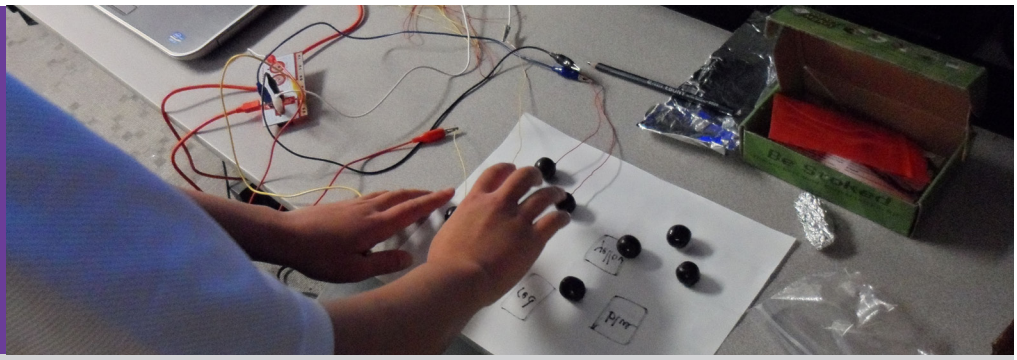
CURRENTlab

MODULE

Making & Moving in the Real World: Physical Computing



OBJECTIVES:

- Students will review strategies and purposes for critiquing artwork, and critique several digital games as works of art, emphasizing the role that the games' mode of interaction plays in the audience experience.
- Students will be introduced to a variety of games and new media artworks that use inventive or unusual physical control devices.
- Students will experiment with several different tools for creating their own interaction devices.
- Students will create a game and custom interaction device that is integral to the experience of playing the game.

NATIONAL ARTS SOLs:

NA-VA.5-8.2 Students generalize about the effects of visual structures and functions and reflect upon these effects in their own work.

NA-VA.5-8.3 Students integrate visual, spatial, and temporal concepts with content to communicate intended meaning in their artworks.

NA-VA.9-12.2 Students create artworks that use organizational principles and functions to solve specific visual arts problems.

VA ARTS SOLs:

5.9, 7.4, AI.6, AII.5 The student will use contemporary media to create works of art.

5.20, 7.15, 8.18, AI.15, AII.17 The student will use specific criteria and criticism processes to evaluate theirs & others' work.

5.10, 6.8, 7.9, 8.11, AI.6 The student will create three-dimensional works of art.

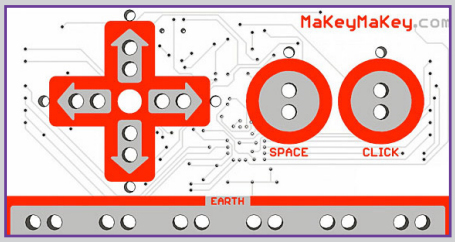
CONTENTS

INTRODUCTION: TOOL AND MATERIAL OPTIONS FOR TEACHERS

Unlike the other CurrentLab modules, which only require the Game Maker software to be implemented, this module recommends a few different child-friendly physical computing tools. Before the unit proper, here is a brief introduction to the tools mentioned in this unit.

It is possible to teach this unit without having *all* of these tools at your disposal, and you would not need to have one for every student in the class. For instance, CurrentLab instructors have done physical computing units in a class of 16 students with only 2 "MaKey MaKey" tools, which the class was able to share.

MAKEY MAKEY

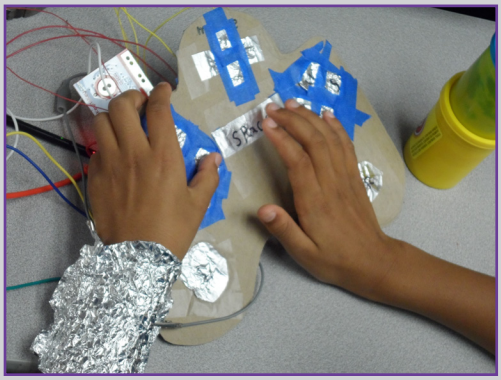


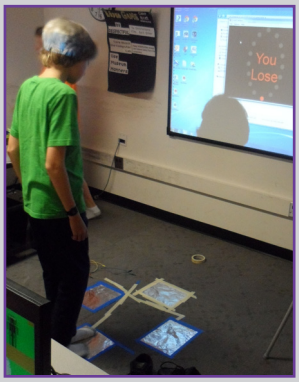
Cost: $49.95, includes the MaKey Makey board (right), 7 alligator clips, 6 short lengths of copper wire

Where to get it: http://www.makeymakey.com/

Info: MaKey MaKey is a small circuit board that lets virtually any object function as a keyboard button - as long as the object can conduct a current. This means students can create their own controllers using materials as varied as tinfoil, play-doh, fruits and vegetables, and even each other! By connecting these objects or materials to the MaKey MaKey board with alligator clips, students can then have the computer read touches of those objects as buttonpresses or mouse clicks.

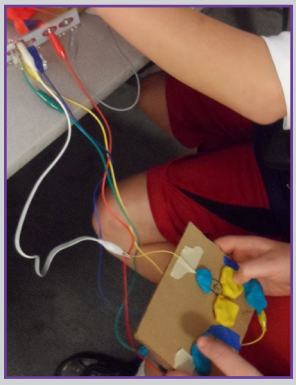
Because of this versatility, it is also recommended that you provide your students with plenty of raw construction materials to use with the MaKey Makey: tinfoil copper wire, cardboard, tape, and glue are especially useful. Here are some images of the types of controllers CurrentLab students have created using MaKey MaKey:

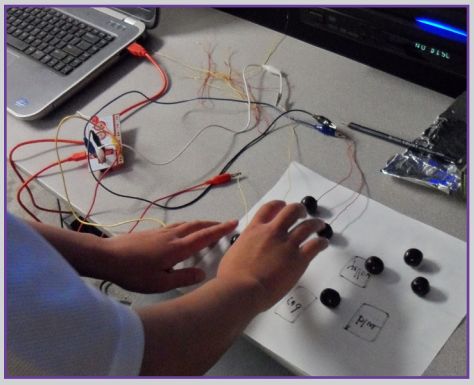




far left: A student used foil, wire, and cardboard to create a custom controller that allowed the player to manipulate the mouse, as well as use the myriad keys he had mapped in his game for special actions like changing equipment, aiming, flying, etc.

left: A student taped large foil squares to the ground to make a large controller requiring the player to use their feet to play the game. The student was inspired by the game "Dance Dance Revolution."





