

Robotic Object Manipulation using Tactile Feedback



Demo!

Olin College
of Engineering
SCOPE

amazonrobotics

The Problem

Amazon Robotics is exploring innovative manipulation techniques for asymmetrical objects.

Current System

Reliance
on vision
Uniform
objects



Tactile System



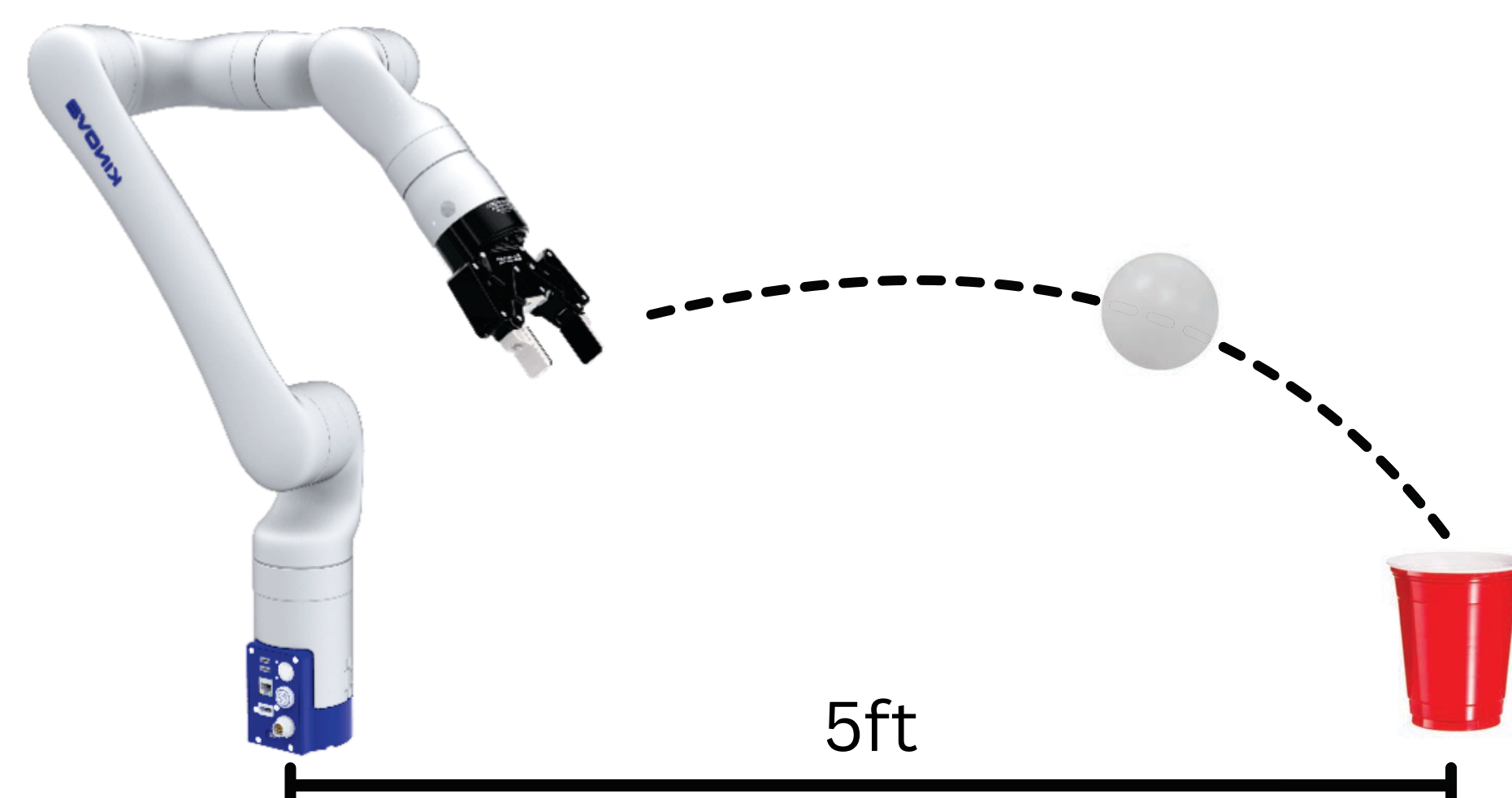
Measures
forces
Complex
surface

Current manipulation strategies are suction-based and have a heavy reliance on vision. Tactile sensors are able to extract object properties and conform to unique object shapes.

How can tactile sensor data be utilized for object manipulation?

The Experiment

Use a robotic tossing workcell utilizing tactile sensing to throw ping-pong balls into a cup five feet away.



