Robotic Arms connected to Sensor Gloves Remotely

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Background/Purpose

- There are many cases where unsafe conditions or lack of ample room prevent us from performing important tasks. That is why our design could be applied to situations such as:
  - Remote maneuvering in hazardous situations, i.e rubble during a rescue
  - Doctors tending to or performing surgery on patients remotely
- Mental health is important and can be aided through social interactions.
  - Will be able to connect people who are unable to physically be with other people

Project Goal

- Create an enhanced method of communication between 2 individuals through use of a robotic aid
  - Allows recipient on the robotic/receiving end to experience the other's simulated presence.

Future Work

- Week 4: start on construction of shoulder/torso and connecting electronics to limbs
- Weeks 5-6: finish upper body construction, start working on video chatting feature
- Weeks 7-8: complete all needed software implementations, proceed to debug and test
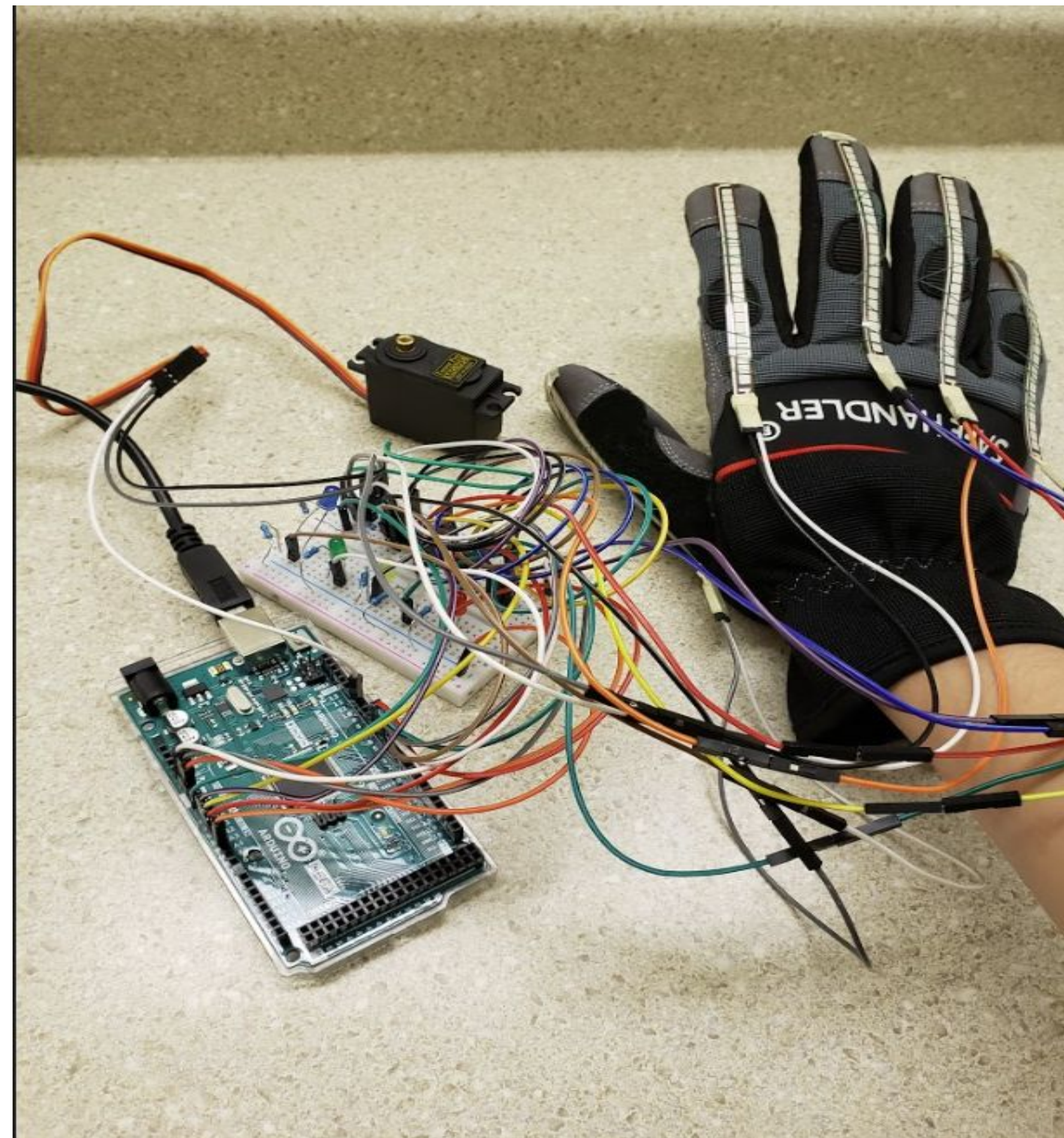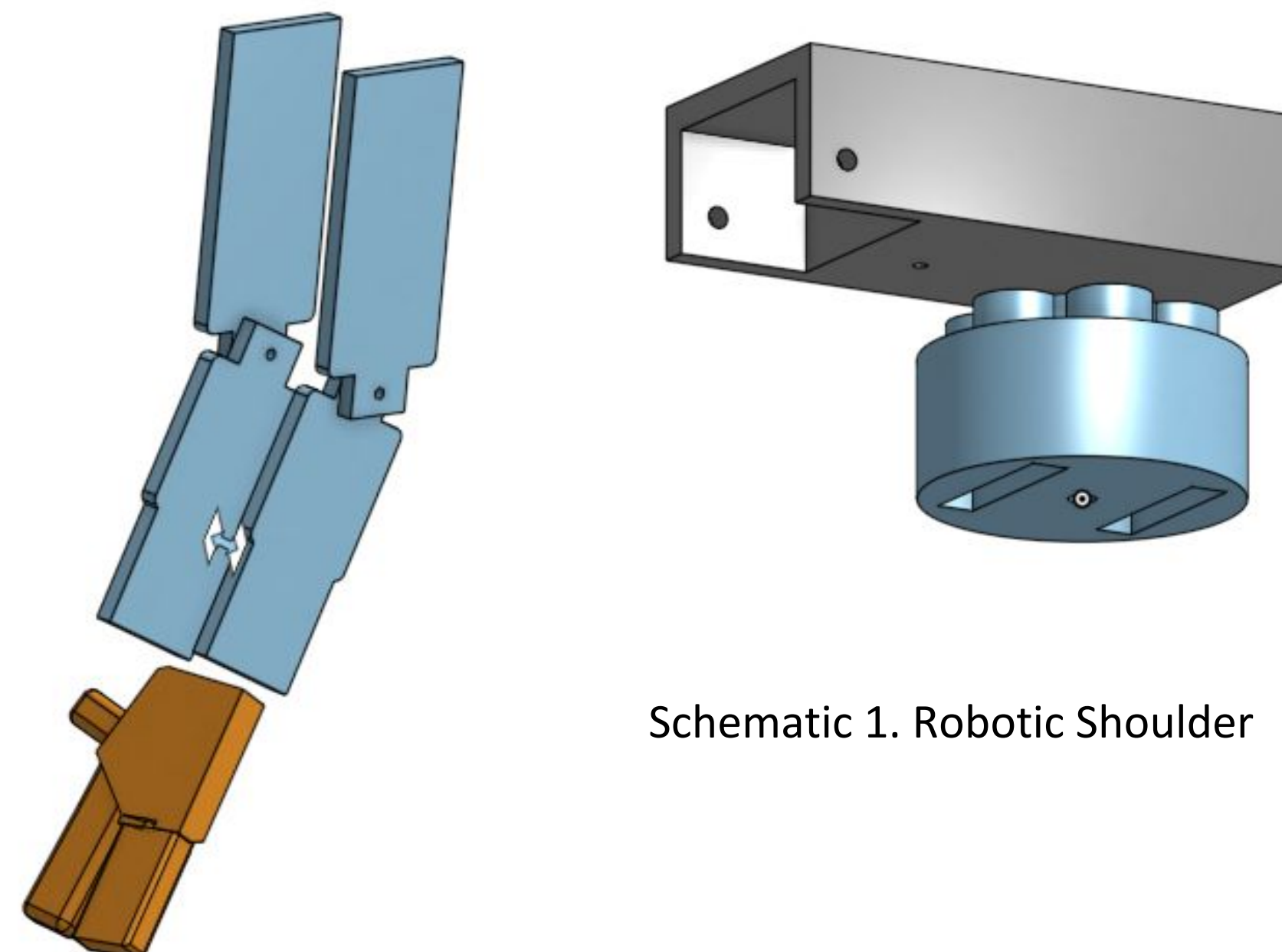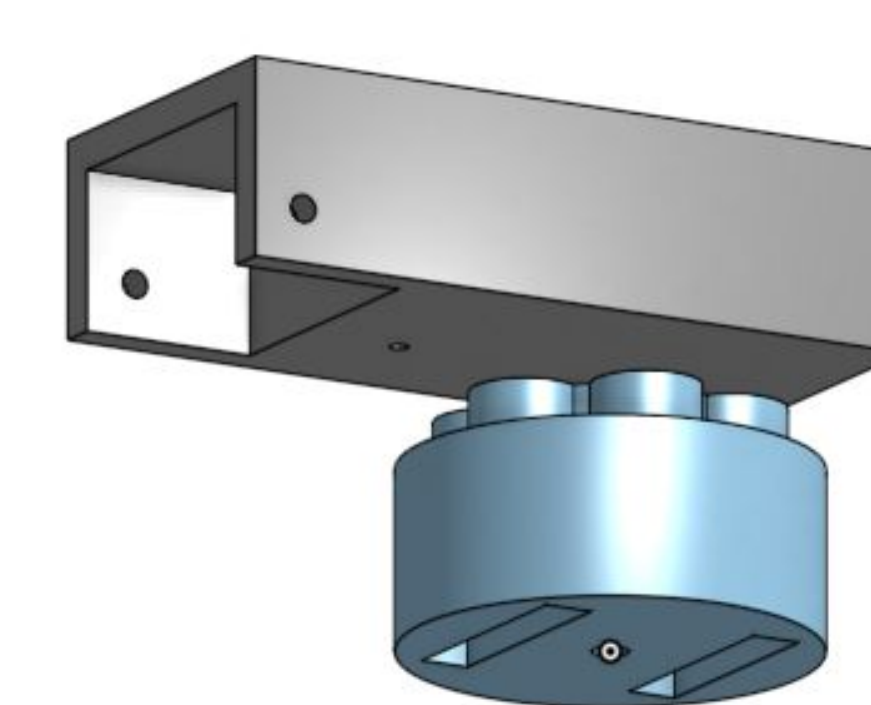- Weeks 9-10: debug, add finishing touches or optional features

