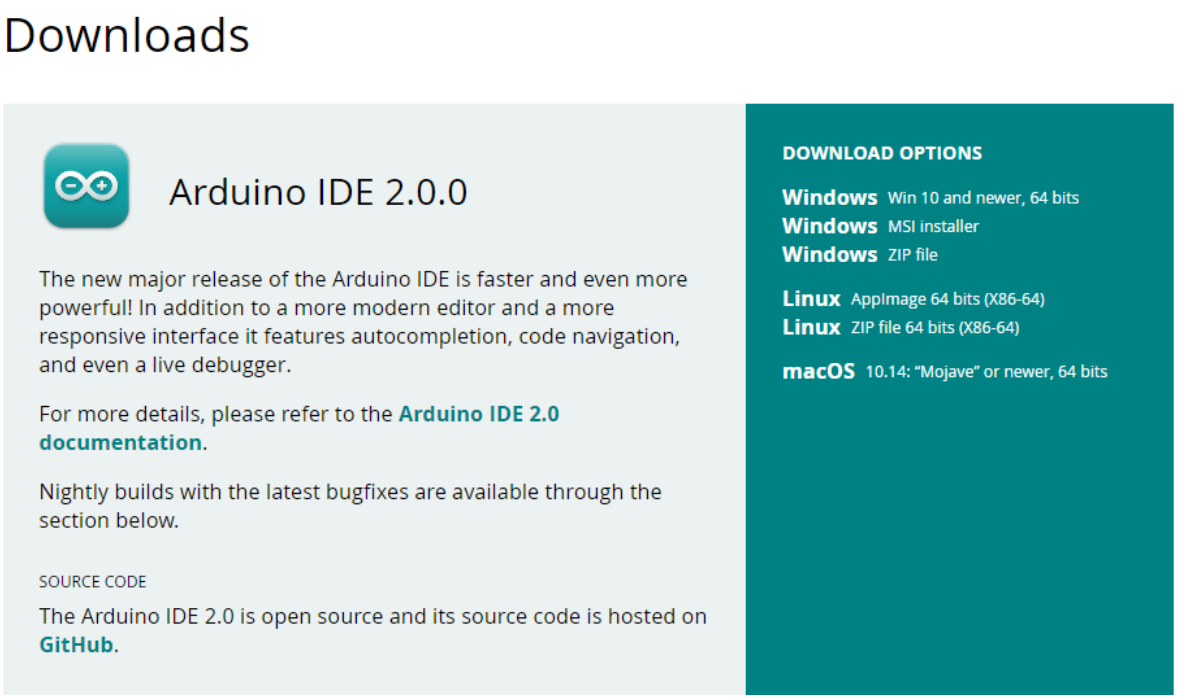
Connection

Attach the LCD 2x16 Shield with Keypad to the Microcontroller Board. The shield has a set of pins that match the pins on the Board. Align the pins and gently push the shield onto the Board. Make sure that all the pins are aligned properly and that the shield is seated securely.

