



# Rehab Robotics- Touch Trainer

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## Background

According to the Center of Disease Control, each year approximately 795,000 people suffer from a stroke. It is currently the leading cause of long-term disability in the United States. When an individual suffers from a stroke, many lose somatosensation in their left or right hand. This impairment refers to your sense of touch (tactile sensation) and sense of movement of your limbs (proprioception). Limitations include patients loss of motor function typically affects the fingers up to the wrist with slower and weaker muscle strength in the arm. Additionally they can suffer from spasticity which is stiff, tight muscles that keep the effected hand clenched tight. Rehab Robotics projects from previous years discovered this loss of somatosensation makes robotic finger training ineffective. Unfortunately, many rehabilitation facilities for stroke patients focuses on assessments of movement and not on somatosensation.

## Goals and Objectives

- Develop the first portable and home automated, stroke rehabilitation device
- Progress sensation in impaired hands of stroke patients after 6 months of using the cube
- Manufacture a cube at maximum size 10"x10" that is battery operated
- Have game times progress until the user can play a full song

## Timeline

### Winter Quarter

Week 1-2: Ordering parts and assigning roles

Week 3-4: Finalize material & manufacturing

Week 5-7: Begin 3D printing & update design

Week 8-9: Finish prototype & update CAD

Week 10: Add electronics & begin testing

### Spring Quarter

Week 1-2: Continue working on code & electronics

Week 3-4: Determine materials for final device

Week 5-7: Fabricate finalized CAD

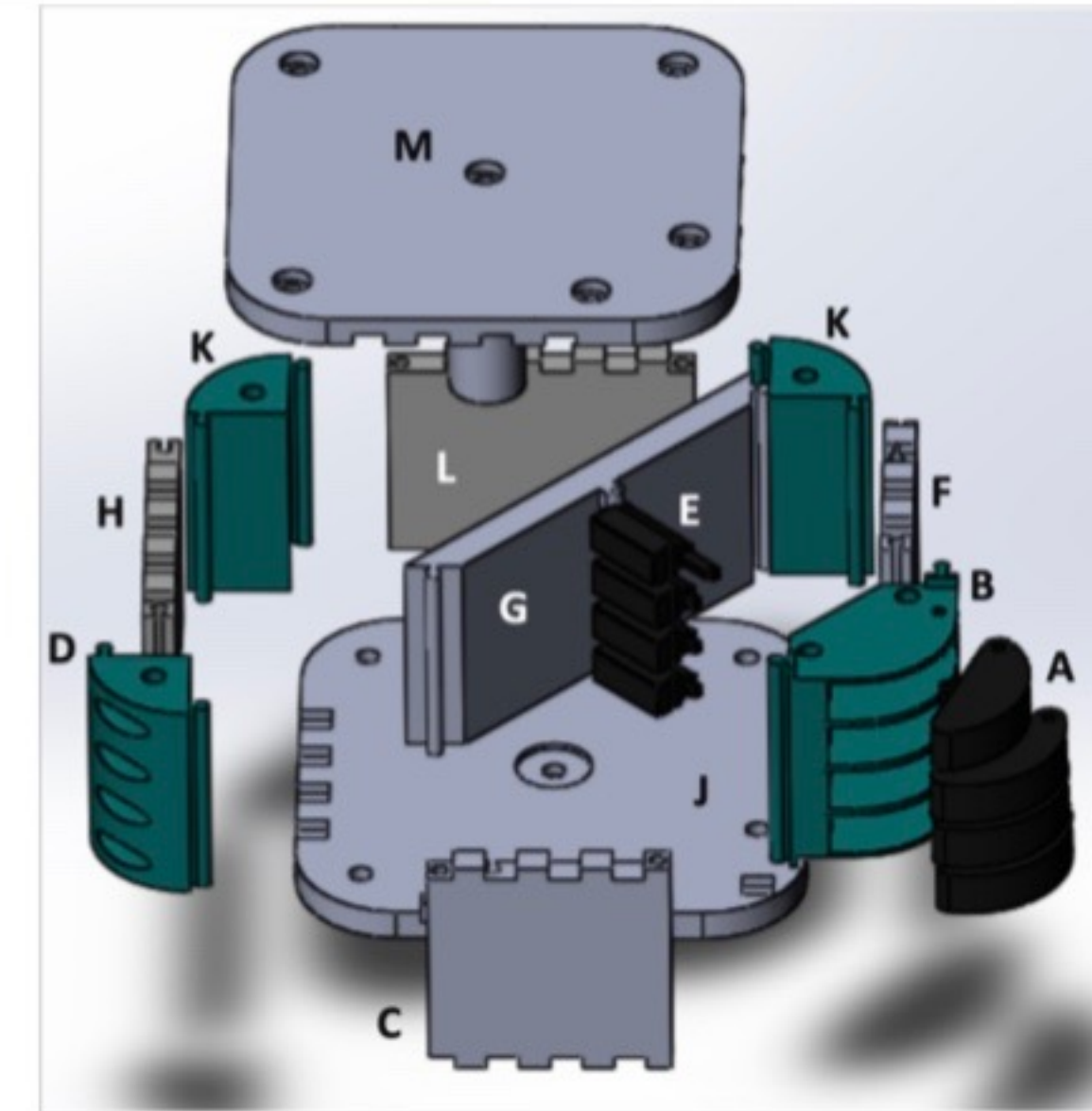
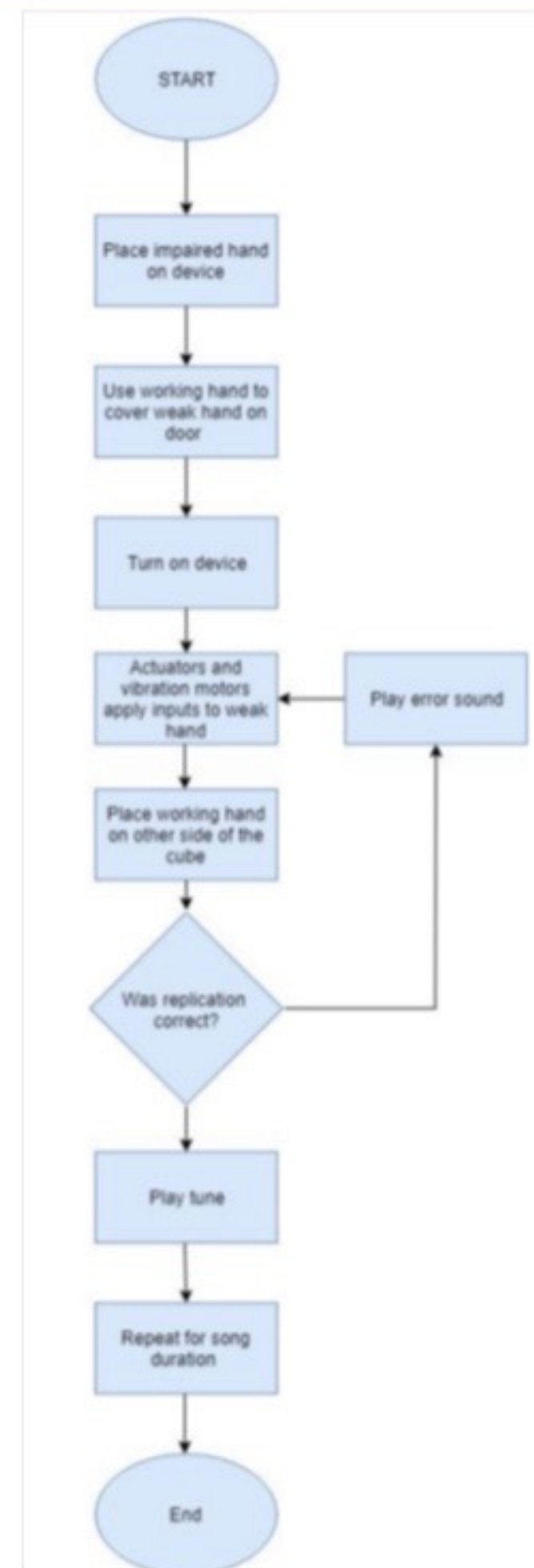
Week 8-9: Finalize game, code, and fabrication