Figure 1. Remote Glove with Circuitry

Schematic 1. Robotic Arm

Schematic 1. Robotic Shoulder

Progress/Challenges

Progress
- Design structure for the arm is finalized
- Code for flex sensors and Bluetooth complete
- Code for Skype web chatting on Raspberry Pi in progress

Challenges
- The motors did not have 360 rotation
  - New motors with 360 rotation had to be ordered, which put us a little behind schedule
- The hands were not delivered until a week ago. Then when it was delivered, one of the hands was broken. This set us back as well
- The shoulder was difficult to design in order for the robot's arm to move outward and forward

Standards

- Use Bluetooth/WiFi connection between gloves and arms since it is a standard connection method.
- Use Arduino Mega and Raspberry Pi to control the robotic arms since Arduino and Raspberry Pi are standard microcontroller company.

References

[1] "Robotic Surgery: A Current Perspective : Annals of Surgery," *LWW*. [Online]. Available: https://journals.lww.com/annalsofsurgery/Abstract/2004/01000/Robotic_Surgery__A_Current_Perspective.3.aspx. [Accessed: 01-Nov-2019].

[2] P. Dhepekar and Y. G. Adhav, "Wireless robotic hand for remote operations using flex sensor," *2016 International Conference on Automatic Control and Dynamic Optimization Techniques (ICACDOT)*, Pune, 2016, pp. 114-118.

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