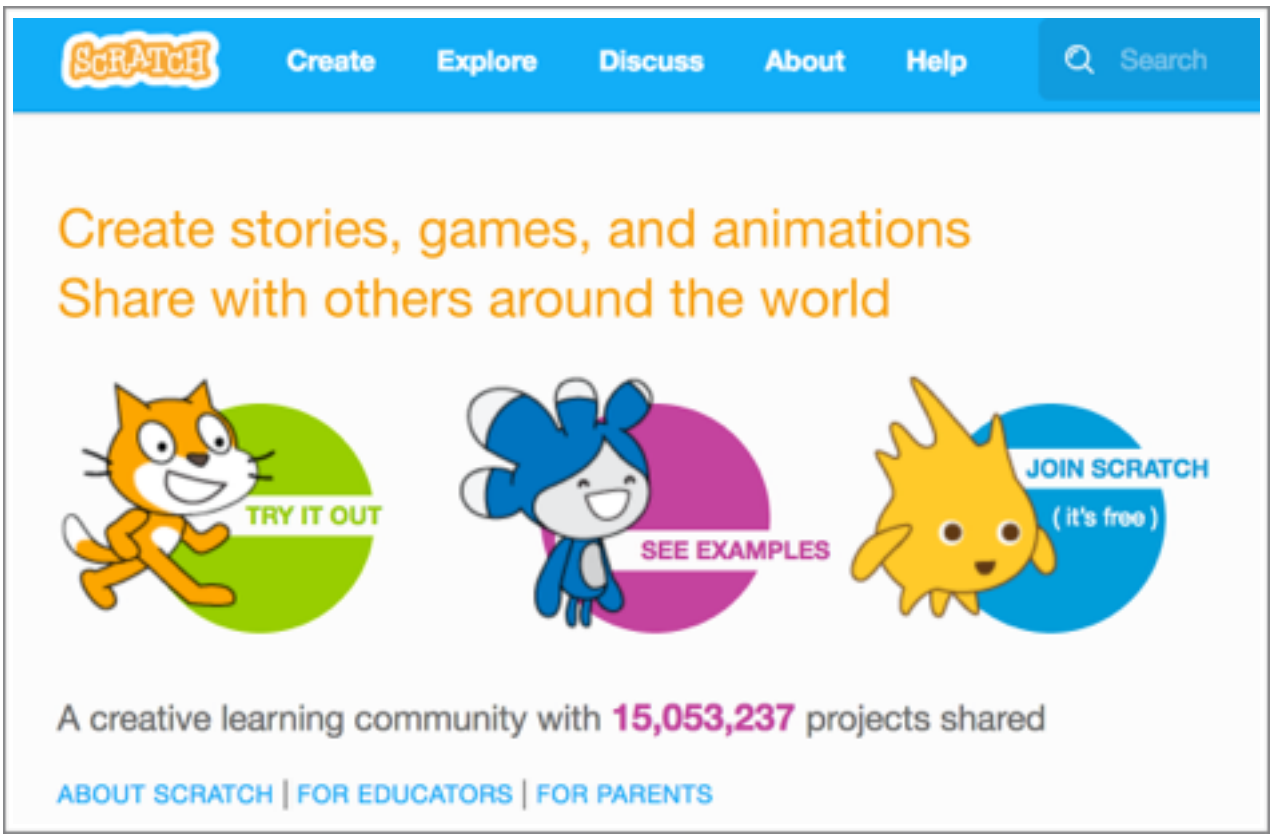
# SCRATCH




## Introduction to creative computing with Scratch 2.0

### What is Scratch?

Scratch is a visual programming language that allows you to create your interactive stories, games and animations by using blocks as scripts. By dragging, dropping and connecting blocks into the Script area, you can easily create a program of your choice.

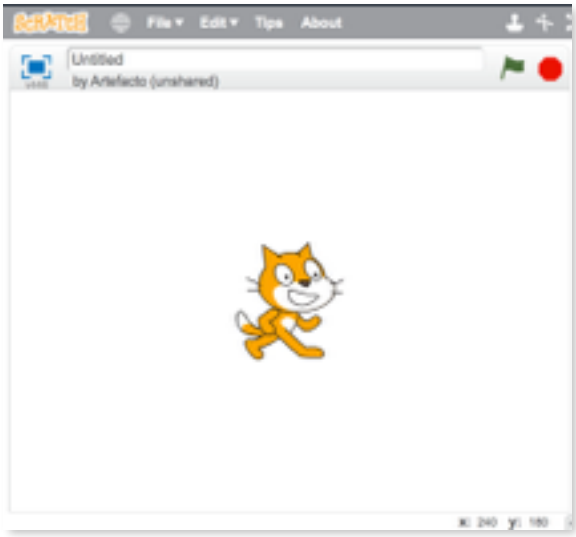
Scratch is designed especially for ages 8 to 16, but widely used by people of all ages. Using Scratch is an easy and fun start into the world of programming.

You can access Scratch online or download the software via scratch.mit.edu

**The resources for the workshop can be found at:**

**https://scratch.mit.edu/users/Artefacto/**

# The Scratch editor




To create with Scratch, it helps to be familiar with the different parts of the Scratch editor interface.

