

# Thumb Exoskeleton

Robotic Rehabilitation — The independent patient.  
 Advisor: Professor David Reinkensmeyer, Ph. D.

## Background

Stroke patients have difficulties with their hand movement and any currently in post-stroke rehabilitation are being treated by physicians with machines that assist the patient in small hand tasks. However, these methods are costly and do not allow for the patient to have their own assisting device with them at all times.

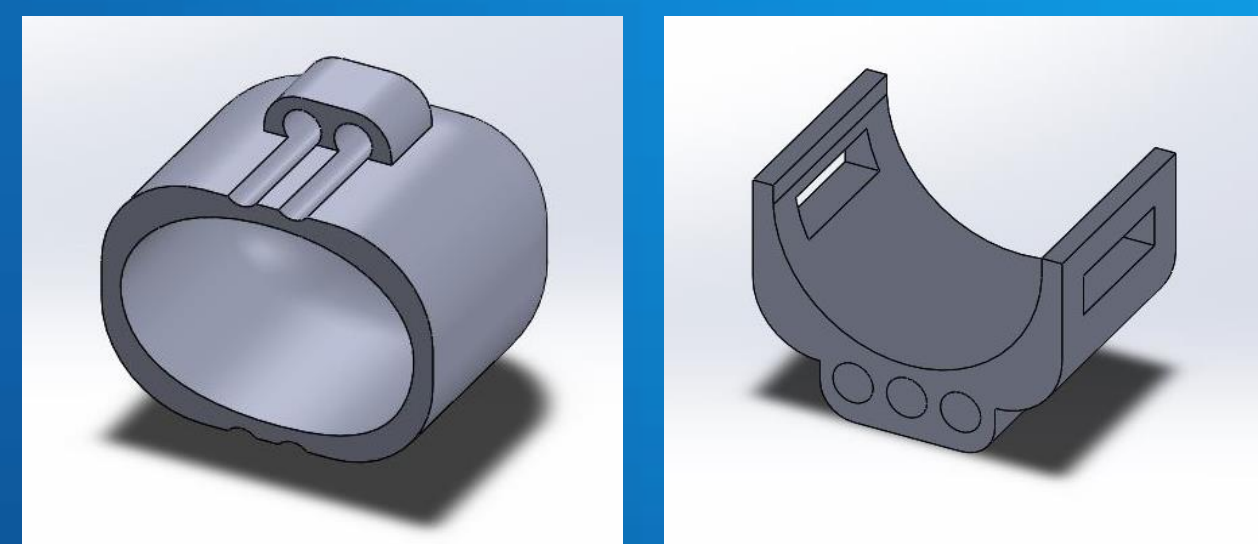
## Project Goal

- Design a portable exoskeleton device aimed at assisting a patient open and close their thumb.