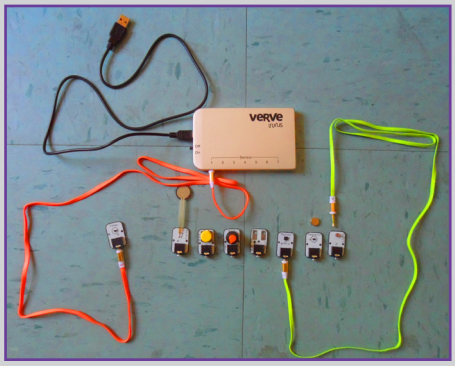
right: A student made an intentionally overwhelming interface of numerous snaking foil buttons to disorient the player.

center right: This student made a traditional game controller, but used play-doh blobs for the buttons so that they could be moved by the player for increased comfort.

far right: As an experiment, a student used the grapes from his lunchbox to create a controller for his game!

MaKey MaKey is very easy to use - the computer simply recognizes it as a keyboard, and the "buttons" students create simply act like pressing the keys on the keyboard, meaning you can control any game that uses keyboard controls.

VERVE



Cost: $99.00, includes the Verve board (right), 8 sensors, 7 connector cords, 5 cord extension blocks, and the Verve app. An additional sensor pack (optional) costs $59.00.

Where to get it: http://myinxus.com/verve/shop/

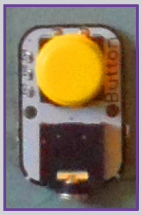
Info: Verve is a tool similar to MaKey MaKey, in that it takes special inputs and converts them into keyboard presses for the computer. However, instead of converting common objects and materials into buttons, Verve comes with a variety of customized sensors allowing for special kinds of interaction, which are then converted to keyboard presses.

These sensors include:

A **light sensor**

A **turn sensor** (a knob)

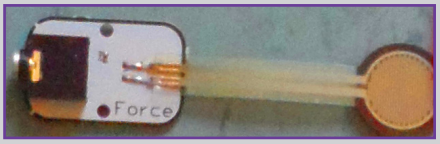
A **magnetic sensor**, which can detect positive and negative magnetic forces, with a magnet



A **button sensor**

A **motion sensor**

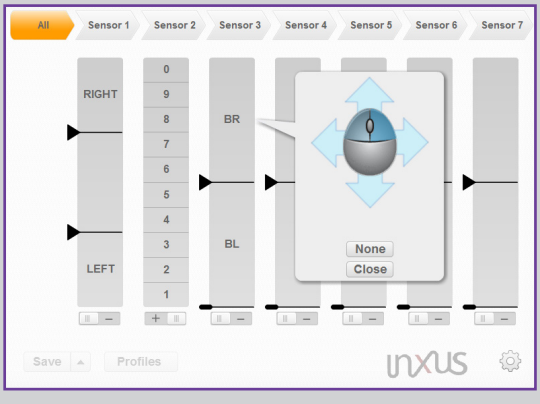
A **touch sensor** that functions like a MaKey MaKey connection, allowing a student to attach any conductive object with alligator clips, and make it a button



A **'force' (squeeze) sensor**

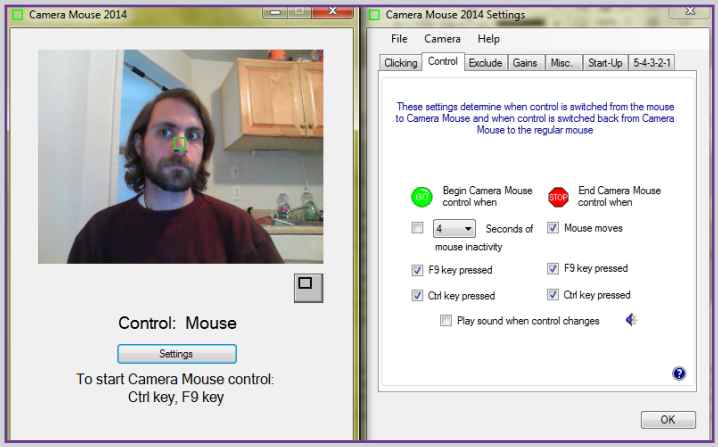
The Verve comes with a simple app which lets you set keyboard or mouse events to be triggered by any of the sensors plugged into the device. For instance, turning a dial left or right might make the mouse cursor move left or right to aim a 'release' in a game, or casting a shadow over the touch sensor might trigger the space bar, set to turn on the lights in the game world.

Seven sensors can be plugged in at once, so students can make a game that uses, say, both light and touch sensors to control different parts of a game.



INTRODUCTION: TOOL AND MATERIAL OPTIONS FOR TEACHERS (cont.)

CAMERA MOUSE



Cost: Free (requires a webcam), but Windows-only. A similar application for Mac, called Pinocchio, costs $9.99.

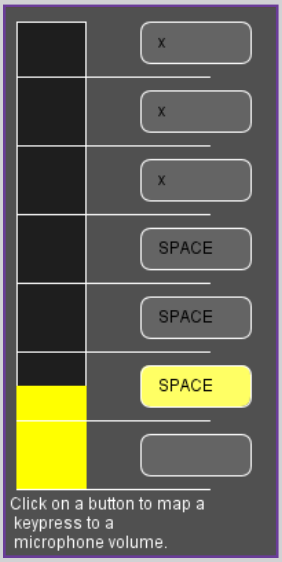
Where to get it: Download from the CurrentLab website (http://currentlab.art.vcu.edu/module-physical-computing/), or from http://www.cameramouse.org/.

Pinocchio can be downloaded from the Mac App Store at https://itunes.apple.com/us/app/pinocchio/id411434005 .

Info: Camera Mouse is a free piece of software primarily designed to help individuals who have difficulty using their hands control the mouse cursor on their computers using facial movement.

The program is far from perfect, but is free and very simple to use. Simply start the program up, and click on the facial feature in the camera image that you would like the cursor to follow. The cursor tracking can be turned on and off using the Ctrl or F9 keys, or can be set to auto-activate after the mouse has been idle for a certain amount of time.