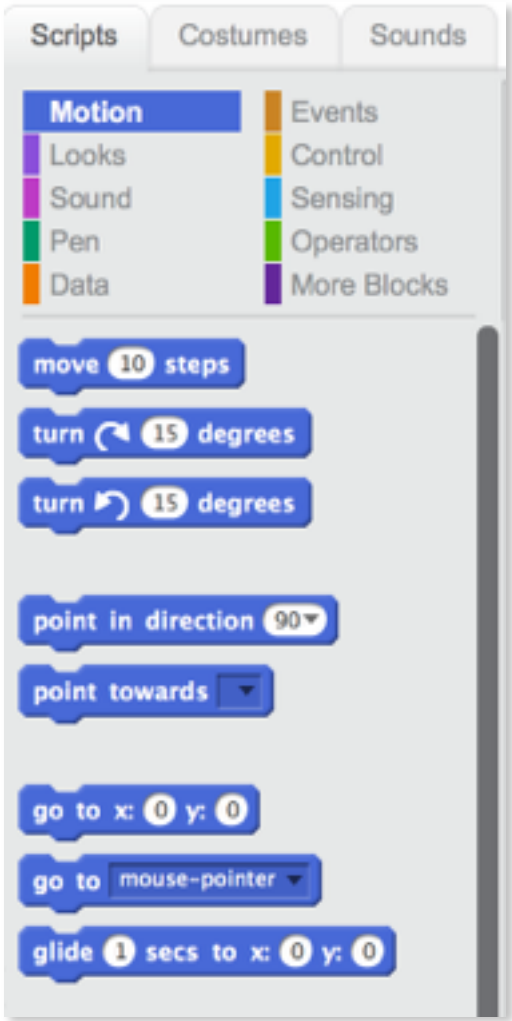
This is **the stage**. It's where your sprits (the characters and objects that you can control in Scratch) go.

Each object in Scratch is called a **sprite**. You can add a new sprite and customise it according to your needs.

To make it more exciting you can add a sound, change colours, add a backdrop and effects, and other fun stuff.

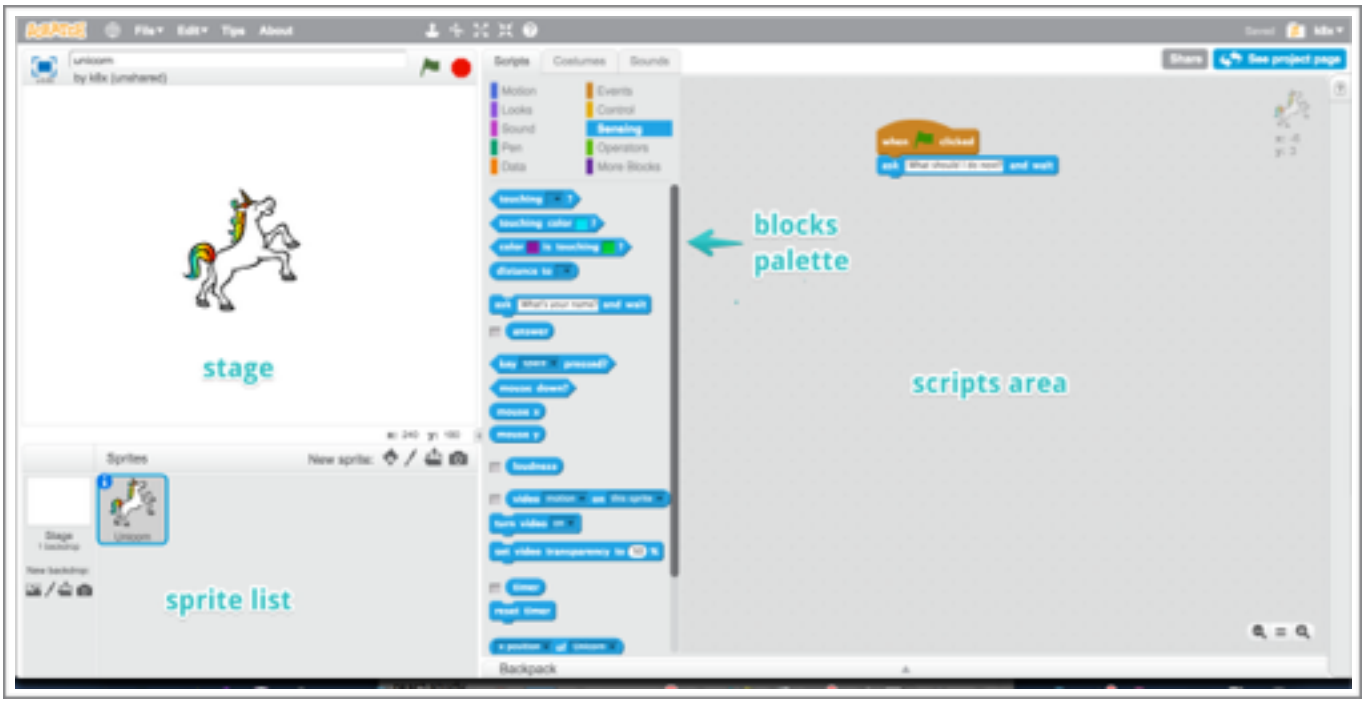
The **block palette** is made up of different 'blocks' of code that you can drag and drop onto the scripts area.

The code blocks are colour coding by block groups so you can easily find a block based on its colour. The block categories are **Motion, Looks, Sound, Pen, Data, Events, Control, Sensing, Operators**, and **More** Blocks.

