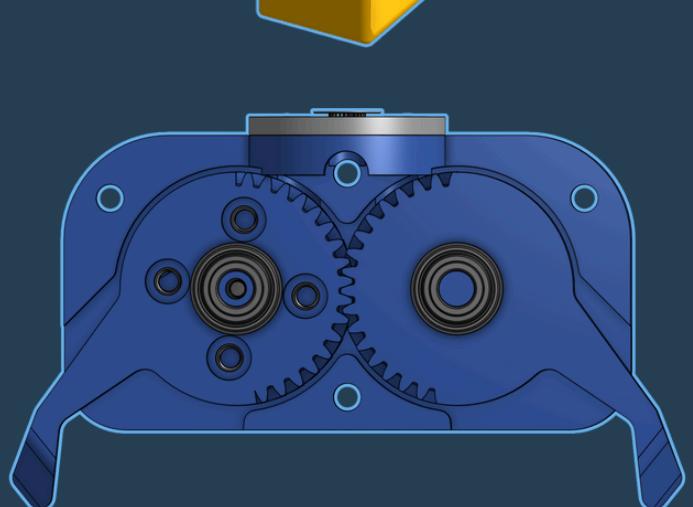
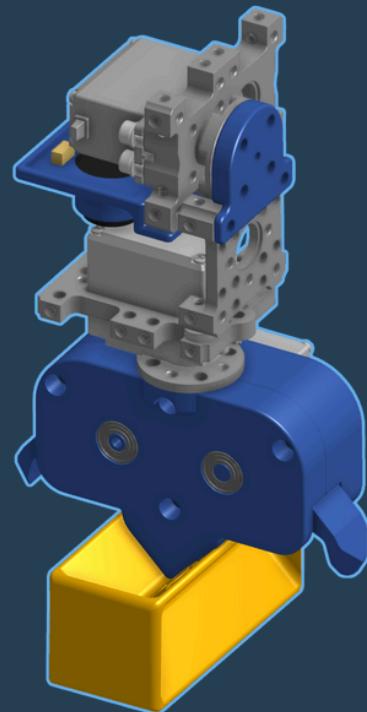
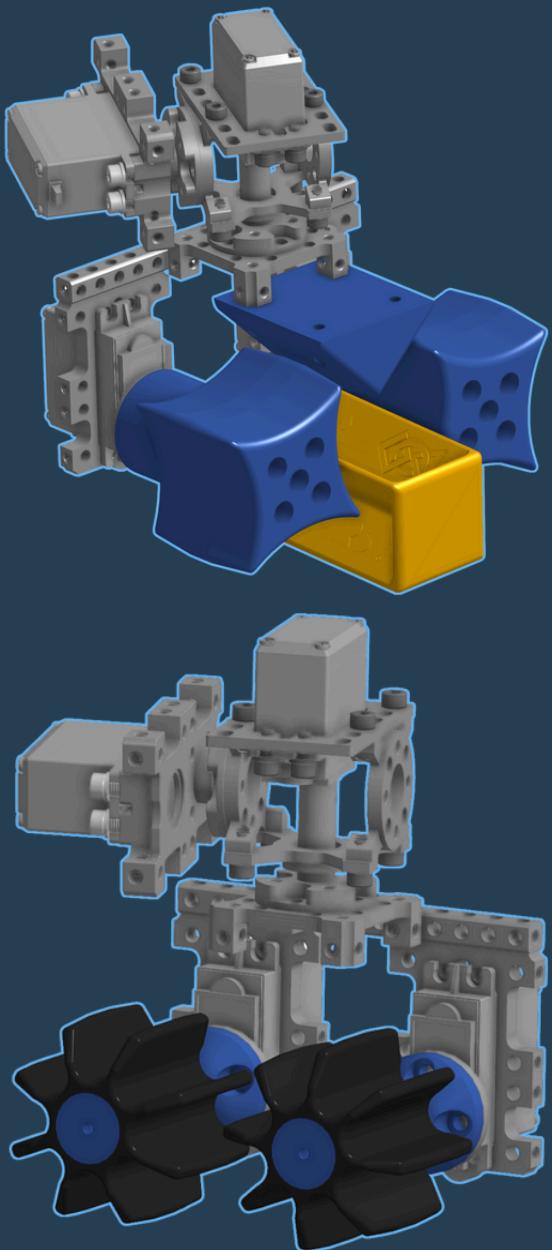