KEY SIMULATOR

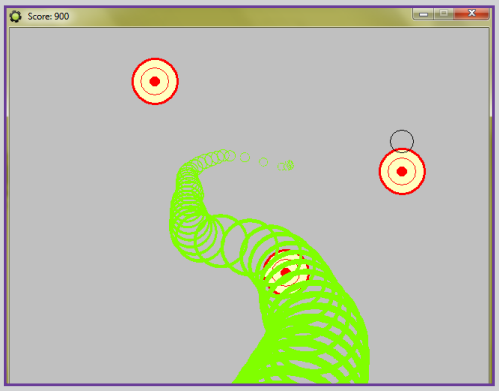


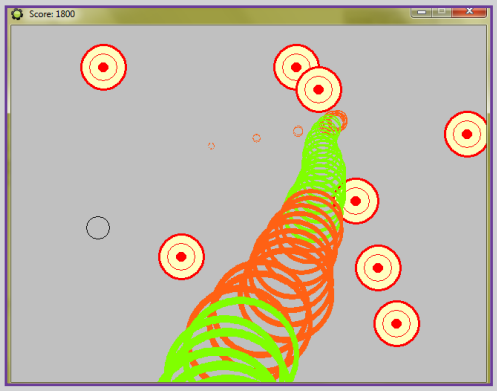
Cost: Free (requires a microphone).

Where to get it: Download from the CurrentLab website (http://currentlab.art.vcu.edu/module-physical-computing/).

Info: Key Simulator is a free, very basic bit of software developed by CurrentLab, which lets users map different volumes of microphone input to keyboard presses on the computer. For example, you could set it so that shouting causes a platform character to jump, or crowing at a certain volume causes the sun to rise in the game.

Below are screen shots from "Shouter," a simple Game Maker game (included in this module) which combines Camera Mouse and Key Simulator, creating a game where the player aim a reticule at targets and shouts to release green circles at them. Shouting louder releases "more powerful" orange circles.





Again, **you do not need to have all of these tools to teach this unit**, and it can be adapted to work with some or all of these options. For instance, the first lesson, on the following page, includes exemplar games and demonstration recommendations for first MaKey MaKey projects, then Verve projects, then camera/microphone projects. Classes with only one or two available options may opt to omit certain parts of the presentation, while classes with all three may opt to omit an exemplar from each demonstration for purposes of class time.

DAY 1: BUILDING A NEW "CONTROLLER" (MAKEY MAKEY)

- One thing that makes video games different from a lot of other art forms is that they are **interactive**. What does this mean?
  - The audience doesn't just look at or listen to the artwork, they can actively participate or play with it.
- How do we typically **interact** with games? How have we interacted with the games we made in the previous unit(s)?
  - Typically a controller for console games, touch screens for mobile games, or mouse and keyboard on PC. Other possibilities might include a WiiMote, Playstation Move, or Microsoft Kinect.
- Have you ever played a game that didn't use a normal controller, a keyboard, or mouse? What did you use to **interact**?
  - Possibly a WiiMote, Playstation Move, Kinect. Rock Band/Guitar Hero instruments. Dance Dance Revolution pads. Etc.
- We're going to look at a game that some of you might have played. It was one of the first very popular arcade games to use a nontraditional controller.

GAME EXEMPLAR: Dance Dance Revolution by Konami (1998)

Dance Dance Revolution was one of the very first rhythm and dance video games. It is played by standing on a "dance pad" with four colored arrows, and stepping on them in time with visual and musical cues. The object of the game is for players to perfectly time their movements with the game/song, achieving a perfect score.

- Watch the video of the child playing DDR (available at **CurrentLab** or on **YouTube**).
  - **What is different about the experience of playing DDR versus playing a Mario style game?**
    - The player uses their whole body - especially feet - rather than just hands. While in Mario you press a button to make the character run and jump, in DDR you *actually* have to move and dance.
  - **The controls are clearly different, but what else is different? Are there levels? Enemies? How do you win?**
    - The game isn't a platformer, and there are no levels or enemies. Instead of more difficult levels, the player dances to more difficult songs. Instead of defeating enemies and getting to the end of the level, the player needs to dance well enough to make it to the end of the song without getting a "game over."
- We're going to look at a video game made by artists who use a similar control scheme in a different way.

GAME EXEMPLAR: Hyper Olympics by Djeff, Charlotte Charbonnel, & Loic Horrellou (2006)

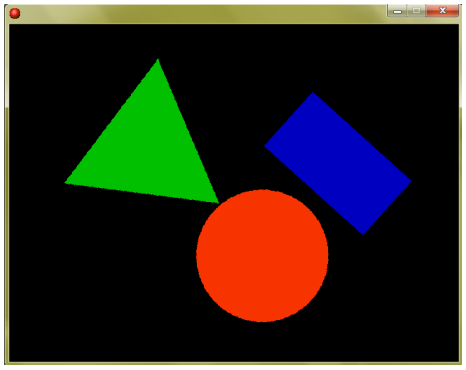
Hyper Olympics was initially inspired by the Atari 2600 version of Konami's Track & Field, which required the player to rapidly, repeatedly move the joystick left and right to make their player run along a track. French media artist Djeff conceived of a "full body" joystick controller for the game, and worked with scultpor/installation artist Charlotte Charbonnel to build them. Djeff also worked with artist/programmer Loic Horrellou to create a computer game in the style of Track & Field which would interact with the controllers.

- Watch the video of people playing Hyper Olympics (available on **CurrentLab** or on **Vimeo**).
  - **What is different about the experience of playing this versus playing a Mario style game?**
    - Again, the player uses their whole body - especially feet - to move. The controller also requires the player to balance while they move, adding challenge. The emphasis is less on accuracy (like DDR) and more on speed. It looks tiring!
  - **Were these controllers store-bought, like a WiiMote or a Dance Dance Revolution pad?**
    - No, the artists created their own controllers. We're going to look at some other artists who built their own controllers, then learn how to make our own.