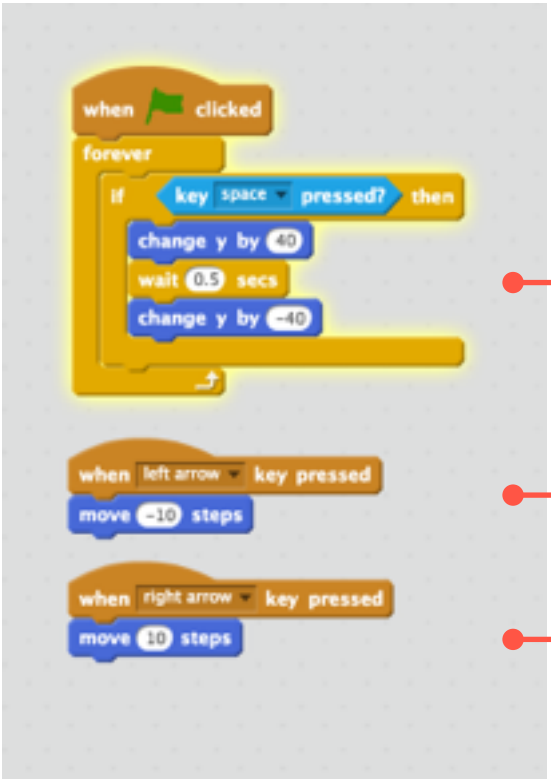



You create scripts by combining blocks together in the Scripts area to tell the sprites what to do.

To remove something from your Scripts area, just drag it back onto the blocks palette.




To create a script, select the blocks you need from the palette and drag and drop them onto the scripts area.




Jump by pressing spacebar

Move left

Move right

**Flying tutorial available at http://scratch.mit.edu/fly**

# Your first Scratch project

## Building a virtual fish tank with Scratch

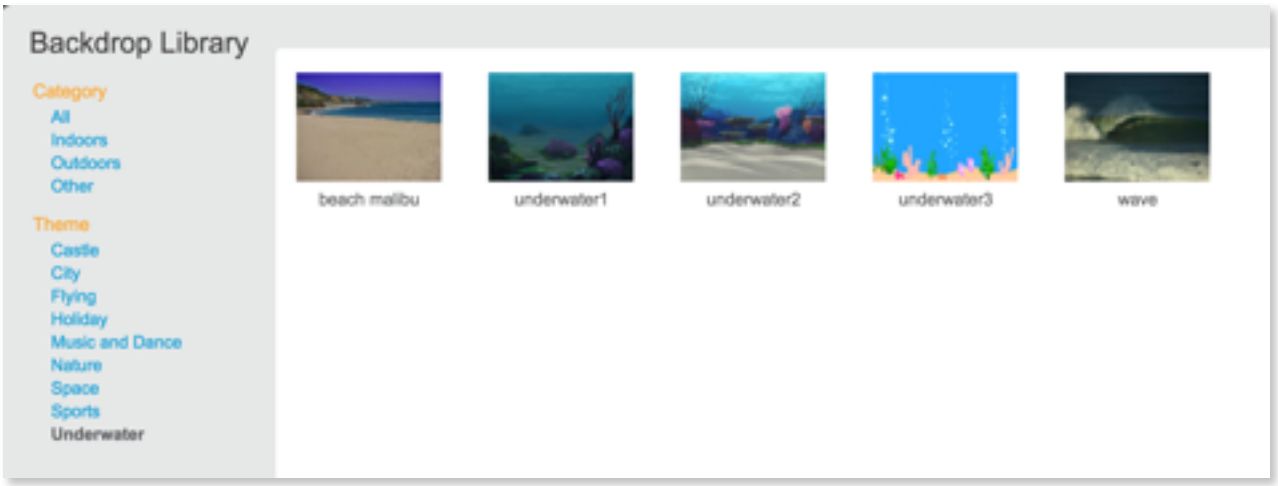
First, let's delete the Scratch Cat sprite so we have a blank canvas.

Right click on the Cat image and select 'delete'.

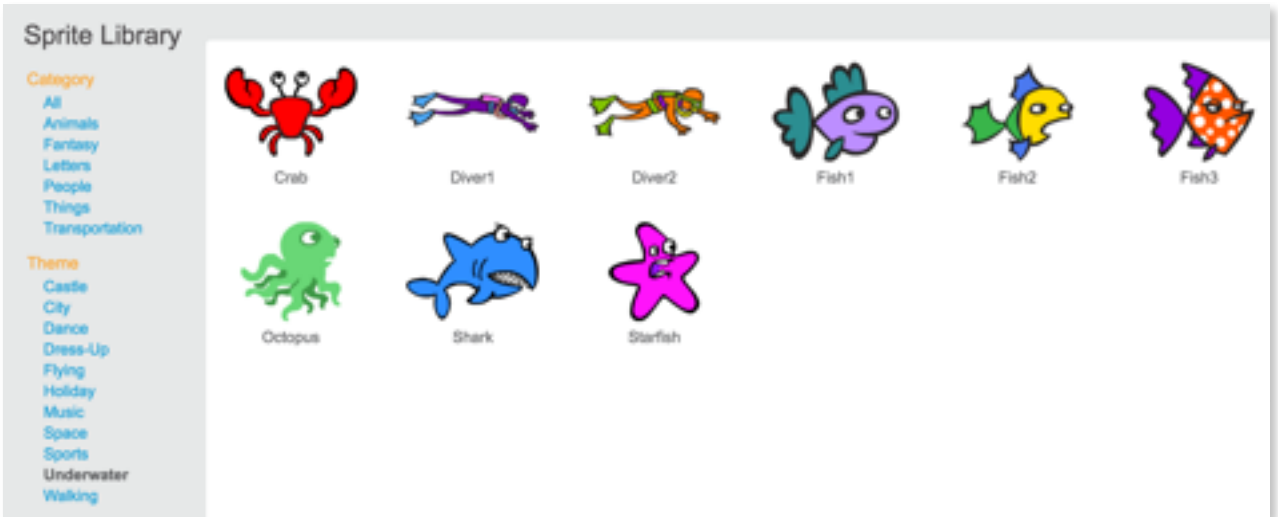
Now we'll set the scene by adding a fish tank stage (background) to our stage

