

Megamark Processing 3.0 Setup Guide

Processing is a flexible software sketchbook and a language for learning how to code within the context of the visual arts. There are tens of thousands of students, artists, designers, researchers, and hobbyists who use Processing for learning and prototyping.



At its core, the Choitek Megamark has an Arduino Mega 2560 microcontroller, which can be controlled by issuing serial commands via USB cable connected to a Mac, Windows, or Linux laptop computer running Processing scripts. This tutorial will show you how to set up core Processing software to work with the Choitek Megamark Robot Platform.

Downloading and Installing Processing 3.0

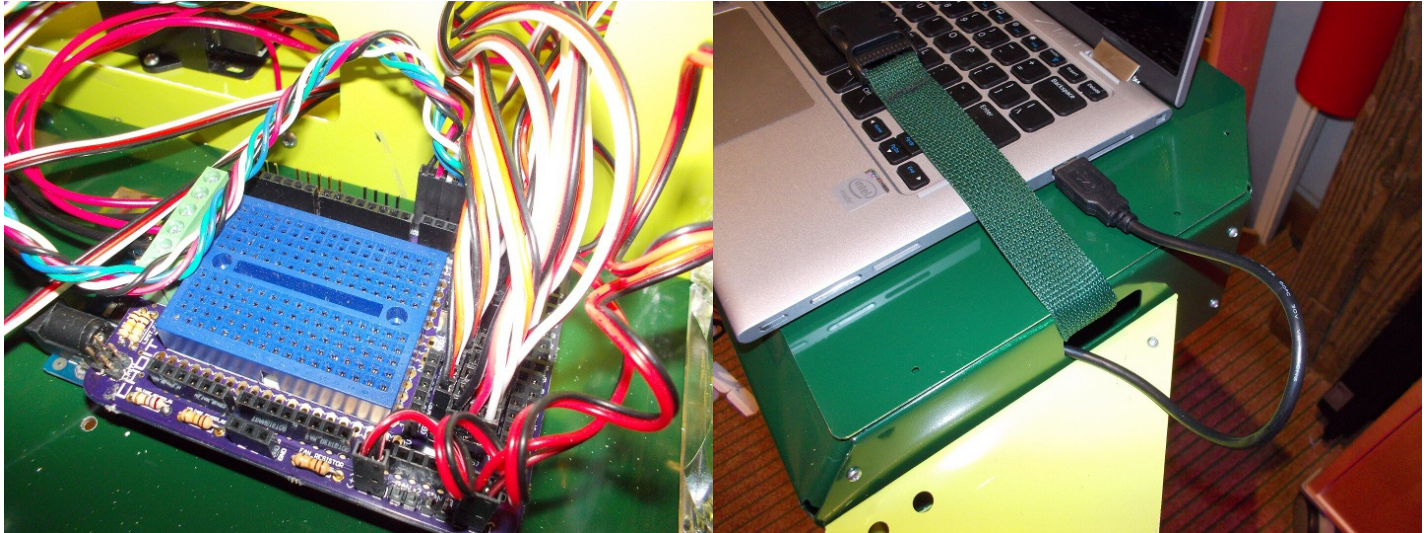
Step 1: First, install Processing 3.0 from the official Processing website for your chosen operation system.

The screenshot shows the Processing website's download page for version 3.3.6. The page has a dark blue header with navigation links: Processing, p5.js, Processing.py, Processing for Android, and Processing Foundation. Below the header is a search bar and the word 'Processing' in large white letters. A sidebar on the left contains various navigation options: Cover, Download, Donate, Exhibition, Reference, Libraries, Tools, Environment, Tutorials, Examples, Books, Handbook, Overview, and People. The main content area features the Processing logo, the version number '3.3.6 (4 September 2017)', and download links for Windows 64-bit, Windows 32-bit, Linux 64-bit, Linux 32-bit, Linux ARMv6hf, and Mac OS X. Below the download links, there are links to GitHub, Report Bugs, Wiki, and Supported Platforms, along with a note about reading the changes in 3.0 and the list of revisions.