Jaybots Robotics 2024-2025 Gripper Design Portfolio



Designed by Matthew Glasser

Overview

Last season, our robot had to pick up rectangular blocks called samples, which were randomly arranged at the start of each match. As CAD Leader, I oversaw the full design, and I personally designed our gripper intake.

Sample →

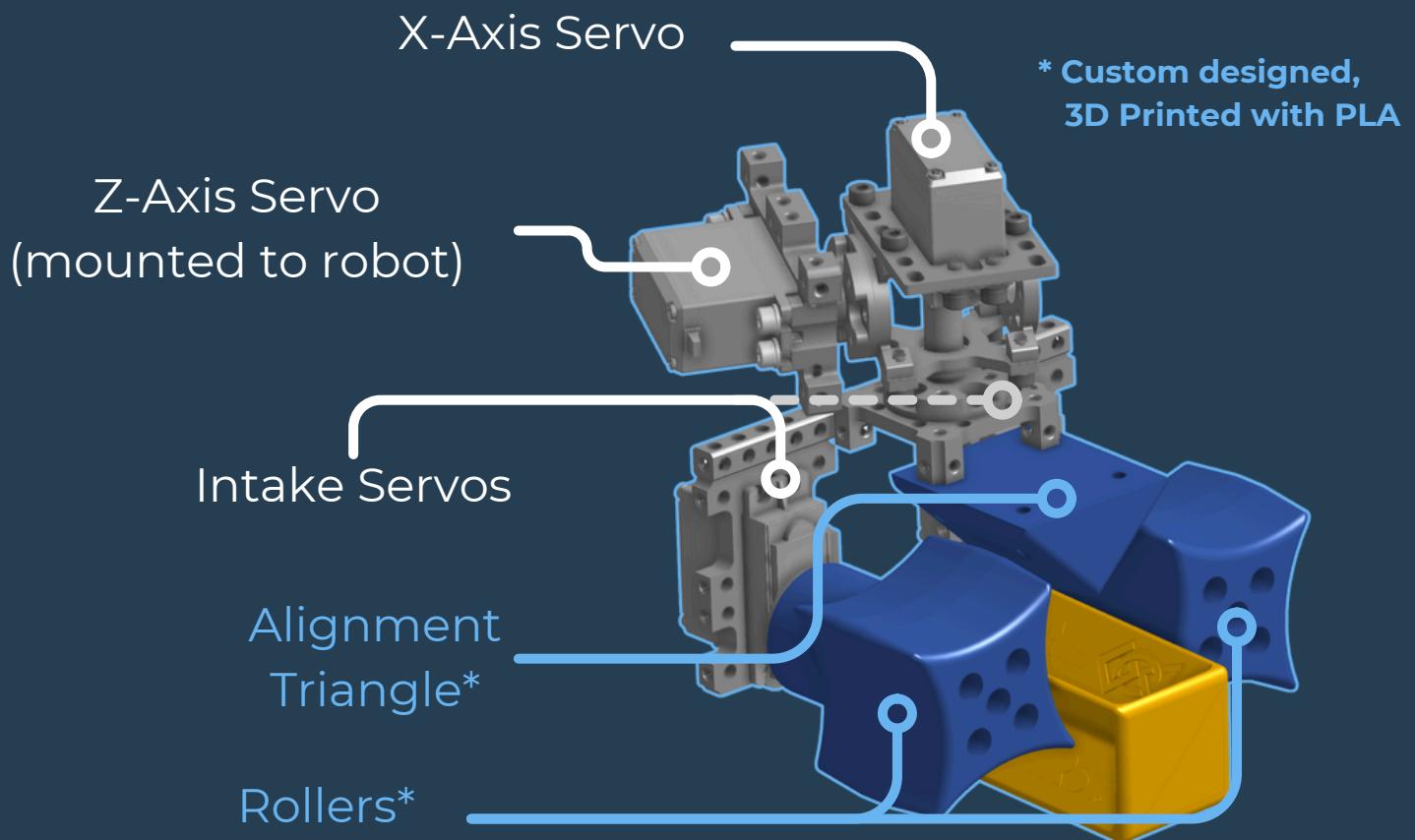


Design Constraints

- Be able to pick up samples from any angle/orientation
