# Software Assembly

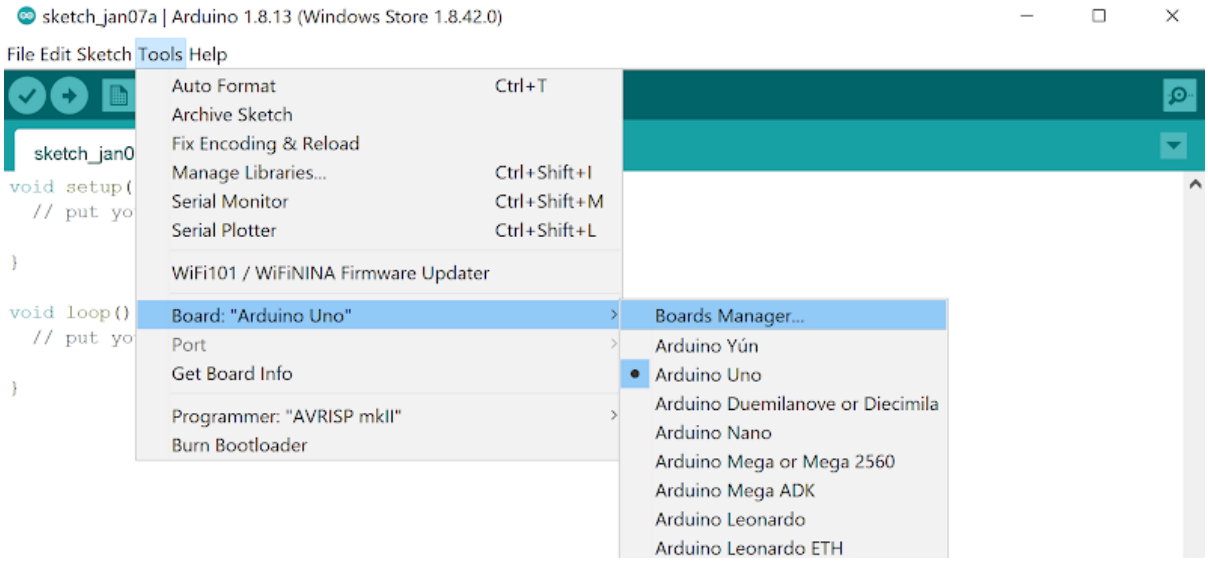
Now that we have successfully completed the hardware assembly. Let's move on to the software. We will be installing some important libraries which are essential for our project!

### Installing the Board Files for the Nano 33 BLE Sense

One of the primary advantages that the Arduino ecosystem affords is the portability of code you write for one or another board within their line-up or even in porting code to affiliate boards. This is made possible by the support files organized in the Boards Manager, which coordinates a download and installation of files that detail the Arduino functions (sometimes 'core') that are defined for that particular board (which is how hardware differences between boards are abstracted) as well as compiler or linker details specific to the given board.