To do this, in the bottom left corner, click on the picture icon to add a new backdrop.

For our fish tank, we're going to select one of the 'Underwater' backdrops.




Now we can choose a new sprite that better suits our backdrop. Again, we have an 'Underwater' category we can choose form.



Once we have an underwater backdrop, we start adding a script to control our sprite's behaviour.

Click back on the sprite. When the sprite is selected, our list of script blocks is available. These can be dragged onto the stage area.

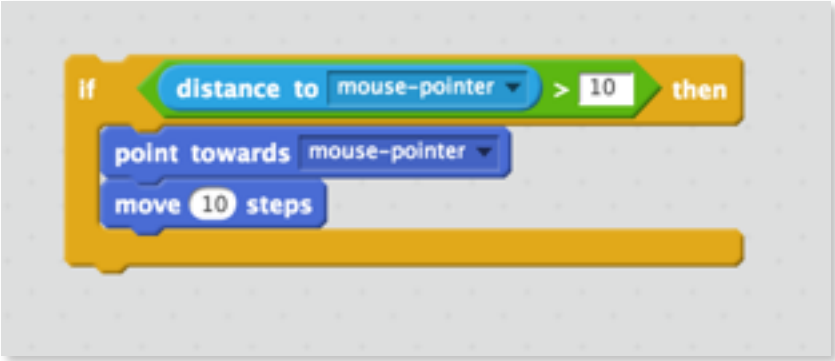
The first thing we want to do, is let our fish move in response to when we move our mouse/cursor.

These are the parts we're going to use for this part of the script.

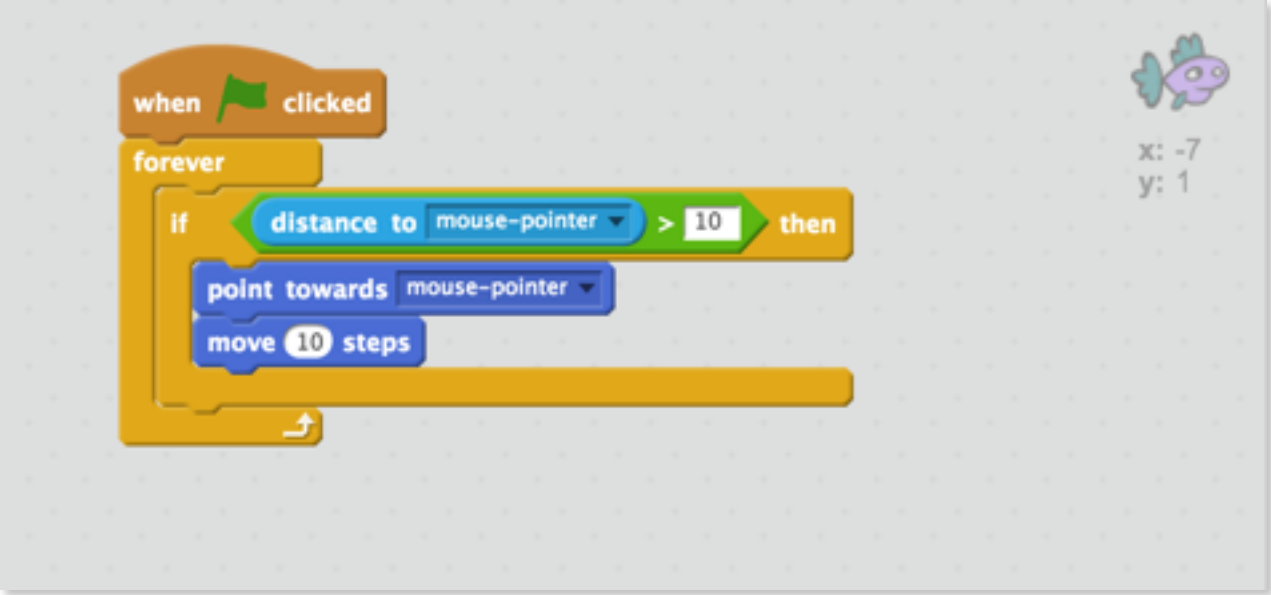
The script blocks are colour coded to help make them easier to find.

You can connect the different functionality blocks together.