FINE ARTS LINK: Water Bowls by Victoria Vesna (2006)

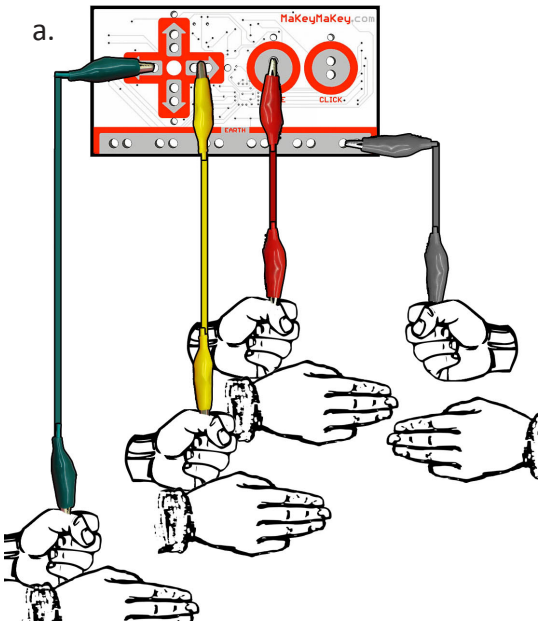
Vesna's Water Bowls series is a collection of interactive sound installations, where the audience can create and transform sounds in the space by touching and manipulating several bowls of water. The sounds are accompanied by abstract projected videos that are often projected such that the audience is also "interacting" with them, by standing in the projection and becoming a part of the imagery while manipulting the water bowls.

- Watch the video of Vesna's Water Bowl installation "Sound" (available on **CurrentLab** , or on **her website**).
  - **What does this work of art have in common with the games we just looked at?**
    - The audience can touch it, play with it, and interact with it. The audience uses their body to directly interact with the artwork (touching the water, or dropping coins into it). The artwork responds to the audience's interaction (by creating new sounds and changing the ones that are playing).
  - **How is this work of art different than most work of art you have seen in museums or galleries (if you've been to those)?**
    - Many of the things that make it similar to the games! People can touch it, it responds to interaction, it has sound and video and sculptural elements all in a single piece.



- Next, we're going to look at a tool we can use to make controllers like these artists did.
  - Watch the **MaKey MaKey** video (available on **CurrentLab** or **YouTube**).
  - To demonstrate the MaKey MaKey possibilities, we've included a simple Game Maker program, "makey-test.gmk" (right). This is simply a 'game' which produces a different shape and tone when the LEFT, RIGHT, and SPACE keys are pressed. You can demonstrate this tool a few different ways using the same program, to show the different uses for the MaKey MaKey:
    - One simple strategy, depicted in **diagram a**, is to connect wires to the left, right, and space, buttons, then have students hold the other ends of the cords. Then you (or a fourth student), holding the 'earth' cord, can touch hands with each student to 'activate' a shape/sound. Putting all of your hands together in a "Go team!" gesture in the middle will activate all of the colors and sounds at once!
    - Another setup, depicted in **diagram b**, would involve setting up a "Dance Dance Revolution"-style set of tinfoil pads on the floor. A student, holding the "earth" cord, can activate the colors by stepping on each square. Maybe tape the pads down to the floor, far enough apart from each other that touching all three at once becomes a Twister-like physical challenge, and ask the student to try and activate all three pads at the same time!

a.



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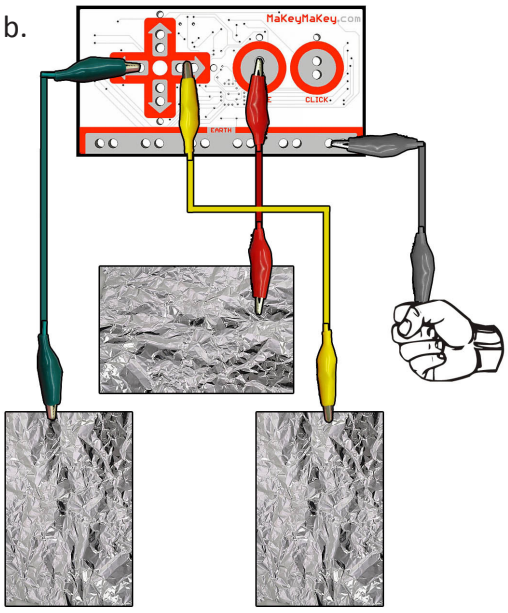
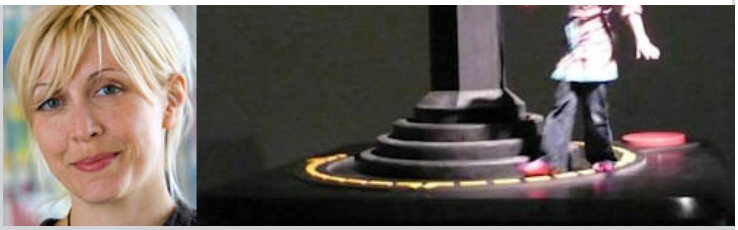


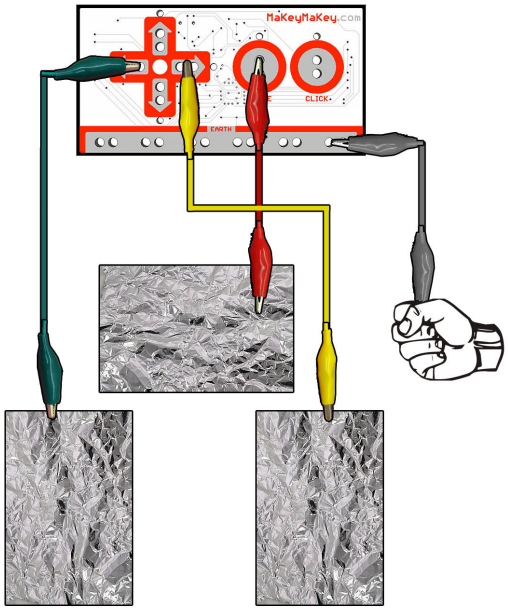
- Now, we'll look at an artist who built a device to play old games in a new way.

GAME EXEMPLAR: GiantJoystick by Mary Flanagan (2006)

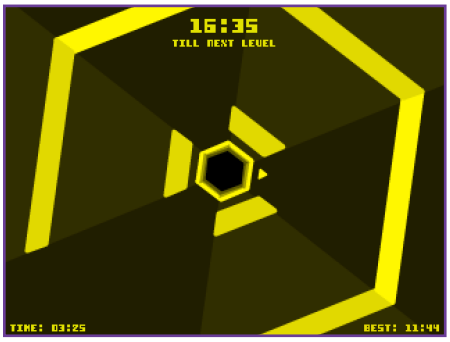


GiantJoystick is a sculpture/installation that recreates the classic Atari 2600 joystick at a monumental, 10-foot-tall scale. The joystick is connected to a terminal playing several classic Atari games, which the audience is challenged to play with this new controller. The giant stick makes the familiar unfamiliar, and encourages new ways of playing the old games, such as using collaboration between multiple people to operate the stick and button simultaneously.