- Make it easy for the robot's drivers to align the gripper to pick up and score
- Tilt samples to any angle to aid in scoring
- Consistently and securely hold samples

Design 1: 3-Axis Spinning Gripper

Used 4 servos (x-axis, z-axis, and 2 for intake) with 3D printed rollers and a triangle to align the samples to pick up and hold them easily from any direction.



Advantages

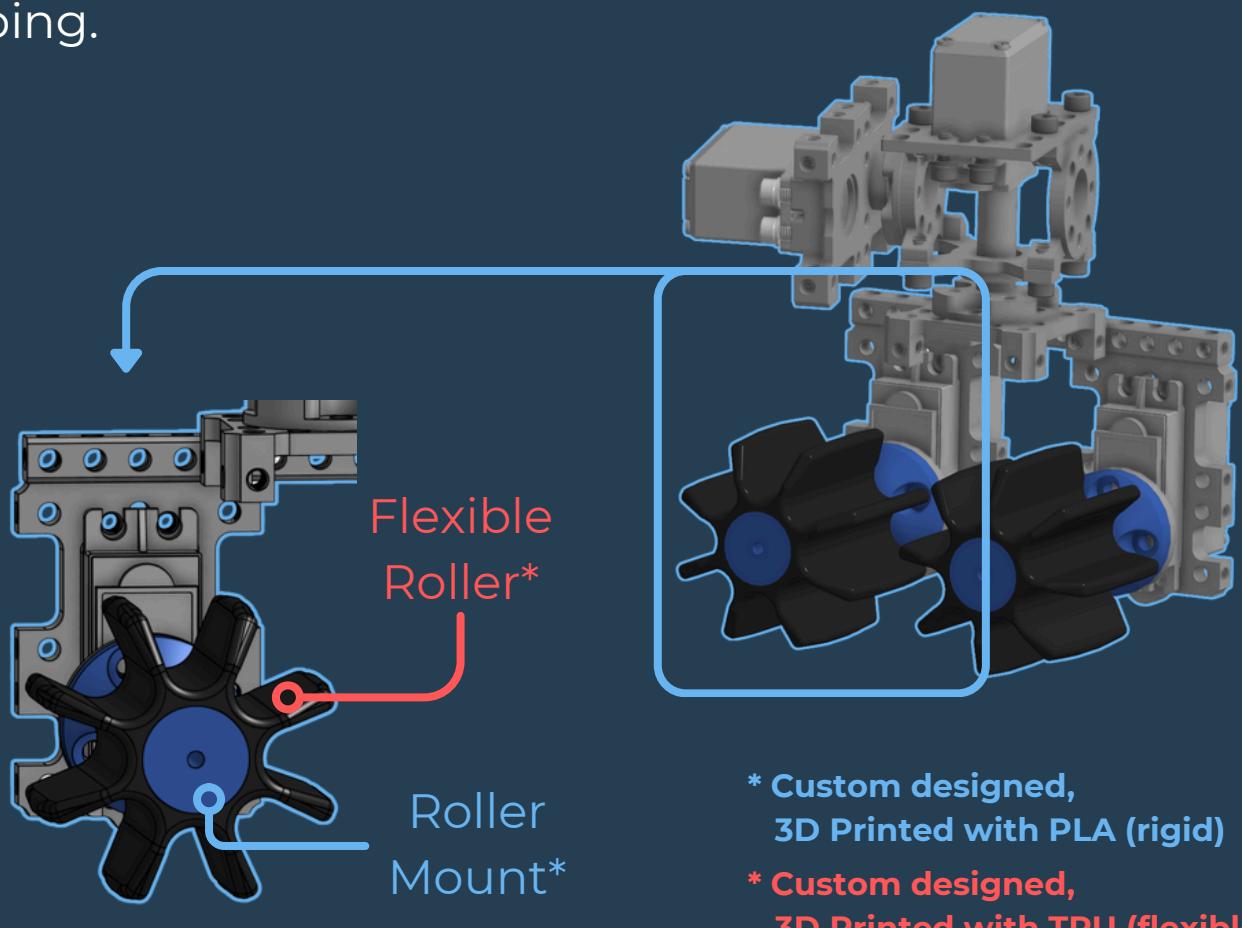
- Could rotate in 3 dimensions, allowing for collection of samples in any orientation