If you click on the flag item to run the script, you'll notice it only runs once and then stops. To make it run continually, we can add a 'forever' block:




The script on the stage should look like this:

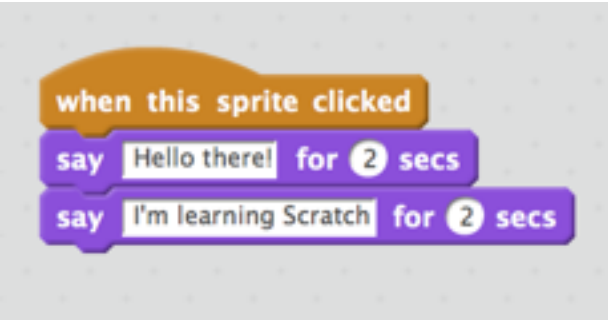



Click the green flag to run the script.

Press the stop sign icon to stop the script from running

# Extending your script with inputs and outputs

Add a new Sprite and a speech block




**AN INPUT is data that the computer receives. A mouse or keyboard is an input device.**

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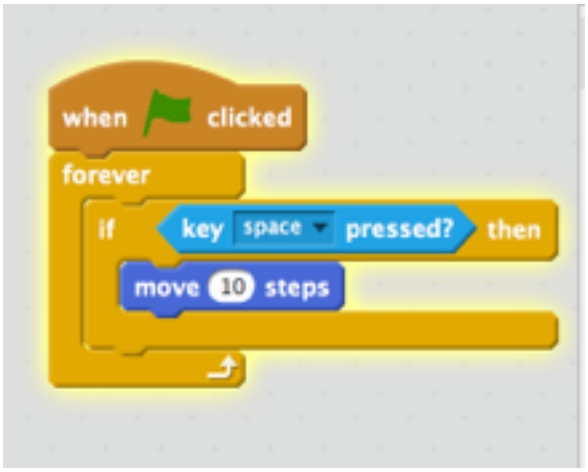
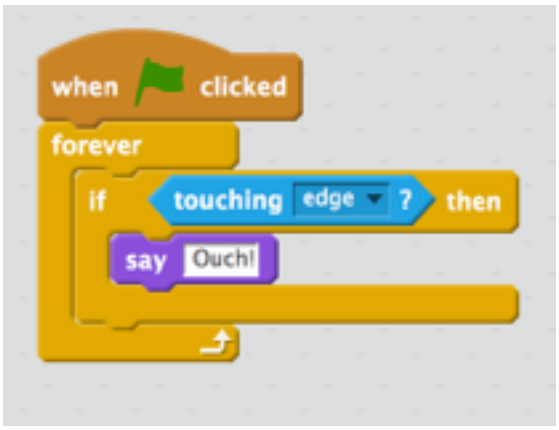
**AN OUTPUT is the information sent from the**