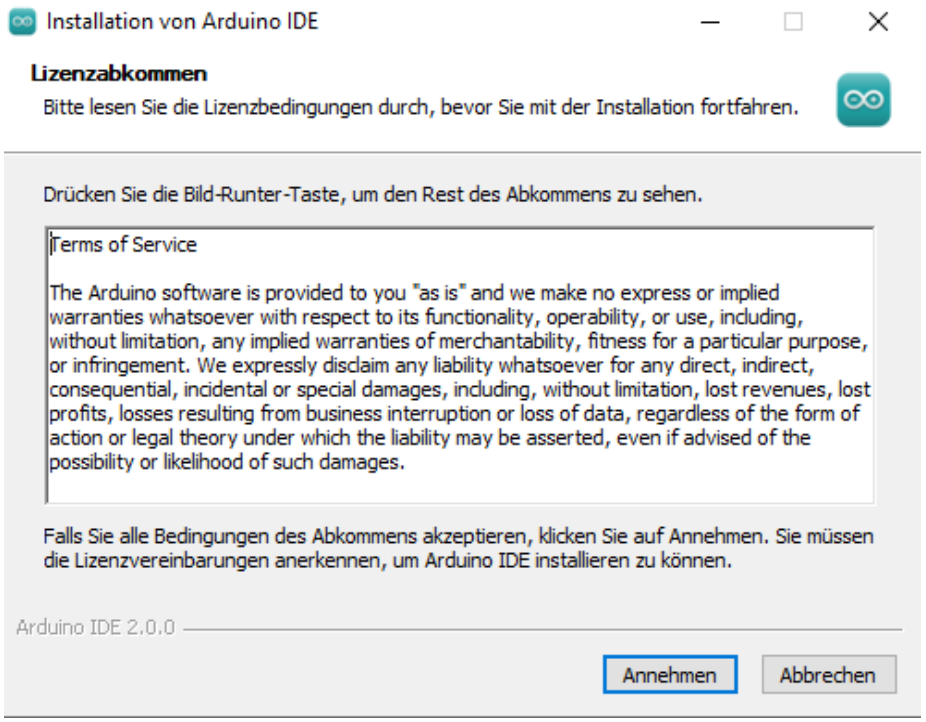


Software installation

Download the latest version of Arduino IDE here:
https://www.arduino.cc/en/software

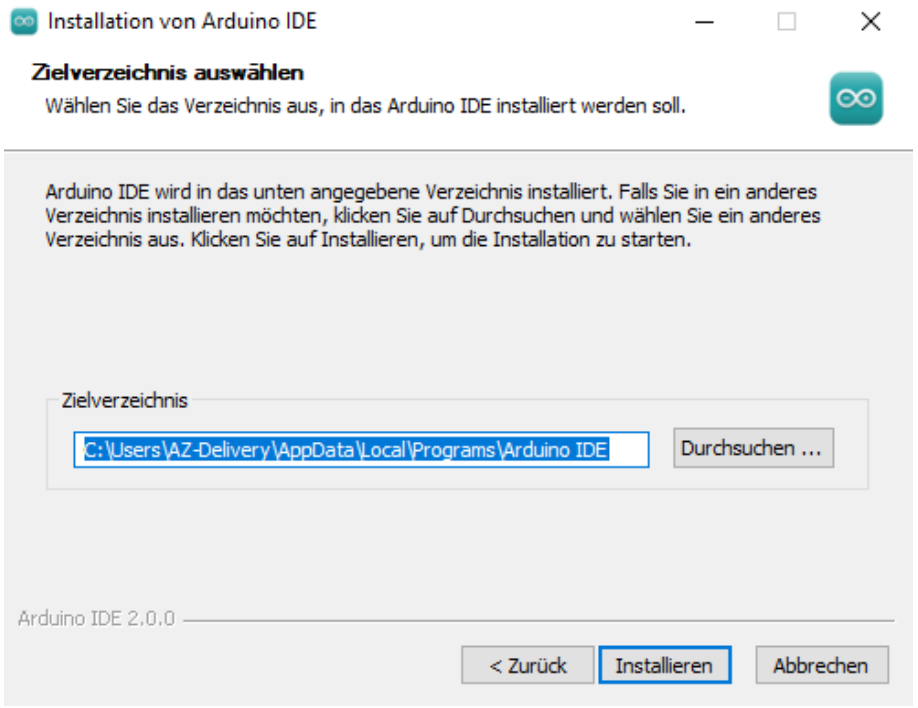


After starting the Arduino IDE installation file "arduino-ide_2.0.0_Windows_64bit.exe" the license conditions of the software must be read and accepted.

