

## HW6: 3 Ideas

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### Project 1: Use EEG and EMG to control prosthetic arm

- EEG and EMG are attached to person and the EEG and EMG are used to control a prosthetic arm that's also connected to the person. If the patient is only missing the forearm, the EMG would be attached to the upper arm bicep and tricep areas. If the patient is missing their whole arm up to the shoulder, the EMG could be attached to the deltoid and shoulder area. So, when the patient flexes, the prosthetic arm would flex like a normal arm. The EEG could be used to control fingers. So, it could be controlled using blinks. For example, if the person blinks twice, the fingers could curl. Or, the person could program a series of blinks to control one finger (right, left, right, right, left). Also, sensors could be added to give a sense of touch. For example, there would be a beep or light that turns on if the person touches something hot.
- Participants using the prosthetic arm would be wearing the EEG, EMG, and the arm. They would be able to control the arm with their muscles and blinks.
- Criteria
  - The electronic component would be used throughout the arm, with the EMG, and the EEG.
  - The laser cut portion might be used for parts of the arm.
  - The 3D printed portion would be the bulk of the arm.
- It would be evaluated by testing it out. The EMG should be able to control the bigger parts of the arm to move (elbow bending, etc.) and the EEG should be able to have the arm move the fingers for smaller movements using blinks.
- It should be built within budget because the only things needed are electronics to make it, the sensors, and stuff we already have in the lab. Things we already have in lab are EMG, EEG, 3D printer, and laser cutter.
- At the symposium, people might be able to try on the arm! It is designed for people without an arm, but, there might be a way to strap it to someone who has an arm, just to test out.

### Project 2: solar powered plant waterer

- A pot with a plant could have a sensor in the soil detecting how much water is there and then if there isn't enough, the sensor would tell the plant watering tube to let more water in. The plant watering tube would be streamed into the soil and connected to a bowl of water. Basically, it would be like a straw from the bowl to the plant. There would be a clamp at the end of the straw that opens and closes based on the reading of the water sensor inside the soil. This whole mechanism could be solar powered, since the plant has to be in the sun anyway... why not harness more of that sun's energy?
- Participants with this system wouldn't have to interact with it too much at all. However, they should occasionally check the mechanics of the system to make sure everything is still working properly.
- Criteria

- The electronic component would be used to power the sensor and the clamp on the tube.
- The laser cut portion might be used for an enclosure of the electronics.
- The 3D printed portion would be used to make the flower pot and bowl with tube.
- The project would be evaluated by its efficacy. If the flower pot is overflowing or is completely dry, then the sensor or the mechanism aren't working properly.
- The project shouldn't take too many electronics to work, but the solar panel might be the most expensive part. Otherwise, we already have the 3D printer and laser cutter in class.
- At the symposium, people would most likely watch the mechanism of the flower being watered. However, we could switch out the flower pots and test how the sensor works in different levels of water in soils. So, we could switch it between a dry soil and a sufficiently watered soil.

Project 3: use EEG and EMG to control a solar power car.

- An EEG and EMG are attached to a person and are used to control a car. For example, blink with left eye, car turns left and blink with right eye, car turns right. With the EMG, the speed could be adjusted by the flexing of muscles. So, for example, the right arm could flex which would speed the car up and the left arm could flex to slow the car down. Both arms could flex to stop the car. A double blink could put the car in reverse. The car could be charged using solar power.
- Participants would interact with this system and attaching the EEG and EMG to themselves. Then the car would be controlled by their movements. They would also have to place the car in the sun to charge
- Criteria
  - The electronic component would be used to power the car.
  - The laser cut portion might be used for decorative parts of the car and the body of the car.
  - The 3D printer could be used to make an enclosure for the electronics.
- It would be evaluated by how well it responds to the movements.
- It would be built within the budget because we already have the 3D printer and laser cutter and those will be the bulk of the car. We also already have the EEG and EMG. The most expensive thing to buy would probably be the solar panel and then the rest of the electronics.
- We could connect the EMG and EEG to the people attending the symposium and they could test out the car and try to control it with their movements.

Project Idea  
Prosthetic Arm



Water powered plant waterer



EMG + EEG to power a car

