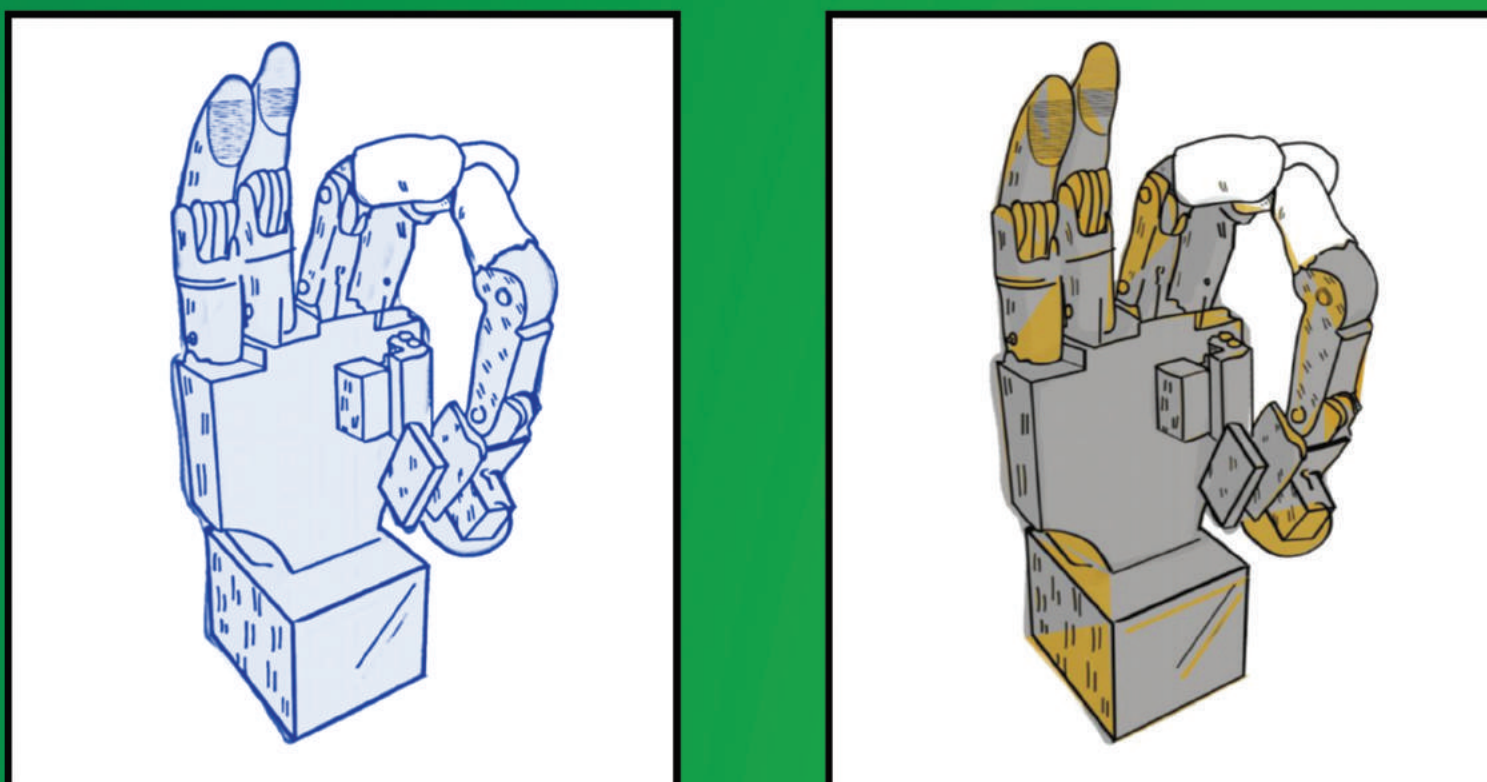


# CUSTOM **FORCE** SENSOR

## AND SENSORY FEEDBACK SYSTEM TO ENABLE GRIP CONTROL OF A ROBOTIC PROSTHETIC HAND

### INTRODUCTION

- Prosthetic hand lacking sensory feedback are costly
- Cost and sensory feedback is addressed



