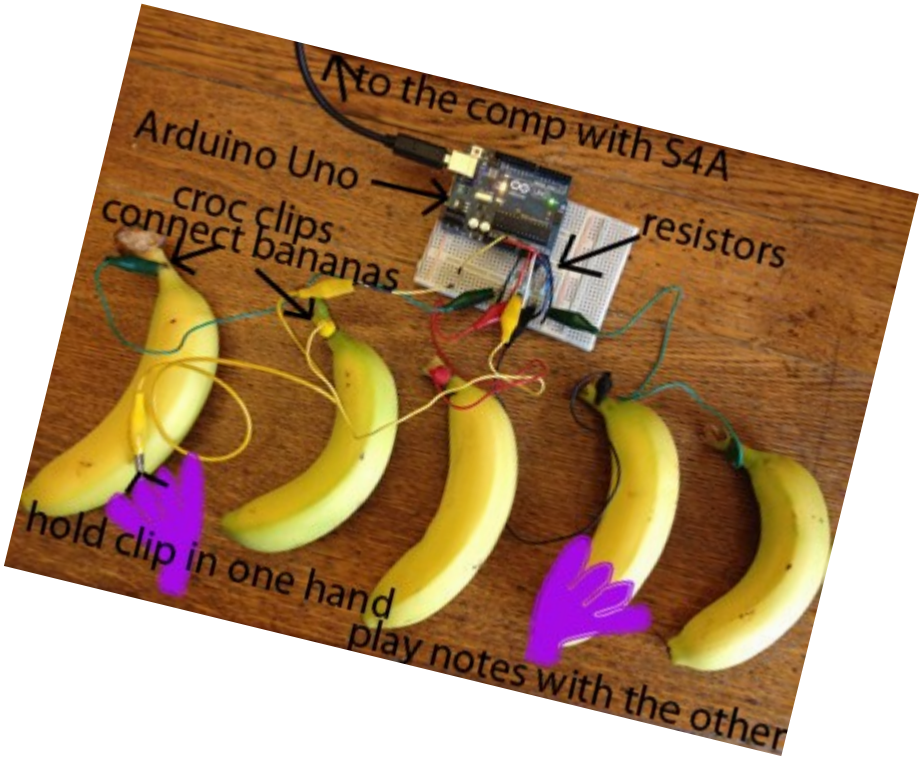
Clues for Making a Banana Piano



The kit contains:

- An Arduino Uno board with the Scratch 4 Arduino firmware preinstalled
- A lead to connect the Arduino to a USB port on your computer
- A small bread board (that is used to connect the components to make the piano)
- 6 resistors
- 7 alligator clip connectors
- 9 mini connecting wires

You're probably going to need:

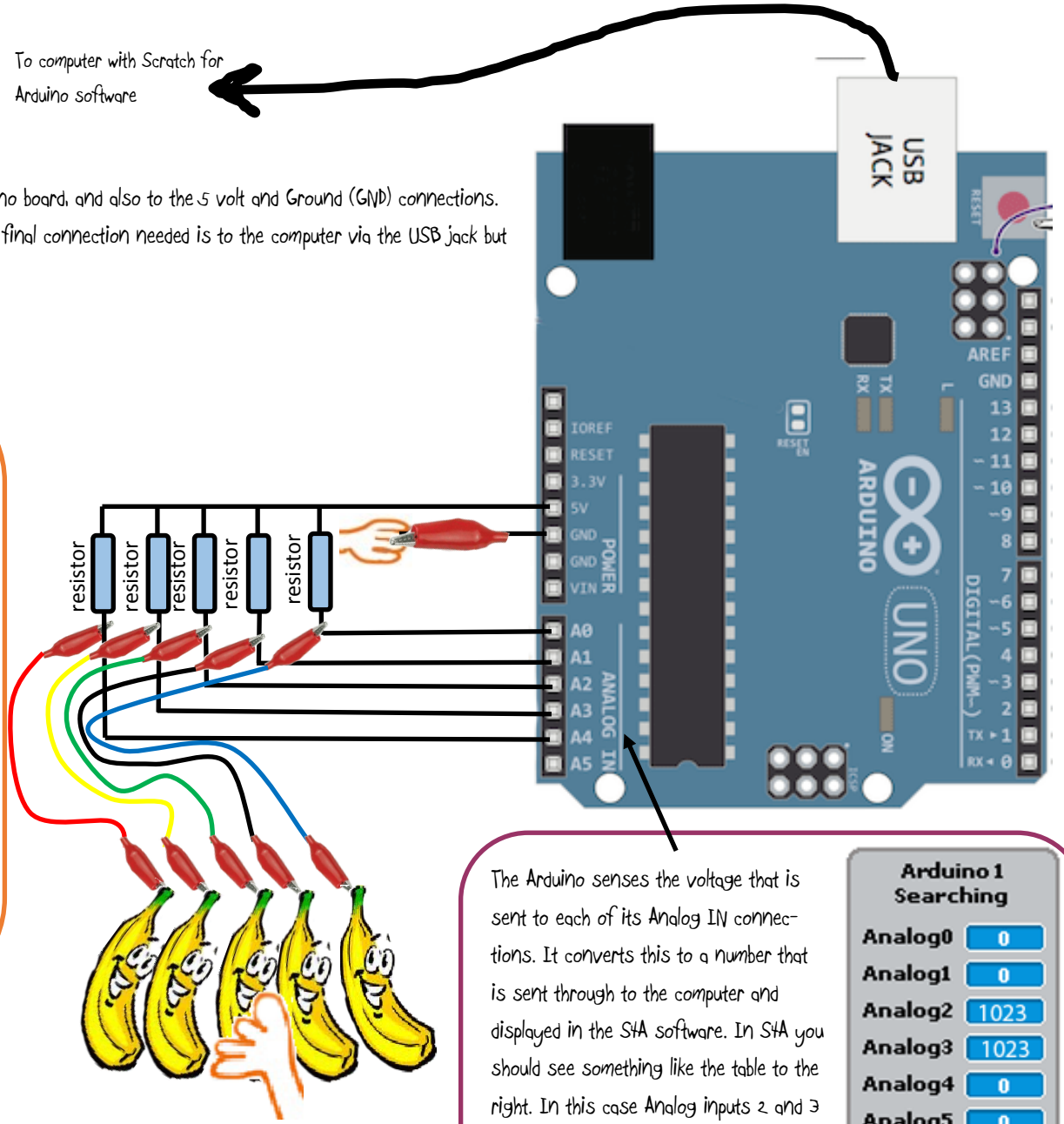
- Fruit, I like Fairtrade bananas, but use whatever fruit or veggies you fancy
- A PC or Mac with
  - ⇒ the Arduino driver software. Get it here: www.arduino.cc (click on the Download link)
  - ⇒ the Scratch for Arduino software. Get it here: www.s4a.cat (click on the Downloads link)
- Either the ready made S4A Banana Piano program from www.loopycomputy.com/banana-piano.html or write your own program.

Here's an idea for a making order:

1. Download and install the Scratch 4 Arduino (S4A) software onto your computer
2. Install the Arduino driver software on your computer
3. Plug in the Arduino, your computer should find the drivers for the Arduino and install them
4. Start the S4A software look to see whether the analog input readings go to around 1000. If they do then your Arduino's talking to your computer
5. Unplug the Arduino from your computer and wire up the piano (clues for this on the following pages).
6. Either write your own S4A program to make the piano work or download from www.loopycomputy.com/banana-piano.html

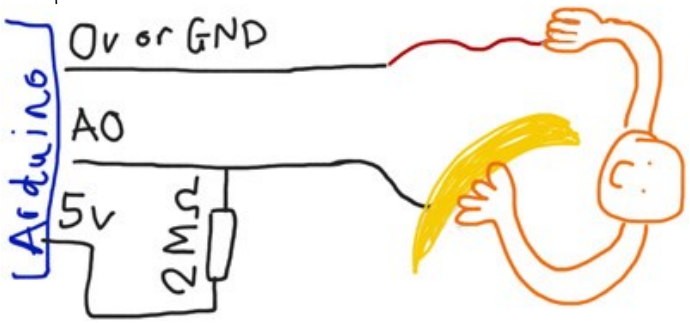
Circuit Clues

To make the circuit we need to make connections to the Analog IN inputs on the Arduino board, and also to the 5 volt and Ground (GND) connections. Use the breadboard to connect the resistors and the alligator clips to the bananas. The final connection needed is to the computer via the USB jack but I wouldn't recommend connecting that until you have completed and checked the circuit.



A clue about how it works...

You are a resistor; electricity can flow you to make a circuit and when it does it can trigger an event (in this case a note to be played). When the A0 pin on the Arduino is pulled towards ground (0V) because the circuit is completed, the Scratch for Arduino program interprets this and plays a note. Connect each banana, with a 2Mohm resistor to a different analogue input and Bob's your aunty you've got a sort-of-piano!



