

Part 1:

Touch & LED Interactivity with the volcano posterboard

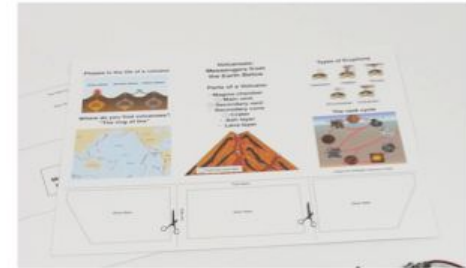
Locate the following in your HyperDuino kit:



Rainbow cables, one with a grey block connector for touchpoints and the other with a black block connector and 6 red LEDs



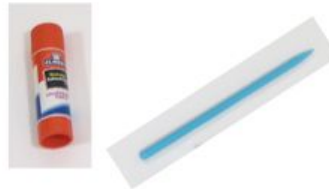
Five touchpoints & backs (earring posts & backs)



flat cardstock for mini volcano project



HyperDuino & 9v battery



Glue stick, blue hole-making tool

Install the HyperDuino Media Linker using the instructions at this link:

<http://bit.ly/2JLloUa>

Make a Model

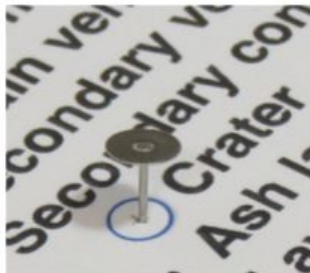
- 1 Use scissors to cut along the dotted lines as you see here.



- 2 Fold into thirds and fold the tabs back.



- 3 Locate the touchpoints and push them from the FRONT of the board through the marked "+" positions. Use a silicone earring back as a "backstop" to protect your fingers behind the paper. Secure on the back using the earring backs.

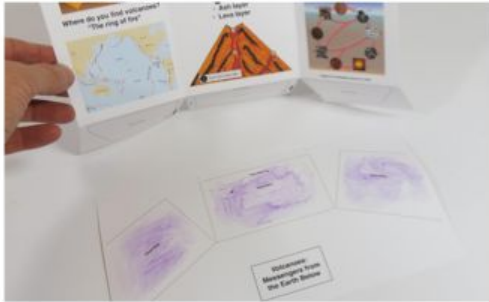


- 4 Push the blue stick completely into the paper to make 3 holes for the LEDs in the orange part of the volcano diagram where you see the small blue circles. Push from the front and use a doubled-over piece of paper as a backstop to protect your fingers from getting poked when the point goes through the card of the volcano.



Connect the LEDs and Touchpoints

- 1 Using the glue stick to apply glue to the 3 areas on the base, and attach the panels so that the base of each panel just covers the black line that indicates where it should be positioned.

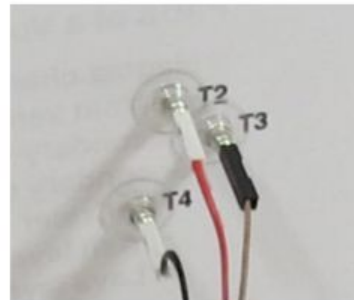


- 2 Push the LEDs **into, but not all the way through**, the holes from the **BACK** of the board. Connect the LED with the **red/brown** wires to L5



- 3 Continue with the LEDs for L3 (black/white wires) and L4 (purple/gray). You can pull apart the wires as necessary.

- 4 For the touch sensors, use the rainbow cable with the gray block connector, and push the sockets onto each of the posts of the 5 touchpoints, starting with the **red** wire on the **outside** edge of the cable. **The posts only go about half-way into the sockets.**

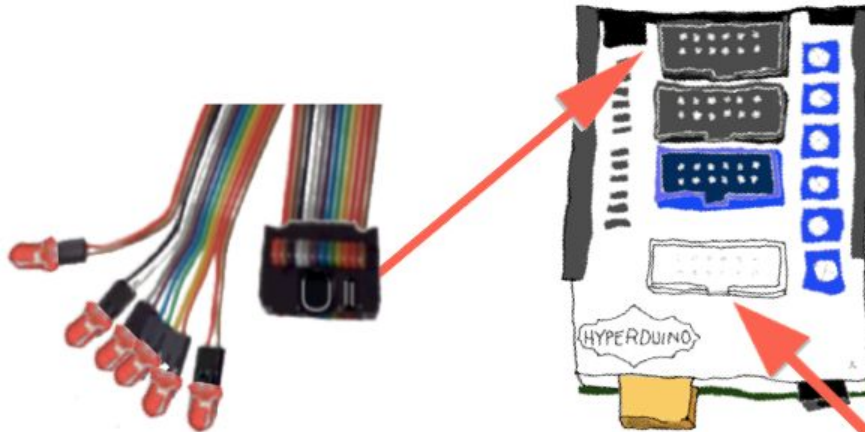


Connect:

the RED wire to T2,
the BROWN wire T3,
the BLACK wire to T4,
the WHITE wire to T5,
the GREY wire to T6.

Connect the Cables to the HyperDuino

- 1** Plug the black block of the LED cable into the TOP black box on HyperDuino board.



- 2** Plug grey block into white box on HyperDuino board



Try It Out!