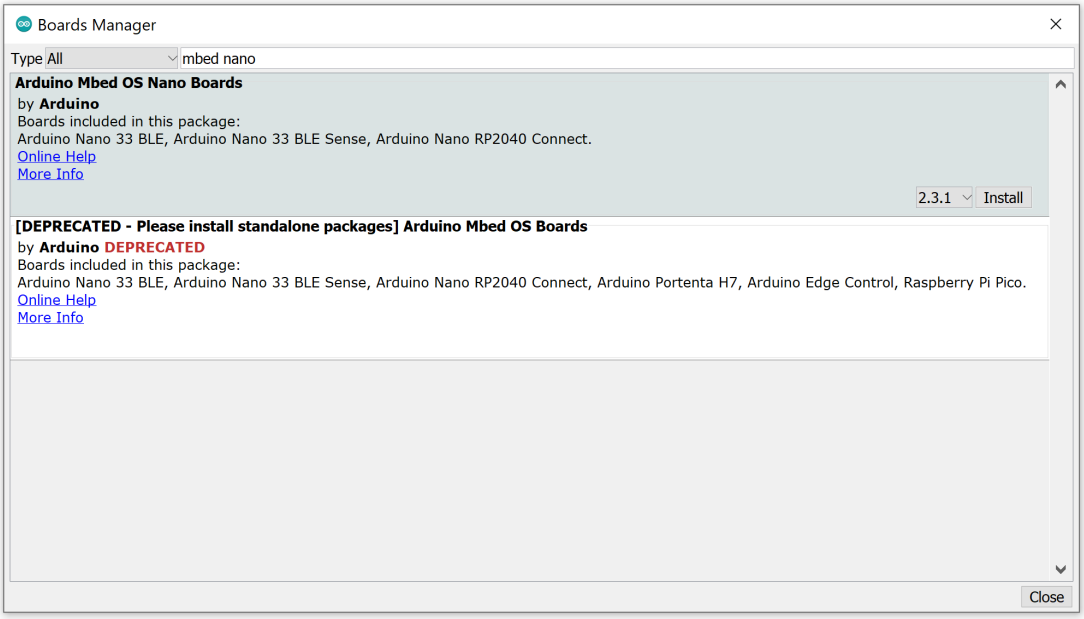
To install the board files that you will need for your Arduino Nano 33 BLE Sense, please do the following:

Open the Boards Manager, which you can find via the Tools drop-down menu. Navigate, as follows: Tools → Board → Boards Manager. Note that the Board may be set to "Arduino UNO" by default.

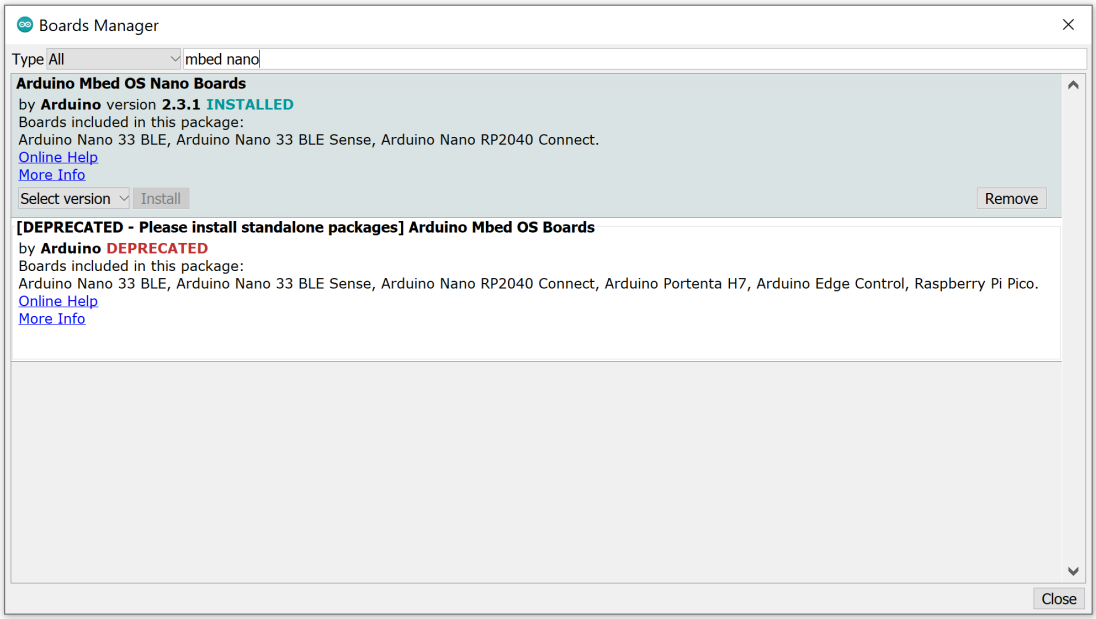



In the Boards Manager dialog box, use the search bar at the top right to search for "mbed nano" which should bring up a few results. We're interested in the first result (as shown), named "Arduino MBED OS Nano Boards,". Make sure you select **Version 2.3.1 or newer (tested up to Version 3.0.1)** and then click "Install." As the install process

progresses, you will see a blue completion bar work its way across the bottom of the Board Manager window. Be patient, you may need to install USB drivers, which requires you to approve an administrator privileges popup which can take a couple of minutes to appear.