Prosthetic Hand

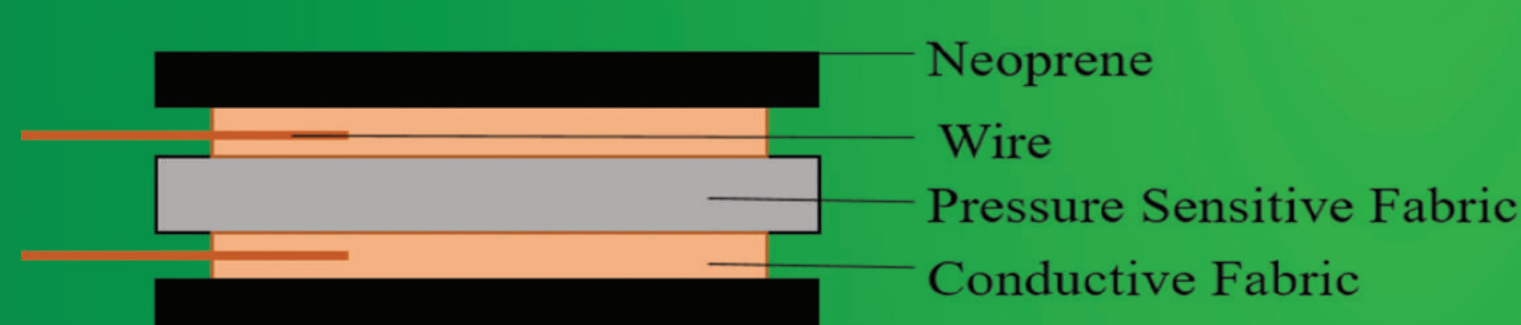
### OBJECTIVE

Design low cost sensory system for prosthetic hand

### METHODS

#### Testing of custom force sensors

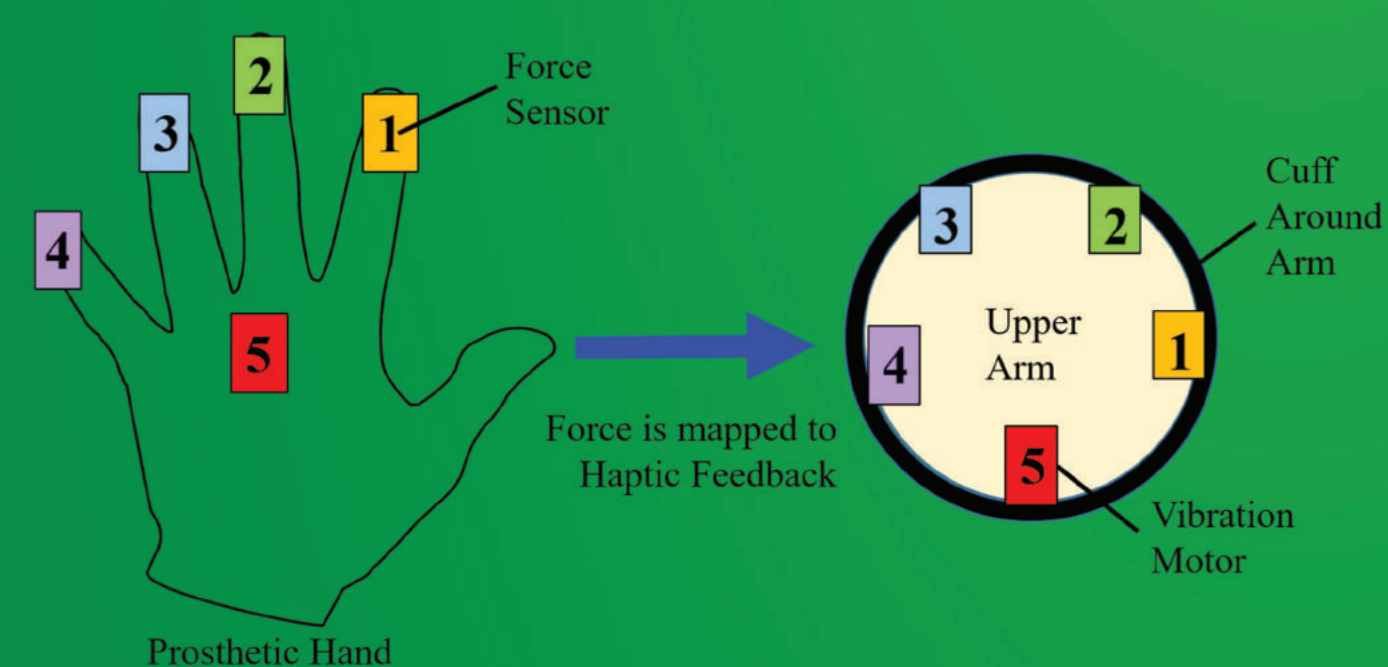
- Compare force vs voltage against a commercial sensor
- Accuracy of force measurement at different points