Week 10: Have fully completed device

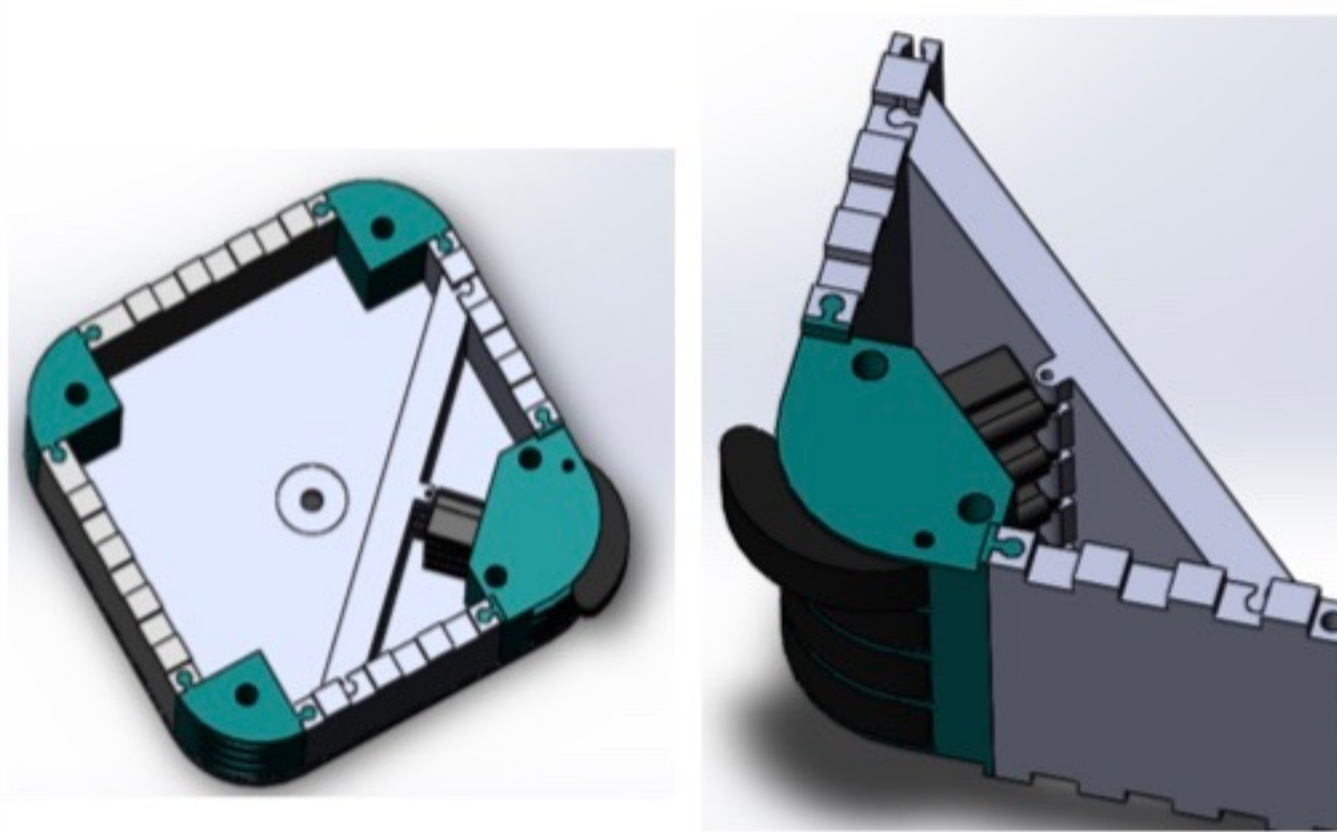
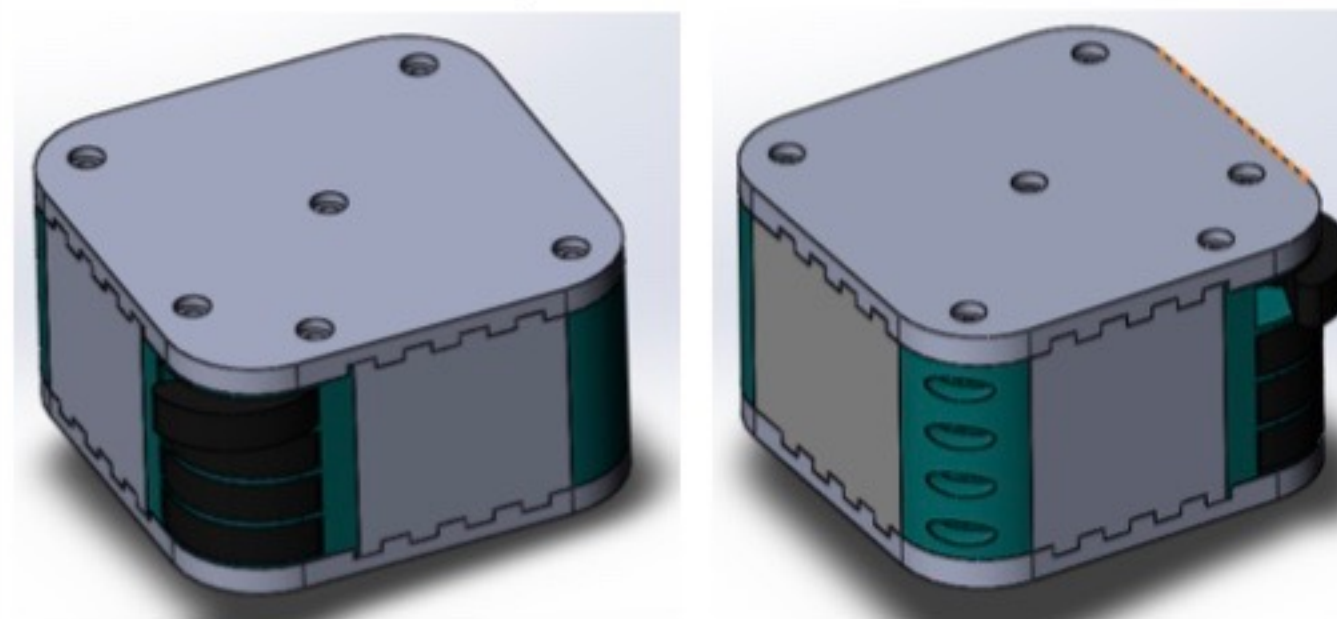
## Design Criteria



## Game Operation



- A: Finger Keys (four of them for each finger)
- B: Disabled Hand Corner
- C: Front Wall
- D: Working Hand Corner
- E: Actuators (shaft & base treated as one, 6 are needed for the entire device)
- F: Disabled Hand Wall
- G: Actuator Connections
- H: Working Hand Wall
- J: Bottom Wall
- K: Basic Corners
- L: User Wall
- M: Top Wall



## The Bigger Picture

- Currently there is no portable, at home device to retrain somatosensation
- Will not require assistance from a medical professional.
- Data collection will be used to further stroke rehabilitation
- Ideally first device that will universally fit all hand sizes.
- Economically appealing: Lower cost training device

## Next Steps

- Finish prototype by end of Winter Quarter
- Complete endurance and vibrational tests on device in Spring Quarter
- Fabricate Phase I device by end of Spring Quarter

## Contact Information

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