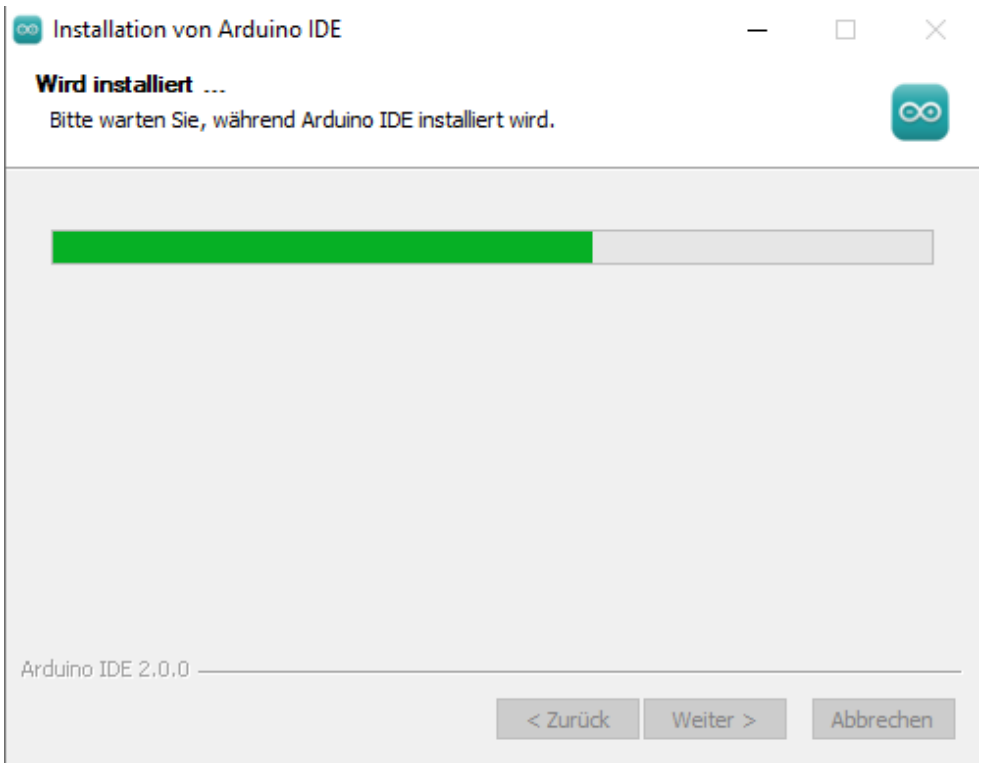


In the next step, different options can be selected for installation.

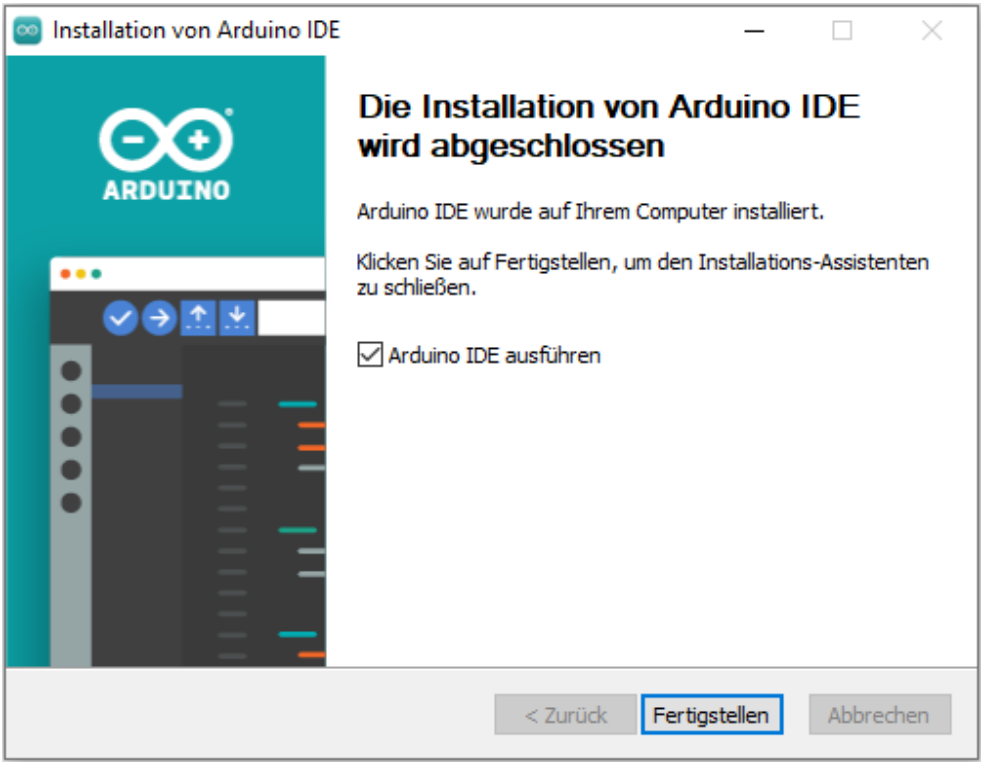
Finally, the destination folder must be specified. The installation requires approx. 500MB of free disk space.



