This is an adorable little kit that is a perfect introduction to wearable electronics. The heart of the kit is the heart shaped electronics board with 8 LEDS. It is easy to program and requires no wiring. The LEDs used are “smart” which means that it is easy to program all kinds of cool patterns from rainbows to a beating heart.

Each Lovey Dove is pre-programed to light up in a single colour. To change the colour you will need to download the Arduino IDE software, libraries, and drivers. Don’t worry if this sounds a bit complicated we will walk you through the whole installation process.

What is included

- 1 Lovey Dove Board
    - Micro-controller (Adafruit Trinket)
    - 8 Neopixels (Special RGB LEDs)
- 1 Battery Pack (batteries not included)
- USB Wire

Warning!

If your Trinket, Neopixel, or any part of your piece starts getting hot, unplug you the battery pack immediately. Check your circuit for crossed wires. If this problem continues, contact makerstore@uottawa.ca and we will help solve the problem.
Do not leave it plugged in for long periods of time unattended.

The soldered points on the underside of the heart pcb (little silver points) can be sharp. Be careful when handling your piece.

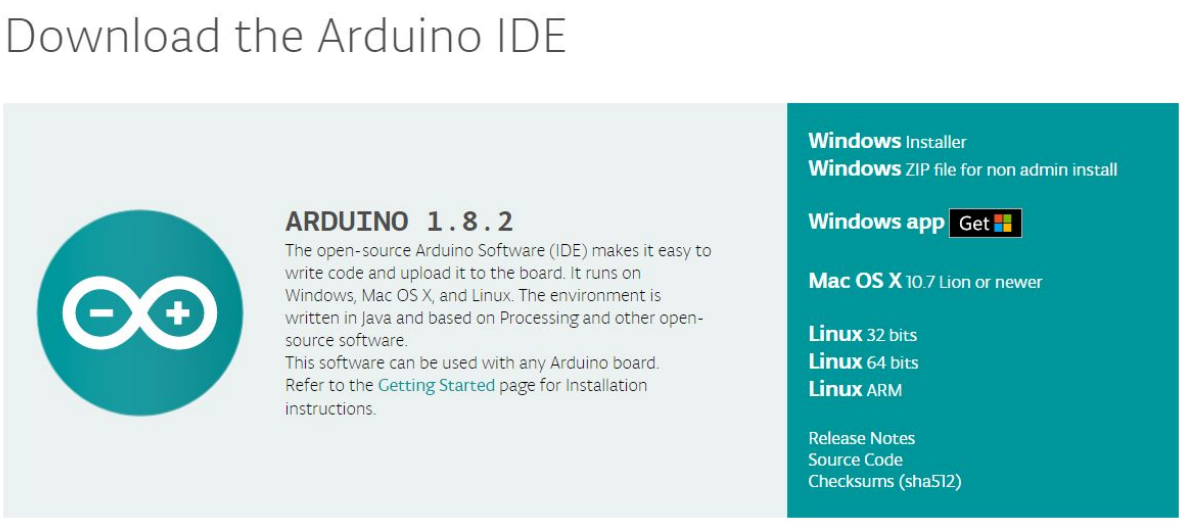
Ressources:

- Neopixel guide: https://learn.adafruit.com/adafruit-neopixel-uberguide/arduino-library?view=all
- Trinket guide: https://learn.adafruit.com/adafruit-neopixel-uberguide/arduino-library?view=all
- Windows trinket drivers: https://learn.adafruit.com/introducing-trinket/windows-setup
- Installing the trinket:https://learn.adafruit.com/adafruit-arduino-ide-setup/overview
- Arduino: https://www.arduino.cc/en/Main/Software

Installation guide:

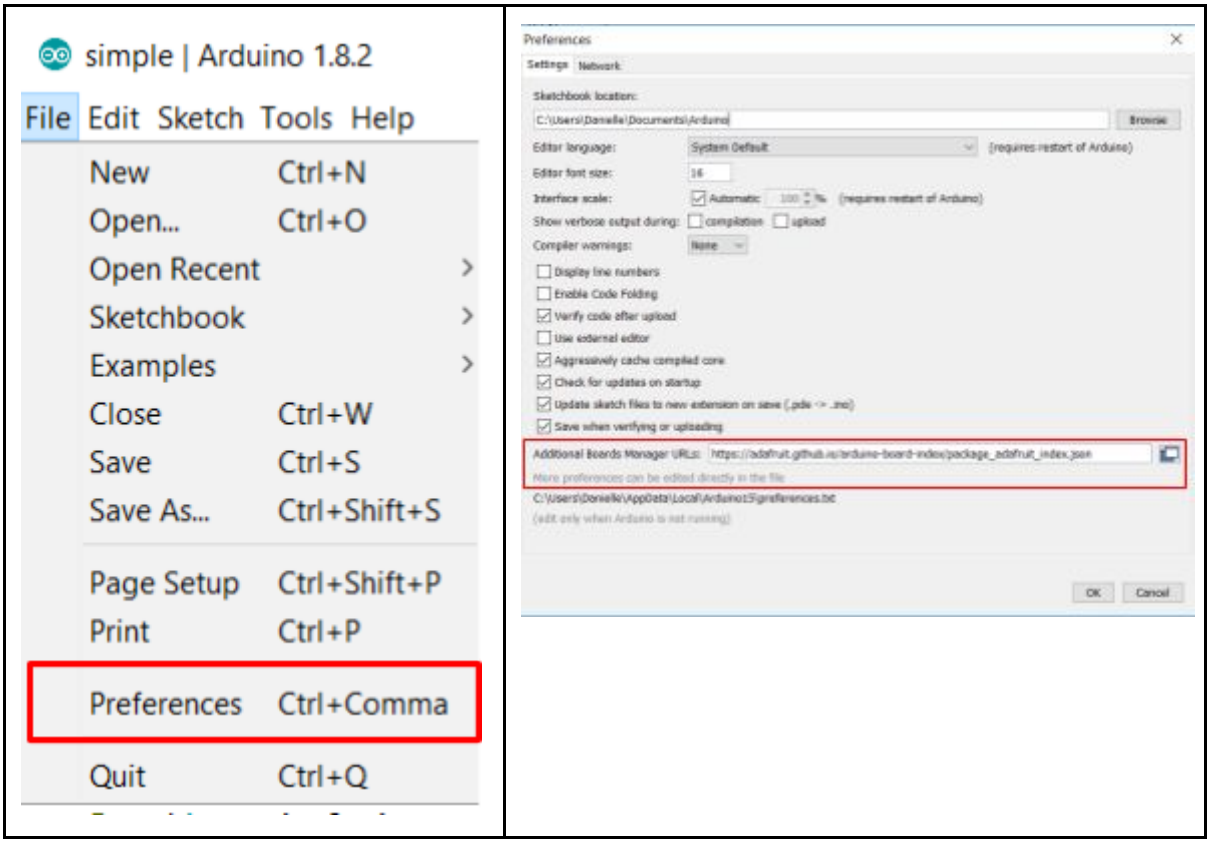
STEP 1: Installing the Arduino IDE

Click on https://www.arduino.cc/en/Main/Software and download the appropriate software. If you run into any issues, arduino created handy guides which you can find at the following link: https://www.arduino.cc/en/Guide/HomePage.