After you have successfully installed the board, if you exit and re-open the Board Manager and search again for “mbed nano” you will now see INSTALLED next to the library and the option to “Remove” the library or install a different version.

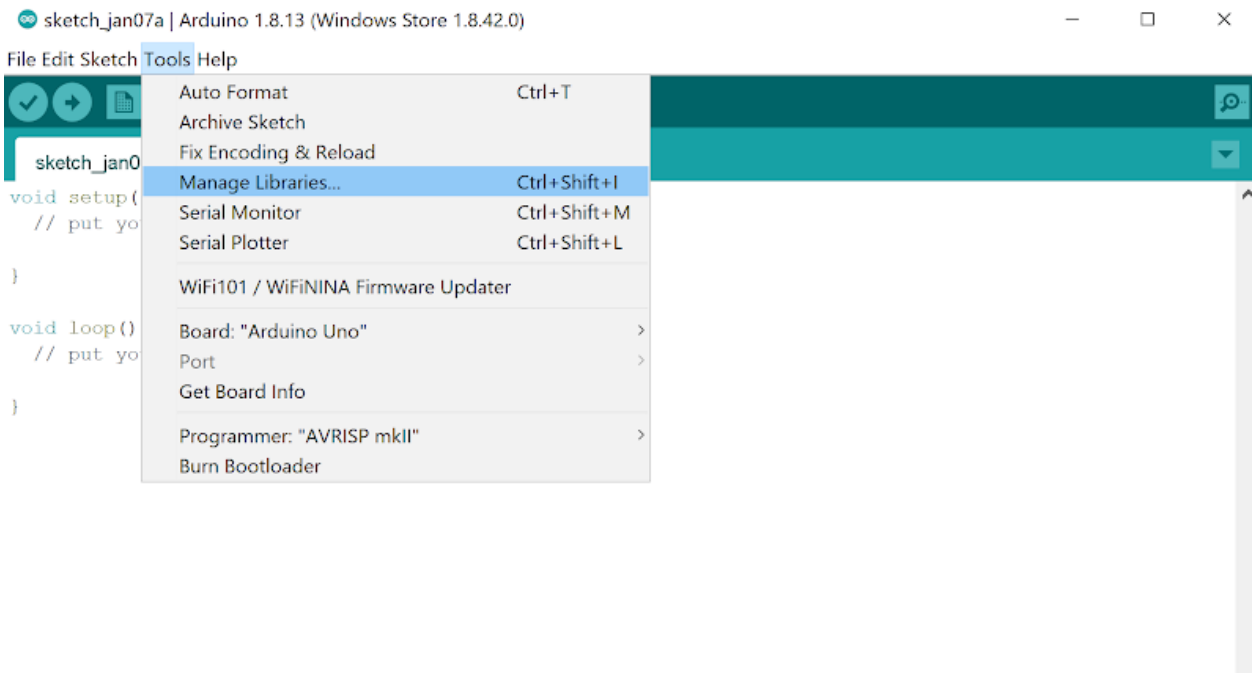


## Installing the Libraries Needed for this Course

Another advantage of the Arduino ecosystem is the availability of a wide array of libraries for performing various tasks, such as interfacing with a sensor module or manipulating data using common algorithms. There are many libraries that can be accessed from within the Library Manager in the Arduino IDE as described below. Check here for a complete list.

For this course, we are going to need four libraries. To install the libraries, please do the following and **make sure to install the version specified in the reading below or the tinyML applications will not work**:

Open the Library Manager, which you can find via the Tools drop-down menu. Navigate, as follows: Tools → Manage Libraries.