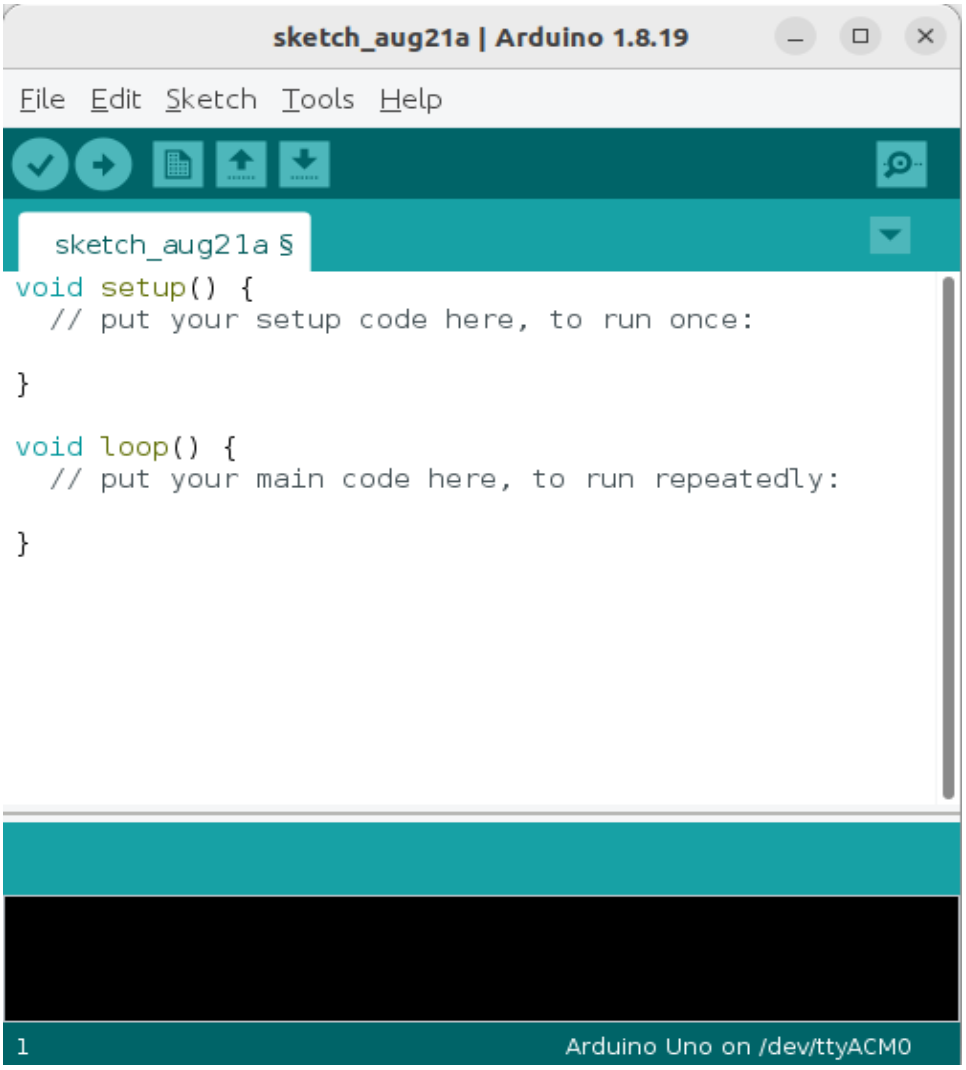
Click on "Install" to start the installation.



After successful installation, the installation programme can be terminated via the "**Finish**" button.

