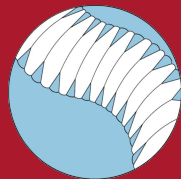




WPI



**SOFT
ROBOTICS
LAB**

Flexible Robotic Origami Gripper (FROG)

Presented by:

Anna Mederer (RBE/ME)

Maria Medina Martinez (CS)

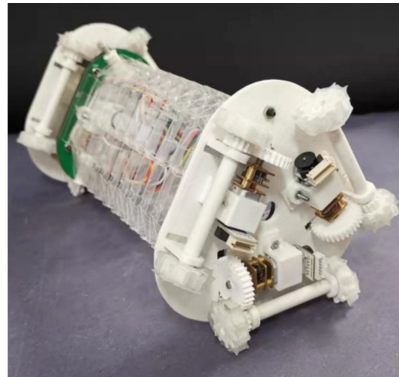
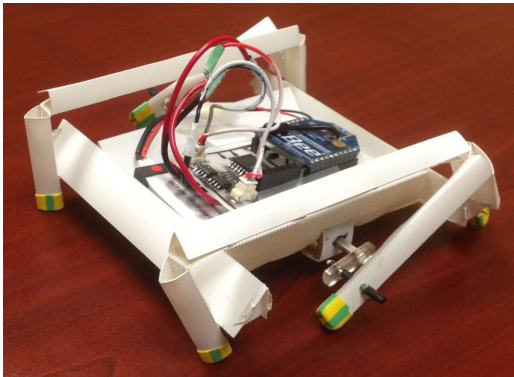
Selina Spry (RBE/ECE)

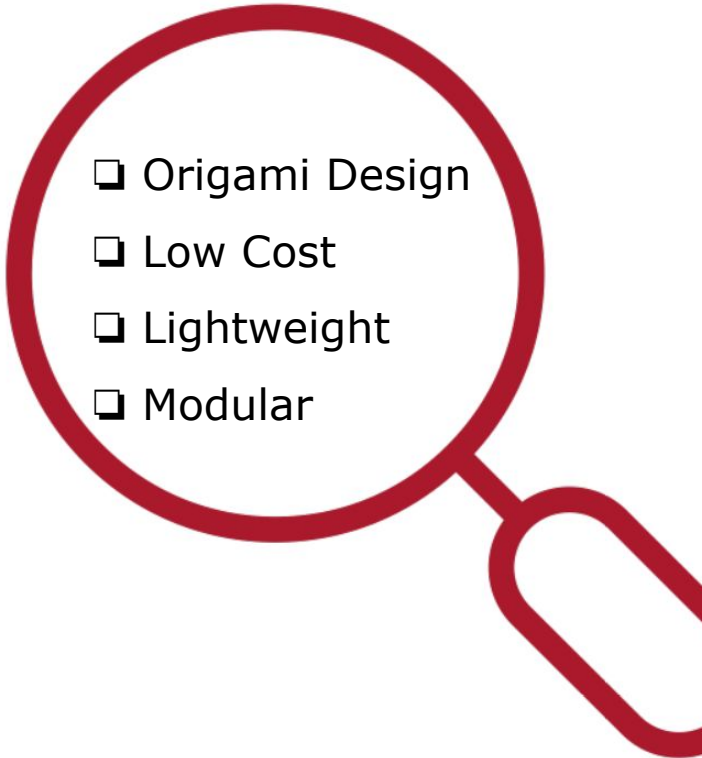


Project Motivation

Origami robot **benefits**

- Better payload to robot weight ratio
- Easy storage and deployability
- Flexible yet durable structure
- Convenient fabrication process



- 
- ❑ Origami Design
 - ❑ Low Cost
 - ❑ Lightweight
 - ❑ Modular

Background



Origami Yoshimura Module



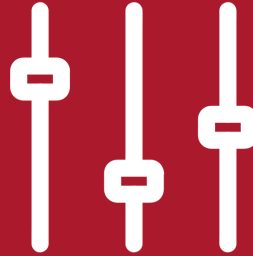
Ann Marie's Prosthetic Hand & Force Sensor

Goal and Objectives

Goal: To create a flexible robotic origami gripper capable of recognizing and grasping objects.