Disadvantages

- Smooth, rigid rollers struggled to pick up samples consistently
- Samples occasionally slipped out of the gripper after being picked up

Design 2: TPU Flexible Gripper

I modified the 3-axis gripper to contain a rigid PLA mount with a flexible TPU Roller. This allowed it to better grip the samples and prevented them from slipping.



* Custom designed,
3D Printed with PLA (rigid)

* Custom designed,
3D Printed with TPU (flexible)

Advantages

- Samples no longer slipped out and were held firmly
- Could still rotate in 3 dimensions

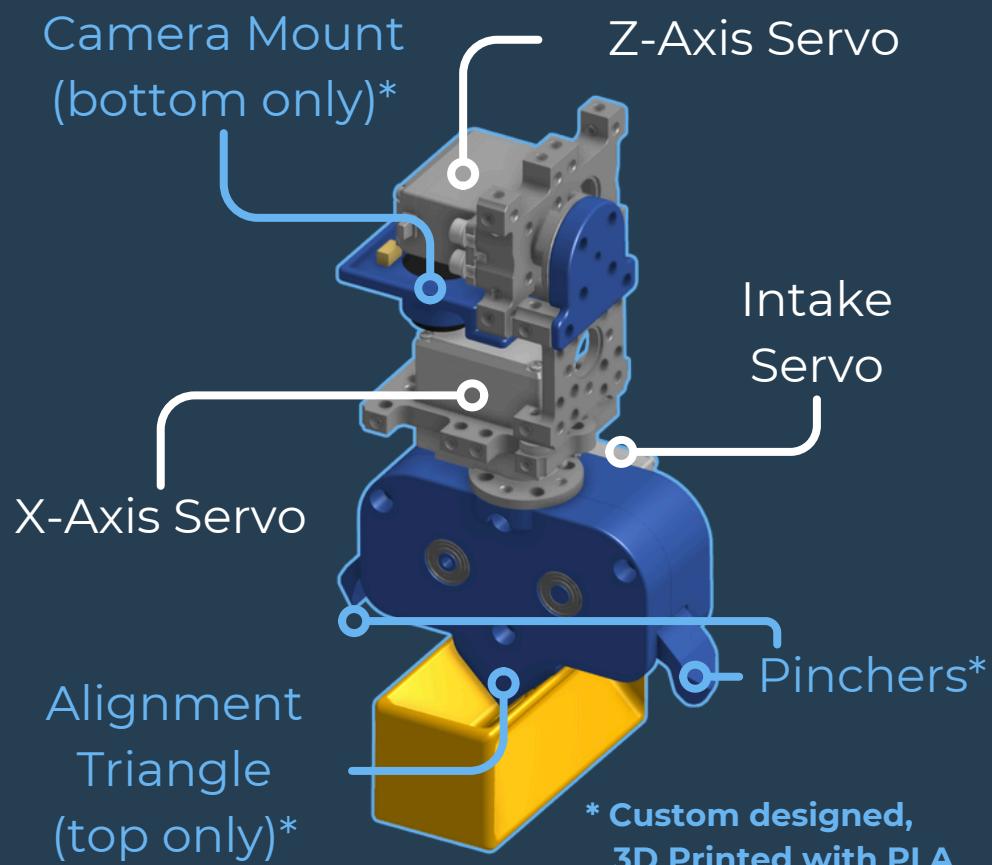
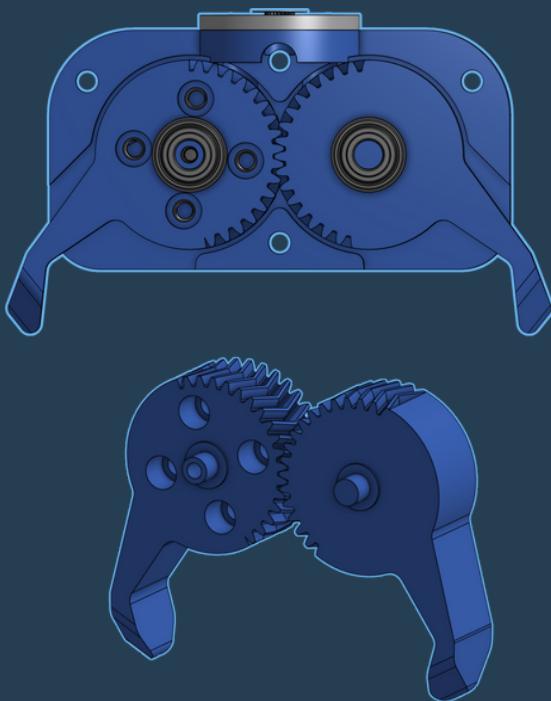
Disadvantages