1

Connect the 9v battery. **Wait for the blinking to stop (about 5 seconds)**

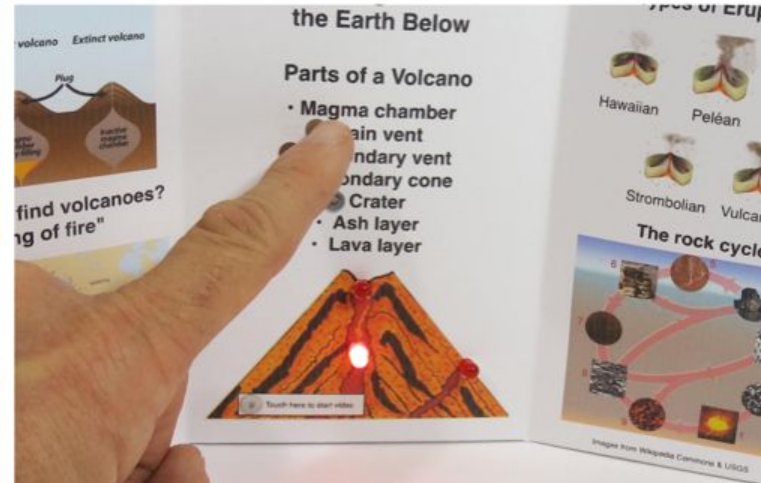
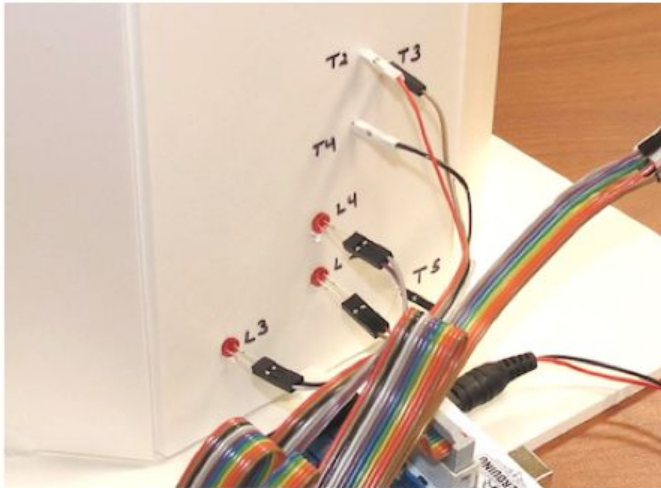
When you touch the "Main vent" and other sensors, the LEDs will light up.



How Did All That Work?

The Arduino is like a small computer, and the HyperDuino program that you installed on it just continuously watches the touchpoints. Each touchpoint has a number (2-13), and each LED has the same range of numbers (2-13).

When a touchpoint is touched, the HyperDuino program lights up the same number LED as the touchpoint that is being touched.



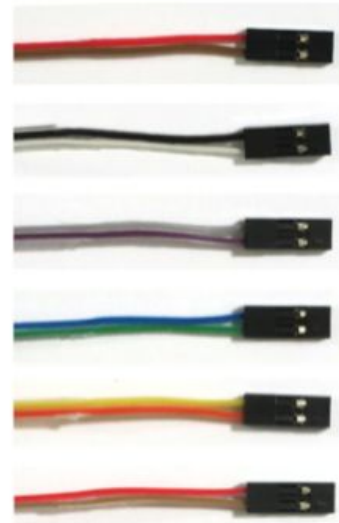
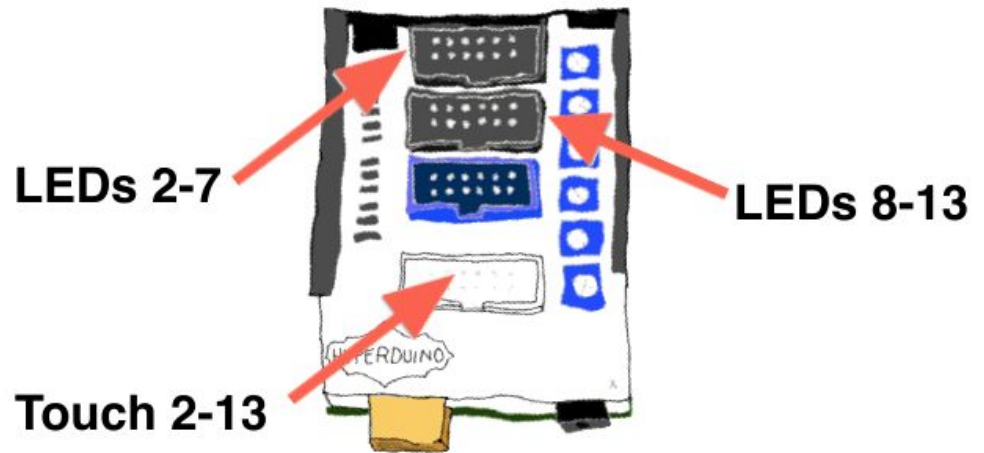
Note: The 4th touch sensor, "Touch here to start video" is used to initiate a YouTube or Google drive video. To see how that works, continue to Part 2 of this activity! (<http://bit.ly/2JUtMII>)

HyperDuino Cable Colors & Numbers

underlined = outside edge of cable
(note that odd/even touch sockets are black/white)



- Touch #2 red
- Touch #3 brown
- Touch #4 black
- Touch #5 white
- Touch #6 gray
- Touch #7 violet
- Touch #8 blue
- Touch #9 green
- Touch #10 yellow
- Touch #11 orange
- Touch #12 red
- Touch #13 brown