**Utilize Soft
Materials**



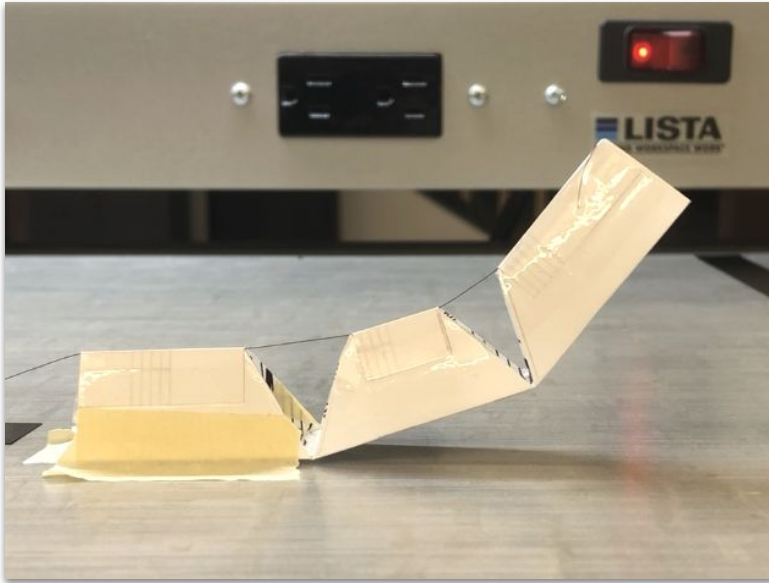
**Control
Movement**



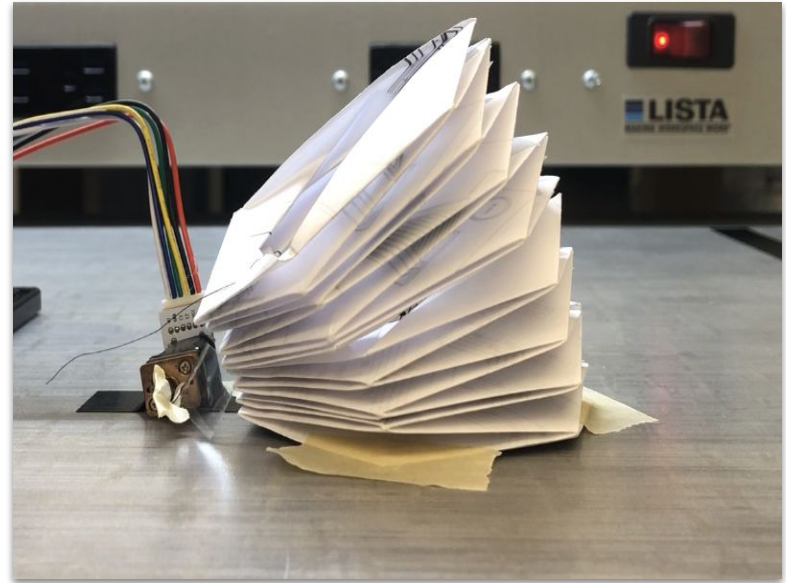
**Detect
Objects**

Prototyping

Triangular Beam

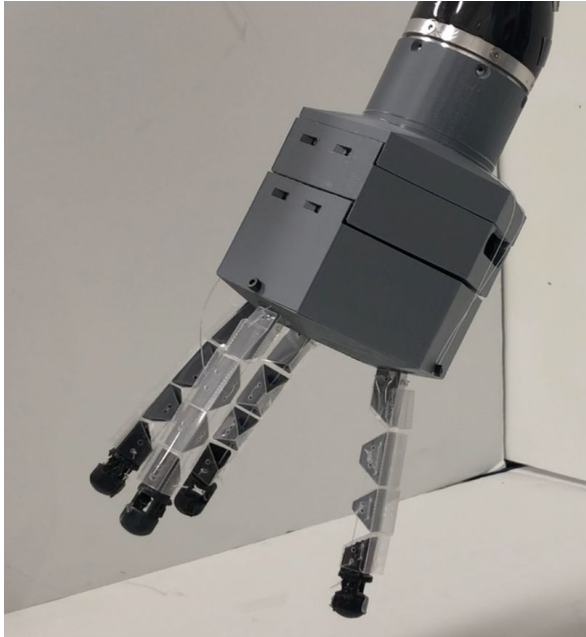


Yoshimura

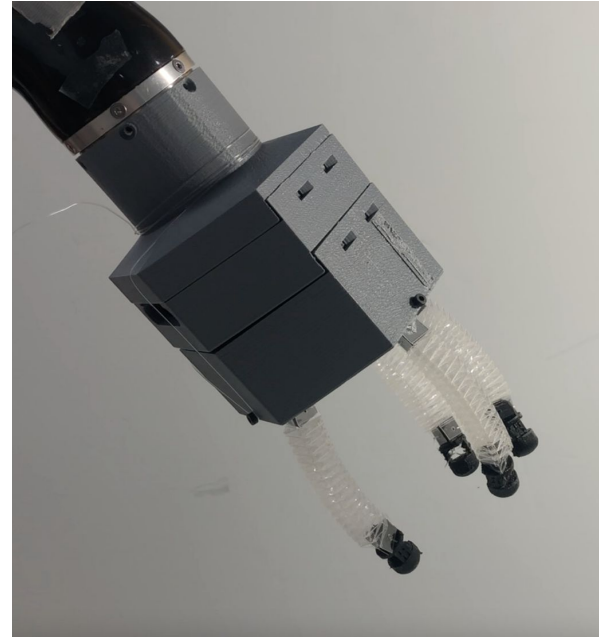