## Objectives

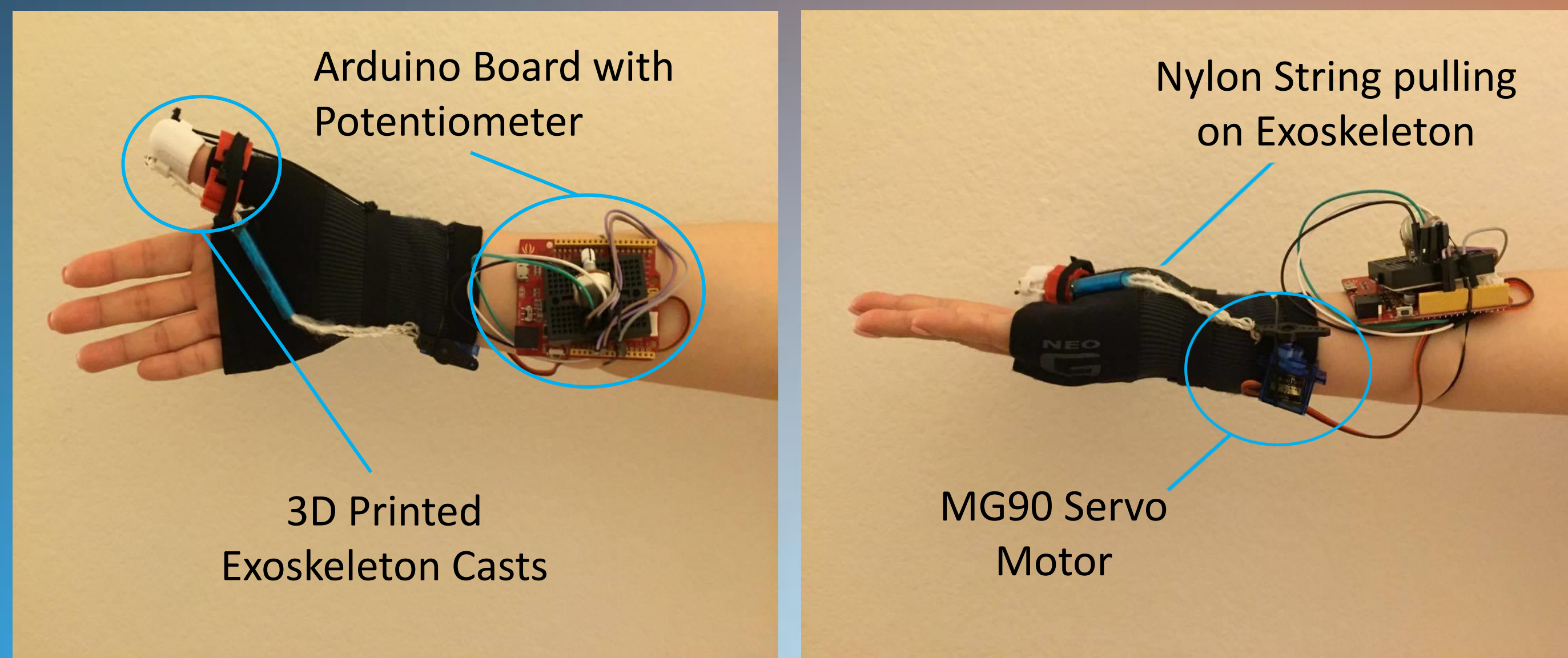
- Have stroke patients test the effectiveness of a prototype.
- Improve the overall design of the project after various modifications and tests.