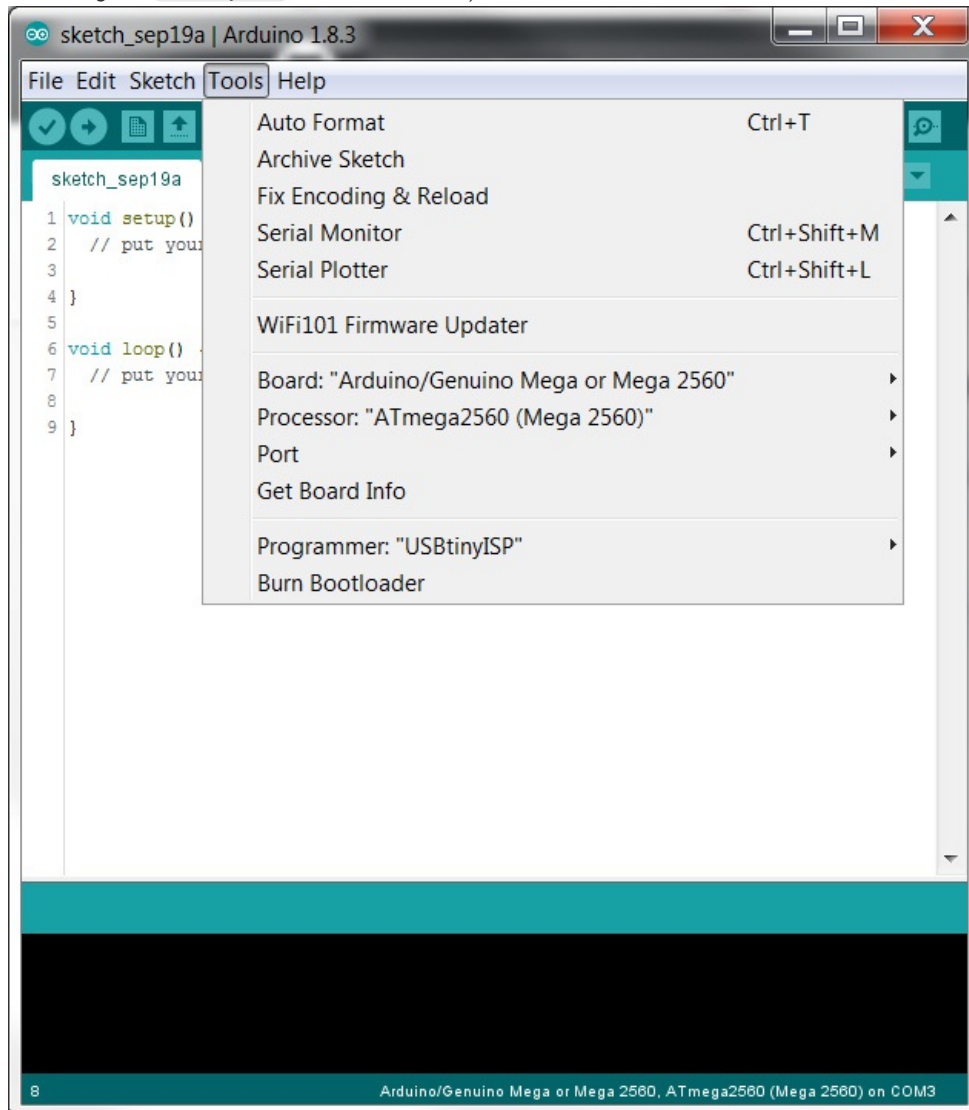
Downloading and Installing the Arduino Firmware

Once you have successfully installed the Processing programming language in the above steps, we can now prepare the firmware on the Choitek's Megamark's Arduino Mega 2560 board.

Step 1: If you have not done so already, follow the steps in the *Megamark Arduino Setup Guide* and make sure you have the Arduino software and the Megamark Arduino Library installed and ready to go. Plug the robot's internal Arduino Mega 2560 onto your laptop via USB Serial.