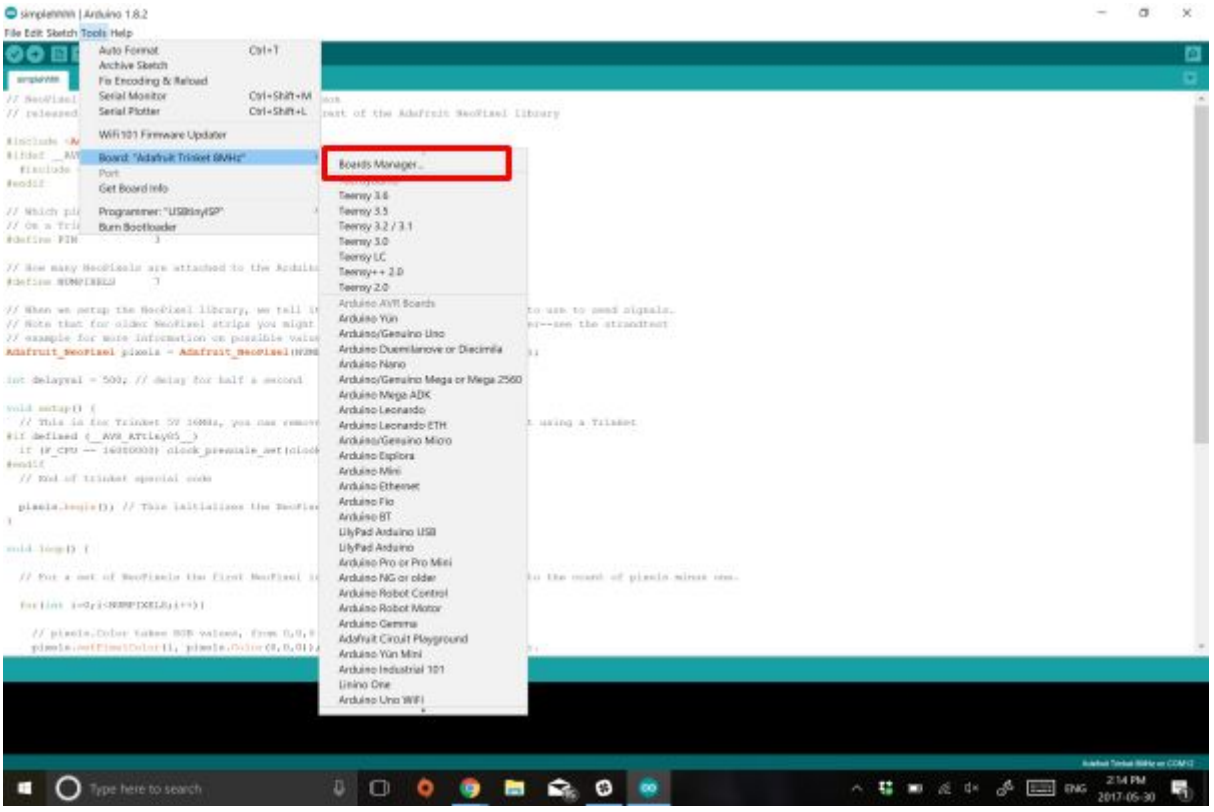


STEP 2: Installing the trinket

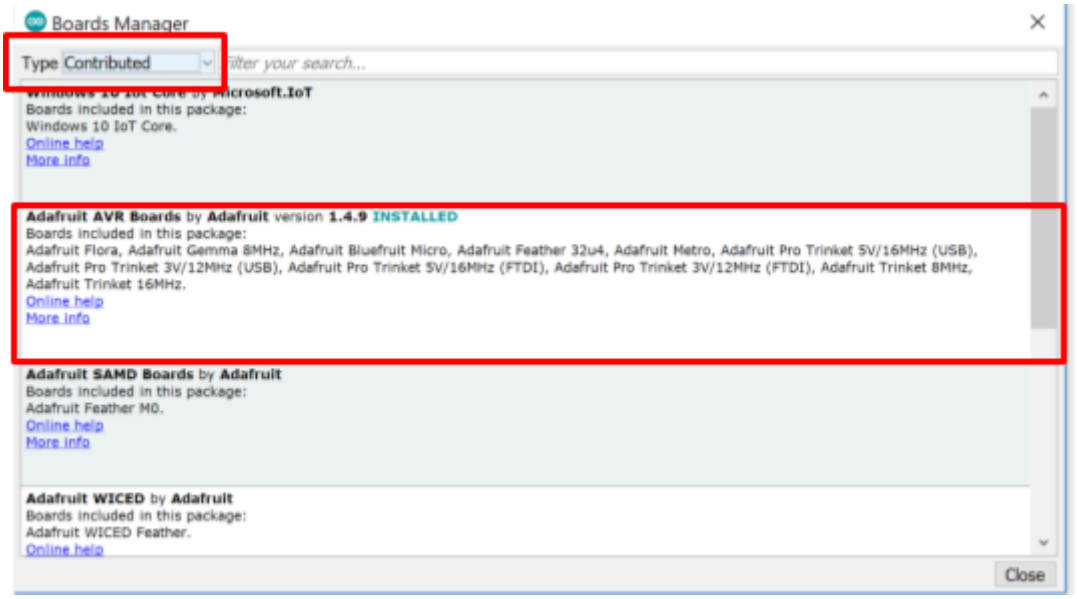
1. Open the preferences window by click **File**>**Preference**. Paste "https://adafruit.github.io/arduino-board-index/package_adafruit_index.json" into the additional board manager then click ok. What you are doing is telling the arduino program where to look to install the board.


simple | Arduino 1.8.2
File Edit Sketch Tools Help
New Ctrl+N
Open... Ctrl+O
Open Recent
Sketchbook
Examples
Close Ctrl+W
Save Ctrl+S
Save As... Ctrl+Shift+S
Page Setup Ctrl+Shift+P
Print Ctrl+P
Preferences Ctrl+Comma
Quit Ctrl+Q
Preferences
Settings Network
Sketchbook location:
Browse
Editor language:
System Default
(requires restart of Arduino)
Editor font size:
Interface scale:
Automatic
(requires restart of Arduino)
Show verbose output during:
compilation
upload
Compiler warnings:
None
Display line numbers
Enable Code Folding
Verify code after upload
Use external editor
Aggressively cache compiled core
Check for updates on startup
Update sketch files to new extension on save (.pde -> .ino)
Save when verifying or uploading
Additional Boards Manager URLs:
More preferences can be edited directly in the file
(edit only when Arduino is not running)
OK
Cancel

2. Next step is actually installing the board. Open the board manager by clicking **Tools>Board: >Boards Manager**

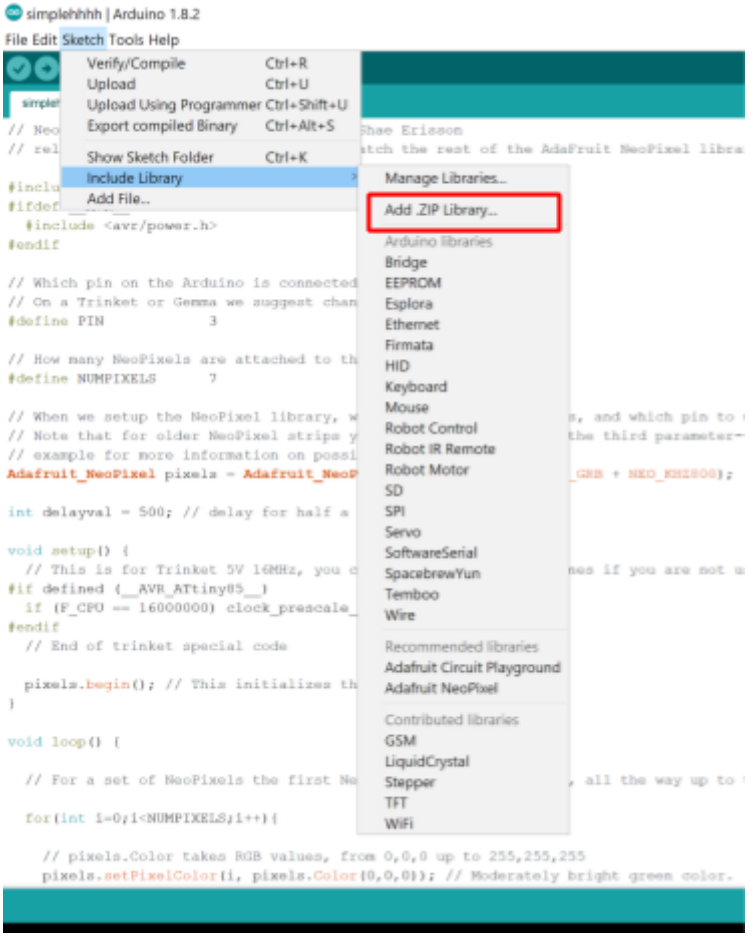


3. A new window will appear. Next to type, there a a drop down menu, select Contributed. Select Adafruit AVR Boards by Adafruit and click install.