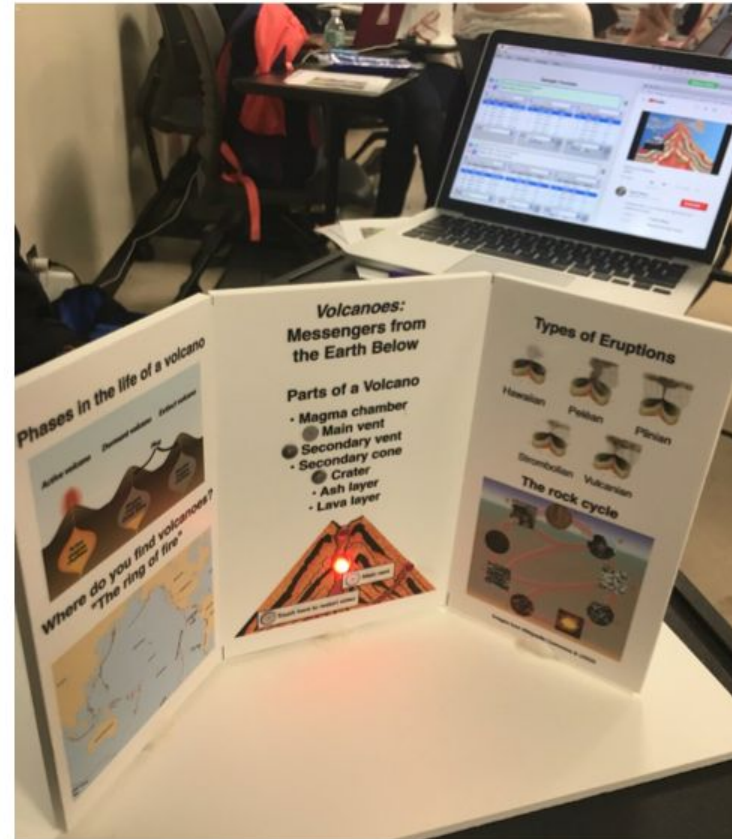
- LED #2 or #8: red/brown
- LED #3 or #9: black/white
- LED #4 or #10: gray/violet
- LED #5 or #11: blue/green
- LED #6 or #12: yellow/orange
- LED #2 or #8: red/brown

Part 2: Linking YouTube videos to models

Note: This activity assumes you already have the HyperDuino Media Linker installed on the computer that you are using.

If you haven't done that yet, install using this link:

<http://bit.ly/2J1b1a1a>



Preparations: Set Chrome Preferences for "Auto-Play"

The Chrome browser now defaults to not letting videos start playing automatically when they are displayed.

For the Media Linker to work smoothly, you will want to enable auto-play on your computer. (If you're using a computer provided to you as part of a workshop or hands-on activity, this may have already been configured).

You can get to this preference by entering "<chrome://flags/#autoplay-policy>" in the address bar of the Chrome browser.



When this screen appears in the Chrome browser, choose "No user gesture is required".'

Autoplay policy

Policy used when deciding if audio or video is allowed to autoplay. – Mac, Windows, Linux, Chrome OS, Android

[#autoplay-policy](#)

Default

No user gesture is required.

Document user activation is required.

After choosing that, quit and re-open the Chrome browser and the Media Linker if it was open, and the Media Linker will auto-play videos when sensors are touched.

How It All Works

Using the HyperDuino Media Linker, you will create a media list that does two different things. First, it will link parts of a video to touch sensors on your model. Secondly, it will set up which LEDs should turn on when a certain part of the video is playing.

Using the Media Linker is as easy as 1-2-3! Locate the media you want using the web-view window on the right. Click "+" to add it as a media list item. Choose the touch sensor & LEDs. That's it!

With this basic technique, you can now create extraordinary interactive projects, linking all sorts of digital media to your physical projects, even including web-pages, Google Earth, Google Slides, and more!

Media bookmarks
(Google, Drive, Videos, YouTube, Earth, Sample Video)

3 Configure touch & LEDs

2 Add the new item to the media list.

Add new item

Click the + to add new media that is currently open in the web view window to the right.

1 Find & display your media in the web-view window.

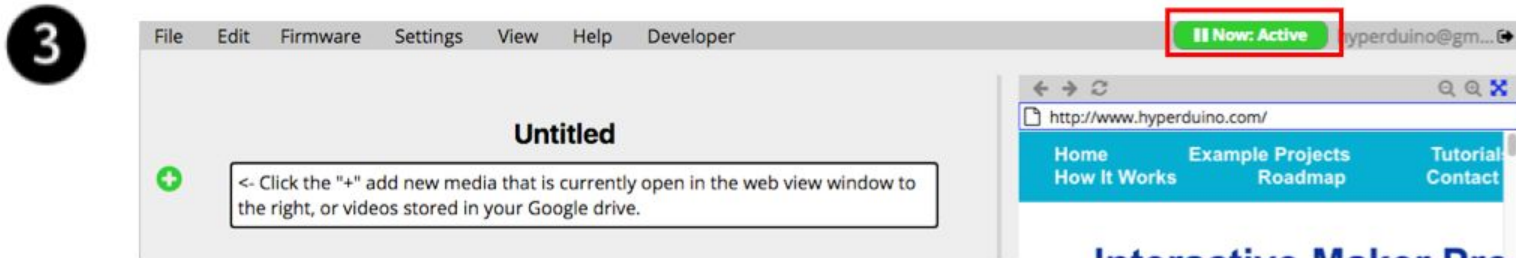
Media list window
Link & configure media

Web-view window
Search & select media

Open the App, New Media List

1 **Disconnect** the battery from the HyperDuino, and use the USB cable to connect the computer to the HyperDuino board.