## Current CAD Prototype Casts

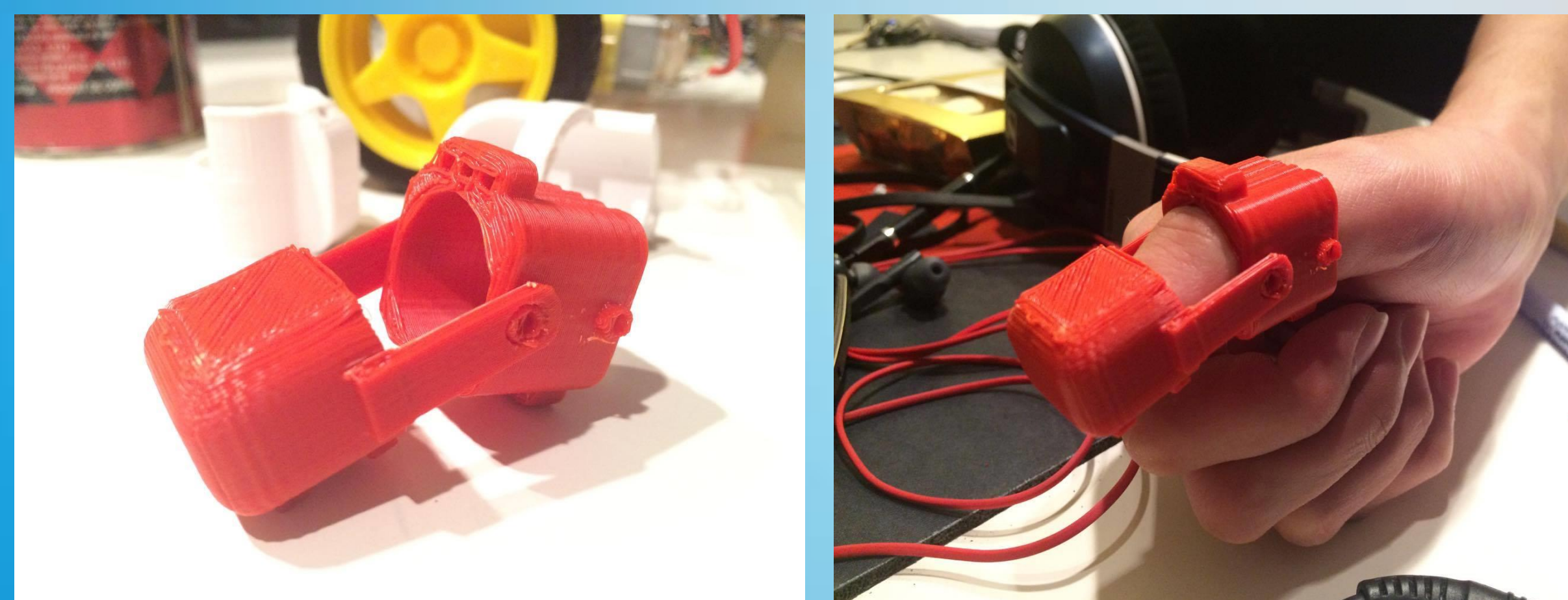


## Design

- Wearable glove constructed with 3DP thumb casts adjustable to patient's thumb.
- Elastic bands control the expansion movement.
- Servo connected to nylon string attached to the bottom of casts control the closing of thumb.