STEP 3: Install the Neopixel library.

1. Click on the following link http://github.com/adafruit/Adafruits_NeoPixel/archive/master.zip and download the zip folder. Remember where you saved it.
2. Click on **Sketch>Add ZIP Library...**

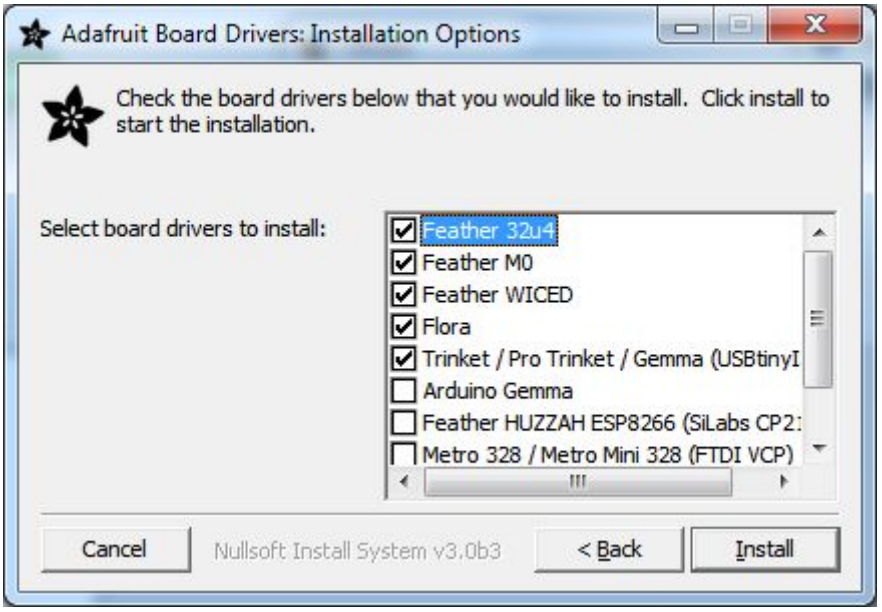


3. Select the zip folder that was just downloaded, Adafruit_NeoPixel-Master

STEP 4: Windows drivers

This step is only needed ONLY if you are running windows.

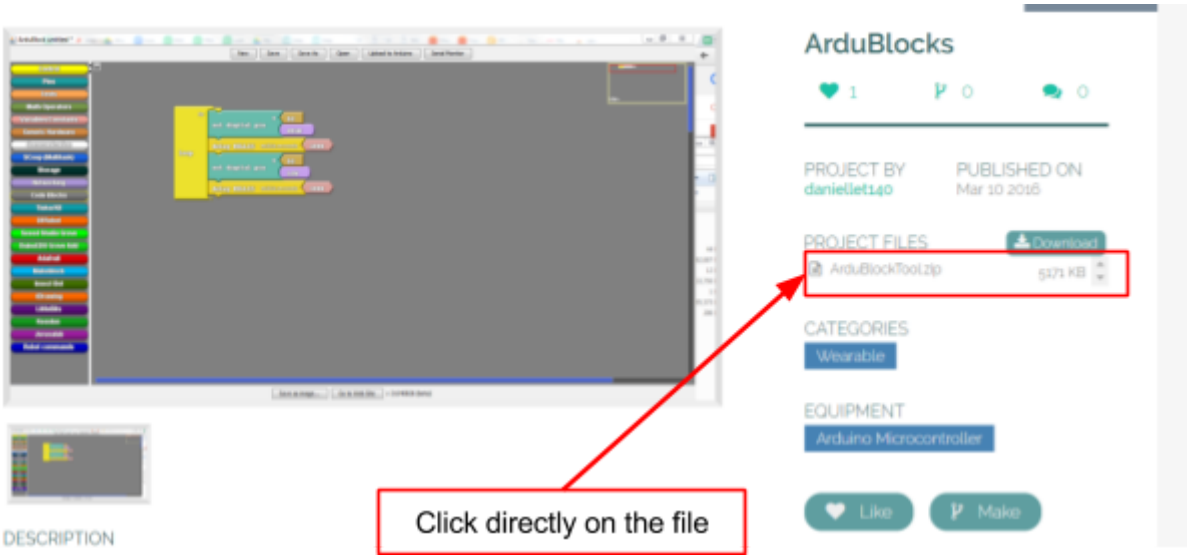
1. Click on the following link https://github.com/adafruit/Adafruit_Windows_Drivers/releases/download/1.0.0.0/adafruit_drivers.exe and download the driver exe.
2. Run the installer. Maker sure the Trinket option is selected before you click install.