2 Open the HyperDuino Media Linker:



Note: If the connection status at the upper-right of the window says, "**Now: Idle**" use this link to jump to the serial connection section of the HyperDuino Tutorial <http://bit.ly/2PEA2ex>

4 Give your media list a name by clicking on the name "Untitled" and entering a new name.



Link to the YouTube Video

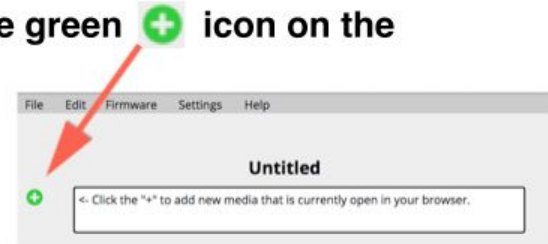
1 In the **web-view window** (at the right) of the MakerBit app, click on the volcano icon (sample video) to open the volcano video from YouTube.



Note: If you are using a school-issued computer that has YouTube or SafeYouTube blocked, click on the Google Video icon instead.



2 Only after the YouTube video is displayed, click on the green **+** icon on the media list side to add a new media list item.

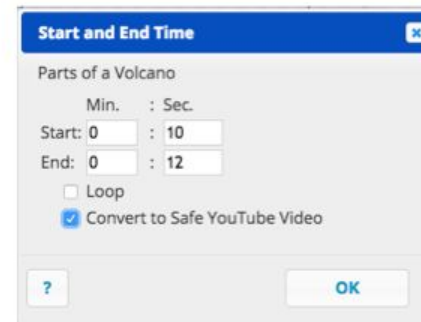


3 Enter the **start of 0:10** for the YouTube video, and the **end time of 0:12**

Start: 0:10
End: 0:12

This is the time range for where she says "the main vent".

Click "convert to Safe YouTube Video"
Click OK for the time range

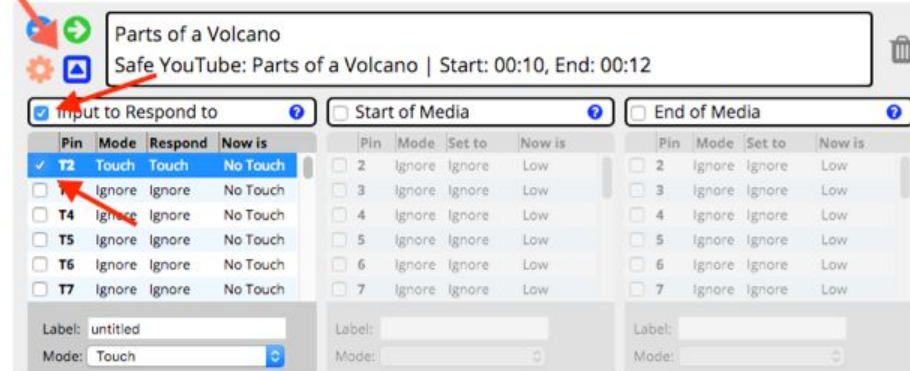


Configure the Sensor & LED

4

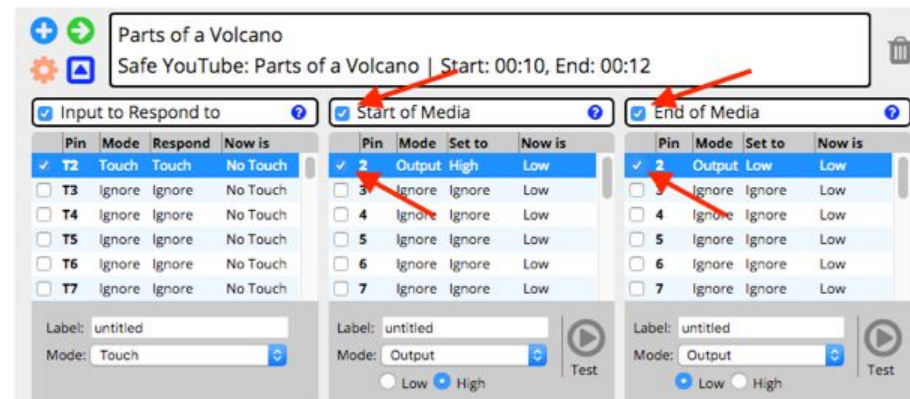
Click on the blue triangle to view the settings for the media list item.

Click on checkboxes as shown here for "Input" and sensor "T2". This will start the video when you touch sensor T2.



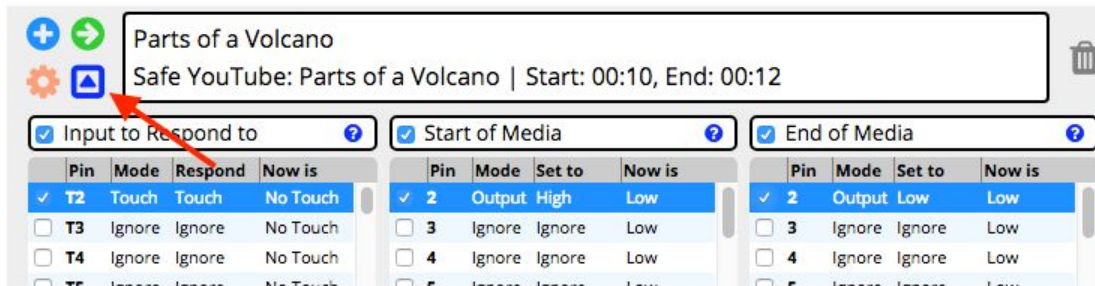
5

Now click on "Start of Media" and "End of Media" to turn on LED #2 between 0:10 and 0:12 seconds in the video (where she is saying "main vent"), and then turn it off.