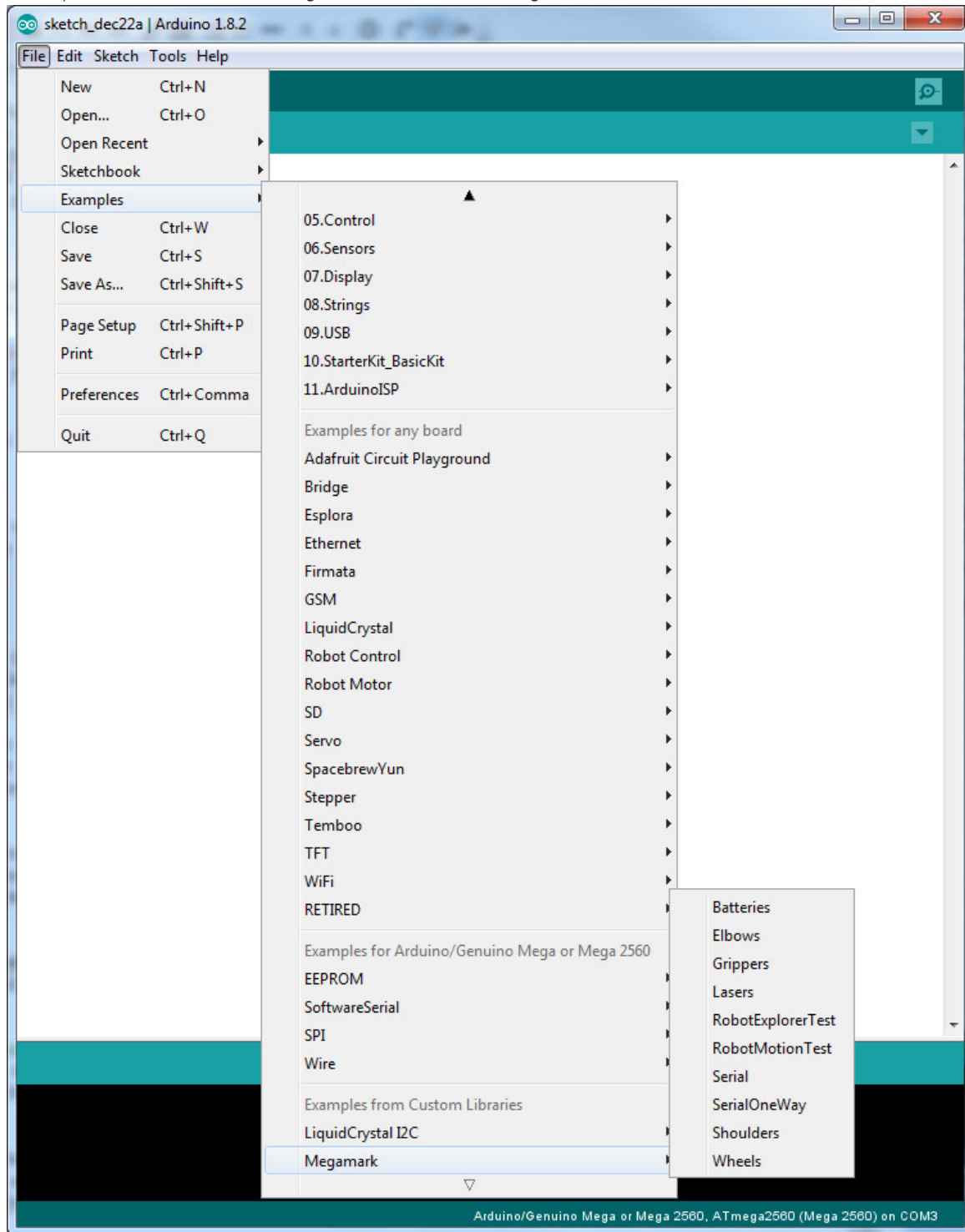


Step 2: Fire up the newly installed Arduino IDE. Set your board type by going into `Tools->Board->Arduino/Genuino Mega or Mega 2560`. Set your COM port by going into `Tools->Port->COM##`. (Normally, this would be `COM3` on Windows if this is the first time you are using Arduino. This is something like `/dev/ttyACM0` on Linux and Mac.)