**computer, such as**

Add a movement script



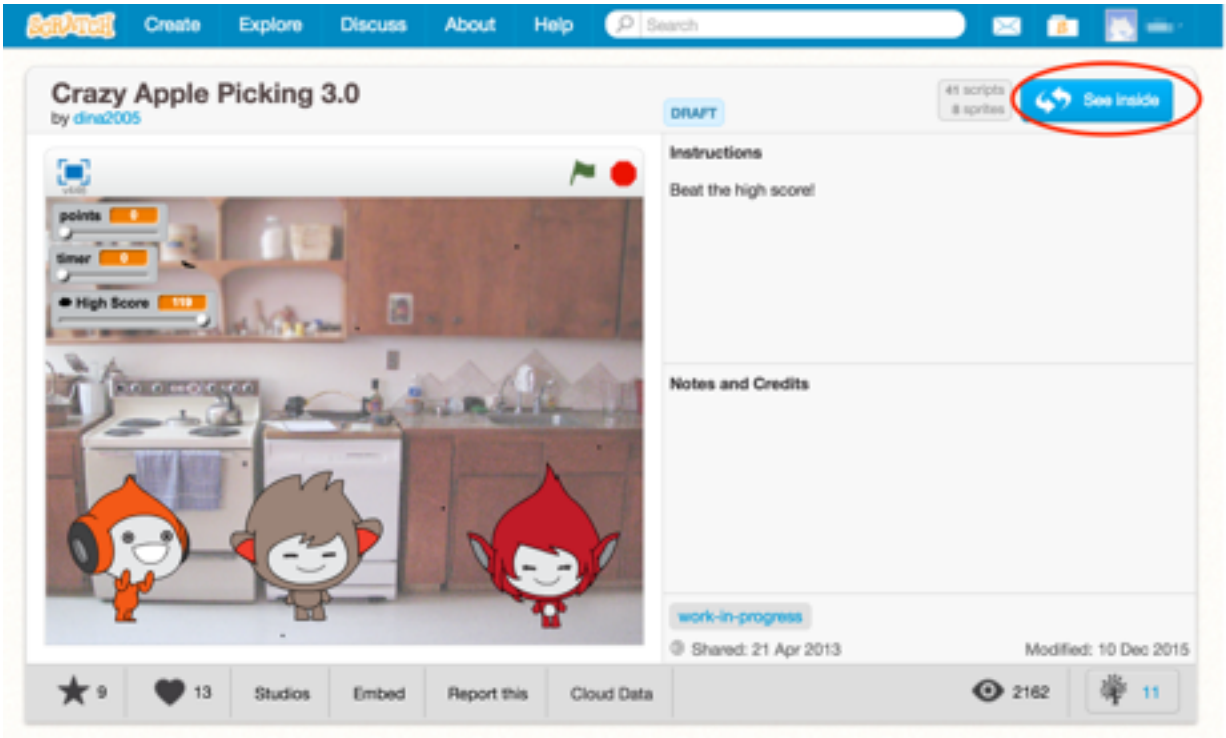

Add a sense reaction



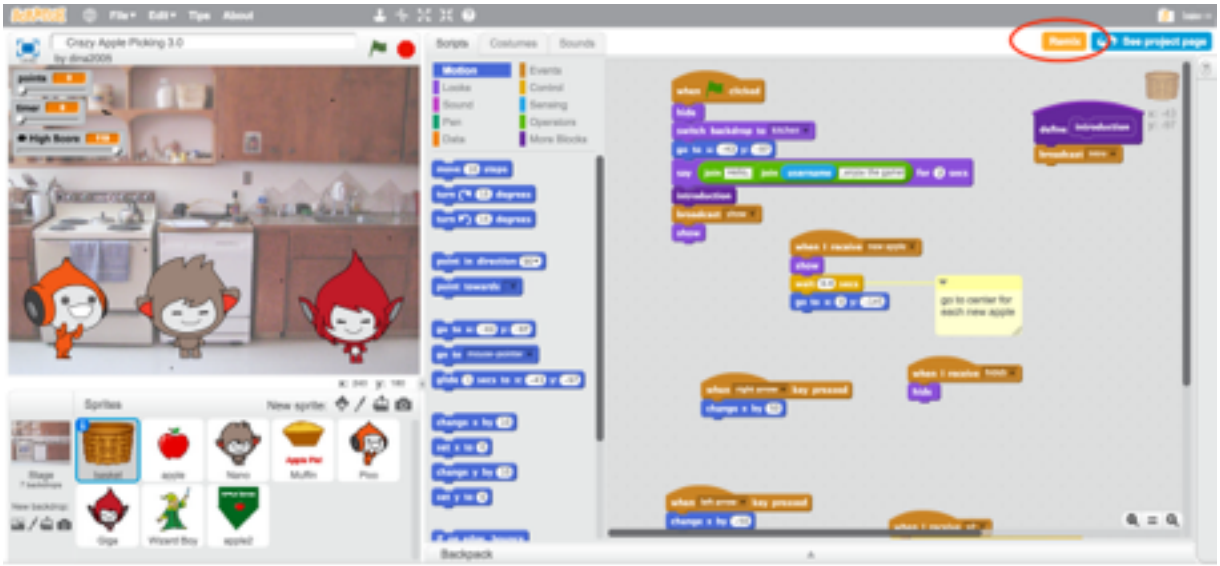

**Which ones of these examples is an input and which is an ouput?**

# Remixing projects in Scratch

If you find a project you're interested in, you can click on the '**See Inside**' button to see how it's put together.