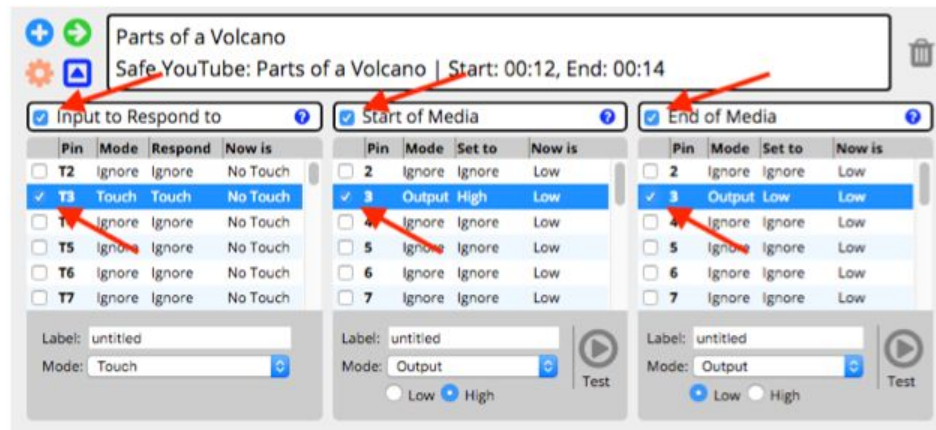
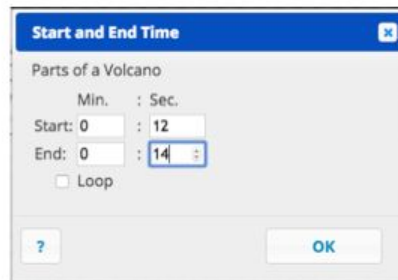
Try It Out, Add Another

- 6 Try it out! Touch the "Main vent" touchpoint. The video will play, and the LED will come on when the student says "main vent"!
- 7 Before adding the next media list item, first **close** the configuration for the first media list item by clicking on the blue triangle.





Problems getting LEDs or touchpoints to respond? Try resetting the system -> See Card "R"

- 8 Add a **new media list item** for the secondary vent by clicking on the next **GREEN** (not blue) "add media" icon  to add a new media list item for what is now the **SafeYouTube video**, but this time to turn on LED #3 between 0:12 and 0:14 seconds in the video (where she says "secondary vent").



And a Few More...

- 9 Close the configuration window for the second media list item by clicking on the blue triangle, and add a 3rd media list item for the crater by clicking on the next GREEN (not blue) "add media" icon  to add another new media list item (remember, the SafeYouTube video of Parts of a Volcano video needs to be present in the web view window when you click on the  icon.

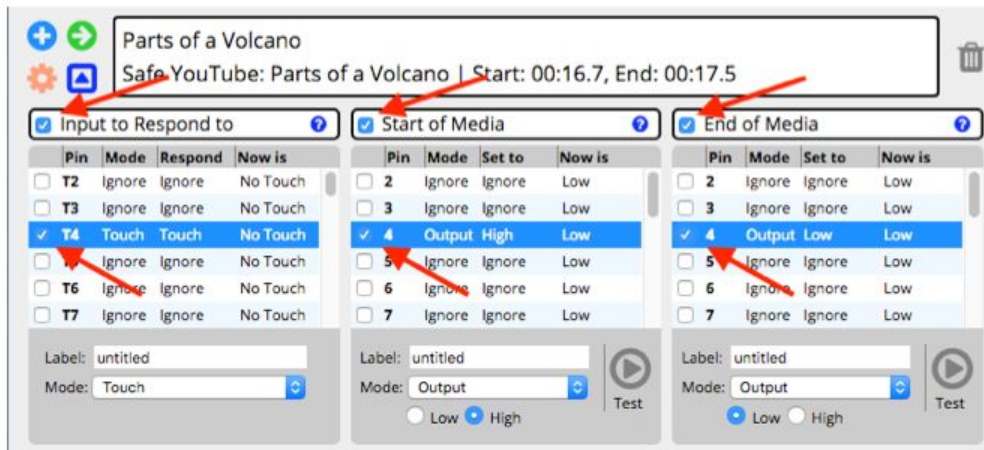
Set the time to Start: 0:16.7 and End: 0:17.5 (this is where she says "the crater").

Start and End Time

Parts of a Volcano

	Min.	Sec.
Start:	<input type="text" value="0"/>	<input type="text" value="16.7"/>
End:	<input type="text" value="0"/>	<input type="text" value="17.5"/>

- 10 Click on the blue triangle to view, and then click on T4 for Input to Respond to, and Pin 4 for Start and End of Media.



Parts of a Volcano

Safe YouTube: Parts of a Volcano | Start: 00:16.7, End: 00:17.5

Input to Respond to				Start of Media				End of Media			
Pin	Mode	Respond	Now is	Pin	Mode	Set to	Now is	Pin	Mode	Set to	Now is
<input type="checkbox"/> T2	Ignore	Ignore	No Touch	<input type="checkbox"/> 2	Ignore	Ignore	Low	<input type="checkbox"/> 2	Ignore	Ignore	Low
<input type="checkbox"/> T3	Ignore	Ignore	No Touch	<input type="checkbox"/> 3	Ignore	Ignore	Low	<input type="checkbox"/> 3	Ignore	Ignore	Low
<input checked="" type="checkbox"/> T4	Touch	Touch	No Touch	<input checked="" type="checkbox"/> 4	Output	High	Low	<input checked="" type="checkbox"/> 4	Output	Low	Low
<input type="checkbox"/>	Ignore	Ignore	No Touch	<input type="checkbox"/> 5	Ignore	Ignore	Low	<input type="checkbox"/> 5	Ignore	Ignore	Low
<input type="checkbox"/> T6	Ignore	Ignore	No Touch	<input type="checkbox"/> 6	Ignore	Ignore	Low	<input type="checkbox"/> 6	Ignore	Ignore	Low
<input type="checkbox"/> T7	Ignore	Ignore	No Touch	<input type="checkbox"/> 7	Ignore	Ignore	Low	<input type="checkbox"/> 7	Ignore	Ignore	Low

