

Cool Careers in Cyber Security

MaKey MaKey

Duration: Delivery: Can be used as a table demo (hands-on) activity or during a presentation session. Can pre-assemble MaKey MaKey to laptop or have students assemble from box.

Session Overview:

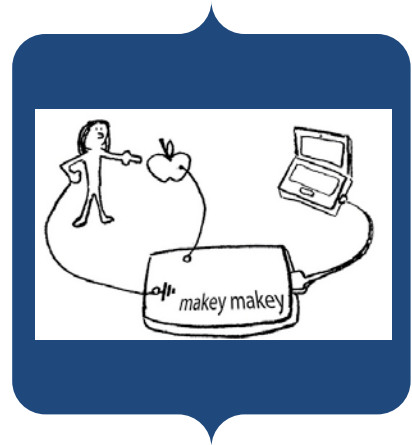
Computer Science 2

Objectives:

- Students will learn the basics of computer input devices
- Students will understand how the MaKey MaKey can be used in place of another input device using household items as inputs

Materials/Supplies:

- Computer with internet access
- Electric outlet
- MaKey MaKey [order from <http://www.makeymakey.com/>]
 - circuit board
 - Red USB Cable
 - 7 Alligator Clips
 - 6 Connector Wires
- Selection of objects e.g. fruit, toys, leaves, playdoh etc. – a good range of items made of different materials that do and do not conduct are good



Introduction:

MaKey MaKey is a circuit board kit that can be used to connect objects with a computer, transforming those objects into computer keys or mouse clicks. With *MaKey MaKey*, students can playfully invent new devices, instruments, and controllers, or remix familiar objects - as long as they are adequately conductive. For example, bananas can become pianos, or Play-Doh can be shaped into Nintendo controllers. With these inventions, students learn about the fundamentals of circuits and gain insight into how their computers work.

MaKey MaKey allows for the easy creation of basic circuits and gets students familiar with the basic components of a circuit (power source, wires, input and output) and how circuits interact with computers. Since *MaKey MaKey* also hooks up to computers, the possibilities are limitless for students interested in getting more experimental. Students can find new programs to control and new objects to use as controls, as well as design new software that can interact with the kit. In this way, *MaKey MaKey* acts as both an introduction to circuits and a tool for invention. This extends the learning goals of *MaKey MaKey* to computer programming, engineering and design, and art.

Scenario:

Evidence was found on the thief's home computer. However, the keyboard is missing. Is there another way to use the computer without a keyboard?

NOTE: Make sure ALL the Makey Makey parts are collected after each presentation.

Lesson:

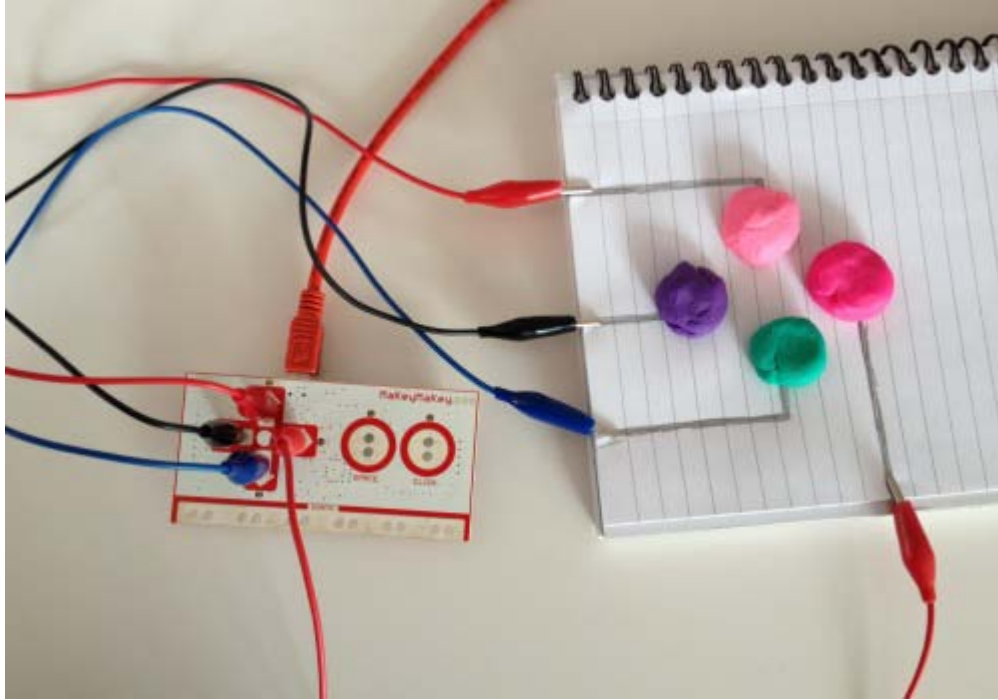
Discuss with students what an input device is, and all the different devices that serve as inputs for a computer. These include a keyboard, mouse, wireless mouse, and webcam, to name a few. But the question is, how does the computer understand the input you are sending? Each input sends specific data that the computer translates to a special command. It sends this command to whatever application you are using. In the case of something like a webcam, it may send video to software that saves it to a movie, or routes it to Skype.