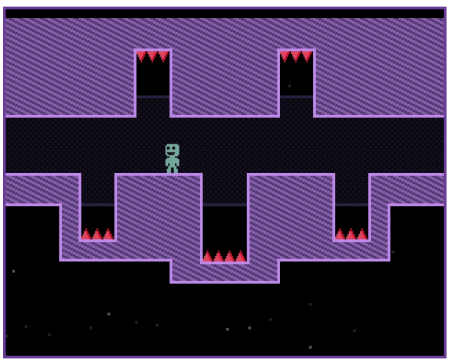
- Watch the video of Flanagan discussing GiantJoystick (available on CurrentLab, or on YouTube).
  - **Seeing the people play the classic games, and listening to Flanagan talk, how is it different to play a classic Atari game using GiantJoystick?**
    - Player has to use their whole body to move the controller, making simple actions more challenging. Flanagan mentioned that the size requires people to work together, using teamwork to move the heavy stick and to be able to use the button at the same time as the stick. In doing this, it turns single-player games into cooperative multiplayer games.
- Our first project is going to be to use the Makey Makey to make a new controller for an old game, like Mary Flanagan.



- **DEMO:** Set up the MaKey MaKey with the tinfoil pads on the floor connected to left, right, and space, as shown in the diagram (right).
  - Load up a copy of Terry Cavanaugh's **Hexagon** (playable on CurrentLab).
  - Give a few students the chance to play. The game is a very challenging, short game (a single try takes a few seconds - even shorter when controlling it this way) so several students can have a turn.
  - To show the versatility with which different schemes can be mapped onto different games, you could load up Cavanaugh's **VVVVVV** (playable on Currentlab), which uses the same three buttons and thus can also be played using this controller.



- **TASK: CREATE A NEW MAKEY MAKEY CONTROL SCHEME FOR AN OLD GAME**
  - The class will be divided into small groups. Each group will be assigned a different game from a list for which they will create a new controller using Makey Makey.
  - **GROUP(S) CAN ADAPT THE FOLLOWING GAMES (playable on CurrentLab):**
    - The End of Us
    - Space Invaders
    - Asteroids
    - Battle Zone
    - Tempest



- As class time is running short, give teams time to sketch their ideas. Tomorrow will be a work day to build their controllers.

DAY 2: BUILDING NEW CONTROLLERS FOR OLD GAMES

- Review the current task:
  - Using MaKey MaKey to build a new control scheme for a classic game.
    - Think about Hyper Olympics, Giant Joystick - how players had to use their whole body to play the game.
    - Think about the MaKey MaKey video - what kinds of objects could you use as "buttons" for your "controller"?
    - **Your controller doesn't have to make the game easier, or "better" - it just has to make it *different* in an interesting way!**
- Give groups time to finish sketching out their ideas on paper.
- Once they have a plan, they can begin building their control device using foil, wire, cardboard, etc. to connect to the MaKey MaKey.
  - Students' plans should not only include a sketch of their control device, but describe what materials they'll need or things they'll need to make.
  - Recommended materials/objects to have for MaKey MaKey include: tinfoil, copper wire, masking tape, cardboard (and scissors/craft knives), Play-Doh, and possibly rubber bands, dowels, or scraps of wood.
- Depending on the length of your class periods, students may have time to finish, present their work, and play each others' work (if not, sharing can be done the next class).
  - During presentaton, let students from one group play the game the students from another group were working on.
  - Discussion questions:
    - **How did playing the game this way feel different than playing it with a keyboard?**
    - **What other kinds of games could you play with this controller? Can you think of a game that would go especially well with it?**

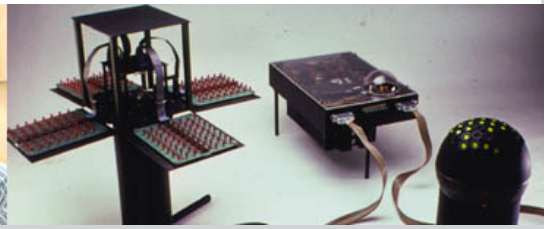
DAY 3: CONTROLLING GAMES WITH SENSORS (VERVE)

GAME EXEMPLAR: Flower by Jenova Chen (2009)

Flower was developed by Jenova Chen as an experimental game for the Playstation 3, which used only its tilt-sensing "six-axis" controller, and none of the conventional buttons or joysticks on the controller. The player plays as the wind in Flower, tilting the controller left, right, and forward to fly through a field and help the flowers in it bloom.

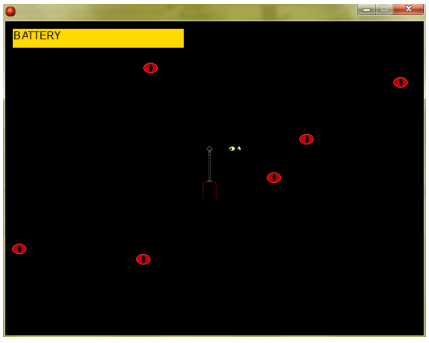
- Watch the video of Chen playing *Flower* (available on **CurrentLab**, or on **Gamespot**).
  - **How does this game's control work differently than any of the other games we've looked at?**
    - Rather than affecting the game by pressing buttons (or pressing/stepping on objects that work as buttons), the controller senses the movement of the player.
- We're going to look at an artwork that also makes use of sensors to interact with the environment.

FINE ARTS LINK: House Plants by James Seawright (1984)



James Seawright's House Plants are interactive sculptures with sensors to detect different light levels, temperature, and humidity in a space. They respond to different environmental conditions, opening their petals and flashing their lights in different patterns based on the stimuli picked up by their sensors.

- Watch the video of Seawright's House Plants (available on **CurrentLab**, or on **YouTube**).
  - **How is this artwork similar and different to the artworks and games we've looked at before?**
    - It's similar in that it uses sensors to detect changes in its environment and respond to them. It's different in that it detects things like light and temperature, and isn't directly "interactive" (unless you turn out the lights, or cast a shadow over it!).
- Another tool we have to make games in this unit is the **Verve**. It's similar to a MaKey MaKey, but it has several different sensors that can be plugged in.
  - Show the Verve, and its light, temperature, motion, magnet, squeeze, touch, and button sensors. Show how the Verve app reads each sensor and how to assign buttonpresses to it.



a.