Some versions of the Choitek Megamark run on an Arduino Mega 1280 instead of the Arduino Mega 2560 for legacy compatibility reasons. If this applies to your Megamark robot, you will also need to change `Tools->Processor->Board->ATmega1280`.

Step 3: Go over to `File->Examples->Megamark->Serial`. This allows the Megamark robot to communicate over USB serial to Processing scripts running on a laptop. Once the example file has been loaded, press the `Upload` button (shaped liked an arrow in the upper left corner of the screen) to load the code onto the Megamark Robot's Arduino Mega.

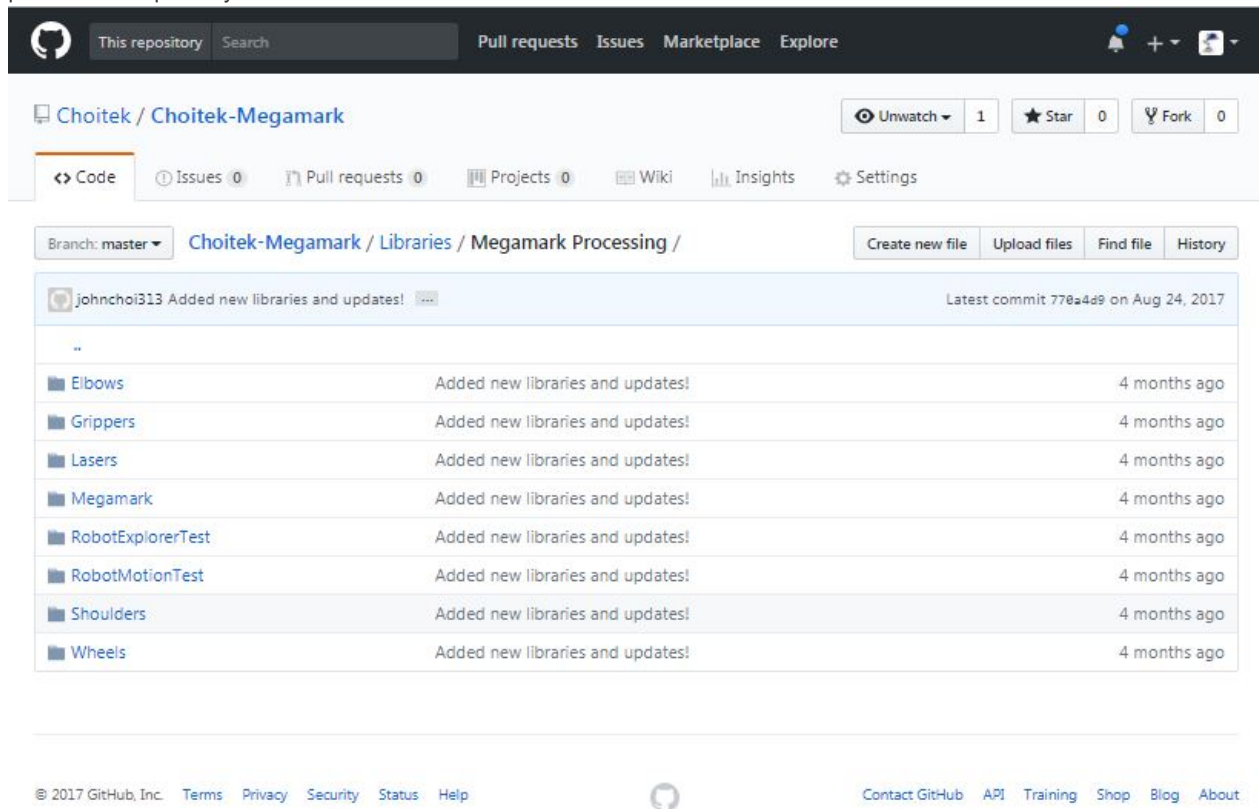


Once the `Serial` example has been loaded, the robot should now be programmable using Processing 3.0.

Running Example Processing Scripts

Now that Processing 3.0 has been installed with the correct Arduino firmware loaded on the Megamark Robot, we can now test some actual Processing scripts for the Megamark Robot.