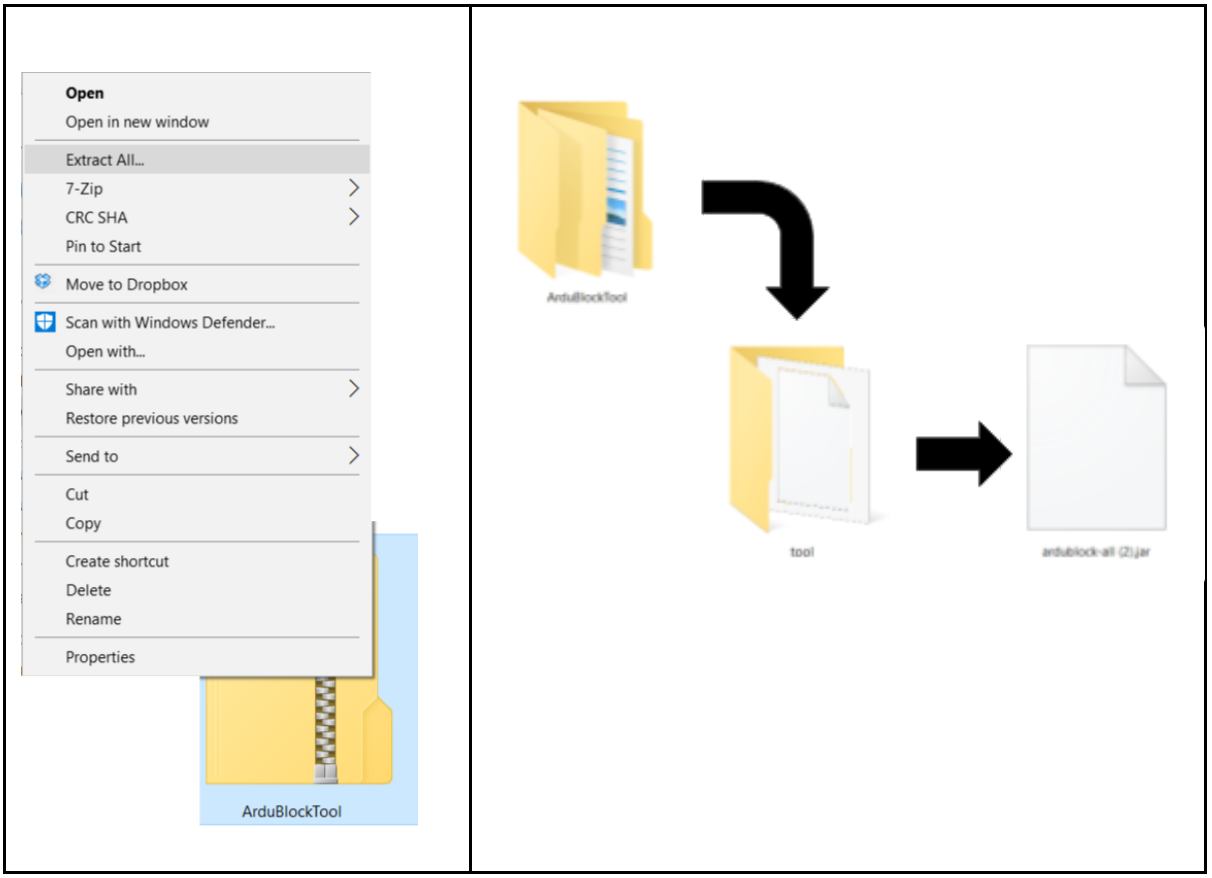
STEP 5: Installing ardublocks

If you are familiar with the Arduino IDE and plan on programming directly in arduino, you can stop here. Ardublock are an easy puzzle style method of programming. Instead of typing out lines of code, you simply connect the coloured pieces.

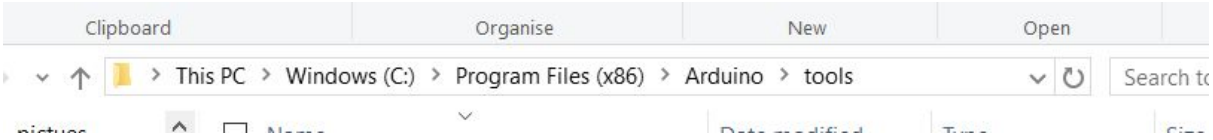
1. Go to the following link: http://makerepo.com/daniellet140/ardublocks. And download the ArduBlockTool.zip file.



2. Right click on the folder that you downloaded and select extract all. A new folder will be created called **ArduBlockTool**. Inside there should be a folder called **tool**. Inside that folder should be a file called ardublock-all.jar (or something similar).



3. Now it is time to move the folder into your arduino folder and then tools.
    a. WINDOWS: Your arduino folder is found in your program files. Open file explorer and click on:
    Windows(C:)->Program Files (x86) -> Arduino -> tools

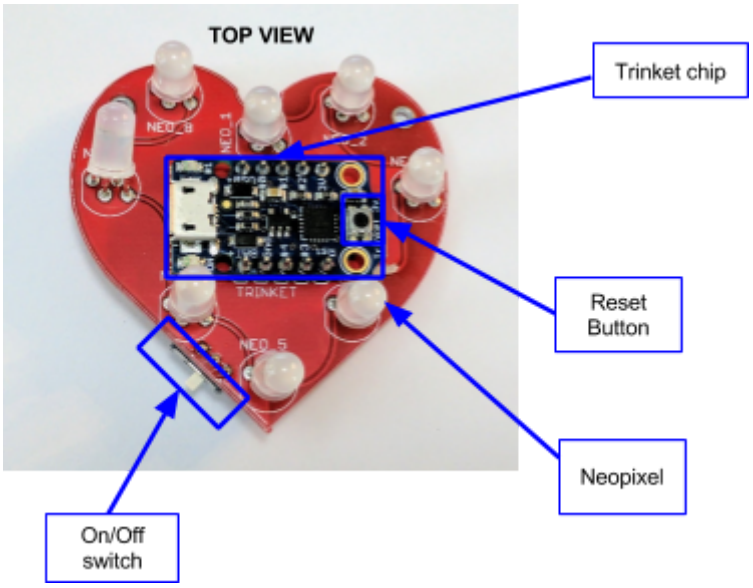


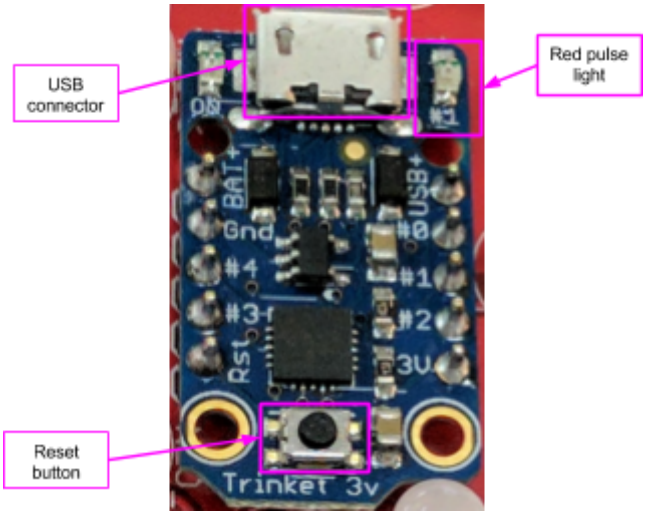
    b. MAC: Your arduino folder is found in the documents folder. Click on Documents->Arduino->tools