- The camera mounted next to the gripper for automatic sample orientation detection interfered with the gripper movement
- Gripper was large and bulky

Final Design: Pinchers

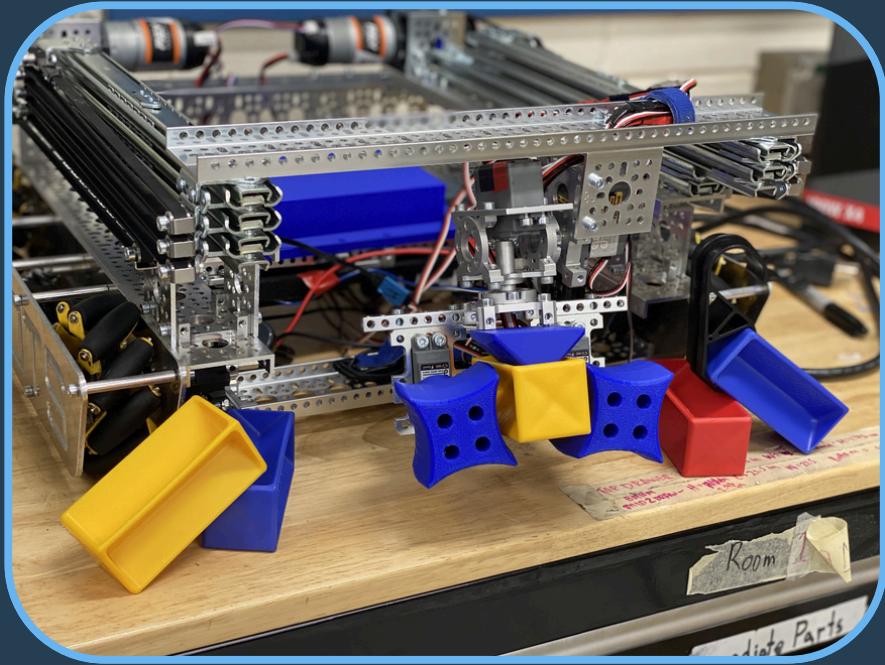
I designed 2 sets of pinchers that transfer samples between them and moved the camera. The bottom pinchers pick up samples, and the top set lifts and places them into the scoring baskets. They each contain three servos (intake, horizontal rotation, and vertical rotation).