- We've included a simple demo GameMaker game, "verve-light-game.gmk" with this unit. Connect the light sensor to the Verve, set up the app as in **figure a**, and run the program.
- Have a student man the light switch for the classroom, and turn out the lights. In the game, turning the lights on kills the monsters, but drains the battery. Turning the lights off lets the battery recharge. See how long the student can keep the character safe by flipping the real-world lights!
- You can also try swapping out the sensor for others to show how easy it is to experiment - the game will work just as well with a squeeze or button sensor, but will be a very different game!

- Just like with the MaKey MaKey, we're going to use Verve to make a new controller for an old game. Here are two artists who built a controller using specialized touch sensors like those in the Verve.

GAME EXEMPLAR: Massage Me by Hannah Perner-Wilson and Mika Satomi (2004)

Massage Me is an alternate controller device designed to work with consoles such as the Playstation and Playstation 2. It maps button inputs to areas on the back of a vest which is worn by one person, while the player must play the game by pressing into their back. Typically, the game is exhibited with street-fighting games (Tekken, Dragon Ball) because, ironically, the aggressive and rapid button-pushing of those games produces the most deep and relaxing massages.

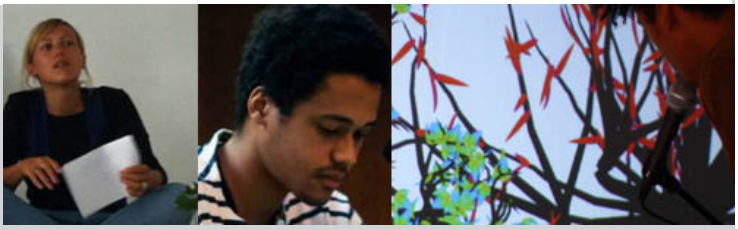
- Watch the video of gallerygoers playing Dragon Ball with Massage Me (available on **CurrentLab**, or on **YouTube**).
  - **How is playing a fighting game using this controller different than using a regular one? How is it different for the watcher who is wearing the jacket?**
    - The player has to touch another person to play, which might be uncomfortable, or might make some people only want to play with close friends. The person in the jacket gets to "feel" the game - every impact and movement the player makes happens on their back. The buttons are arranged very differently and not marked, which might be disorienting at first.
  - **This controller probably makes it harder to play the game - does that mean it fails as a controller?**
    - Not necessarily. People can still always play Playstation with a normal controller. This one is less precise, but trade-off is that it offers a totally new experience with the game.
  - **How could you make something like this using the tools we've played with in class so far?**
    - You could use the touch or squeeze sensors on the Verve and sew/attach them to a jacket or shirt. You could tape tinfoil buttons to a jacket/shirt and connect them to the MaKey MaKey. Maybe you could sew a microphone into a jacket and have the volume of the impact on the person's back control a button in a simple game.
- **TASK: CREATE A NEW VERVE CONTROL SCHEME FOR AN OLD GAME**
  - The class will be divided into small groups. Each group will be assigned a different game from a list for which they will create a new controller using Verve.
  - **GROUP(S) CAN ADAPT THE FOLLOWING GAMES (playable on CurrentLab):**
    - Super Mario Crossover
    - The End of Us
    - Space Invaders
    - Asteroids
    - Battle Zone
    - Tempest
  - Give students time to play their game (10 minutes, max), and then sketch out their idea. Students should focus on:
    - Which sensor will map onto which controls? Can one sensor work as multiple buttons (e.g. turn knob left for left arrow, and right for right arrow, rather than having one button sensor for left and one for right)?
    - Where will the sensors be? Will you need any other materials (e.g. A dowel to attach the motion sensor to to make a magic waggle wand, or a piece of wood or cardboard to attach buttons to, a lidded box you can close over the light sensor, etc.)?
  - Students can work on their sketches/plans, and depending on amount of class time, create their new control schemes.

DAY 4: USING SENSORS WITH OLD GAMES

- Review the current task:
  - Using Verve to build a new control scheme for a classic game.
    - Think about Hyper Olympics, Giant Joystick - how players had to use their whole body to play the game.
    - Think about Massage Me - where could you put sensors besides on or in a game controller?
    - **Your controller doesn't have to make the game easier, or "better" - it just has to make it *different* in an interesting way!**
- Give groups time to finish sketching out their ideas on paper.
- Once they have a plan, they can begin building their control device using the Verve sensors.
  - Students' plans should not only include a sketch of their control device, but describe what sensors they'll need as well as additional materials.
  - Recommended materials/objects to have for Verve include: additonal sets of sensors (if budget allows), additional "headphone" cable to extend cords, dowels, pieces of wood, and rubber bands, blu-tak, or tape to attach sensors to surfaces. MaKey MaKey materials (foil, wires, cardboard) may also be useful for using Verve's "touch" sensor.
- Depending on the length of your class periods, students may have time to finish, present their work, and play each others' work. If not, sharing can be done the next class. Conversely, if the students made much progress the previous day and don't need the full class time today, you can move on to the presentation from the next lesson (on microphone and camera games).
  - During presentaton, let students from one group play the game the students from another group were working on.
  - Discussion questions:
    - **How did playing the game this way feel different than playing it with a keyboard?**
    - **What other kinds of games could you play with this controller? Can you think of a game that would go especially well with it?**

DAY 5: CONTROLLING GAMES WITH CAMERA & SOUND

FINE ARTS LINK: MOC by Béatrice Lartigue & Cyril Diagne (2011)



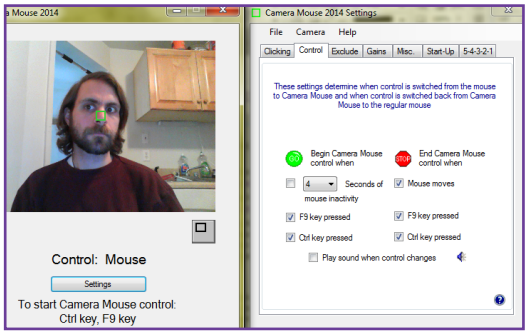
MOC is an installation by Béatrice Lartigue and Cyril Diagne, artists working in the collective Lab 212. MOC involves a projected image ofa landscape with colorful animals walking across it, and a microphone. By making sounds into the microphone, users prompt MOC to grow trees in the landscape based on the type of sounds they make.