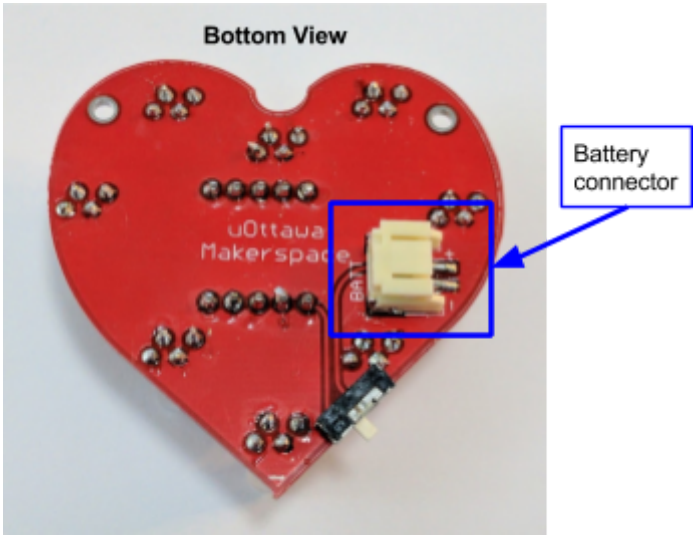
Installation process COMPLETE

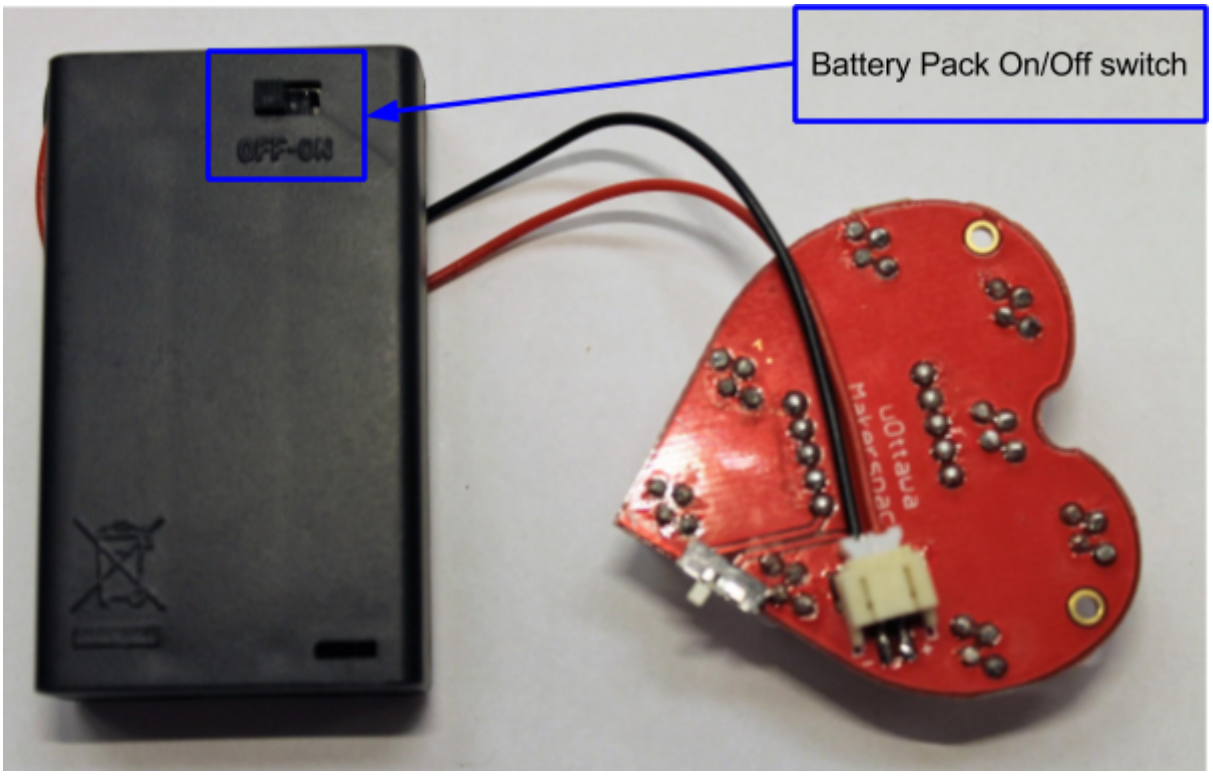
Activity

Getting to know your heart PCB




USB connector
Red pulse light
Reset button
BAT+
USB
Gnd
#4
#0
#1
#3
#2
3V
Trinket 3v


Bottom View
Battery connector
uOttawa
Makerspace



Sometimes the battery connector is hard to plug and unplug, so be gentle, but you may need to apply some force.

There are **TWO** on off switches. One on the heart **and** one on the battery. For your heart to light up, you need to have **both** switches in the on position.

What are neopixels

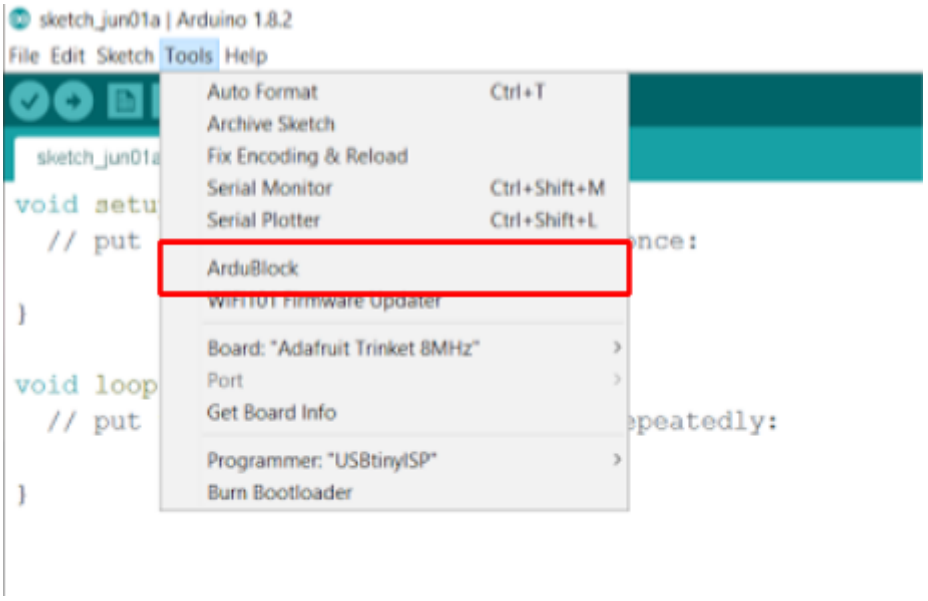
Neopixels are used to when you want to easily add lights and colours to your project. Neopixels are a special kind of RGB LED that have an integrated driver board. An LED is a light emitting diode, which means that when voltage is applied to the leads, it will light up. RGB means that they can light up red, green, blue or a combination of the three. To get the light up with the color you desire, you need to enter the right combination of red, green, and blue. This is done by assigning each color a value between 0 and 255 where 0 is off and 255 is full brightness. If you input red=255, green=0, blue=0, then your LED will light up red. If you want a magenta coloured light, enter red=255, green=0, blue=255.

What is a trinket?

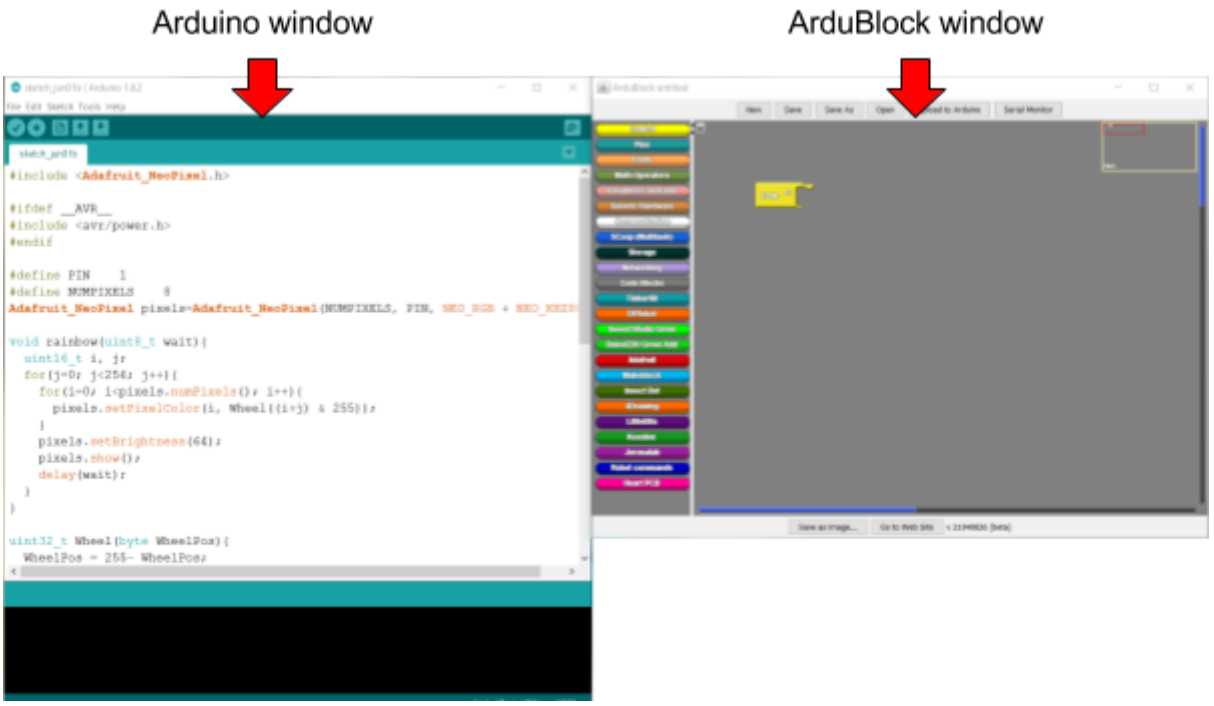
A trinket is a microcontroller which is like the brain of the computer. It is used to interpret and execute the instructions we gave it. It takes the inputs and gives desired outputs which will depend on the program we give it. In our case, everything is already wired and good to go. A wiring diagram can be found ****** for those who are interested.