Inside View

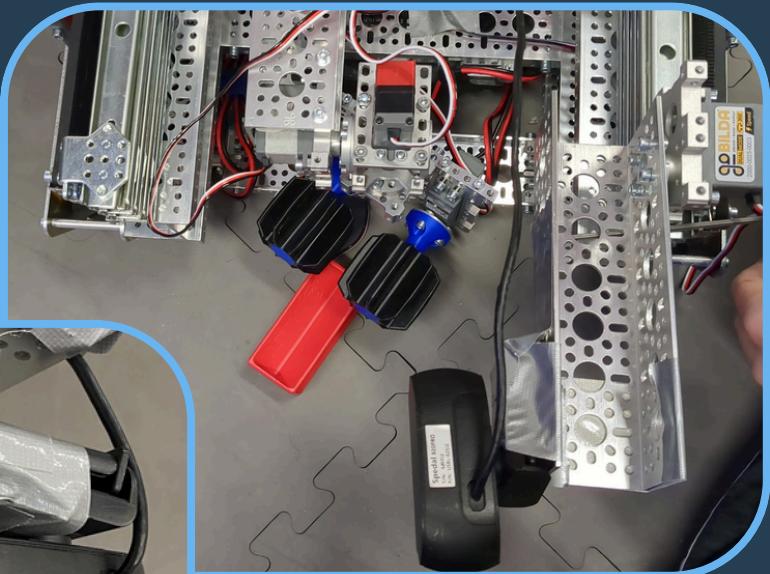
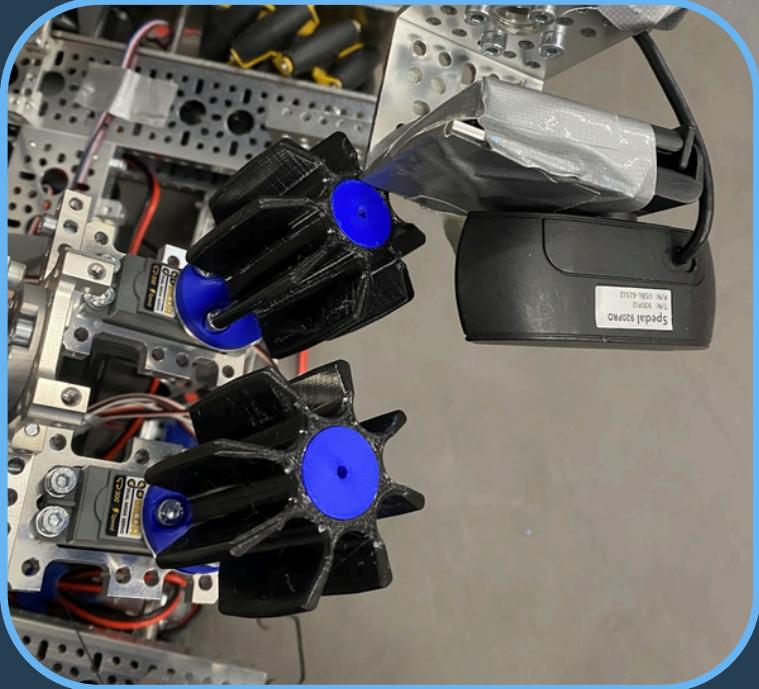