- Watch the video of people playing with MOC (available on **CurrentLab**, or on **Vimeo**).
  - **How else could a game or artwork use sound as a control/interaction?**

FINE ARTS LINK: Text Rain by Camille Utterback & Romy Achituv (1999)

Text Rain is a playful installation where a camera captures the image of the viewer and projects it, mirror-like, onto a facing wall. The projection also contains letters which fall from the sky and collect on the figures in the image. The letters are from lines of a poem about bodies and language, and by "catching" the letters, viewers can sometimes collect words and lines of a poem.

- Watch the video of Text Rain (available on **CurrentLab**, or on **YouTube**).
  - **Have you ever played a game that used a camera to track your body? Like the Kinect or Playstation Eye? What are some other ways a person might interact with a screen using a camera like this?**
- We can use microphones and cameras to control our games, too. We'll use a program called **Camera Mouse** to have the camera track our face, and **Key Simulator** to have the microphone control computer actions.
  - We've included a simple demo GameMaker game, "shouter.gmk" with this unit.



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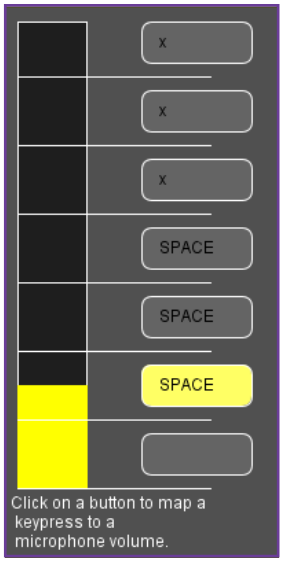
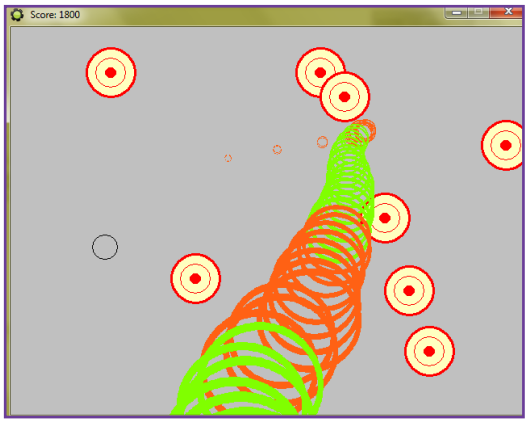


- Run Camera Mouse, and ask a volunteer to stand in front of the camera. Click on the student's nose to start tracking.
- Run Key Simulator, and set up the key mapping as in **figure a**.
- Run "shouter.gmk." The student will point the targeting reticule with their nose, and shout to release rings at the targets to earm points.
- These demos and exemplars should easily fill the class time, but if there is additional time at the end, give students extra time to play with the exemplar games and tools - and experiment with them by trying alternate sensors with the Verve or alternate set-ups with the MaKey MaKey.



- **TASK: CREATE A NEW "HANDS-FREE" MIC + CAMERA CONTROL SCHEME FOR AN OLD GAME**
  - **GROUP(S) CAN ADAPT THE FOLLOWING GAMES (playable on CurrentLab):**
    - Centipede
    - Missile Command
    - Katamari Damacy
    - Curveball
    - Tempest
  - Give students time to play their game (10 minutes, max), and then discuss their idea. Since these tools don't require students to build a physical controller, they can start experimenting with the camera and microphone software right away if their computer has a microphone or camera. If not, students can write - what button(s) will the microphone control, and what movements with the facial tracking control?
  - Students can work on their sketches/plans, and depending on amount of class time, create their new control schemes.
  - Because these schemes are simpler to set-up and try out than the Verve or Makey ones, you will be less likely to need a separate "work day" as with the prior two tools (though, of course, allot one if you need it!). Give students time to develop their alternative control schemes, and then let them test each others' out.
  - Discussion questions:
    - **How did playing the game this way feel different than playing it with a keyboard?**
    - **What other kinds of games could you play with this controller? Can you think of a game that would go especially well with it?**

DAY 6: CREATING OUR OWN GAMES AND OUR OWN INTERACTIONS

GAME EXEMPLAR: ShCoCoooCoCo by Takahiro Miyazawa (2014)

An experimental game exhibited at BitSummit, Japan's largest indie game festival, ShCoCoooCoCo is a traditional side-scrolling shooting game where the player controls their character - a bird shaped like a lotion bottle - by tilting and pumping an actual lotion bottle. The unusual name comes from the Japanese onomatopoeia for squeezing a pump, "shuko shuko." More famous Japanese games with a similar naming convention include Pac-Man (from "paku paku," the sound of an opening and closing mouth) and Doki Doki Panic, which became Super Mario Bros. 2 in the US (from "doki doki," the sound of a heart excitedly beating).

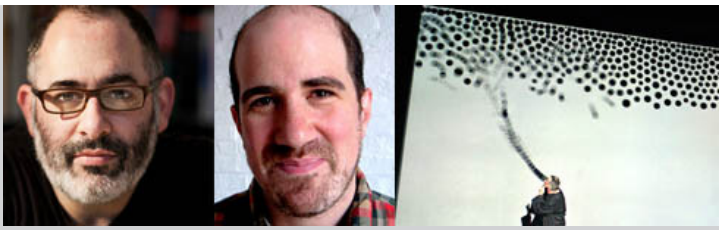
- Watch the video of Miyazawa demonstrating ShCoCoooCoCo (available on **CurrentLab**, or on **Youtube**).
  - **How is controlling this game different from controlling a traditional game?**
    - Instead of moving the character with buttons, the player tilts the pump bottle controller to move the bird up and down. Likewise, attacking is done by pumping the bottle, not pressing a normal button. Controlling the character cosnequently requires much more bodily movement, but gives the player more nuanced control over things like the speed the bird moves up and down.
  - **How did Miyazawa design his game so that it worked especially well with this controller?**
    - The character in the game is shaped just like the pump-bottle controller, and responds precisely to how the real-life pump bottle os moved and pumped, so it feels like the player is directly manipulating the character in the game. This makes the game especially immersive.