Programing in ArduBlocks

To open ArduBlocks, click on tools, located on the top menu bar, then ArduBlock. This option will only be available if it was installed as shown earlier in the document.



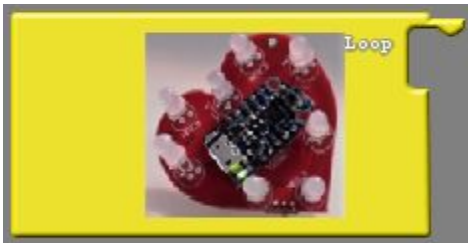
You will now have two windows, the green/blue one will be referred to as the arduino window, the new window that just opened we will call the Ardublock window.



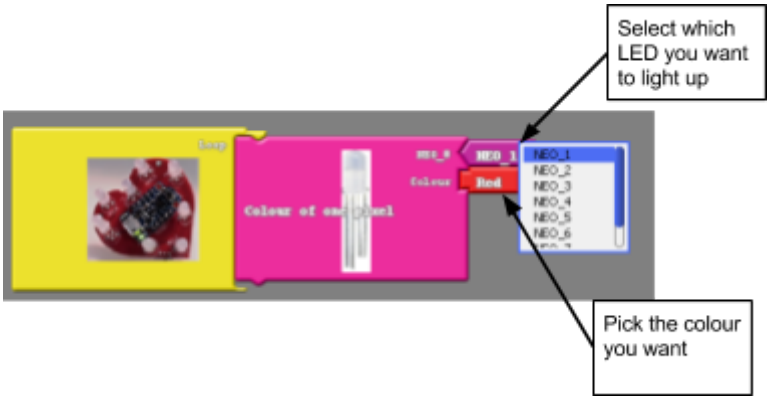
The grey area is where you will put your code. Think of it as your programming space. On the left hand side there are many different types of blocks. We will focus mostly on Control and Heart PCB. If you click on those buttons a menu will open and provide you with new puzzle pieces. If you want to get rid of any pieces on your programing area, just click and drag your pieces back over to the menu area.

The first step in programing our heart project is to click on the yellow loop in the programing area and delete it. To do this, click on the piece and drag it over to the menu area. Next, click on the Heart PCB and drag the loop with the picture of the heart into the programing area. This pieces has all the

special background code needed to program our special lights. For more information on this code, see the next section on programing directly in the Arduino IDE.



Next, go get the piece called “Pixel color between 0 and 255” and place it inside the yellow loop. If hover over the piece attach to Neo_# hole, a drop down arrow will appear. Clicking on it will allow you to select which LED you want to change. For this first example, I want to light up the 3rd light blue. Therefore, I am going to select Neo_3 and change the color to blue.

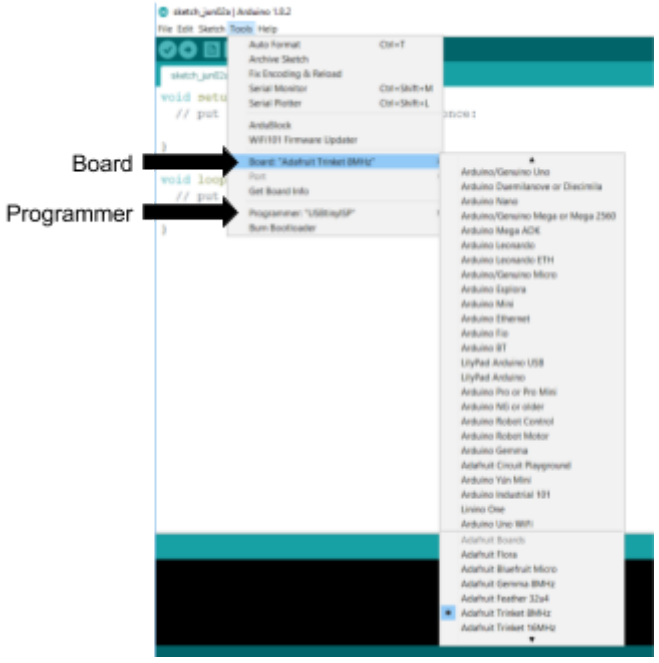


There is one last step need in our first code is to add the piece marked “Show pixels”. It can be found under the Heart PCB menu This piece is important, it tell the neopixels to actually execute the task you gave them. Without it, they will not light up.

Your code should look something like this:

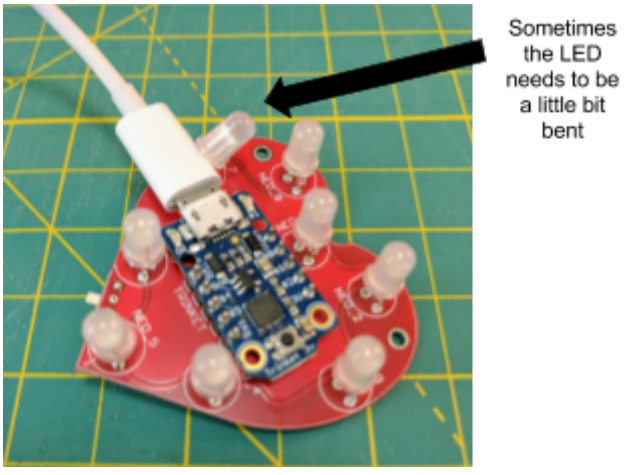
Time to send the code to the heart. This is a little bit complicated, but once you get the hang of it, you will become a heart programming pro.

Step 1: Go back to the arduino window. Click on Tools and bring your mouse over Board:. A list of available boards will appear on the right hand side. Change the board to **Board: “Adafruit Trinket 8MHz”**.



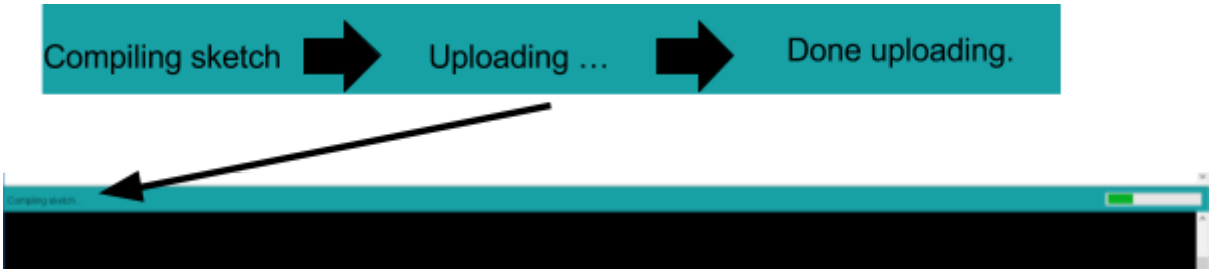
Step 2:In the tools menus, change the programer to **Programmer: “USBtinyISP”.**

Step 3: Now it is time to connect the heart chip to your computer. Plug in one end of the usb to the heart PCB and the other to your computer.



Step 4: Now the hard part. Go back to the ArduBlock window and click upload **Upload to arduino**. **Simultaneously**, press and release the reset button on the trinket (blue chip on heart). Two things will be happening simultaneous.

In the arduino screen, the bottom line should say Compiling sketch, then Uploading... , and finally Done uploading.