Gripper Designs

Triangular Beam

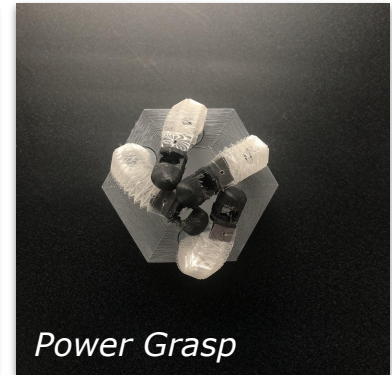
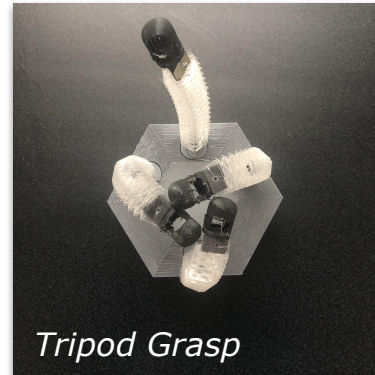
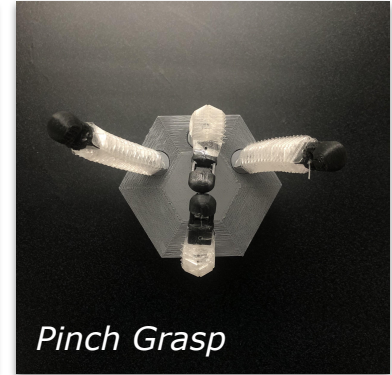
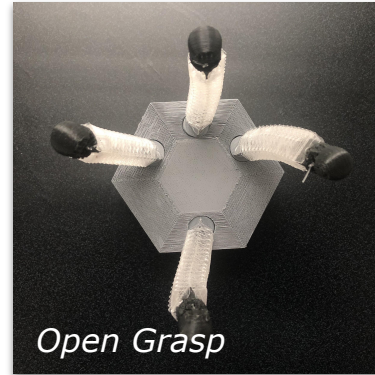
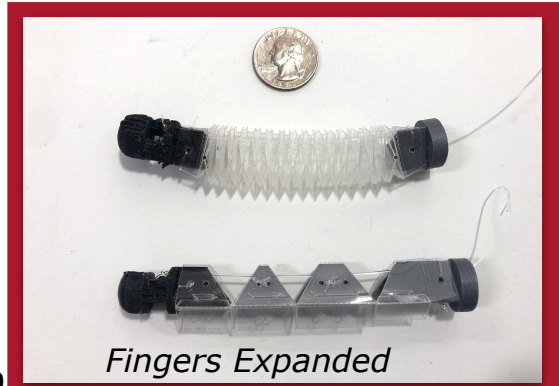


