Open source cost-effective open-source 3D-printed Anthropomorphic Neuroprosthetics

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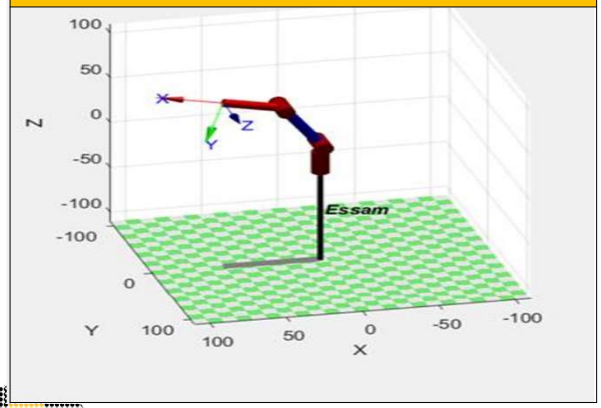
Research Question

A cost-effective open-source 3D-printed Anthropomorphic Neuroprosthetics arm that can be manipulated like an ordinary human arm and creating an open-source Muscle machine interface module that is cost-effective and could help patients have their own custom attachable bionic arm and research treat in the rehabilitation of patients.

Inverse Kinematics Simulation



Results

The 3D-printed Anthropomorphic Neuroprosthetics has been tested and trained to operate with a single channel EMG module with different action potentials. A study was conducted to understand the time difference. Also, the Influence of sensory stimulus and the strength of the servo reaction when used on people with different levels of athleticism were studied. The following results:

- The reaction time does not seem to change on different muscle types.
- External stimulus such as if the person is in contact with another object when conducting the experiment does seem to show a change in the action potential.
- The time delay generally depends on how fast a test subject tries to move his finger.
- People with more superficial muscles showed better results
- Also reducing the amplifier gain as much as possible provided better servo movement.

Methodology

Using Simulink, we used the data collected from the Muscle action potential and run inverse kinematics models. Then once perfect, we deployed the model using Arduino to control the 3D printed robotic arm.

Future Work

- Develop Multichannel EMG module
- 3D print bionic arm with working joint

Robotic Arm