Our Process

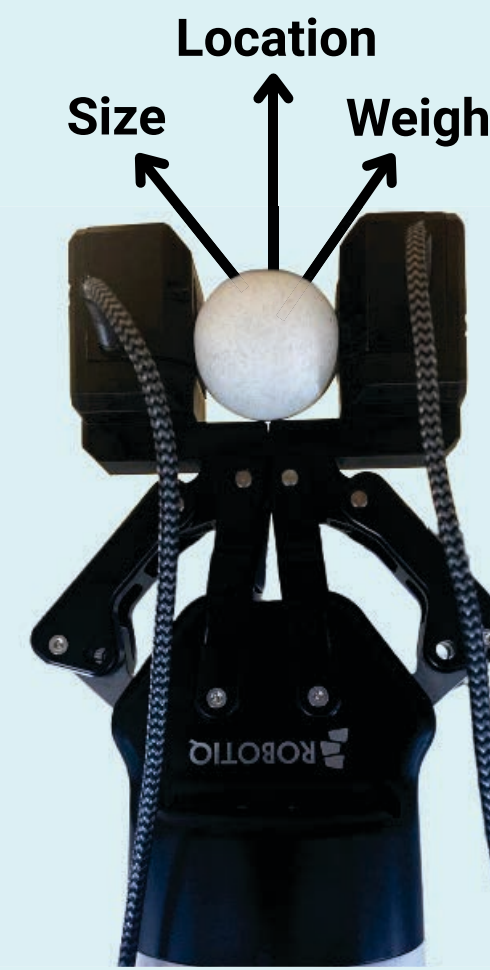
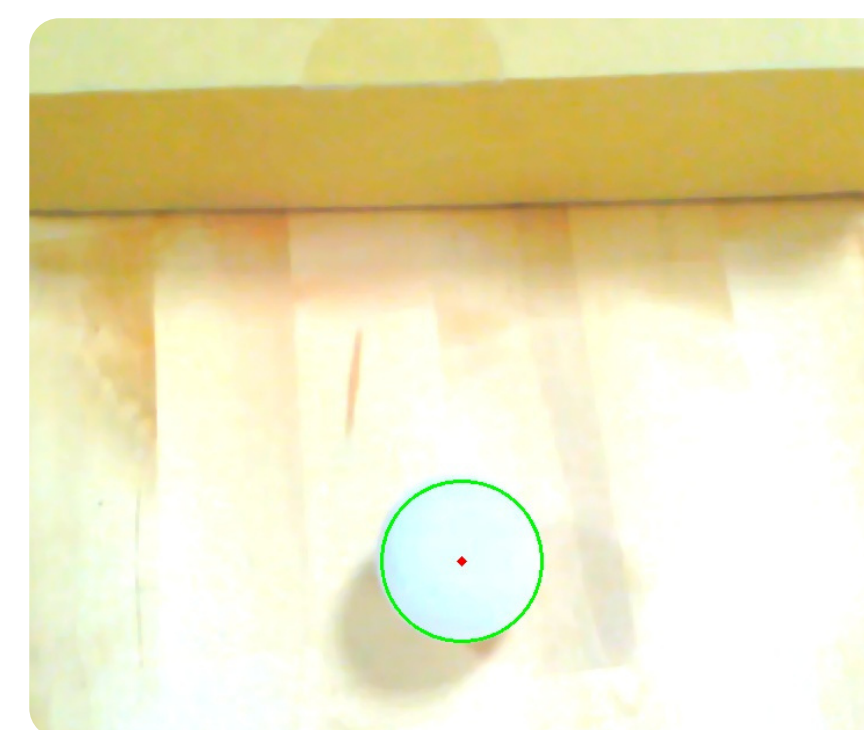
Vision

With a stereo depth camera, we use circle Hough transforms to identify the location of uniform balls.



