Waterkinesis

Control objects in water with your mind

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_

1. Introduction
   1. Your brain is made up of billions of \_\_\_\_\_\_\_\_\_\_\_\_ cells, connected to each other in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   2. EEG is what we use to record \_\_\_\_\_\_\_\_\_\_\_\_\_\_ activity in the form of graphs, just like you can record your heartbeat on a graph and see it on a heartbeat monitor.
   3. Based on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the graphs will record different patterns and different types of waves.
2. Getting familiar with Cognimates & Muse

- Go to cognimates.me in a Google Chrome browser. Click the ‘projects’ tab.

* 1. Cognimates can be used to interact with Artificial Intelligence (AI) technology that’s associated with speech recognition. Load the “Good Boy” project to get started, and follow the provided step-by-step guide.
     1. How well did the computer hear and understand your commands?
     2. How do you think the computer understands your commands?
     3. Name 2 places you’ve seen speech recognition in your life.
  2. Cognimates can also be used to interact with AI that is associated with vision recognition. Load the “Rock, Paper, Scissors” project, and follow the provided step-by-step guide.
     1. Was the computer’s camera recognition instantaneous, or was there a delay in recognition?
     2. How do you think the computer recognizes the colors?
     3. Name 2 ways vision recognition can be used in the real world.

1. Connecting devices to Cognimates
   1. **Connecting the Wedo**:
      1. Start by downloading the Scratch Device Manager from the app store.
      2. [Instruction on fixing the config.json file]
      3. Press the “connect” button the Scratch Device Manager on your laptop, and then press the button on your Lego WeDo. The WeDo should start blinking, and the Scratch Device Manager should say “trying to connect”
      4. Once the two are connected, the WeDo should stop blinking and the Scratch Device Manager should say “connected”. Test the connection by clicking the “turn the motor on” block and see if the WeDo motors move.
   2. **Connecting the Muse**:
      1. Start by turning on your laptop’s Bluetooth.
      2. Load the Muse extension and click the “Connect Muse” block. Click the “allow notifications” notification in the upper right corner, and then press the power button on your Muse headset.
      3. The light on right ear of the headset should be flashing. Pair (connect) the Muse device to your laptop by clicking the correct headset (the last four digits of the headset’s serial number) and pressing the “pair” button.
      4. Once the devices are connected, the headset’s light will stop flashing. Test the connection by putting on the headset, waiting for 10 seconds, and clicking the “Get value of” block. Make sure the block gives you a number greater than 0.
      5. Have some fun with the extension! See an example project, “Bouncing Ghost”, under the projects tab.
2. Program
   1. Let’s start with a simple program. Create a program that makes the WeDo move forward every time you blink.
      1. Which two blocks did you use? Draw the program below!
   2. Now, make the WeDo move forward and switch directions depending on what side of your body is moving. We recommend using the “left sensor” for the left side and “right sensor” for the right side. Click the sensor blocks a few times when you’re still, and a few times when you’re moving one side to see the sensor’s numbers, and decide what the threshold is. Test this with your teammates, and talk about what your program should do, look like, and operate.
      1. Draw a flow diagram of your final program below.
      2. What was the threshold value you used for left side movement?
      3. What was the threshold value you used for right side movement?
3. Build
   1. Now, let’s put everything together!
      1. What you need:
         * 1 Lego WeDo SmartHub (the lego block with the button)
         * 2 Lego WeDo motors
         * 2 black rod legos
         * 2 small black Lego wheels
         * 1 waterproof box
         * Velcro tape
         * 2 propellers
         * 1 screwdriver
         * 1 inflatable beach ball
         * miscellaneous Legos (for decoration)
      2. Place the WeDo SmartHub and motors in the provided waterproof box - place them however you want with the provided legos. Make sure the motors and the SmartHub are connected by sticking the motor’s clear connector in the back of the SmartHub. Stick the black rod pieces in the motors, and make sure they stick out of the holes drilled to the side of the box.
      3. Place the small wheels on the outside ends of the black rod pieces, and press them into the side of the box.
      4. Cut 2 small pieces of velcro tape, and paste one side of them on the wheels. Paste the other side on the propellers.
      5. Connect the WeDo to your laptop with the instructions above. Test to make sure the motors move properly before screwing the box lid.
      6. (Optional) Inflate the beach ball and put more velcro tape on the ball. Paste the other side of the velcro on the waterproof box lid. Decorate the beach ball and box however you want!
   2. Experiment with the devices! Create a game with the WeDo and Muse headsets, and have it move all sorts of ways depending on the Muse headset’s data. Can you think of a way to make a game with these devices and play with your friends?
4. Questions
   1. EEG: What are EEG waves, and what do they measure?
   2. AI: Do you think we should continue to train models that recognize things? Why or why not?
   3. Creativity: Describe a game you could make using the extensions available on Cognimates.
   4. Waterkinesis: Describe the game your group created with the Muse and Wedo sets.