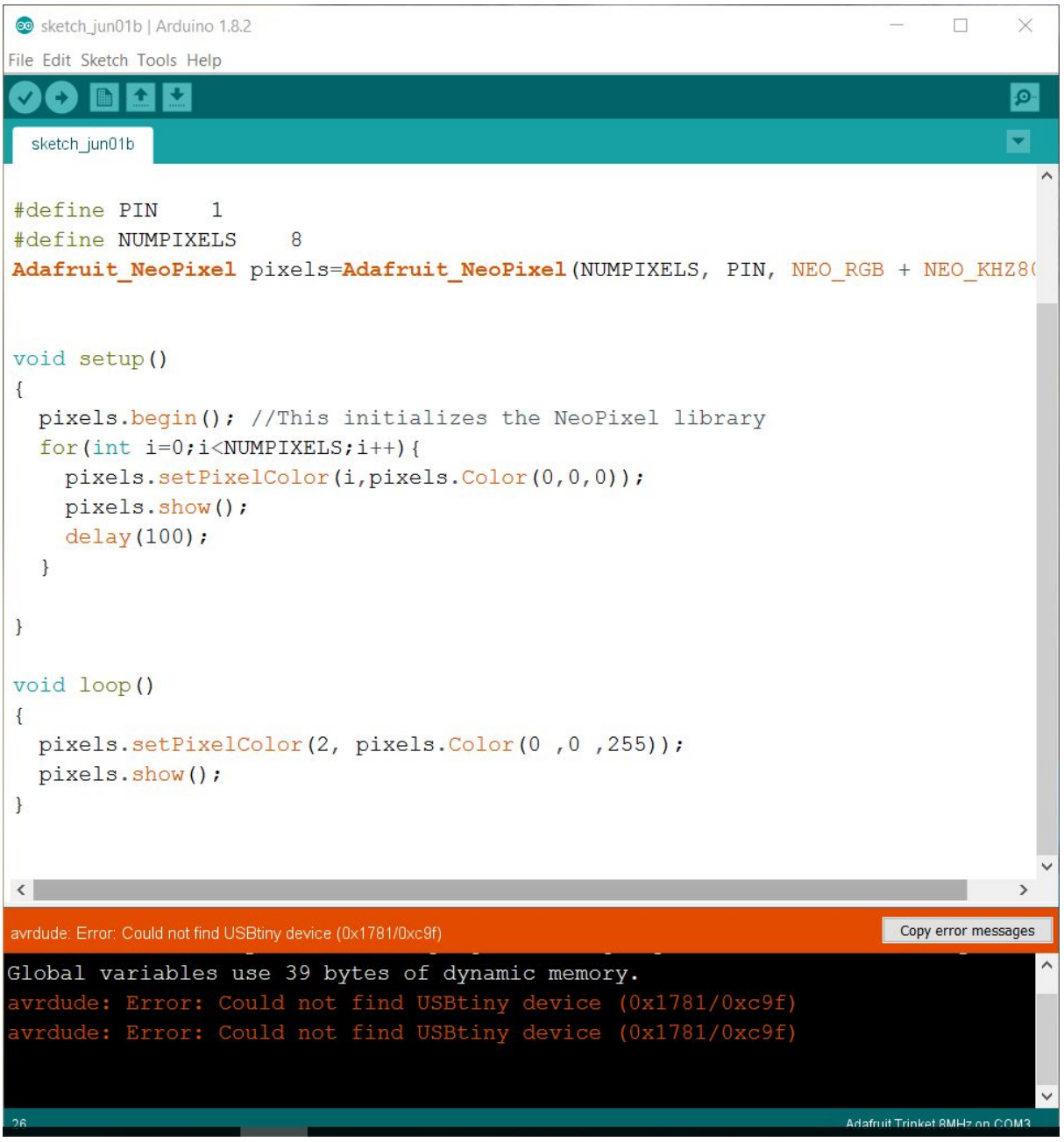


On the heart, a little red light should begin to pulse. The lights may also change colours. Make sure that the red light is still pulsing when arduino says uploading. If you get the error shown in the picture below, the red light was probably not flashing will it was uploading. If you computer is a little bit sluggish, you may need to press the button a second time in order to make sure it remains pulsing while uploading.

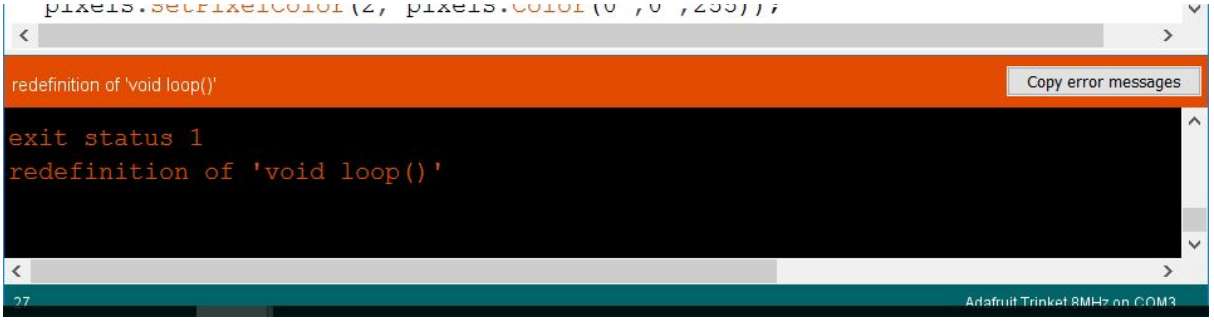
You know it has uploaded properly if the heart is doing what you programmed it to. In my case, only the 3rd light should be lighting up and be blue.

TROUBLESHOOTING

When you click upload, you get an angry looking error at the bottom of your arduino window

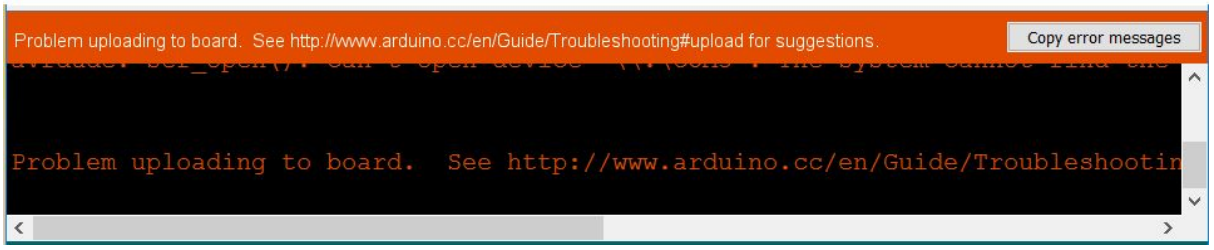


If you error says **avrdude: Error: Could not find USBtiny device (0x1781/0xc9f)**, it means that the red light on the trinket board on your heart was probably not flashing when the arduino program was trying to upload the code. Try again and release the button when you see the **Compiling** message at the bottom of your screen. It may take some time to get it right. Check out this video *** to see how I do it.

