

Multi-Robot Chip Sorting

By Connor Forney

What does this project accomplish?

- ▶ This project involves one Cozmo scouting for chips with a pusher, delivering the chips to a second Cozmo with a lift attachment, and the second Cozmo depositing the chips into their respective boxes.
- ▶ This is broken into many steps:
 - ▶ Scout for chips
 - ▶ Capture a chip
 - ▶ Determine the chip's color
 - ▶ Path to second Cozmo without losing chip
 - ▶ Communicate to second Cozmo what chip color it has when it is delivered
 - ▶ Carefully lift and move the chip to its respective box
 - ▶ Shake the chip off
 - ▶ Reset each Cozmo back to their starting point

What were the most challenging parts of the project?

- ▶ Designing an algorithm to push the chip from wherever it was found back to the origin so that one Cozmo can find the other was especially challenging.
- ▶ Getting the Cozmo robots to actually communicate information to each other was also a challenge.
- ▶ Accurately determining what could possibly be a chip and what isn't a chip was another large problem to solve.

What is the most interesting part of your solution?

- ▶ After pathing back to the origin with the chip, the pusher Cozmo looks for the Aruco tags above the lifter Cozmo, and uses S-bend pathing to correct itself until it is directly in front of it.
- ▶ When looking for chips, Cozmo excludes areas that are too big, too small, or too close to the edge of his camera (which usually indicates the object is on a far wall and is not a chip). Cozmo also double checks what he actually has is a chip by looking down and making sure there is still an area that fits the chip description.

What work remains to be done?

- ▶ The pusher Cozmo relies on Aruco tags to find the lifter Cozmo. With a better shared world-map, the pusher Cozmo should be able to find the lifter Cozmo without the need for these tags.
- ▶ There is potential for other colored chips to be added.
- ▶ There are many points where accuracy of movement could be improved.

Changes since the Presentation

- ▶ Changed the Aruco detection/decision making code so that the pusher Cozmo more reliably and successfully delivers the chip to the lifter Cozmo.
- ▶ Enabled the pusher Cozmo to return to his origin (or close to it) to look for more chips.