Yoshimura



Gripper Overview

Origami Finger Configurations

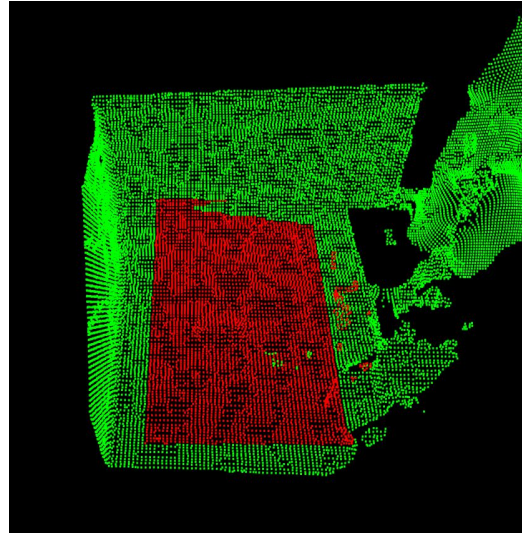


Object Detection

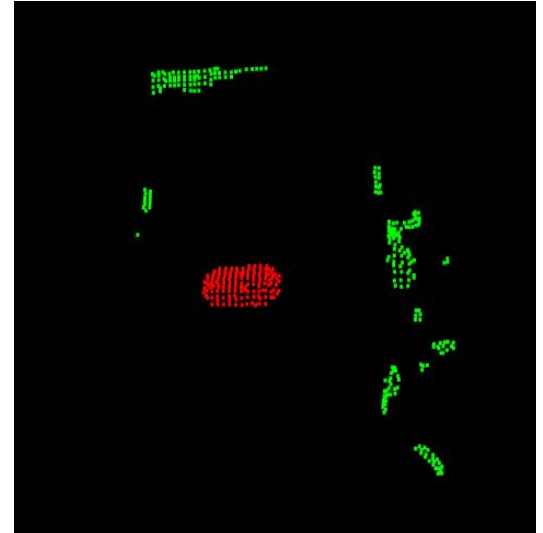
Image View



Region of Interest

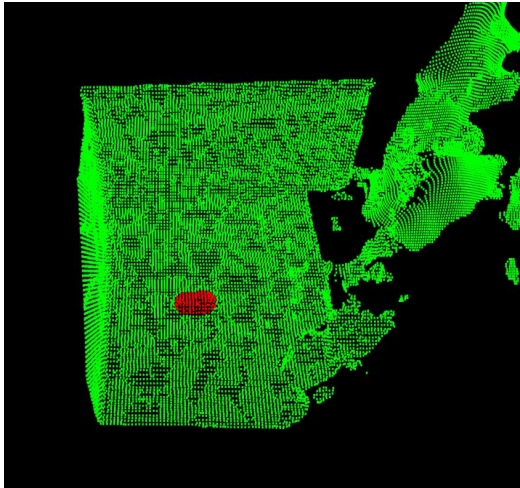


Segmented Object

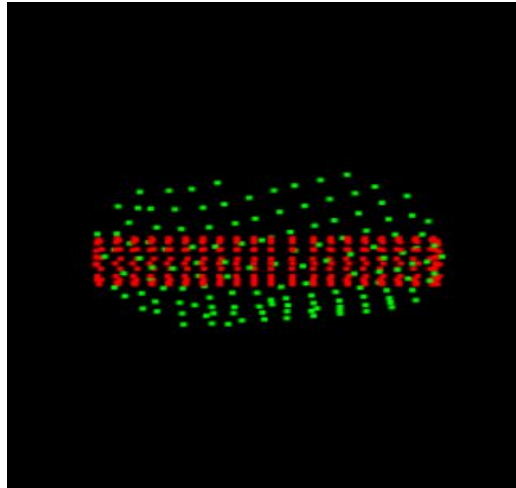


Object Detection