Design of custom sensor

#### Sensory feedback system testing

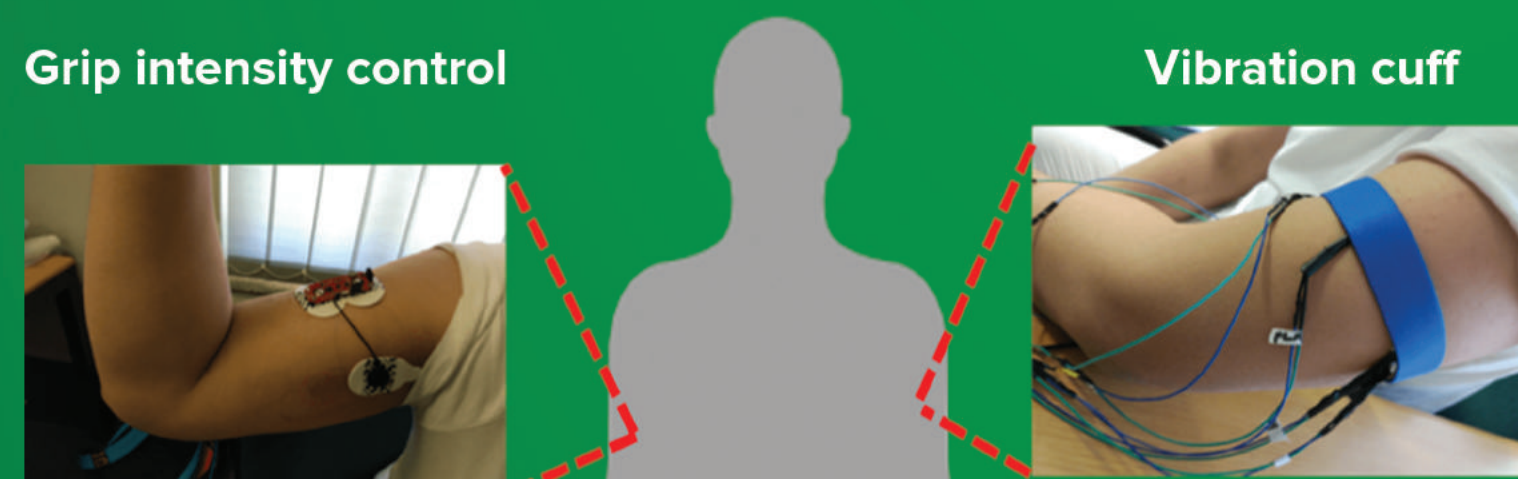
- Restrict visual and hearing sensors of user to prevent external factors influencing the system
- Comparison between perceived and actual for finger grasp and intensity of grip