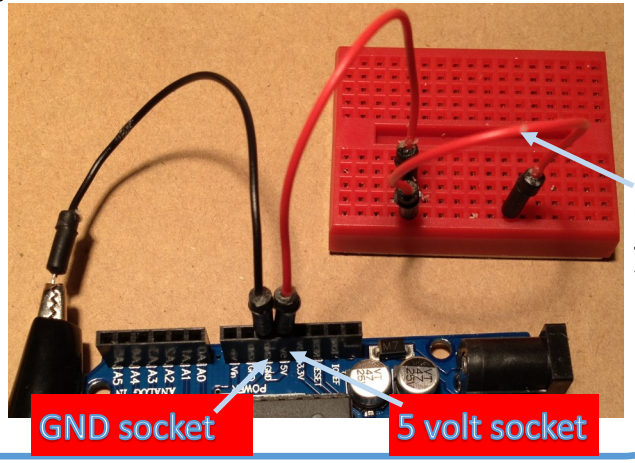
The Arduino senses the voltage that is sent to each of its Analog IN connections. It converts this to a number that is sent through to the computer and displayed in the SfA software. In SfA you should see something like the table to the right. In this case Analog inputs 2 and 3 are sensing 5 volts whilst the rest are at 0 volts.

Arduino 1 Searching	
Analog0	0
Analog1	0
Analog2	1023
Analog3	1023
Analog4	0
Analog5	0
Digital2	false
Digital3	false

Wiring Clues

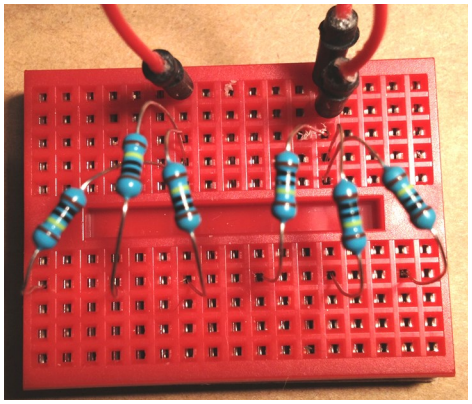
1. The yellow lines show how the mini sockets are connected together underneath.

2. Connect mini leads between the 5 volt socket on the Arduino and the breadboard. Connect a mini lead to the GND socket and pop an alligator lead onto the end. This will be the bit you hold.



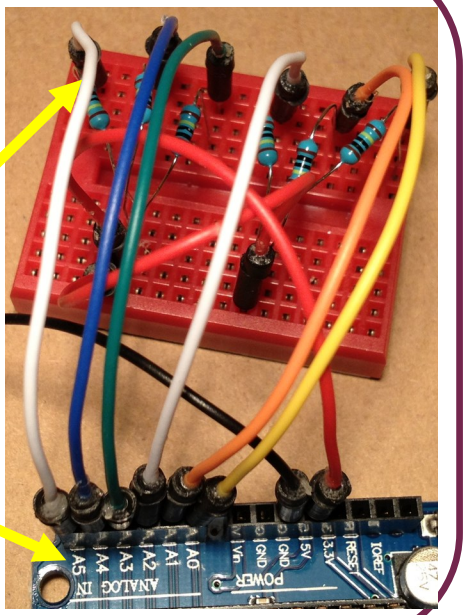
3. Plug the resistors into the breadboard so that each is connected to 5 volts at one end and into a separate column at the other. It doesn't matter which way round the resistors go.

On this side the resistors are all connected to 5v

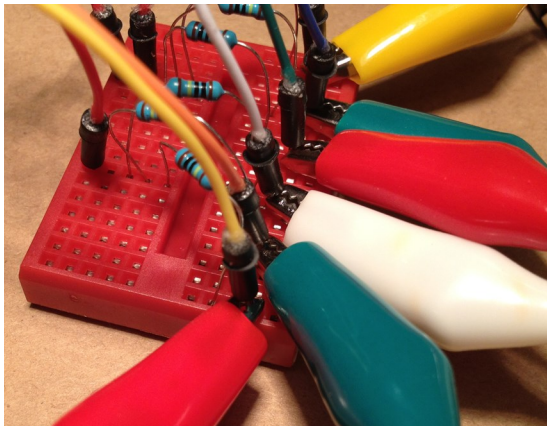


On this side each resistor lead has a separate column

4. Connect 6 mini connectors into each of the columns where there is a resistor but don't push the mini connector plug right down. Plug the other end of the connectors into each of the Anolog In sockets.



5. Clip one end of each alligator connector onto each of the mini connectors. The other end of each should be attached to the fruit.



6 Make sure you have carried out steps 1 to 4 on page 1. Then...plug in the USB cable and start up S4A. You should see all the analogue inputs display around 1023. Hold the Ground connector in one hand and then touch the other alligator clips for the fruit to test. As you do the reading on the corresponding input should drop to around 500. If this happens then you've got a working system and you're ready to connect your bananas and either write a program to turn it into a piano or download one from www.loopycomputy.com/banana-piano.html As all bananas are different you may need to tweak the program settings a bit to get it to concert standard.

Taking it to the max!

Why not get use your piano keys to control a game or simulation you have created in S4A. A slight adaptation to the circuit could also allow it to be used as a rain sensor or burglar alarm. Or how about using it to make musical stairs by attaching aluminium foil to the handrail and treads as keys. Endless projects are possible with the Arduino board. Look online for more ideas.