GAME EXEMPLAR: Perfect Woman by Lea Schonfelder & Peter Lu (2014)

Perfect Woman is a "Life Simulator" designed by Lea Schonfelder which uses the Kinect controller. The player travels through life from infancy to adulthood to retirement, choosing different life roles and professions (e.g. college professor, mother, princess, charity worker, etc.). The player must then "perform" these roles by recreating different bodily positions for the Kinect. Performing different roles with greater accuracy will then increase or diminish different character attributes that contribute to the player's overall "perfectness" score. In addition to being a simulation of the various roles people play in life, and the challenges those roles present, the game also specifically functions as an exploration and critique of the expectations placed by societies upon women, and the particular challenges presented to women as a result.

- Watch the video of Perfect Woman (available on **CurrentLab**, or on **Youtube**).
  - **How is controlling this game different from controlling a traditional game?**
    - Instead of moving the character with buttons, the player must align their body - and the on-screen character's body - with a constantly changing silhouette. The player has to move their whole body, and difficulty comes not only from the design of the "levels," but from the limits of the player's own physical ability.
  - **In the intro module, we talked about "central concepts." What is a game's "central concept"?**
    - What the game is "telling us." Is it telling a story? Is it telling us about an idea?
  - **How did Schonfelder and Lu design the game so that it worked especially well with this control scheme? How does the control scheme connect with the game's "central concept"?**
    - The game is about "performing" different roles in life, so making the player have to physically perform actions fits the theme. The difficulty of the game comes from the "imperfections" in the players own body (in terms of balance, flexibility, speed, etc.), which connects to the game's theme of you being expected to be "perfect."

FINE ARTS LINK: Messa di Voce by Golan Levin & Zachary Lieberman (2003)



Messa Di Voce was a collaboration between artists/programmers Levin and Lieberman and vocalists Jaap Blonk and Joan La Barbara. Lieberman and Levin created an interactive projection which transformed the voices of the vocalists into imagery on-screen. The software was projected on-stage during a performance in which Blonk and La Barbara sang and created sounds which were manifested visually behind and around them. Levin and Lieberman have also created versions of Messa Di Voce which worked as installations, where museumgoers could interact with the imagery by making their own sounds.

- Watch the video of Messa Di Voce (available on **CurrentLab**, or on **Youtube**).
  - **How is interacting with this artwork different from controlling a traditional game?**
    - The audience doesn't "have" to do anything. Just by moving and making sounds, they will interact with the piece. Because this installation uses cameras and microphones to produce the imagery, interaction is totally "hands-free."
  - **How did Levin & Zachary design the software so that it worked especially well with this control scheme? How does the control scheme connect with that art's "central concept(s)"?**
    - The software was designed to be seen in a performance or in a gallery, so they made sure it was as interesting to look at as to play with (watching Messa Di Voce is more fun than watching most people playing video games). The software lets the performer improvise their movements and sounds - they don't "have" to be at a specific part of the stage for it to work, and they don't "have" to make a certain sound to make the "right" shapes. This gives the performance - or the audience, in a gallery installation - freedom to play.
- **TASK: Create a game that uses a custom control scheme, and create the custom control scheme for the game.**
- This is the main project for this unit. We've already experimented with several different options and applied them to older games. NOW the task is to create a new game that uses a new kind of controller. This means we'll need to:
  - Decide on a central concept for your game (an **idea** or a **story** that your game is telling).
  - Choose a tool (MaKey MaKey, Verve, or Microphone + CameraMouse)
  - Plan your game & its specialized control scheme
    - **Does your game have to have levels, bosses, or even a player character like a traditional game?** No - many of the games and artworks we looked at in this unit didn't have those.
    - **Does your game have to have a central concept?** - Yes, but you can approach that concept differently than in the intro unit. Think about an art installation like MOC, about growth, or Text Rain, about language and poetry. Neither of those pieces had a "goal" that you could win, but still had movement, actions, and *interactions* people could do that were interesting and related to the concept.
  - Make your game in Game Maker
  - Build your controller
- The above order of events could be more explicitly codified as a schedule for the students to follow. For example, you could have a day for concept development and sketch, two days for creating the software, and a day for building and testing the physical controller - or a series of flexible duedates for each component.
- The next lesson in this plan is the outline for the final critique. However, you should allow the students several workdays to go through the above process.

DAY 7+: CRITIQUE

- This is a plan for the final critique of the project. If you have time in your schedule, it would also be helpful to do one of these earlier as a "process critique" while the students' games are still in progress,
- Review with students the **purpose of critique**
  - To **help the artist** make their work stronger by talking about:
    - What their art is already doing well.
    - Parts that they can improve - **and how to improve it**.
- Is it helpful to the artist if you just complain about their game? **NO.**
- Would you like it if someone just complained about your game? **NO.**
- **Critique is not a place to bash other people's work - the point is to be helpful**.
- Remember our two critique questions (adjusted here to emphasize this unit's goals):
  - **What is fun/interesting in the game and its custom control scheme? How does the control scheme relate to the game's central concept?**
  - **How could the artist improve parts of the game that aren't fun/interesting? How could they improve the interaction? How could the interaction relate more to the game's central concept?**
- **Critique:**
  - Give each student one or more critique sheets (included in this module).
    - The sheet has two columns reflecting the two critique questions, and three rows representing three games.
  - Because of the physical nature of these games, the set-up required, and the likelihood that students will be sharing MaKey Makeys/Verves/etc. as a class, the most likely way of staging the critique will likely be to give each student/team a chance to present their game + controller on a main computer for the class (such as a teacher station, ideally hooked to a projector or smartboard).
  - Students can have turns playing the game, and during this time, other students should record their written critique on the sheet.
    - Written critiques are a good, concrete artifact to assess/grade students' understandings of the underlying concepts. Telling the students they will be graded on their written critiques also helps ensure that they will invest some effort in them.
  - Students can then verbally share their critiques. One strategy to encourage sharing is to require each student to make at least one compliment and one recommendation over the course of the class period, and to record these as part of their grade.
  - Afterward, discuss as a class: What were things in general that worked really well in games we played in class? What things could have been improved? Are there any problems/issues that seemed to come up in a lot of games?

NAME:_____

GAME CRITIQUE

	What is fun or interesting about the game and its custom control scheme? How does the control scheme relate to the game's central concept?	How would you fix the things about the game that aren't interesting/fun? How could they improve the interaction?
GAME #1 Title:_____ Artist(s):_____		
GAME #2 Title:_____ Artist(s):_____		
GAME #3 Title:_____ Artist(s):_____		