

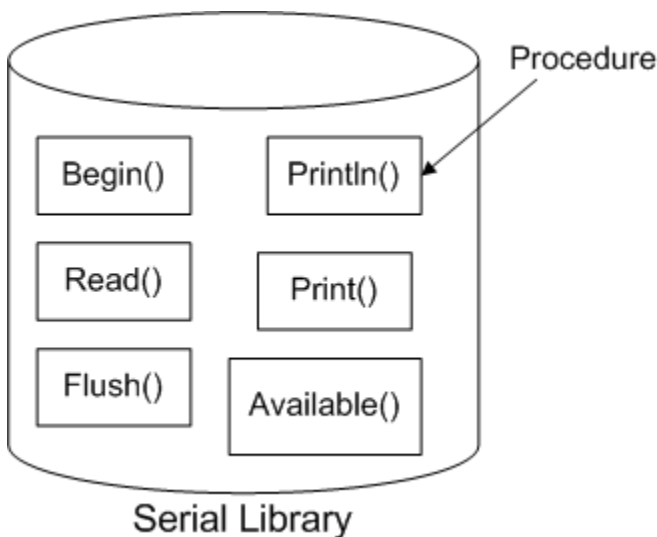
Libraries and How To Install Them

What is a Library?

Libraries are great places, and not yet illegal in the United States! If you ever need to learn how to do something, like say fix a motorcycle, you can go to your local library and take out a book. Sure you could buy the book but the library is nice because as a resource you can get the book whenever you need it, keeping your house uncluttered.

Software Libraries are very similar. We already studied what a procedure is, in [lesson 3](#) : a procedure is a list of things to do. A library is a big collection of procedures, where all the procedures are related! If you, say, want to control a motor, you may want to find a Motor Control Library: a collection of procedures that have already been written for you that you can use without having to do the dirty work of learning the nuances of motors.

For example, this is the Serial Library, which allows the Arduino to send data back to the computer:



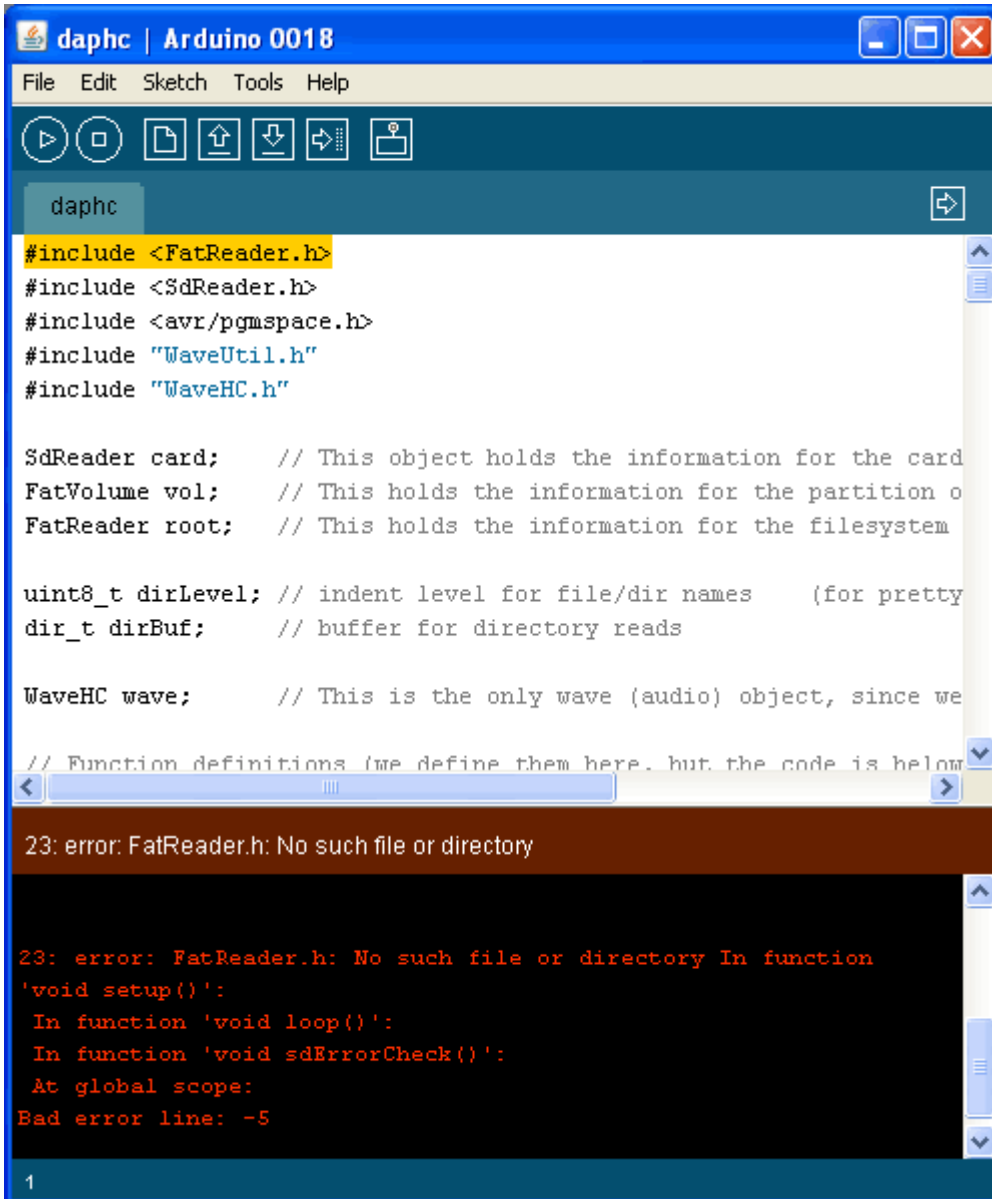
Using libraries

One of the best features of the Arduino project is the ability to add on pre-crafted libraries that add hardware support. There's tons of them, and you can pick and choose which to install. They're only loaded in when the sketch you're working on needs them, so for the most part you can download and stash them for future use.

Sketches will often **depend** on libraries, you can see what they are by looking at the top of the sketch. If you see something like

```
#include <FatReader.h>
```

that means that you'll need a library called FatReader or a library that contains the file FatReader. If you don't have it installed you'll get an error:



```
daphc | Arduino 0018
File Edit Sketch Tools Help
daphc
#include <FatReader.h>
#include <SdReader.h>
#include <avr/pgmspace.h>
#include "WaveUtil.h"
#include "WaveHC.h"

SdReader card; // This object holds the information for the card
FatVolume vol; // This holds the information for the partition o
FatReader root; // This holds the information for the filesystem

uint8_t dirLevel; // indent level for file/dir names (for pretty
dir_t dirBuf; // buffer for directory reads

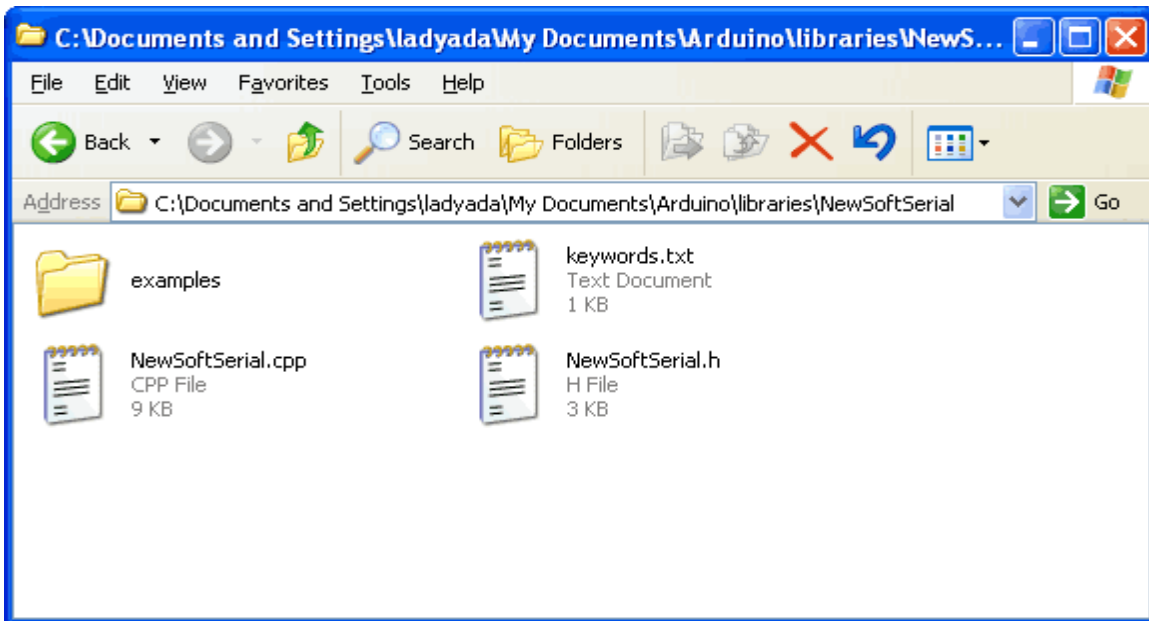
WaveHC wave; // This is the only wave (audio) object, since we

// Function definitions (we define them here, but the code is below
23: error: FatReader.h: No such file or directory

23: error: FatReader.h: No such file or directory In function
'void setup()':
In function 'void loop()':
In function 'void sdErrorCheck()':
At global scope:
Bad error line: -5
1
```