Label: untitled Mode: Touch

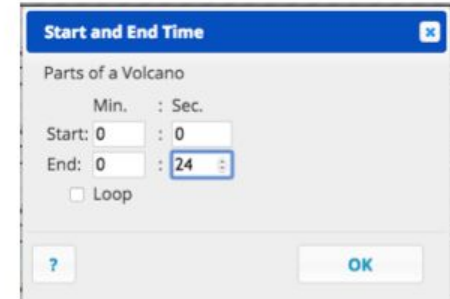
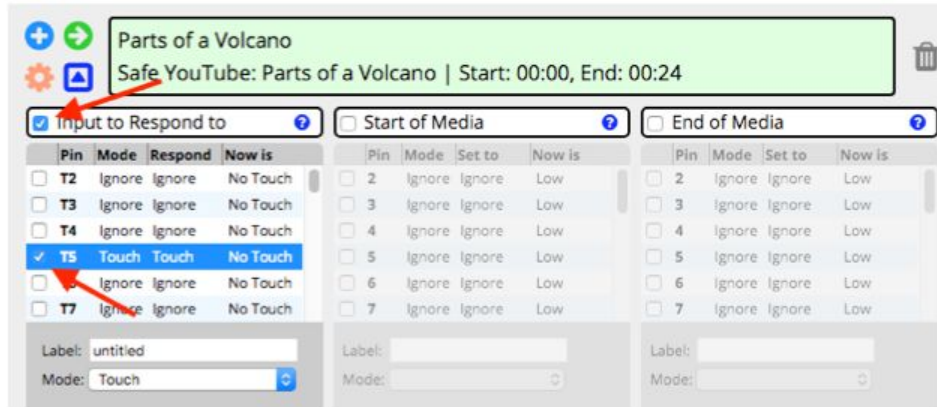
Label: untitled Mode: Output Low High Test

Label: untitled Mode: Output Low High Test

And One More to Play the Entire Video

11

Finally, add one more item for playing the entire video, but this time, don't set the LEDs. Only set T5 to play the entire video, Start: 0:00 and End: 0:24

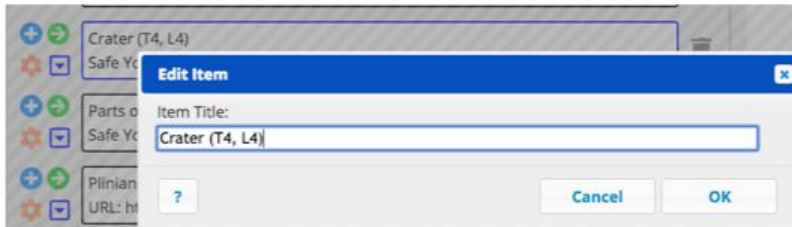


12

Now when you touch the "Touch here to restart video" touchpoint, the entire video will play, and parts of the model will light up at the matching times during the video!

13

You can also name each item in the media list by clicking on the default name of "Parts of a Volcano", and renaming them, "main vent", "secondary vent", and "crater". We have also found it can be helpful to include the touchpoint and LED numbers in the name for easy reference when looking at a media list.



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Media bookmarks
(Google, Drive, Videos, YouTube, Earth, Sample Video)

3 Configure touch & LEDs

2 Add the new item to the media list.

Add new item →

Click the + to add new media that is currently open in the web view window to the right.

Media list window
Link & configure media

Web-view window
Search & select media

Activity 3

Linking Google Earth to models

(10 minutes)

The screenshot shows a web browser window with a menu bar (File, Edit, Programs, Settings, View, Help) and a status bar (Now: Active, hyperduino@gmail.com). The main content area is titled "Volcano Parts & Google Earth" and contains a list of media items, each with a plus icon, a right arrow, a gear icon, and a checkmark icon. The items are:

- Main Vent (T2, L2) | Safe YouTube: Parts of a Volcano | Start: 00:10, End: 00:12
- Secondary vent (T3, L3) | Safe YouTube: Parts of a Volcano | Start: 00:12, End: 00:14
- Crater (T4, L4) | Safe YouTube: Parts of a Volcano | Start: 00:16.8, End: 00:17.5
- Parts of a Volcano | Safe YouTube: Parts of a Volcano | Start: 00:00, End: 00:24
- Plinian Eruption - Vesuvius (T6) | URL: <https://earth.google.com/web/@40.81609289,14.40772542,642.28607252...>
- Click the + to add new media that is currently open in the web view window to the right.

The right side of the browser shows a Google Earth view of Vesuvius. The URL bar displays <https://earth.google.com/web/@40.81609289,14.40772542,642.28607252a,3549.55403566d,3>. The map shows the volcano with labels for "Vesuvio" and "Parco Nazionale del Vesuvio". The interface includes a search bar, a settings gear, a 2D/3D toggle, and a globe icon.