Vibration sensory system set-up

#### Integrated system testing

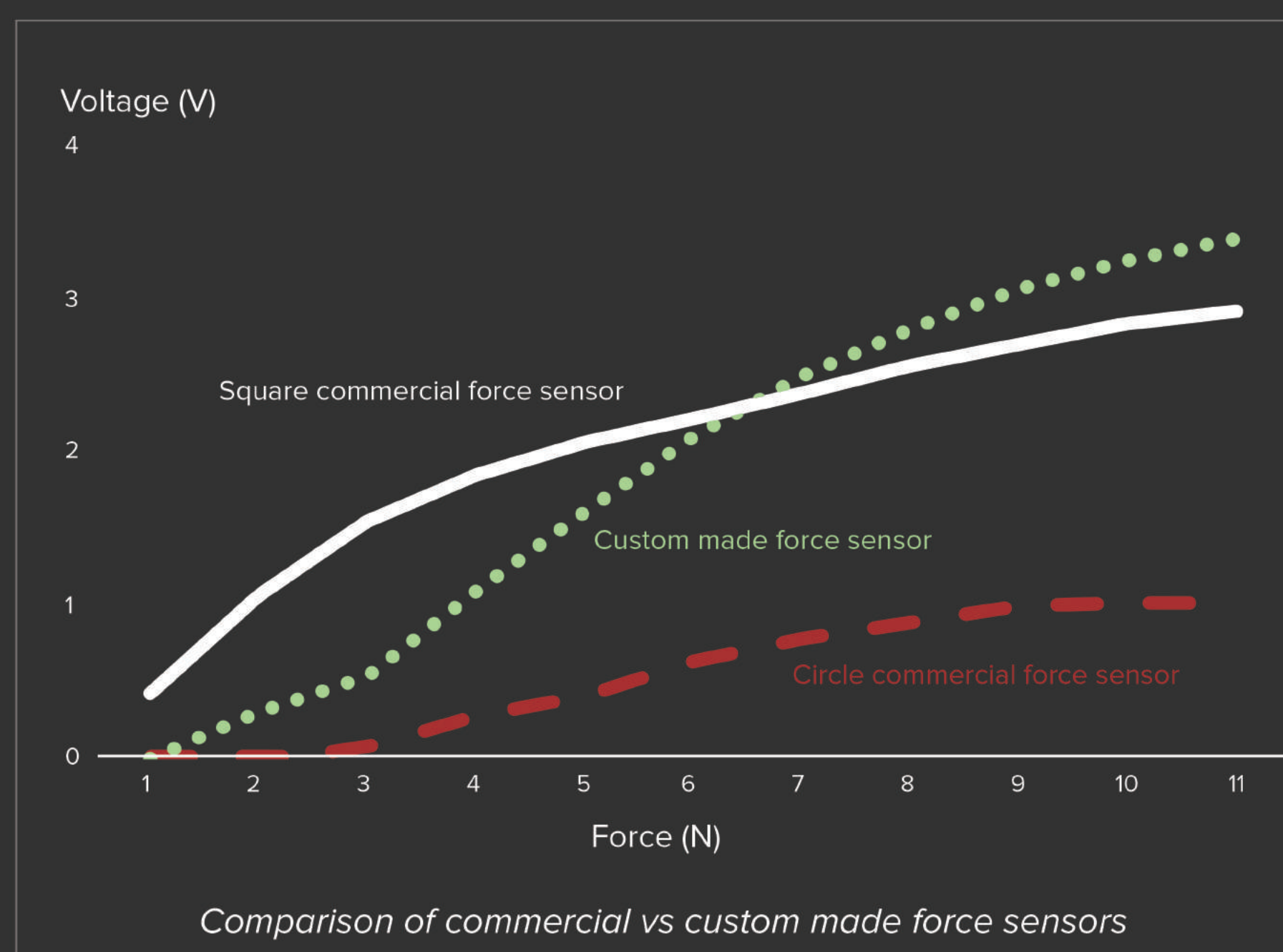
- Restrict visual and hearing sensors of user to prevent external factors influencing the system
- Objects are placed in the prosthetic hand
- Comparison between perceived and actual Regions, individual fingers and grip intensity