Step 1: Go ahead and download the *Megamark Library for Processing*, which can be found on [Github](#) or the [main Choitek website](#). Extract it and place the examples in your desired location.

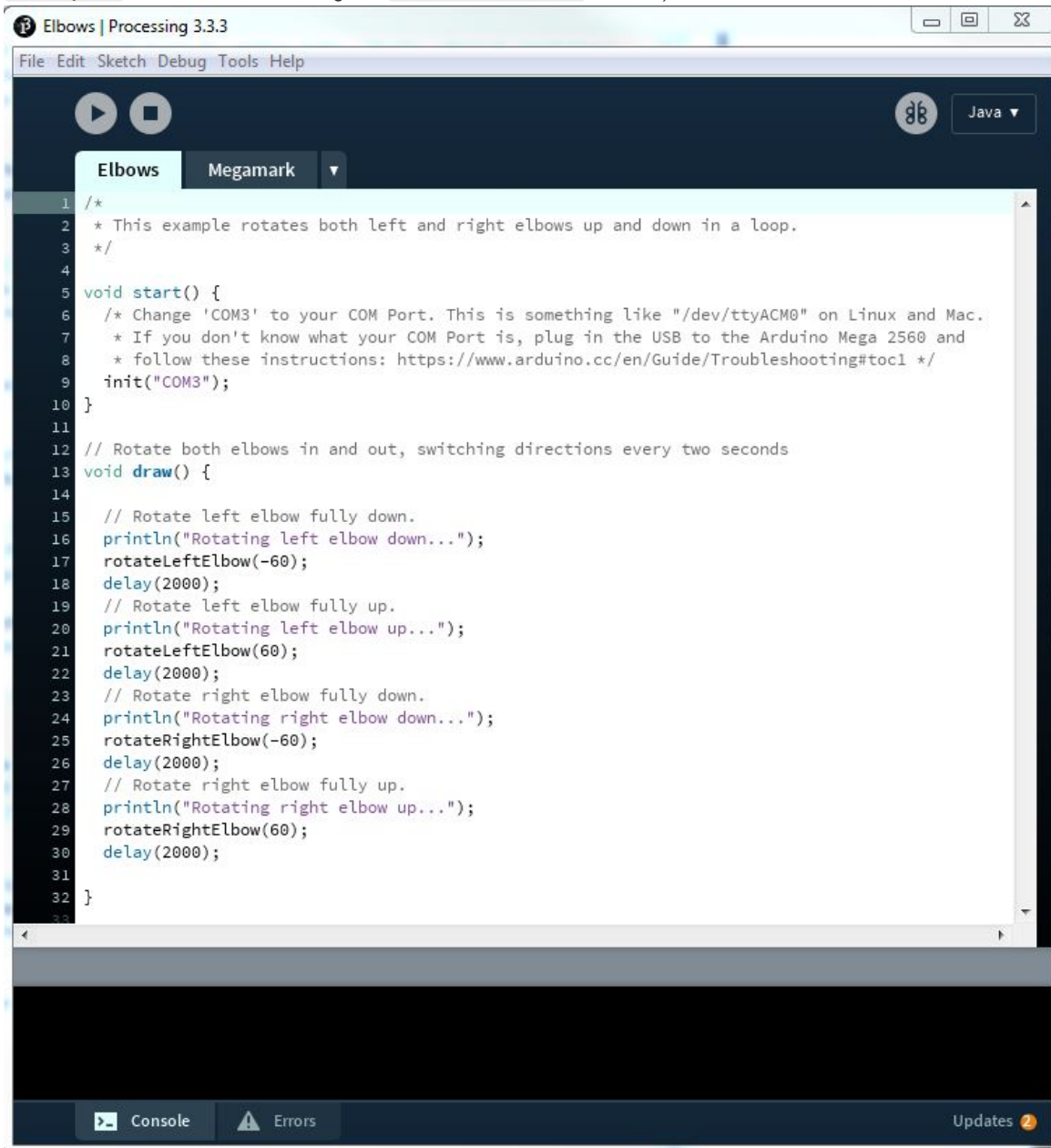


The screenshot shows the GitHub repository page for Choitek / Choitek-Megamark. The repository is on the master branch. The commit history table is as follows:

Commit Message	Latest Commit	Date
..	778a4d9	Aug 24, 2017
Elbows	Added new libraries and updates!	4 months ago
Grippers	Added new libraries and updates!	4 months ago
Lasers	Added new libraries and updates!	4 months ago
Megamark	Added new libraries and updates!	4 months ago
RobotExplorerTest	Added new libraries and updates!	4 months ago
RobotMotionTest	Added new libraries and updates!	4 months ago
Shoulders	Added new libraries and updates!	4 months ago
Wheels	Added new libraries and updates!	4 months ago

Note: Every Processing project that references the Choitek Megamark must have the `Megamark.pde` file in the same folder! If you don't do this, you will be faced with a missing library error.

Step 2: Now, find the Processing 3.0 application on your computer and run it. Go to `File->Open...` and open `Elbows.pde` from the Megamark Processing examples. Be sure to change the line referencing your COM Port. (Normally, this would be `COM3` on Windows. This is something like `/dev/ttyACM0` on Linux, and something like `/dev/cu.usbmodem1411` for Mac.)



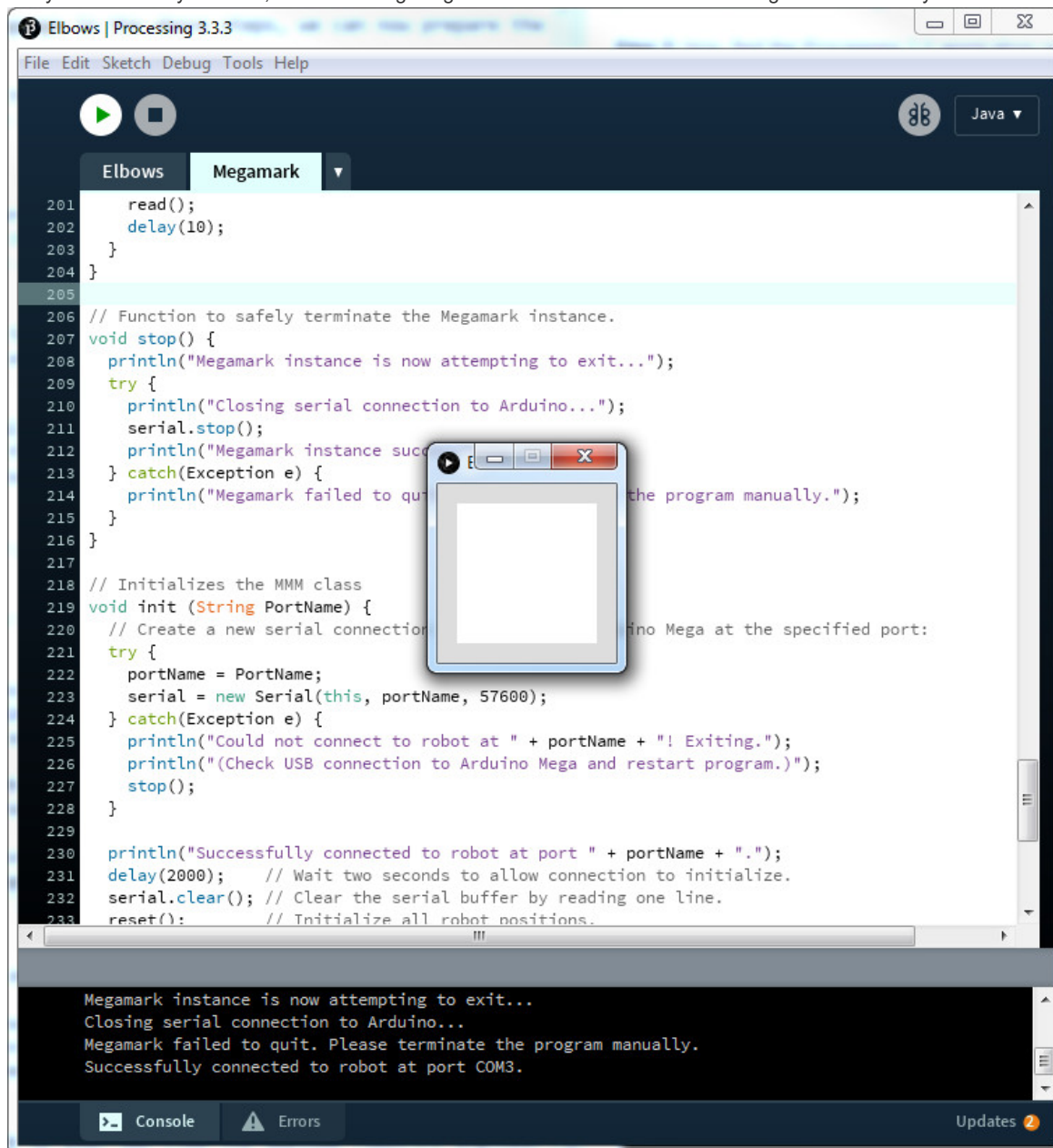
```

1 /*
2  * This example rotates both left and right elbows up and down in a loop.
3  */
4
5 void start() {
6   /* Change 'COM3' to your COM Port. This is something like "/dev/ttyACM0" on Linux and Mac.
7    * If you don't know what your COM Port is, plug in the USB to the Arduino Mega 2560 and
8    * follow these instructions: https://www.arduino.cc/en/Guide/Troubleshooting#toc1 */
9   init("COM3");
10 }
11
12 // Rotate both elbows in and out, switching directions every two seconds
13 void draw() {
14
15   // Rotate left elbow fully down.
16   println("Rotating left elbow down...");
17   rotateLeftElbow(-60);
18   delay(2000);
19   // Rotate left elbow fully up.
20   println("Rotating left elbow up...");
21   rotateLeftElbow(60);
22   delay(2000);
23   // Rotate right elbow fully down.
24   println("Rotating right elbow down...");
25   rotateRightElbow(-60);
26   delay(2000);
27   // Rotate right elbow fully up.
28   println("Rotating right elbow up...");
29   rotateRightElbow(60);
30   delay(2000);
31 }
32