## 3D Printed Sample Casts

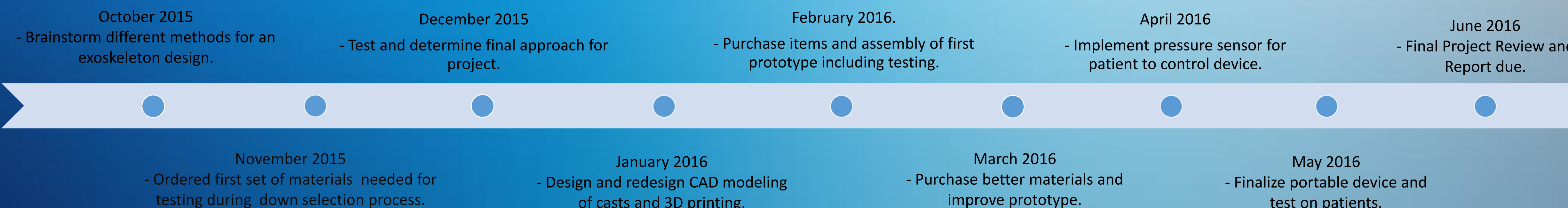
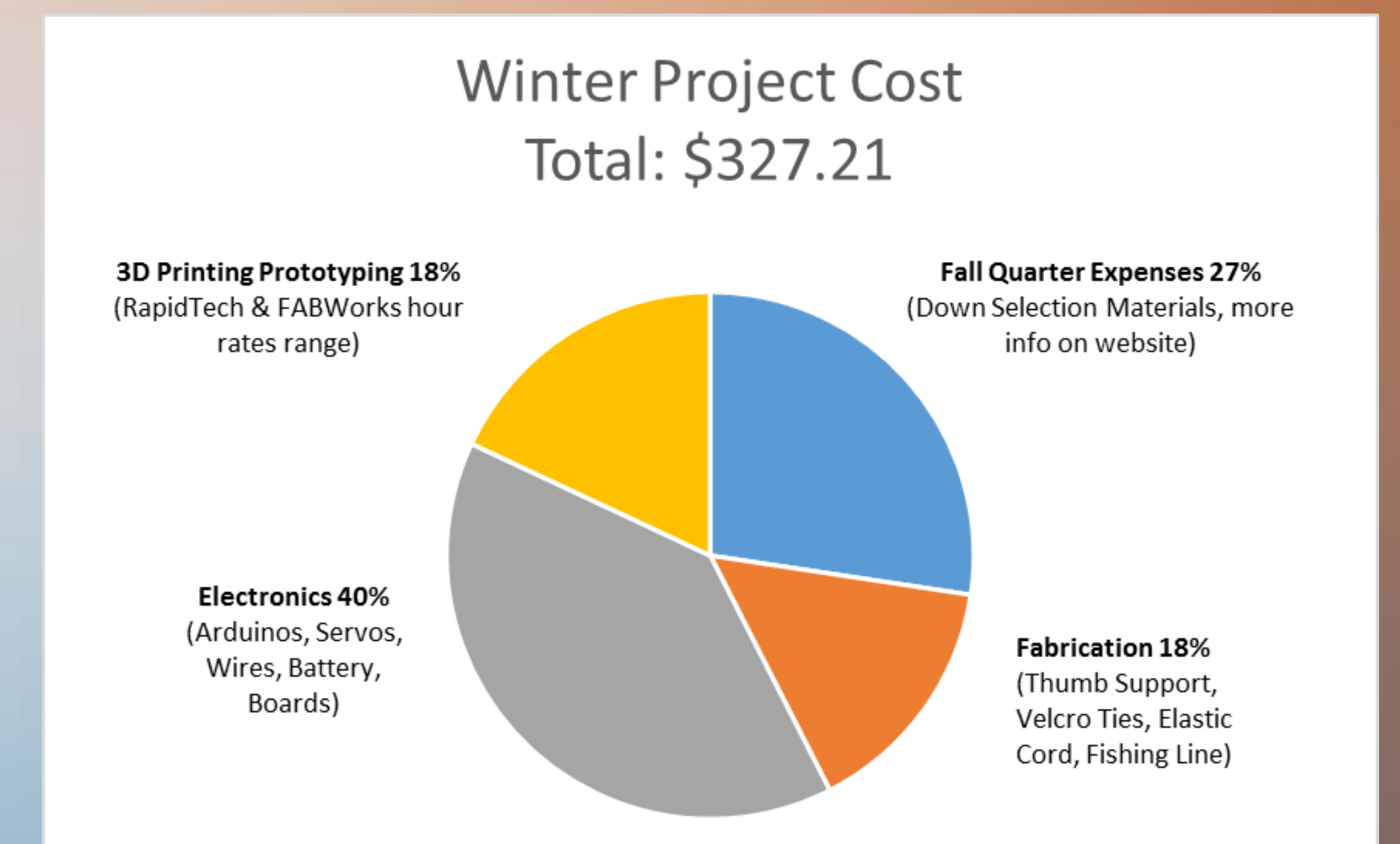


## Future Progress

- Implement a pressure sensor to the design.
- Minimize the packaging of all electronic components for a handheld device.
- Mount the device in a way that is comfortable for the patient to control the motion of their thumb.

## Project Significance

- 795,000 Americans each year have a stroke and 8 out of the 10 survivors will suffer from Hemiparesis, or one-sided weakness in the body.
- Patients can become independent from a physician with a thumb exoskeleton.
- Medical bills for these patients can also be reduced in the process.



For more information, please contact:  
 Emanuel Reyes [reyesed@uci.edu](mailto:reyesed@uci.edu)  
 Alex Liu [yangl19@uci.edu](mailto:yangl19@uci.edu)  
 Annie Lee [menghsul@uci.edu](mailto:menghsul@uci.edu)  
 Han Zheng [zhengh4@uci.edu](mailto:zhengh4@uci.edu)