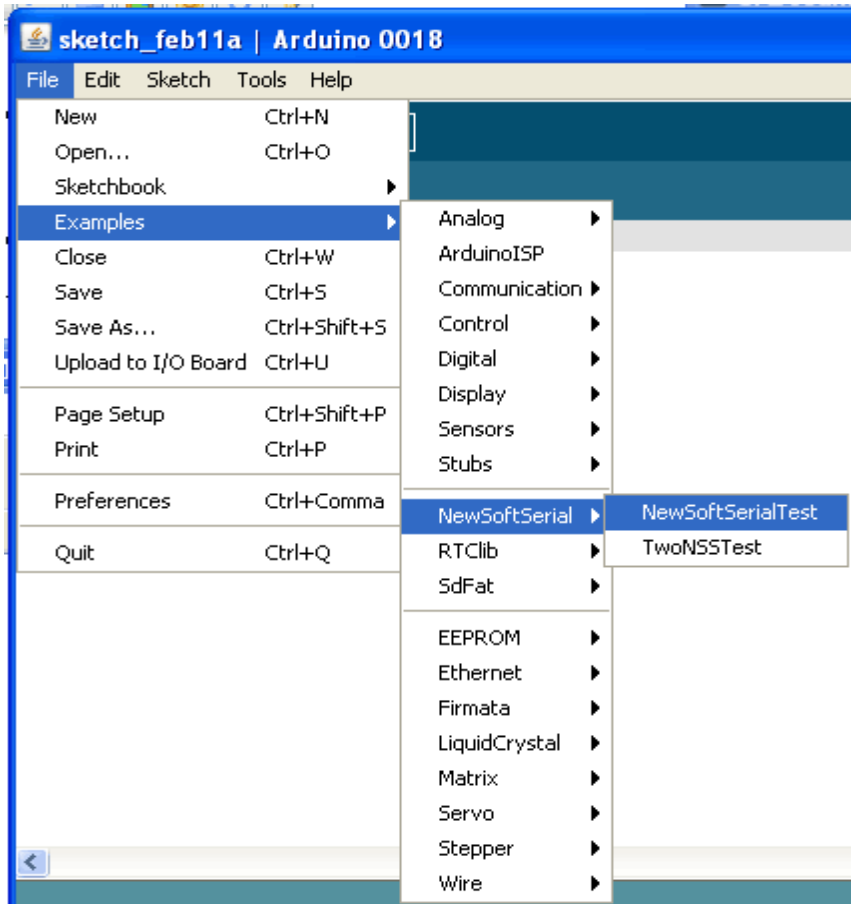
Whats in a library?