Link to a Google Earth Location

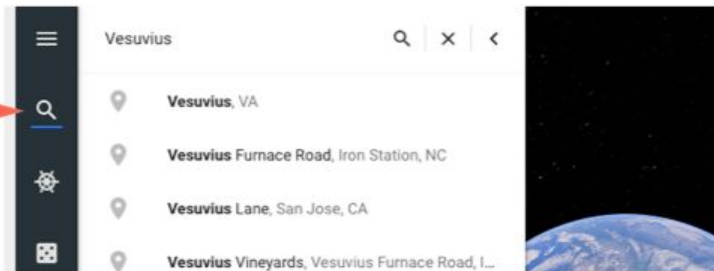


- 1 In the **web-view window** (at the right) of the MakerBit app, click on the globe icon (sample video) to open Google Earth.

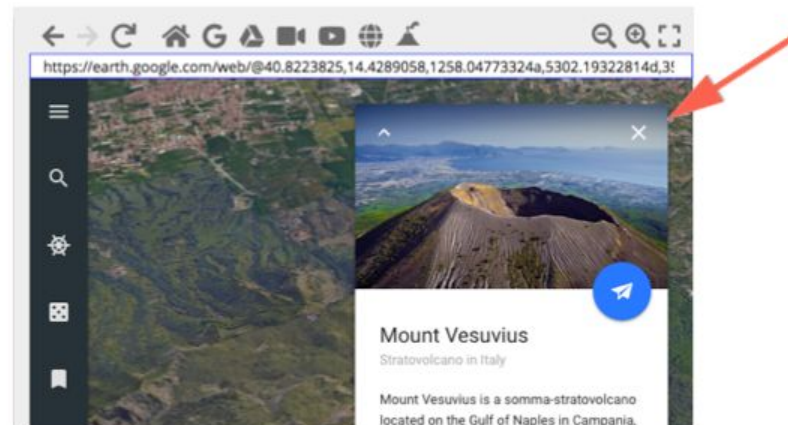


This may take some time depending on your Internet connection speed.

- 2 When Google Earth has fully loaded, click on the search icon, and type in "Vesuvius", and press Return.




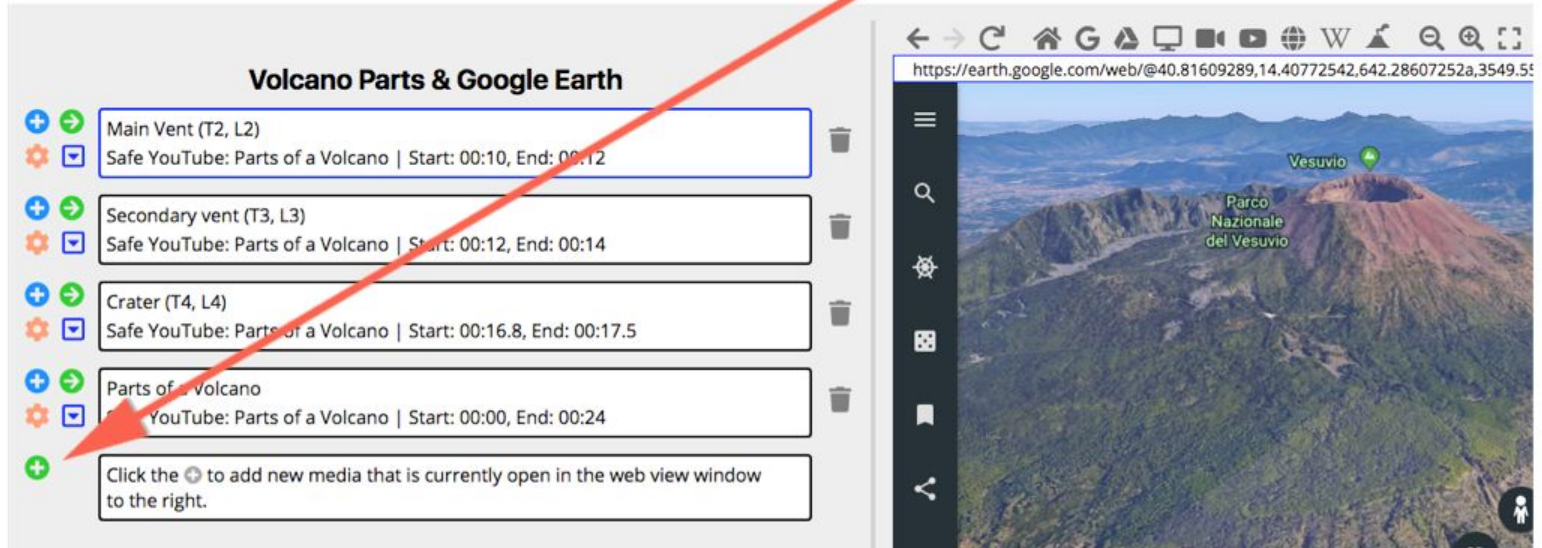
- 3 Click on the "x" to hide the information card, and use shift while dragging the cursor to choose the view you like.



Link to a Google Earth Location

4

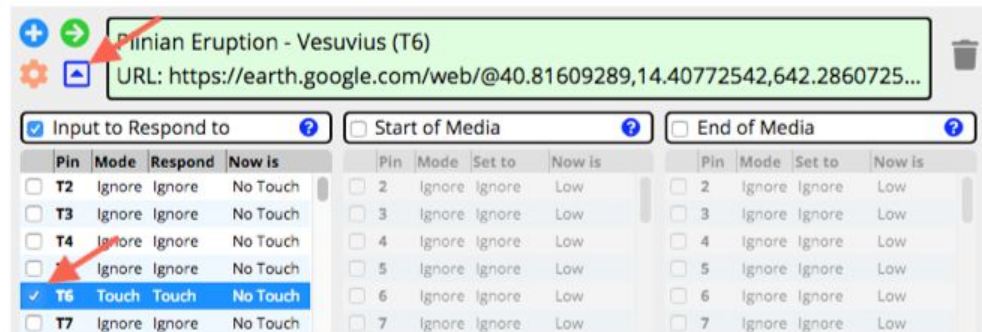
With the view that you like displayed, click on the green  icon on the media list side to add a new media list item.