When you touch the item hooked to the MaKey MaKey, you make a connection, and MaKey MaKey sends the computer a keyboard message. The computer just thinks MaKey MaKey is a regular keyboard (or mouse). Therefore it works with all programs and webpages, because all programs and webpages take keyboard and mouse input. Depending on where your item is connected, a different keyboard message is sent.

1. Plug in USB: Small side of USB cable plugs into *MaKey MaKey*, big side plugs into computer.
2. Close Popup Window: Your computer may ask you to install drivers or do other setup. You can click cancel or close the window.
3. Connect to Earth: Connect one end of an alligator clip to "Earth" on the bottom of the front side of *MaKey MaKey*.
4. Connect to yourself: Hold the metal part of the other end of the alligator clip between your fingers. You are now "grounded."
5. Connect to anything: Make anything into a key! Connections can be made through anything even slightly conductive.
 - a. Play-dough, coins, soft candy etc. will be provided to allow students to experiment.
 - b. Fruit and foods (bananas, apples, celery, meat, cheese, etc. Try it all!)
 - c. Plants, as long as it's not too dry.
 - d. People and animals (be nice!)
 - e. Metals like aluminum and copper (aluminum foil, coins, soda cans, food cans, etc.)
 - f. Pencil markings (make sure they are nice and thick).
 - g. Play-Doh and other hobby clays

Demonstrate how to connect the Makey Makey to the computer and various items, like the image below. Show how the set up controls the up-down-left-right keys in an application of your choice. You can maneuver around a word document or spreadsheet of your choice, or any other item. Move one of the alligator clips to the space bar and demonstrate it in operation as well.

Make sure to discuss how the chip on the back of the MaKey MaKey is like a small computer and translates the signal you create to the desired keyboard command and the sends it on the USB bus. The USB cable not only provides a path for communication with the computer, but also provides power to run the device. When you touch an item you form a complete circuit between the MaKey MaKey, yourself, the item, and back to the MaKey MaKey.



Resources:

- <http://www.makeymakey.com/forums/index.php?topic=5607.0>
- <https://www.sparkfun.com/tutorials/378>
- <http://makeymakey.com/howto.php#SETUP>
- <http://www.youtube.com/watch?v=q9hmLtPj4rl&feature=youtu.be>

Final Thoughts:

Points you might want to make:

- Do not constrain yourself to one type of input device. The MaKey MaKey demonstrates you can use other forms. Other examples
 - Kinect for Xbox
 - Nintendo Wii controllers by movement
 - Tilt on your iPhone (accelerometers)
- Every input must be transformed and then sent to the computer, which must then interpret it.

Recommendations/Feedback:

Can you think of other ways in use to control a computer than a keyboard? What do you think we will be using in 10 years ...50 years?

Answers will vary.

Some ideas – tablets have touch. Can click on item you want. Keyboards are the touch screen. Some items now use voice (such as mobile Google search, Siri, etc.). Kinect input on Xbox. Will we use thought in the future?