Force sensors

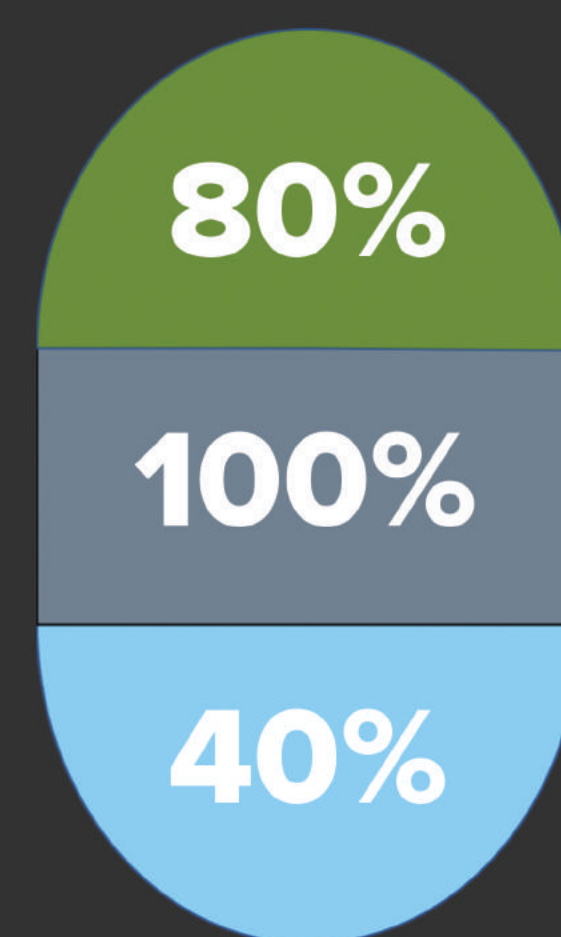
Integration system set-up

### RESULTS



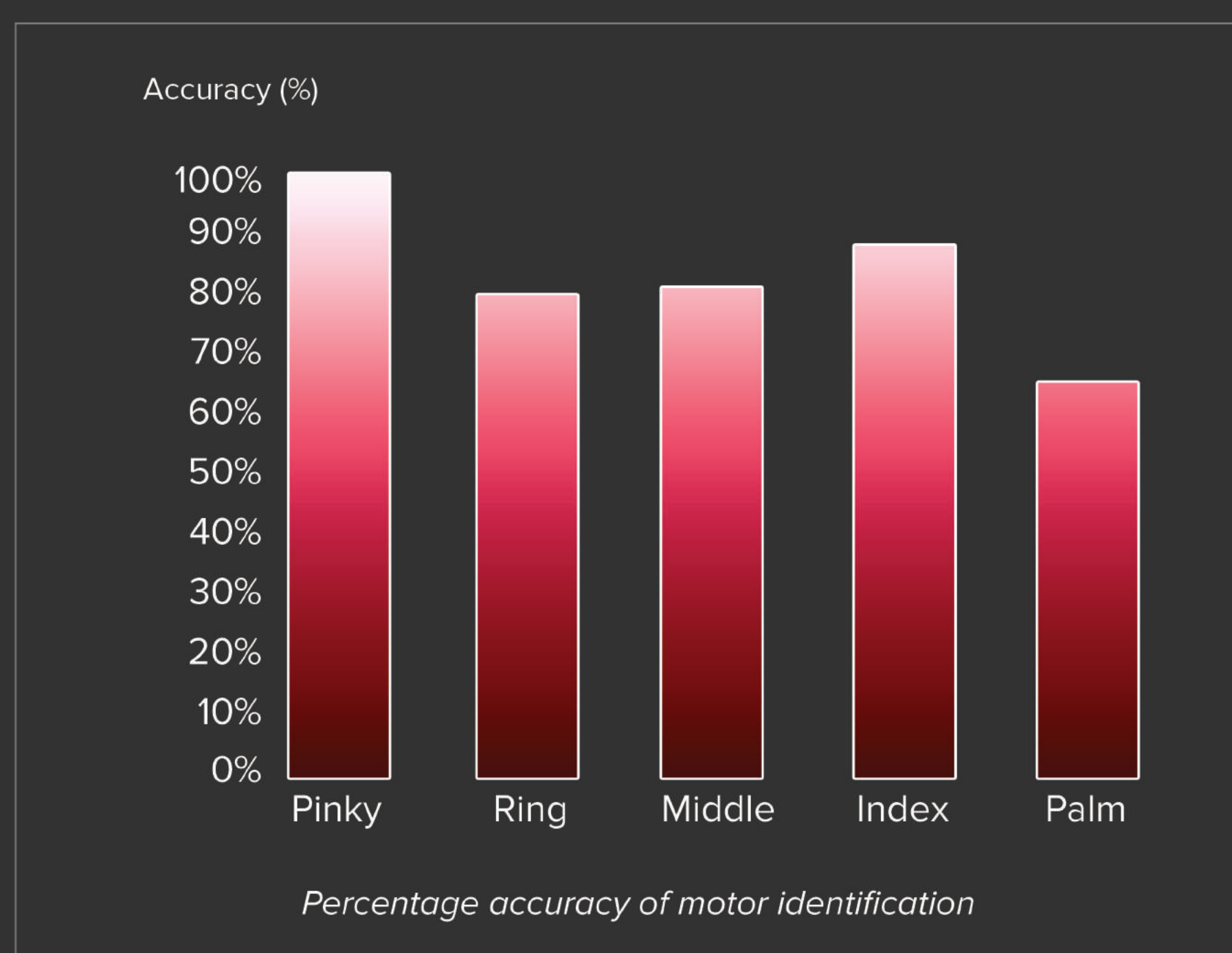
Comparison of commercial vs custom made force sensors

- Custom force sensors are linear (Voltage vs Force)
- Superior resolution to the circular sensors
- Cost \$1 each