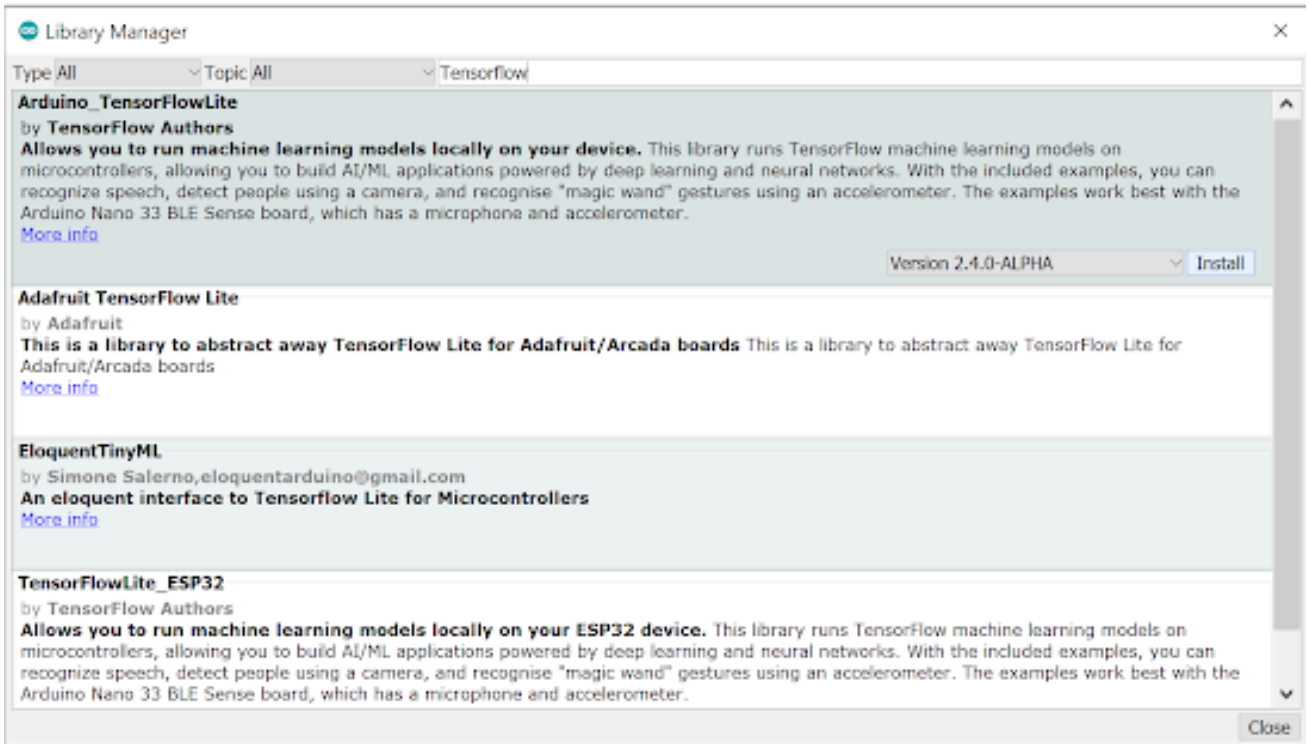

Then, much like for the Boards Manager, in the Library Manager dialog box, use the search bar at the top right to search for the following libraries, one at a time. Note that like with the Board manager, a blue completion bar will appear across the bottom of the Library Manager window.

**The Tensorflow Lite Micro Library:**

Search Term: Tensorflow

Library Name: Arduino_TensorFlowLite

Version: 2.4.0-ALPHA




Not working? Well, google dropped the support for this library in their latest update. Don’t worry, we have got you covered.

- Go to the ESE360_TinyML github repository and close the Arduino_TensorFlowLite library.
- Copy and paste the library to the libraries folder of your arduino installation (home/$USER/snap/arduino/current/libraries for linux users)
- Restart the Arduino IDE and check that the library is installed by going to File/Examples/Custom Libraries/.