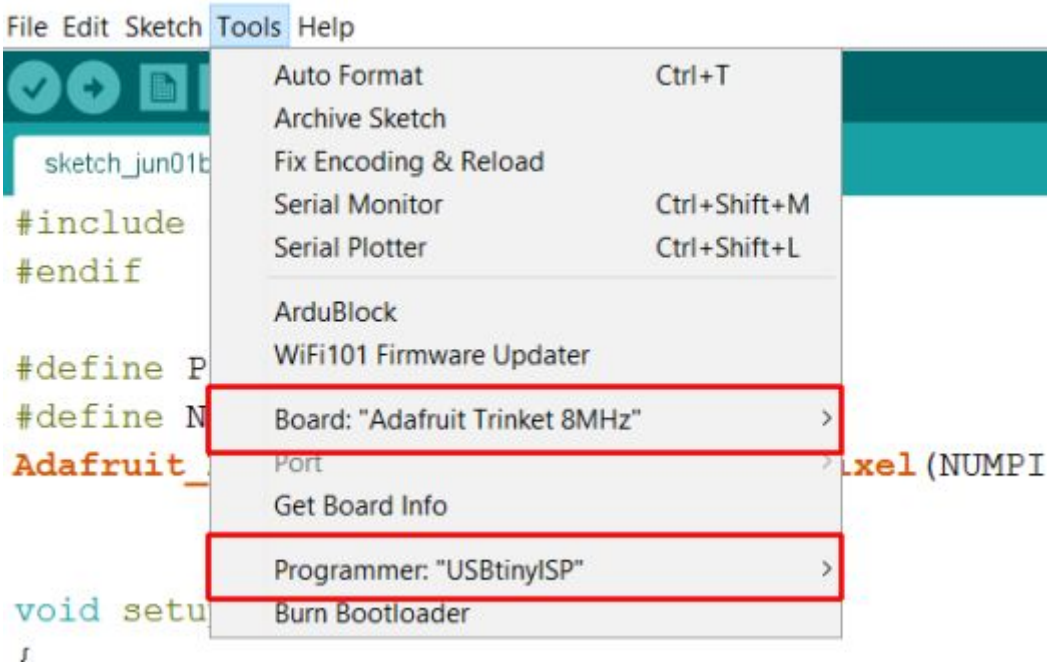


If you get the error **redefinition of 'void loop()'** check to make sure that you actually got rid of that pesky original loop. 

Sometimes, it likes to hide behind the menu bar on the left hand side.



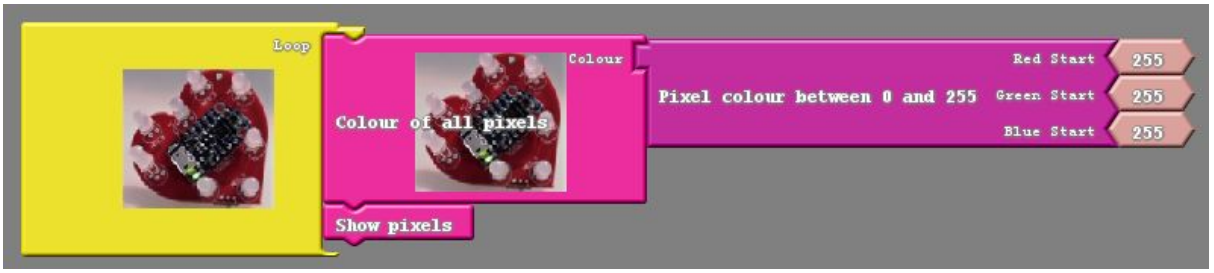
If you get an error that says **Problem uploading to board. See http://www.arduino.cc/en/Guide/Troubleshooting#upload for suggestions.** Check to make sure that your board is set to **Board: "Adafruit Trinket 8MHz"** and programmer is **Programmer: "USBtinyISP"**. These can be found in the arduino window, under the tools menu.



More ArduBlocks

What if you want to change all the neopixels on your heart board? Fret not, there is a block for that. Simply put the **Colour of all pixels** and then the **Show pixels** piece into the loop, as shown below.

Though we have several colours built in, you may want to try something of your own making. Delete the block attached to the color hole and substitute it with **Pixel colour between 0 and 255**. By changing the values connect to the **Red Start, Green Start, Blue Start** holes you can create your own specialty colour.



If you are interested in cool patterns, insert the **pattern block** and then the **show pixel,** as shown below. This block will apply a pattern to all the pixels on the heart.

There are three things that you can change in the pattern block:

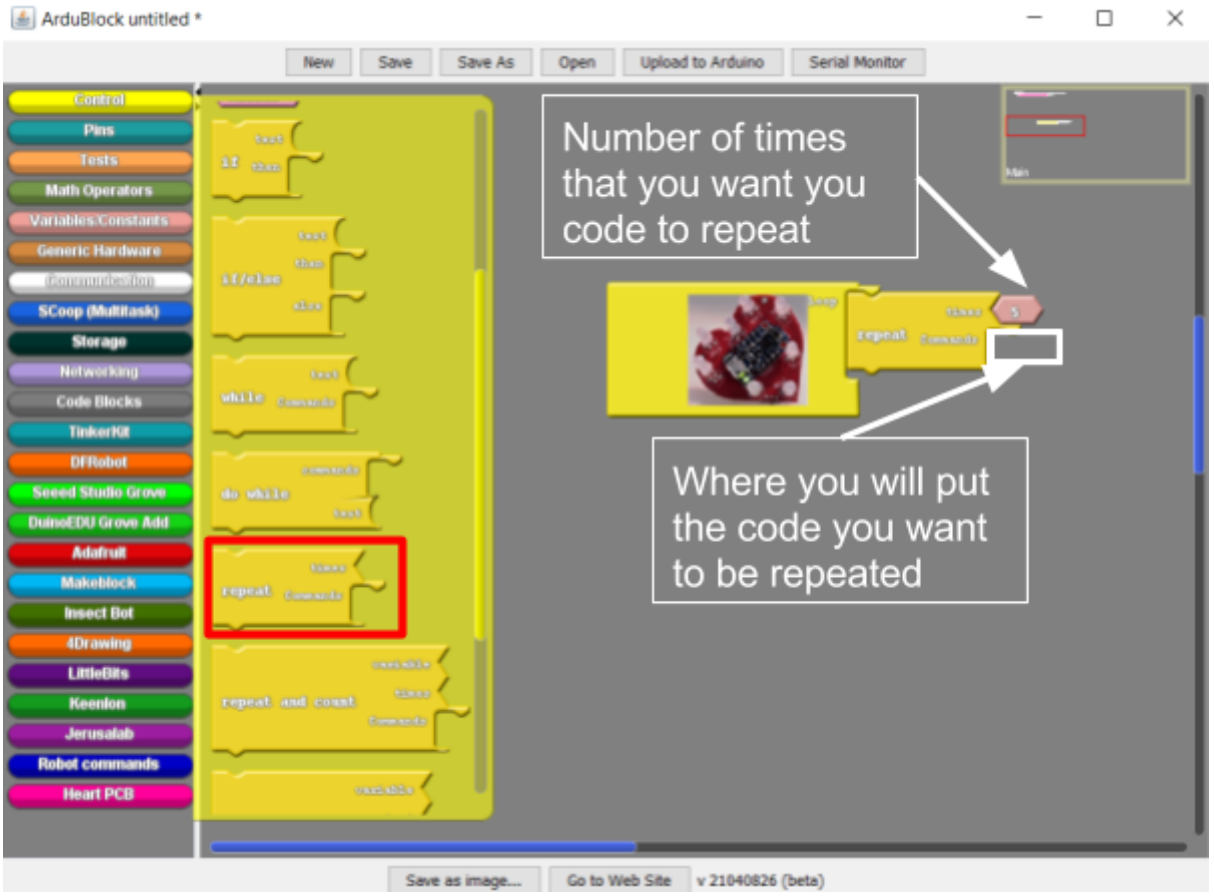
- Pattern: Let's you pick the type of pattern you want to apply. You have the choice between
    - Rainbow
    - Rainbow cycle
    - Theatre chase rainbow
    - Theatre chase
    - Color wipe
- Miliseconds: Change the pace of the pattern. A smaller number means that the pattern will be faster.
- Theater chase: Is the starting color for certain patterns

The best way to get to know the patterns is to test them out.

Challenges!

Let's test your programing skills. In this section we are going to play with some new blocks and some new concepts.

First let's introduce the repeat loop which is found under the **Control** menu. This piece does exactly what you would expect, it repeats the code placed inside it the number of times indicated.



There is a similar block called **repeat and count**. This introduces two new concepts the first is a "variable" and the second is a "counter".