```

Note: In the upper right hand corner of the screen, make sure you are running `Java` mode.

Step 3: To execute the program, click on the **Run** button on the upper left corner of the screen (it looks like a triangle inside a circle). If you have no syntax errors in your code, the Processing will generate a little window that is running the contents of your code.



```
Elbows | Processing 3.3.3
File Edit Sketch Debug Tools Help
Elbows Megamark
201 read();
202 delay(10);
203 }
204 }
205
206 // Function to safely terminate the Megamark instance.
207 void stop() {
208   println("Megamark instance is now attempting to exit..");
209   try {
210     println("Closing serial connection to Arduino...");
211     serial.stop();
212     println("Megamark instance successfully terminated.");
213   } catch (Exception e) {
214     println("Megamark failed to quit. Please terminate the program manually.");
215   }
216 }
217
218 // Initializes the MMM class
219 void init (String PortName) {
220   // Create a new serial connection to Arduino Mega at the specified port:
221   try {
222     portName = PortName;
223     serial = new Serial(this, portName, 57600);
224   } catch (Exception e) {
225     println("Could not connect to robot at " + portName + "! Exiting.");
226     println("(Check USB connection to Arduino Mega and restart program.)");
227     stop();
228   }
229
230   println("Successfully connected to robot at port " + portName + ".");
231   delay(2000); // Wait two seconds to allow connection to initialize.
232   serial.clear(); // Clear the serial buffer by reading one line.
233   reset(); // Initialize all robot positions.

```

Megamark instance is now attempting to exit..
Closing serial connection to Arduino..
Megamark failed to quit. Please terminate the program manually.
Successfully connected to robot at port COM3.

Console Errors Updates 2

Step 4: Your robot will now play the Processing 3.0 script continuously until the script closes. If you were running the `Elbows.pde` script, the robot should now be happily moving its elbows in a continuous up and down motion! Be sure to try out the other examples to get a more comprehensive sense of how to program the Megamark robot using Processing 3.0.



That was pretty easy wasn't it? Now go out there and make some code of your own like the awesome robotics engineer you know you are!