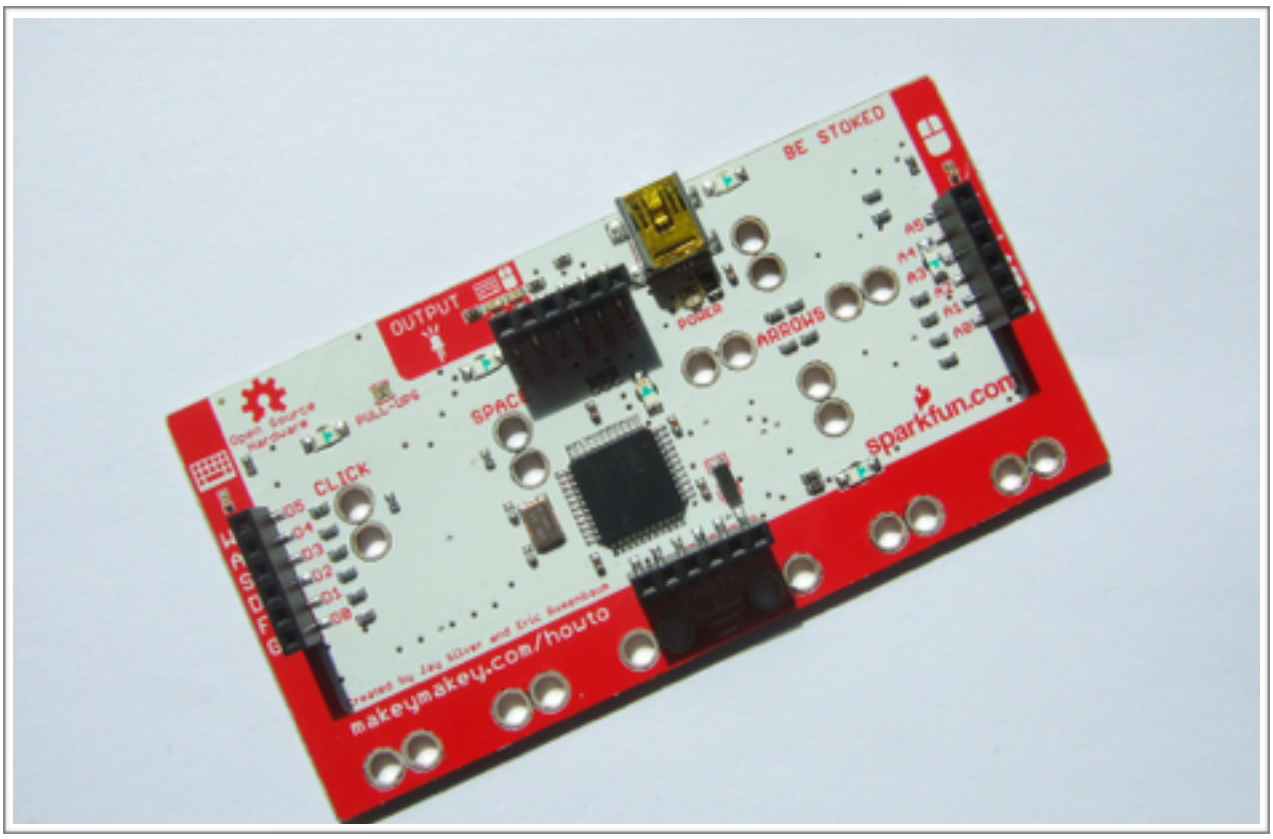



You can then see the different stages, scripts and sprites used to create the project. You can also make a copy to adapt and edit yourself. This is called **remixing**.



Now you have your own copy of this project that you can make your own.

# MAKEY MAKEY




## Introduction to electronics with Makey Makey

### What is Makey Makey?

MaKey Makey is a great introduction tool into the world of electronics and basic coding. It's very simple to use and is suitable for absolute beginners of all ages with no prior technical knowledge required.

Using this simple invention kit allows you to turn every-day (conductive) objects into a keyboard and connect them with the internet.

**MaKey MaKey's official website is a great source of group activities, lesson plans and guides how to use MaKey MaKey.**

**www.makeymakey.com/**

# An introduction to Conductivity

The Makey Makey is a way to create new and creative ways to interact with a computer. It does this by allowing you to easily create a **closed circuit** using different **conductive materials**.

The circuit has to allow the charge to flow from the input to the earth and back to the key material (what you're using for your input).

If the key material used is not conductive, the charge won't flow and so the input command won't be sent. Non-conductive materials are known as **insulators**. Plastic is an insulator as is wood.

**Resistance** is a measure of exactly how conductive a device is.

Firstly, people are conductive  (though this should only be tested with permission ;-). So you can create your first closed circuit by touching the Earth bar while also touching the space circle pad. The LED above the SPACE key should light up, and a space command should be sent to your computer. Nice.

Fruit is also conductive, which is why you often see bananas (and apples and other fruit as well) used as a Makey Makey keyboard.