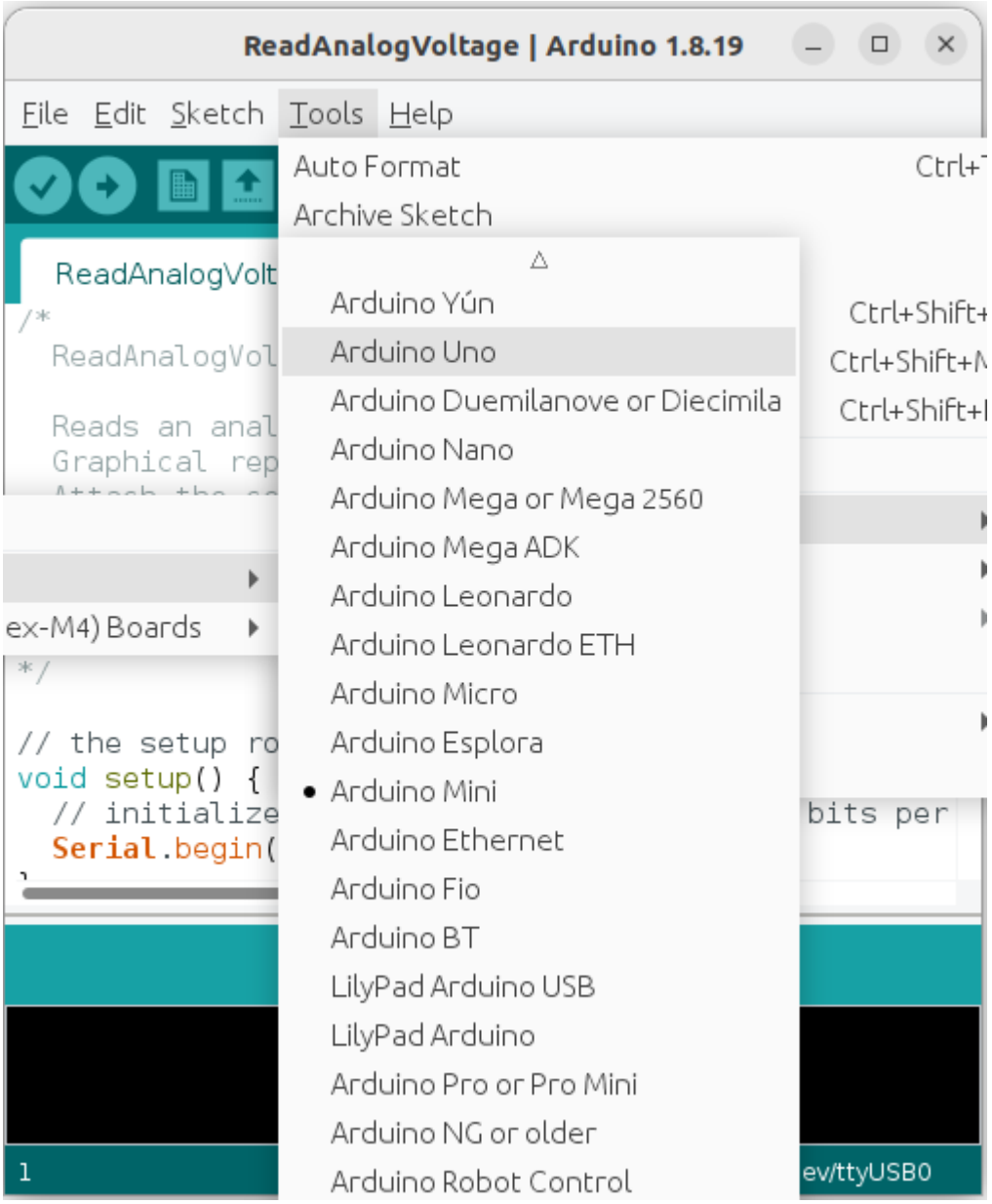


The starting window:



Select the UNO Board:

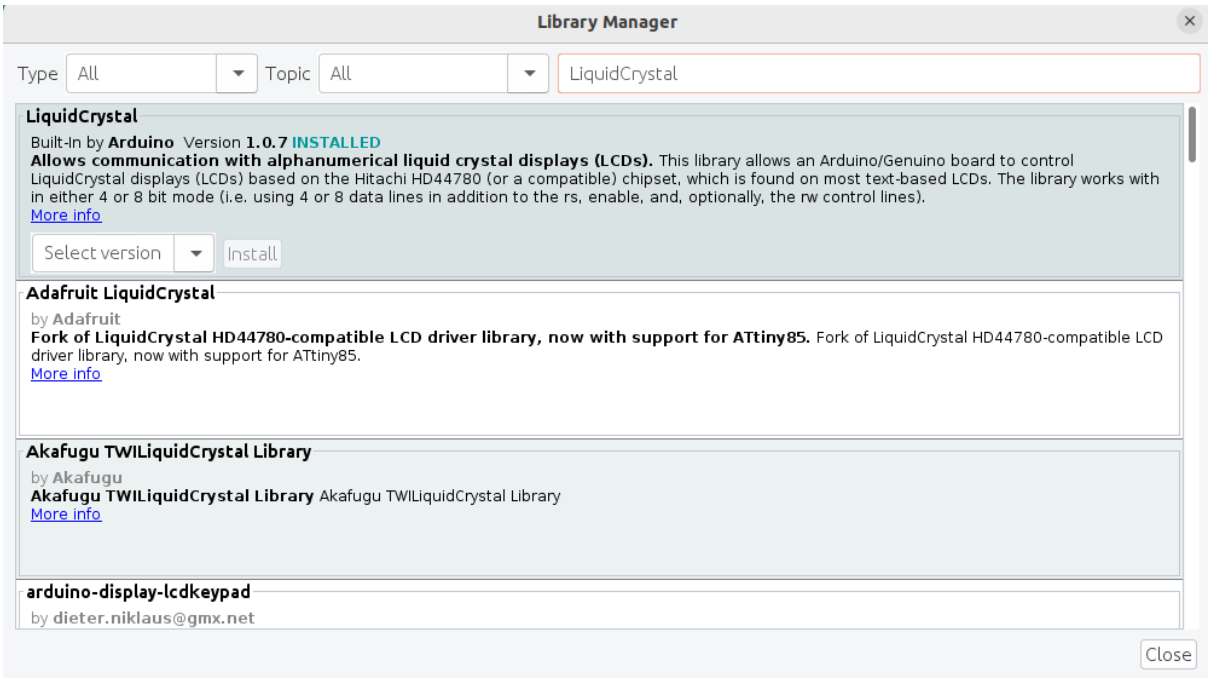
Tools -> Board -> Arduino Uno



Library installation

here are the steps to install the **LiquidCrystal** library from the Arduino Library Manager:

1 - Click on the "Sketch" menu and select "Include Library" -> "Manage Libraries".
3- In the Library Manager, search for "**LiquidCrystal** " using the search bar at the top of the window.
4- Select the **LiquidCrystal** library from the search results.
5- Click the "Install" button to install the library.
6- Wait for the installation to complete.
7- The installation is finished, you should see a message indicating that the library was successfully installed.



Example code

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(8, 9, 4, 5, 6, 7);

int lcd_key     = 0;
int adc_key_in  = 0;
#define btnRIGHT  0
#define btnUP     1
#define btnDOWN   2
#define btnLEFT   3
#define btnSELECT 4
#define btnNONE   5

int read_LCD_buttons()
{
  adc_key_in = analogRead(0);
  if (adc_key_in < 50)   return btnRIGHT;
  if (adc_key_in < 195)  return btnUP;
  if (adc_key_in < 380)  return btnDOWN;
  if (adc_key_in < 555)  return btnLEFT;
  if (adc_key_in < 790)  return btnSELECT;
  return btnNONE;// when all others fail, return this...
}
void setup() {
  // set up the lcd's number of columns and rows:
  lcd.begin(16, 2);
  //print a message to the LCD.
  lcd.setCursor(0, 0);
  lcd.print("Push the buttons");
}


void loop() {
  lcd.setCursor(9, 1);           // move cursor to second line "1" and 9
spaces over
  lcd.print(millis() / 1000);    // display seconds elapsed since
power-up
  lcd.setCursor(0, 1);           // move to the begining of the second
line
  lcd_key = read_LCD_buttons();  // read the buttons

  switch (lcd_key)               // depending on which button was
```

```
pushed, we perform an action
  {
    case btnRIGHT:
      {
        lcd.print("RIGHT ");
        break;
      }
    case btnLEFT:
      {
        lcd.print("LEFT   ");
        break;
      }
    case btnUP:
      {
        lcd.print("UP    ");
        break;
      }
    case btnDOWN:
      {
        lcd.print("DOWN  ");
        break;
      }
    case btnSELECT:
      {
        lcd.print("SELECT");
        break;
      }
    case btnNONE:
      {
        lcd.print("NONE  ");
        break;
      }
  }
}
```

You've done it, you can now use your module for your projects :)

Now it is time to learn and make the Projects on your own. You can do that with the help of many example scripts and other tutorials, which you can find on the internet.
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Have fun!

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