A library is a folder with some files in it, the files will end in **.cpp** (C++ code file) and **.h** (C++ header file).



There may also be some **.o** files. The **.o** files are C++ compiled Objects. If you end up working on the library and modifying it, be sure to delete the **.o** files as that will force the Arduino IDE to recompile the modified **.cpp**'s into fresh **.o**'s

Two optional files you may see are **keywords.txt** (this is a hints file to tell the Arduino IDE how to colorize your sketch and **examples** folder, which may have some handy test-sketches. These will show up under the File->Examples->Library dropdown



It's important to remember!

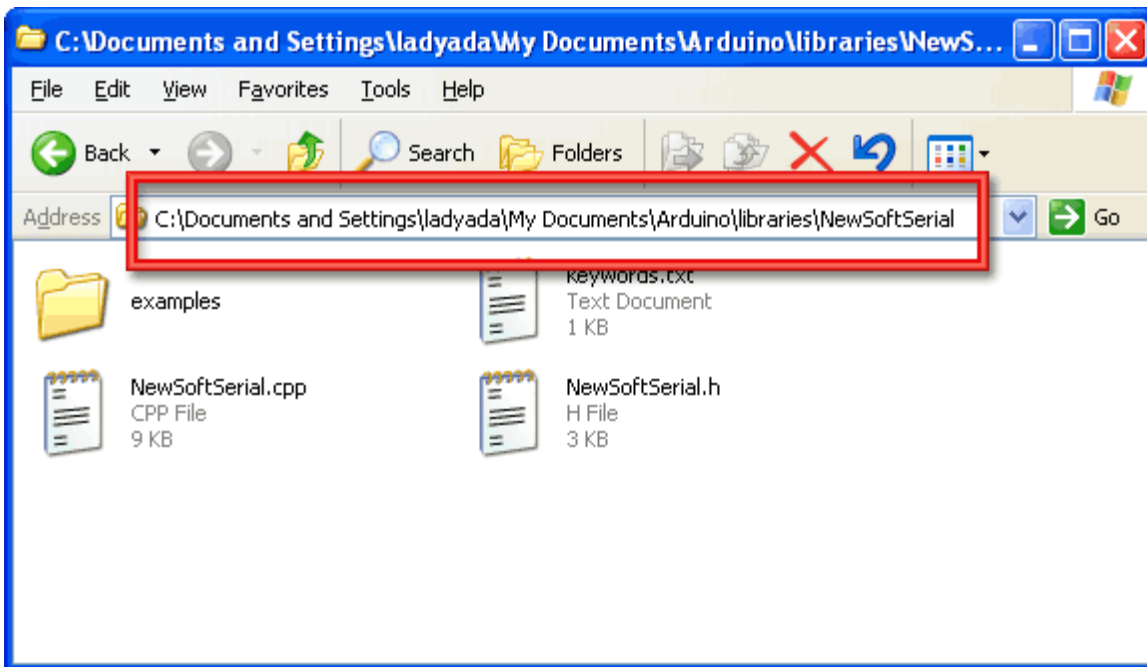
The structure of the library folder is very important! The **.c** and **.h** files must be in the 'lowest level' of folders. For example, you can't have **Arduino/libraries/WaveHC/WaveHC/file.c** or **Arduino/libraries/MyLibraries/WaveHC/file.c** - it must be **Arduino/libraries/WaveHC/file.c**

How to install libraries

In Arduino v16 and earlier, libraries were stored in the **ArduinoInstallDirectory/hardware/libraries** folder, which also contained all the built-in libraries (like Wire and Serial).

In v17 and up, the user libraries are now stored in the **ArduinoSketchDirectory/libraries** folder. You may need to make the **libraries** sub-folder the first time. However, the good thing about this is you won't have to move & reinstall your libraries every time you upgrade the software.

For example, here is how it looks when NewSoftSerial is installed in Windows (of course your username will be different)



After you're done, restart the Arduino IDE

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