Advantages

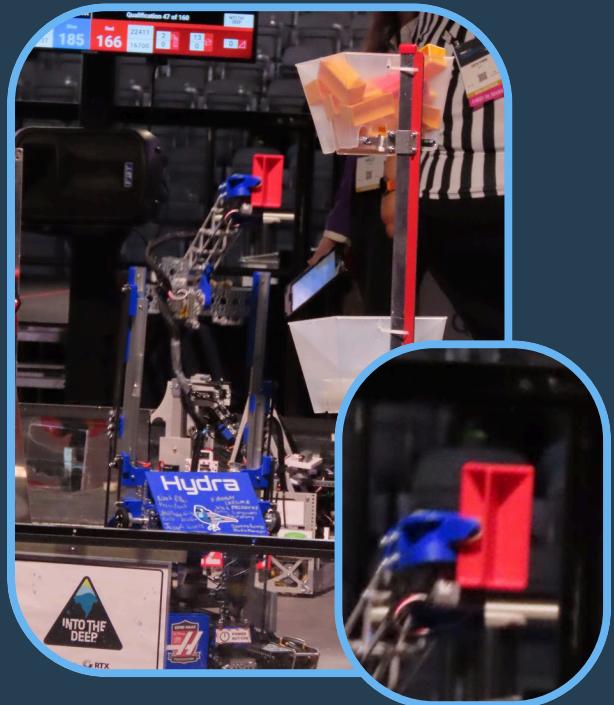
- Integrated camera mount allows for more accurate sample detection
- Pinching is more reliable than the spinners
- More compact than the spinners
- Transferring samples between grippers is fast and easy



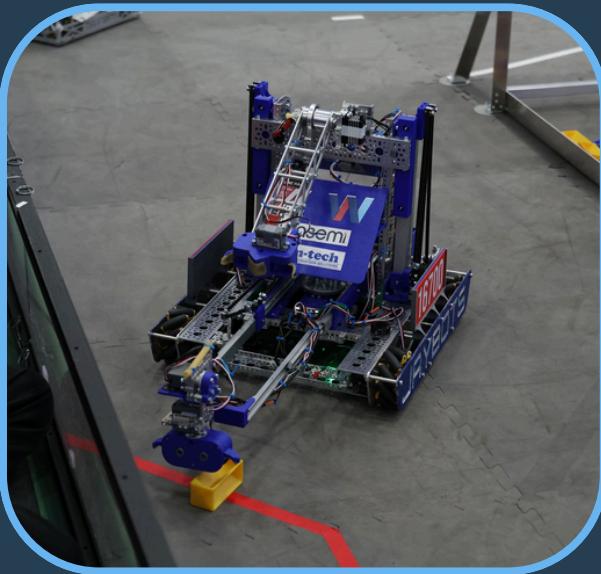
Design 1 holding a sample



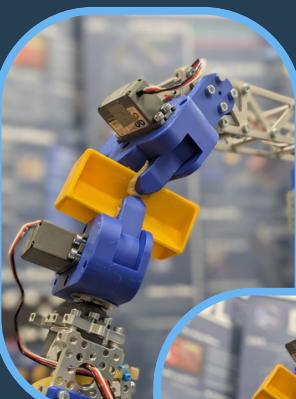
Design 2 picking up a sample with the camera



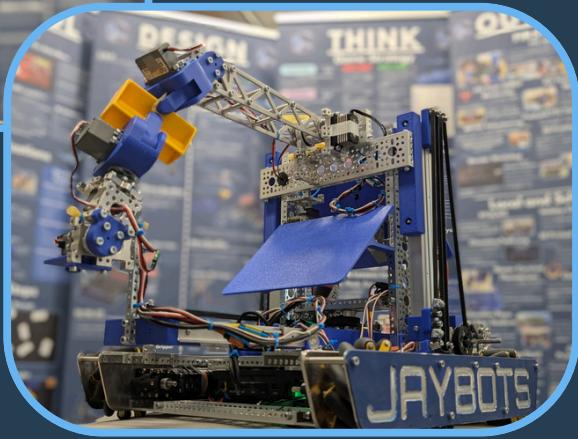
The Final Design scoring a sample at the World Championship