**The TinyML_ESE360 Library for this course!**

You can download the library from canvas and follow the instructions to add it to your arduino IDE. There are 2 ways to do that:

## 1 . Manually import the library

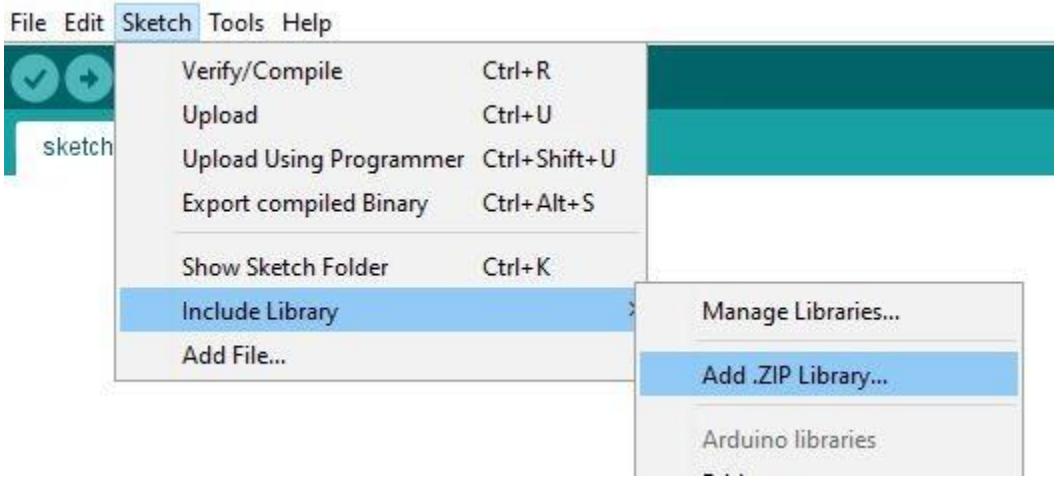
Once you get the library, just 3 steps are required before you can use it:

1. Extract the archive.
2. Place the library folder in Arduino/libraries/.
3. Restart the Arduino IDE.

## 2. Import the library through the Arduino IDE

This will work only if you have created a .zip archive (not .rar or other extensions).

Simply open the Arduino IDE, click on “Sketch” > “Include Library” > “Add .ZIP Library…”, and browse to find your .zip archive.