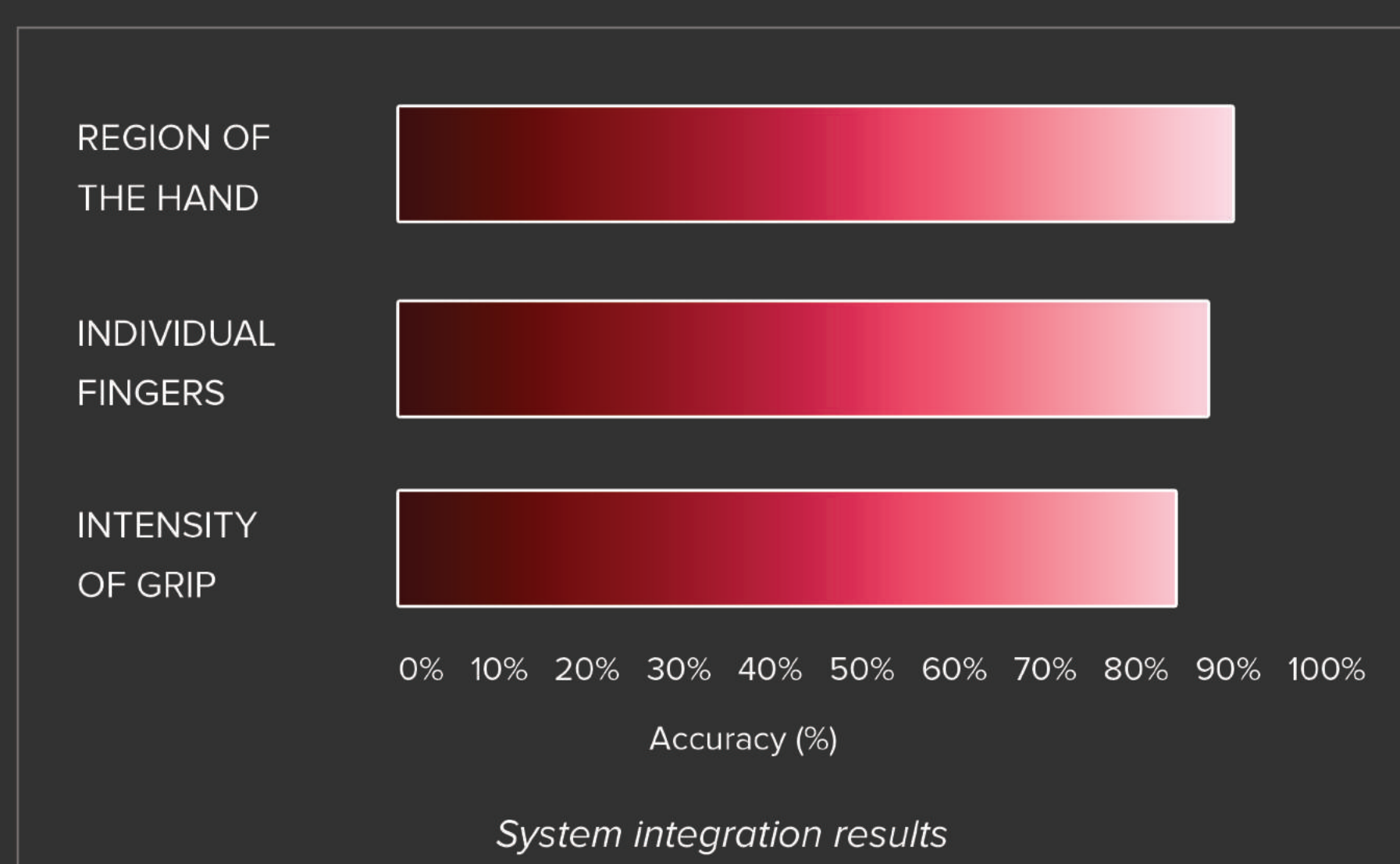


Force mapping across sensor, as percentage of actual force

- Sensor has an overall accuracy of 73%



- Finger detection accuracy of 82%
- Intensity accuracy of 100%



System integration results

- Distinguishing regions, individual fingers and grip intensity to an accuracy of 82% , 81% and 77%

### DISCUSSION

- Custom sensor can represent force accurately
- Sensory system, can decipher intensity and location
- Findings show that it is a viable option to provide cheap and functional prosthetics

### SEE THE SYSTEM IN MOTION



### FUTURE WORK

- Testing of other sensory systems
- Acquiring other properties of objects grabbed
- Rigorous testing of custom made sensor

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