The Final Design picking up a sample autonomously

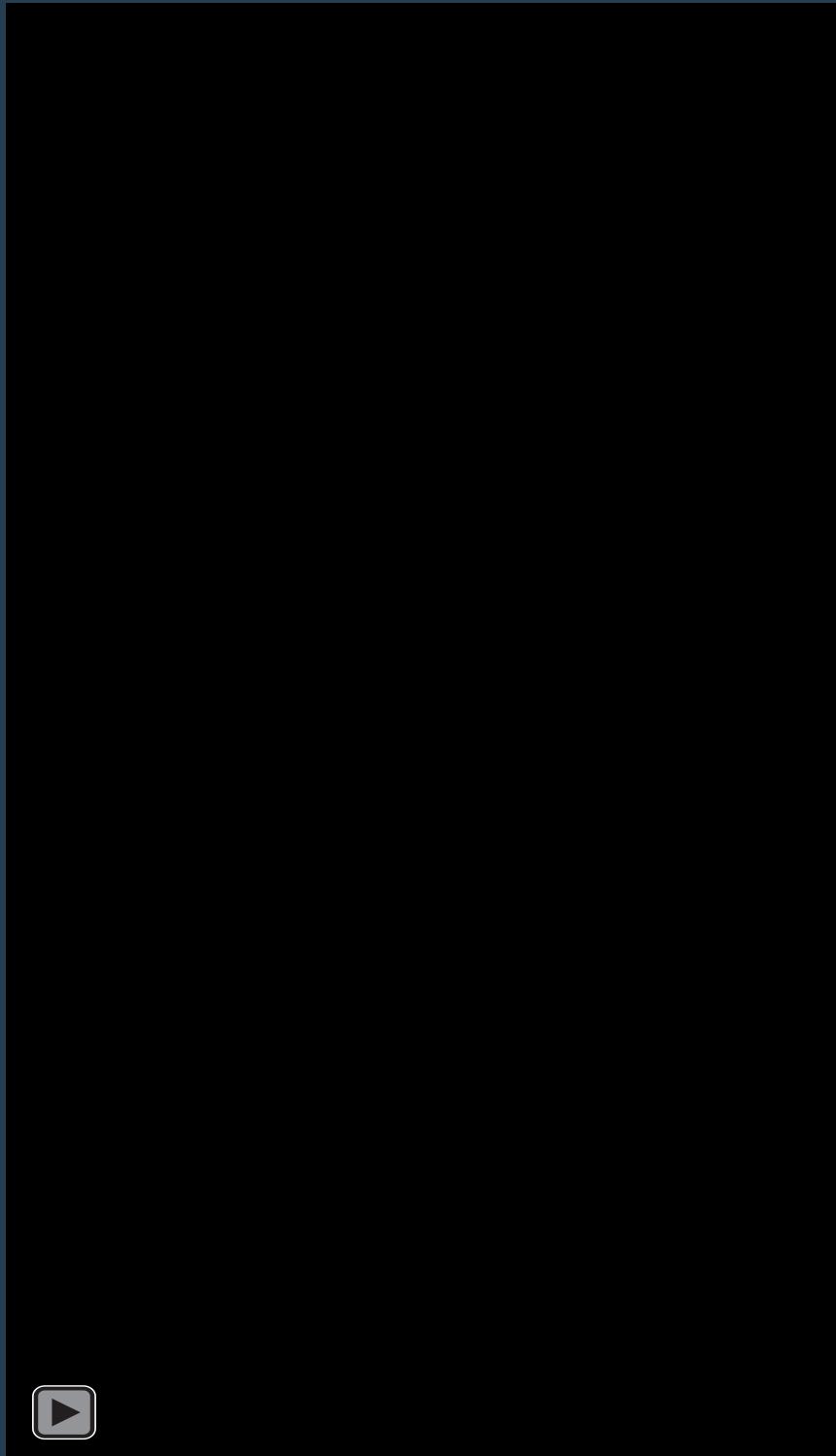


Transferring a sample from the bottom pincher to the top one



The Final Design scoring a sample in the basket

Video Demo



If the video doesn't play, you can find it at
matthewglasser.org/gripper