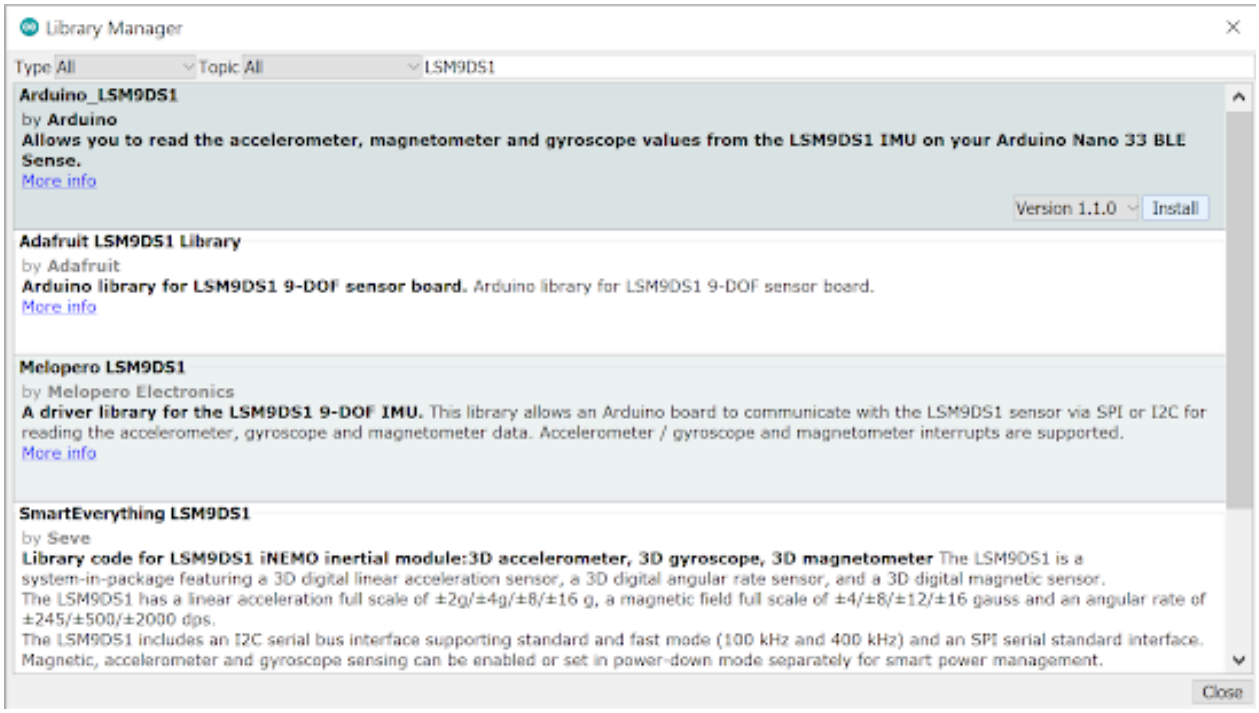

The Arduino IDE will extract the archive, place the library in the Arduino/libraries/folder, and update itself so you don’t need to restart it.