Object in Scene



Aligned Template

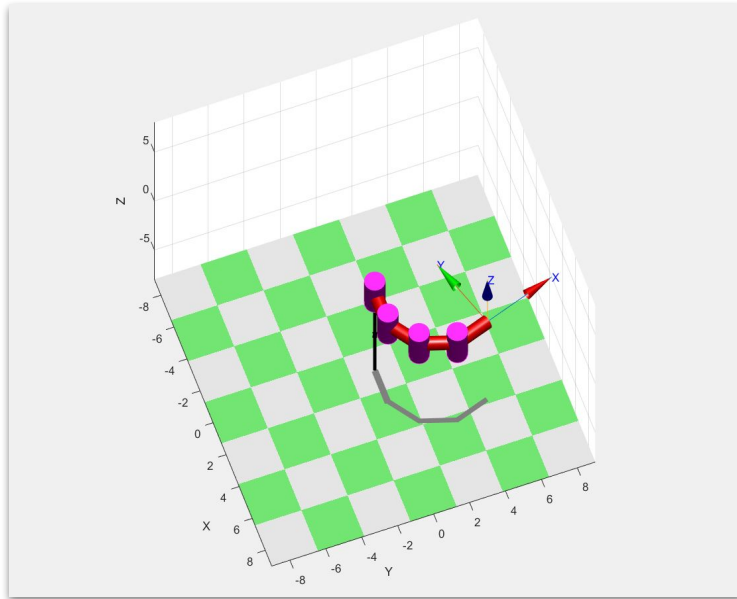


PCA Determined EV

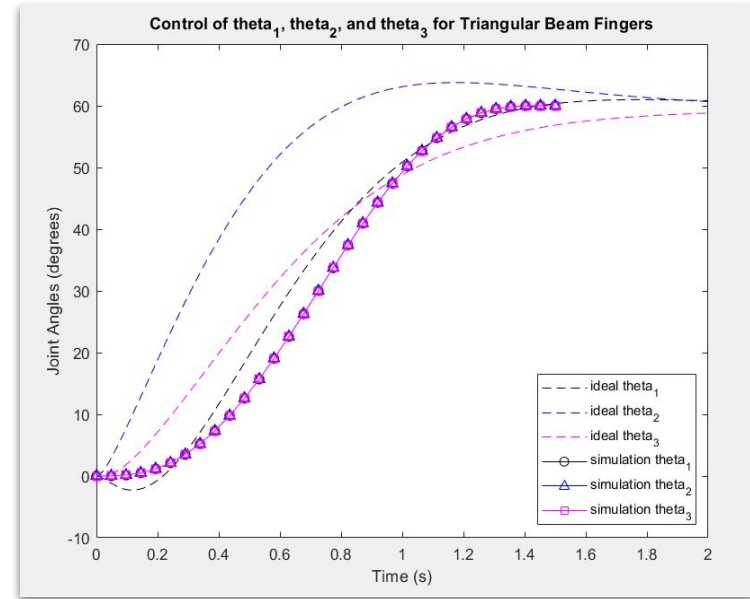
Template 1 (Thin cylinder) Eigenvalues			Object Eigenvalues
	Non-scaled	Scaled	
PC1	0.1015693	0.0013806	0.0013806
PC2	0.0050396	0.0000685	0.0005471
PC3	0.0043773	0.0000595	0.0000623
Grasp	Pinch		