5

Click on the blue triangle to view the settings for the media list item.

Click on checkboxes as shown here for "Input" and sensor "T6".





Try It Out

6

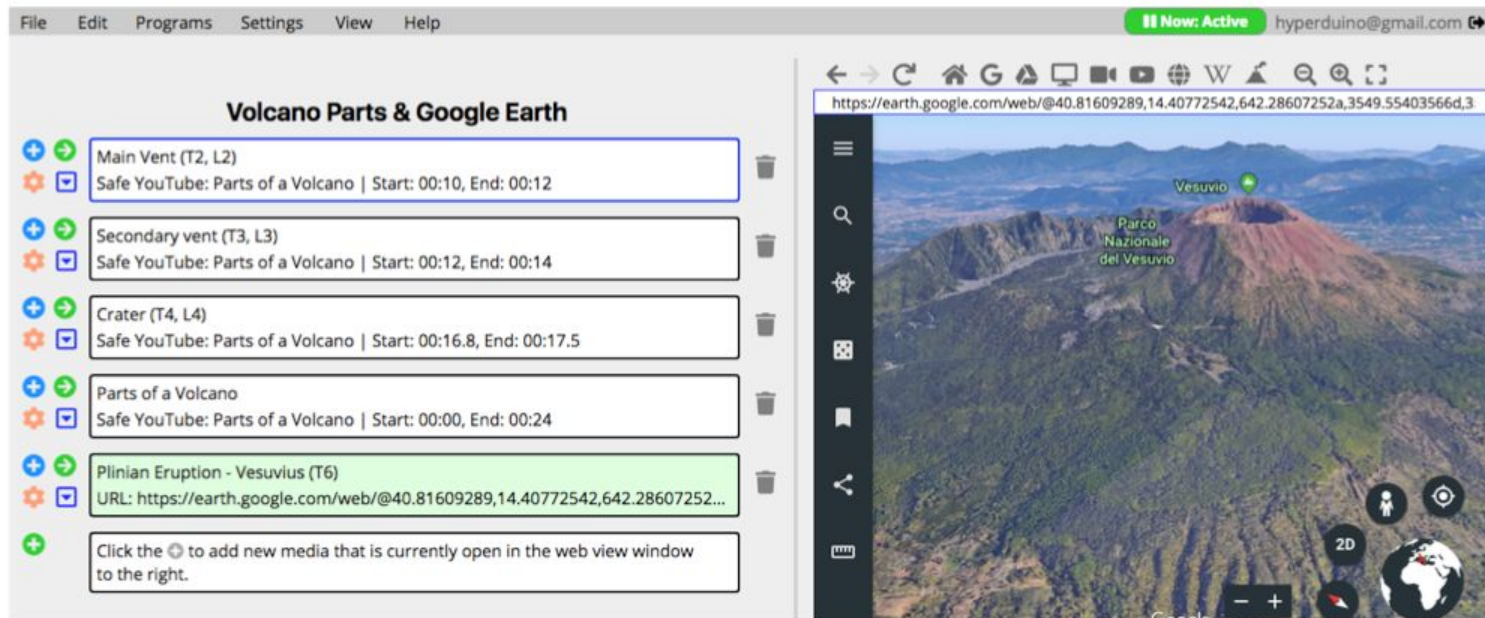
Try it out! First touch one of your other touchpoints to change the screen display, and then touch the "Plinian" touchpoint. The display will change to Mount Vesuvius!

p.s. It's called a Plinian eruption because this type of eruption was described in a letter written by Pliny the Younger, after the death of his uncle Pliny the Elder during the eruption of Mount Vesuvius in 79 A.D.

7

Remember, you can rename media list items by clicking on the name in the media list.

We have also found it can be helpful to include the touchpoint and LED numbers in the name for easy reference when looking at a media list.



You've Completed Part 2!

Special tip: Open House Mode: To put the video in a continuous loop mode, click on the orange gear (settings) icon, and check "loop". Now when the video plays, it will automatically loop. If one of the other sensors is touched, the video can be put back to looping with the "Touch here to start" sensor.

You have now used the "logic of programming" using "if-then" logic to link videos to physical models and turn LEDs on and off at the beginning and end of video segments.

This is all that's necessary to use the HyperDuino system to create physical-digital interactive models, but it also creates the scaffolding for the next level: Coding in the context of the curriculum.

In this approach we introduce block programming, and use it to solve challenges within the thematic space of the primary curriculum topic.

Locate the HyperDuino & iForge Coding Introduction activity guide, and continue on using those now (<http://bit.ly/2UJ7FPX>)

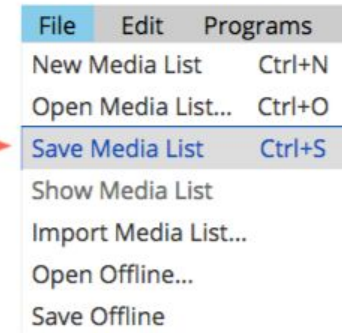


To Reset the System

- 1 If your media list is still "Untitled", click on "Untitled" and name your media list.



- 2 Choose Save Media List in File 



- 3 Quit the HyperDuino Media Linker

- 4 Unplug/replug the USB cable (battery should not be connected)

- 5 Re-open the HyperDuino Media Linker

- 6 Choose Open Media List in the File menu. 