**The library that supports the accelerometer, magnetometer, and gyroscope on the Nano 33 BLE sense:**

Search Term: LSM9DS1

Library Name: Arduino_LSM9DS1

Version: 1.1.0

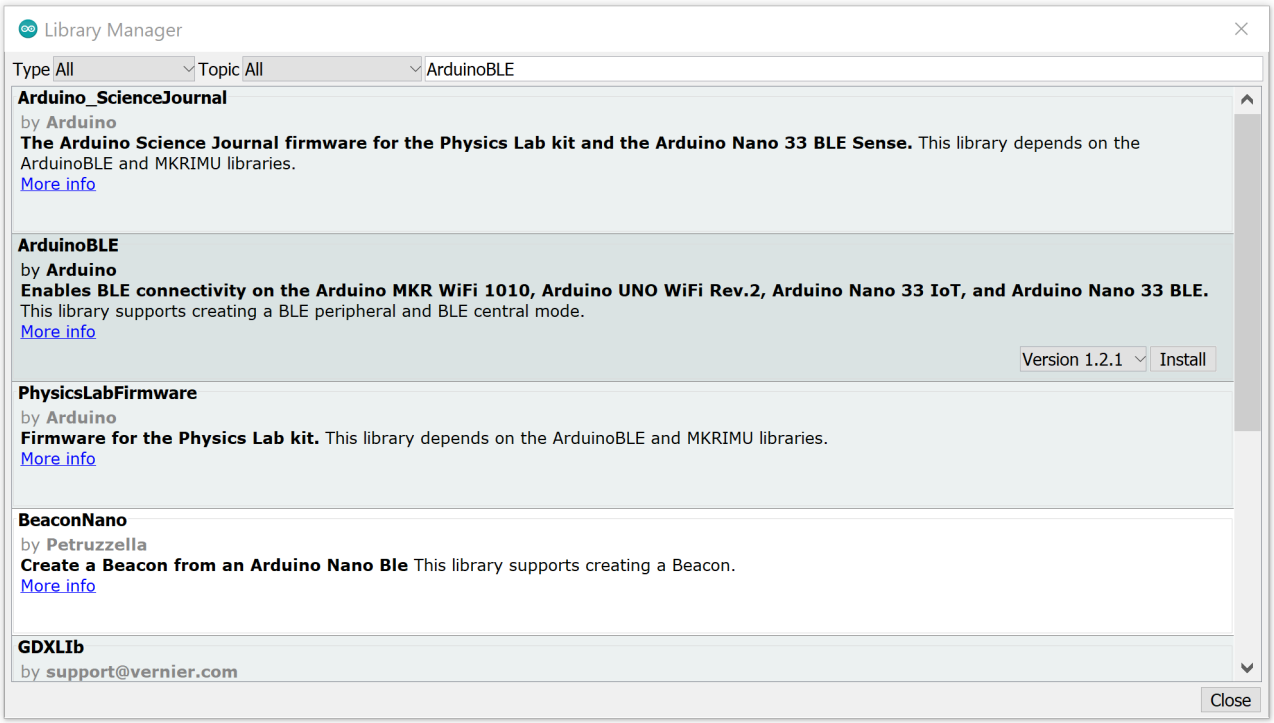


**ArduinoBLE:**

Search Term: ArduinoBLE

Library Name: ArduinoBLE

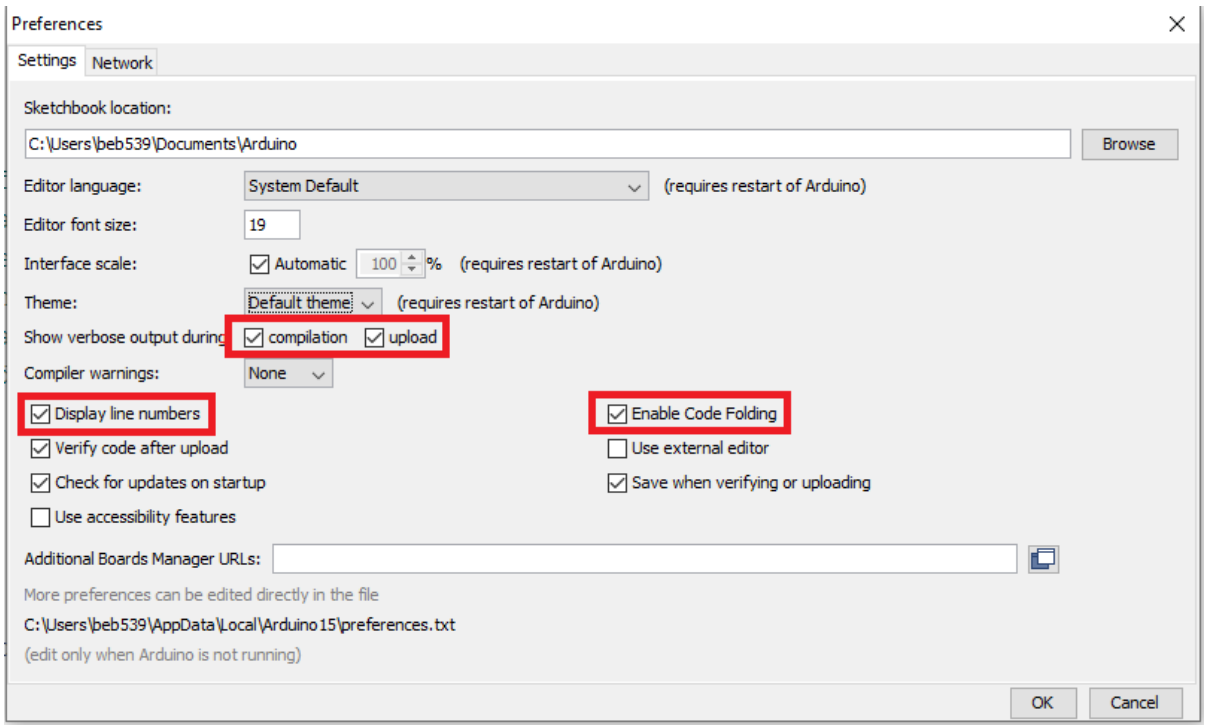
Version: 1.2.1 or newer (tested up to 1.2.2)



### Setting your Preferences

You can adjust the preferences set for the Arduino Desktop IDE via the File drop-down menu, File → Preferences. There are a few preferences that we recommend enabling to make the Arduino IDE a little easier to use, namely:

1. Show verbose output during: compilation and upload.
2. Enable code folding.
3. Display line numbers.




On final note, if you don't like the default theme for the Arduino Desktop IDE, there is a nice tutorial for a dark theme you can find here. Also, if you would like to learn more about the IDE, check out Arduino's documentation.

And that's it! Your Arduino IDE should be all configured for this course. Now that you have all of the necessary board files and libraries installed, it's time to explore the TinyML domain to the fullest.

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