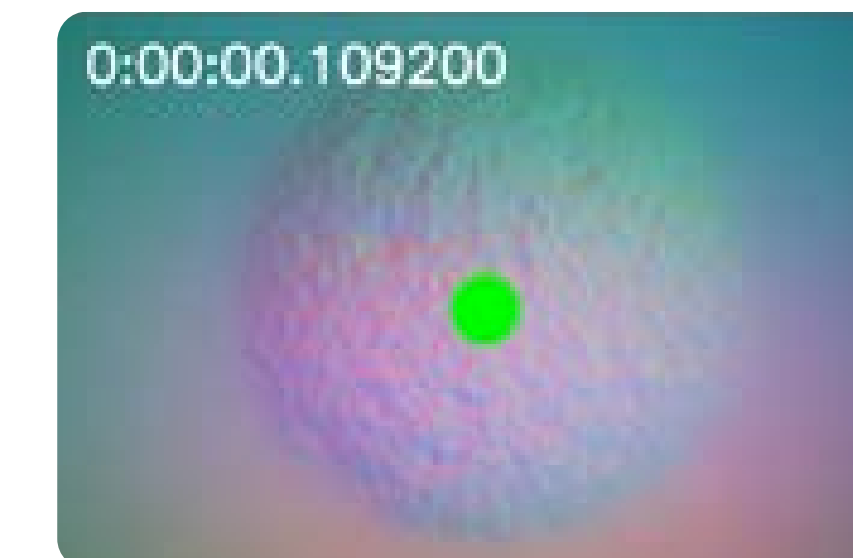
Pick Up

Object Detection



Sense

Object Location



Regrip



The gripper adjusts its position to shift the ball into the desired orientation.



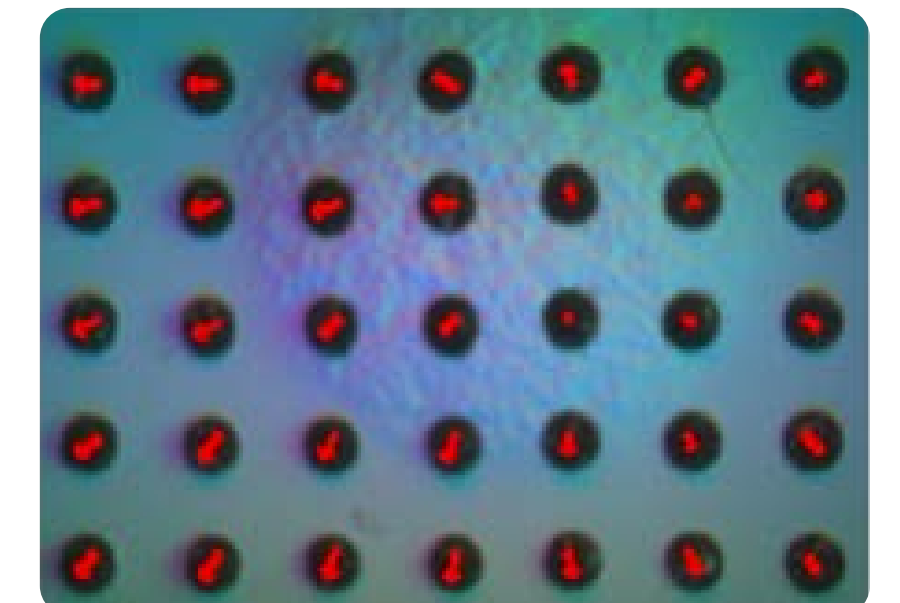
Contactile



Gelsight



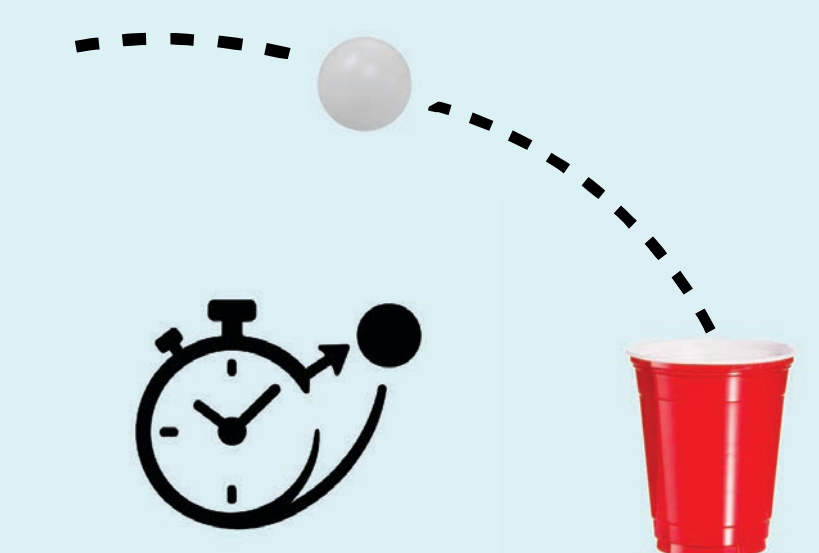
Ras Labs



Object Weight

Release Time

Throwing algorithm receives weight to find ideal release time.



Throw

Why Throwing?

Throwing, and measuring throwing accuracy, helps us analyze the value of tactile sensing by introducing dynamics.



Doduo



Miranda
Pietraski



Jessica
Brown



Stephanie
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Our Team

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