Modeling and Control

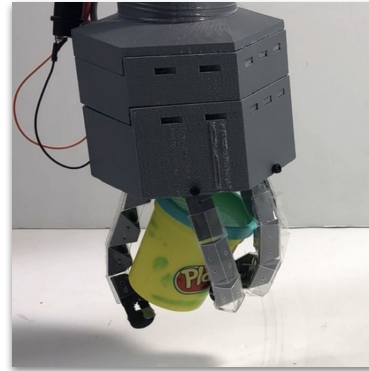
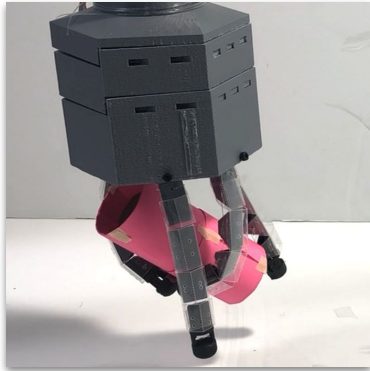
Simulation of Robot Movement



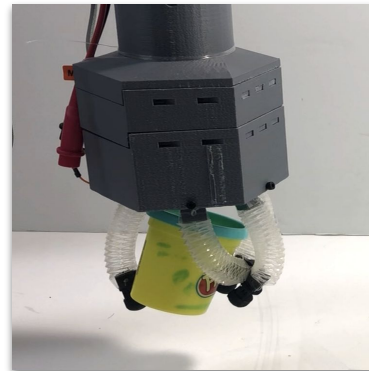
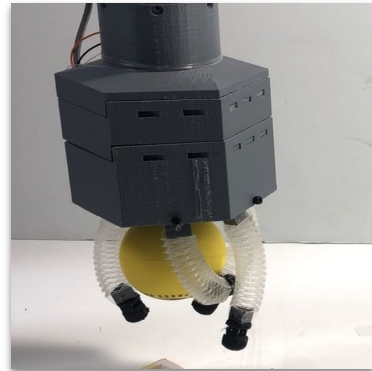
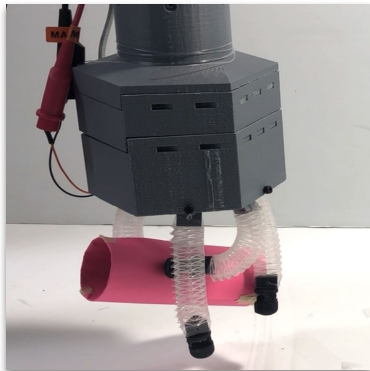
Finger Joint Angle Tracking



Results and Conclusion



**Triangular Beam
Finger Grasps**



**Yoshimura Finger
Grasps**

Pinch

Tripod

Power

Acknowledgements

Special thanks to our advisors:

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Professor Berk Çallı

Professor Jie Fu

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Mason Mitchell

Tyler Looney

Shou-Shan Chiang

Ashley Chu

Erik Skorina

NSF REU



**Thank you for
attending our
presentation!**

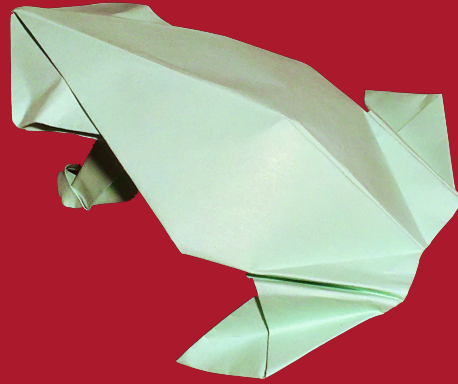


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Origami Frog, Anna

