Arduino Libraries

Arduino has built a huge community, and they all support each other. Once of the biggest pieces of evidence for this is the wide collection of Arduino Libraries that people around the world write and then freely share with the rest of the Arduino Users.

These Libraries are available through the Arduino IDE, and nearly all libraries are written in the style of Object Oriented Programming. [[Which is why lesson #9 came before this one.](https://docs.google.com/document/d/1-ON9_857Sb_qSPOU15IMkT9xT3XV1k8-if_DOvVK2n0/edit?usp=sharing)]

# Example Sketch 1: Serial is an Arduino Library

Below is an example for loop implemented in a program. You can see that the for loop is implemented in the ‘void setup()’ just so you can see that it is the for loop that is actually looping (and not the ‘void loop()’ function).

“Serial” is a strange library because it is built-in to work with the Arduino. You don’t need to run a constructor. That said, it is worth looking to see the Serial functions we’ve been using through the new lens where we can recognize “Serial” as a code object that can run methods.

**void setup() {** // the setup function runs once

**Serial.begin(9600);** // open serial communication

**Serial.println(“hello!”);**

**delay(1000);**

**}**

**void loop() {**  //ignore the 'void loop()' for this one…

**Serial.println(“we are friends…”);**

**delay(1000);** //ignore this...

**}** //ignore this...

Identify the two different methods that the Serial object is running in this sketch.

Answer here

What parameters are passed into these methods to work, and do you expect them to return anything to the program? How would you know?

Answer Here

Getting complete documentation on a library (descriptions of all of its constructor options and all of its available methods) may be difficult or impossible. Often there are example sketches for a library you can explore to better understand how to implement the objects & methods included.

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# Example Sketch 2 << needs updates!

Below is an example array implemented in a program. You can see that the array is implemented in the ‘void loop()’ so this code will run forever, while powered.

**int ledPin = 13;**

**void setup() {** // the setup function runs once

**pinMode(ledPin, OUTPUT);**

**}**

//morse code for the letters “A.I.”

**int times[] = {250,80,750,80,250,80,250,2000};**

**Bool ledState = true;**

**void loop() {** // will run forever, while there is power

**for(int x = 0; x < 8; x=x+1){**

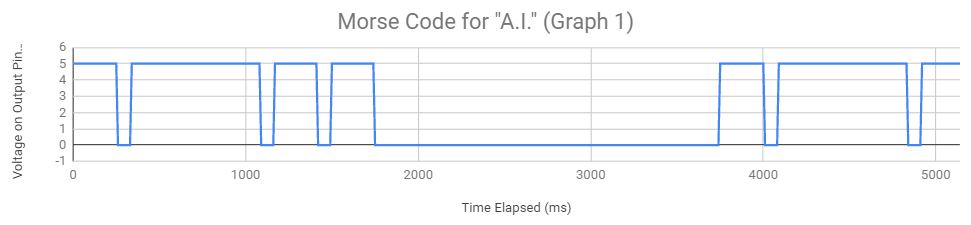
**digitalWrite(ledPin, ledState);** // output on pin 13

**ledState = !ledState;** //change ledState so it will flip

**delay(times[x]);** //wait some time from the array

}

**}**

The example sketch above would output the voltage shown in the graph below: 

Understanding how this voltage relates to the program is an important part of understanding microcontrollers. Please explain in at least one (6 sentence) paragraph how and why the voltage output shown above comes from this program.

Answer here

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# Arduino’s Own Explanations

[For Reference Page](https://www.arduino.cc/reference/en/language/structure/control-structure/for/) << a written explanation of for, and how it works on Arduino

[For Example Sketch](https://www.arduino.cc/en/Tutorial/ForLoopIteration) << an example implementation of for, used in a sketch

# Create your own Library Sketches

*You don't know if you understand it, until you can create it from nothing...*

Using what you have seen above, in the example sketches and from Arduino’s reference materials. Create your own sketch that implements a while loop in some way. You have plenty of creative license in this goal, but you must make a sketch that successfully uses a while loop. A screenshot of your sketch and output is half of your response to these. A written explanation of the logic is also required to prove that you understand what you are doing with this work. Primary tasks are required for all students. Secondary tasks are required to get a top grade.

* Primary tasks:
  + successfully implement a for loop in the ‘void setup()’ function

Screenshot & Explanation here

* + successfully implement a for loop in the ‘void loop()’ function

Screenshot & Explanation here

* Moderate understanding secondary tasks:
  + Increment the for loop by going up (or down) by more than 1

Screenshot & Explanation here

* + Implement a condition statement that includes a <= “less than or equal to”

Screenshot & Explanation here

* + Implement an array with a for loop (see example: File>examples>control>array)

Screenshot & Explanation here

* Advanced understanding secondary tasks:
  + Use some nested for loops (put one inside another)

Screenshot & Explanation here

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