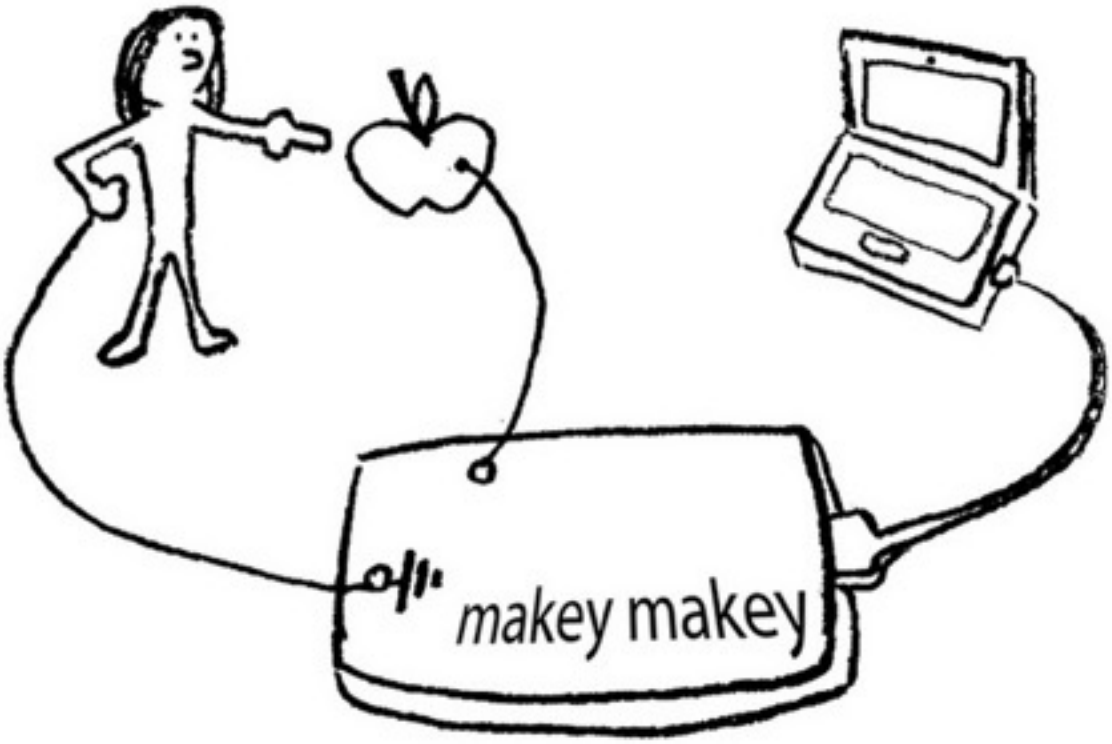
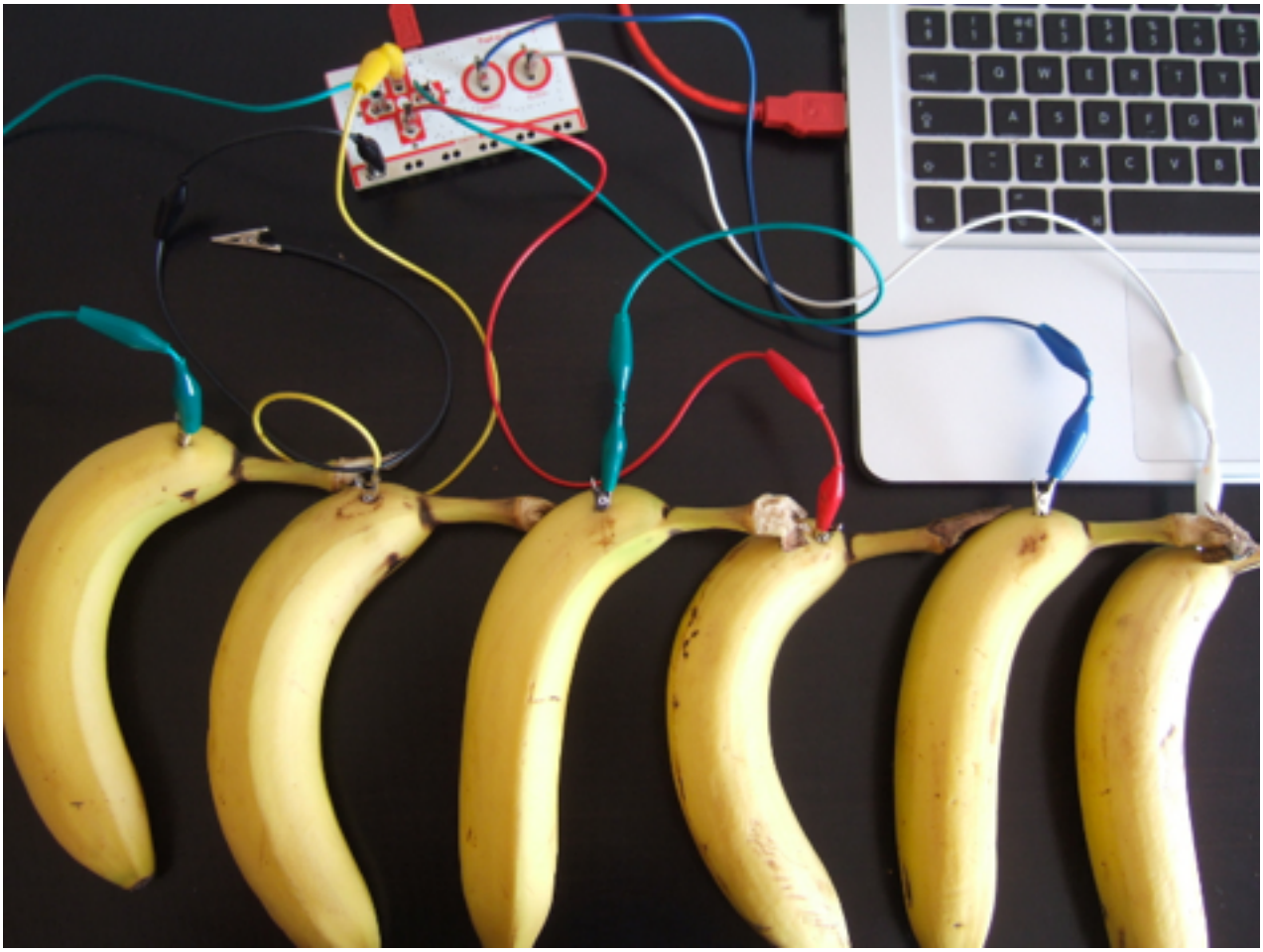



*PHOTO BY JAYAHIMSA ON FLICKR.COM*

# How to make a Banana Piano with MaKey Makey

A great and fun starter project for using a MaKey MaKey is to use different objects to replace the computer keyboard buttons to play a virtual piano. There's an online piano keyboard we can use available on the MaKey MaKey website. In this example, we'll use bananas as our piano keys.

- Connect MaKey MaKey to your computer using USB cable. Plug the small side of USB cable into MaKey MaKey and the big side into your computer. (If your computer asks you to install the drivers, simply click cancel or close the window.)
- Open this link on your browser http://makeymakey.com/piano/ to access a piano keyboard designed specifically for MaKey MaKey. Click on it and play using your computer keyboard's arrows, space and click.
- Connect to Earth. Now you can connect one end of an alligator clip to the bottom of MaKey MaKey which is marked as "Earth".
- Connect to Yourself. Then you hold the other end of the alligator clip (the metal part) between your fingers, and now you become "grounded".
- Connect MaKey MaKey to bananas. If you want bananas become your piano keys you simply connect them to your MaKey MaKey with the help of alligator clips. On the front side of MaKey MaKey you find four arrows, space and click. Connect each of them to a banana. Now you can play a melody with your banana piano.



# ADDITIONAL RESOURCES

## Learning to code

MIT AppMaker (http://appinventor.mit.edu/) A block-based, drag-and-drop programming tool for mobile app creation.

Sonic Pi (http://sonic-pi.net/) Learn to code creatively by composing or performing music

Codecademy (https://www.codecademy.com/) Free learn-to-code platform for different languages.

## Learning to make

LittleBits.CC (http://littlebits.cc/)

MaKeyMakey (http://makeymakey.com/)

LibraryMakers.net (http://librarymakers.net/)

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