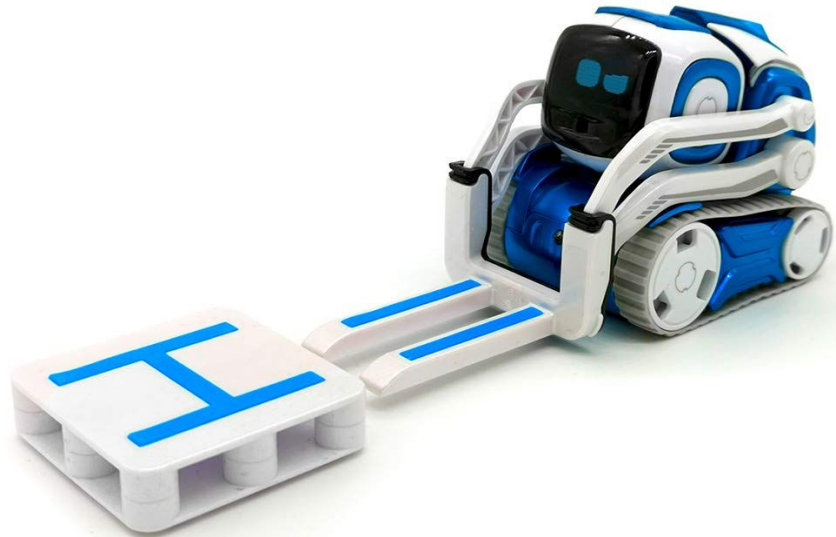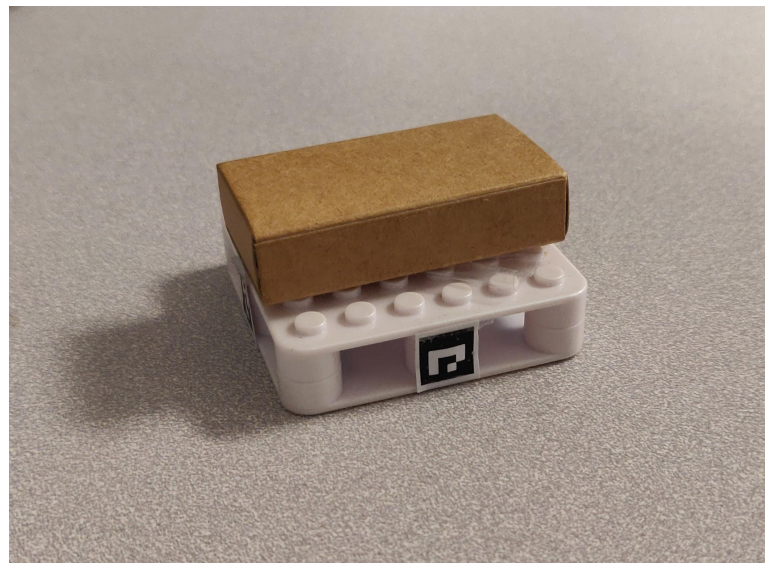# Cozmo Forklifts Things

Zachary Snow and Ian Lo

What are we trying to do?

- Add the ability for Cozmo to use a Pallet and Forklift attachment
- Have Cozmo find pallets and identify them
- Approach the pallet and pick up the pallet by moving the forks to the appropriate height
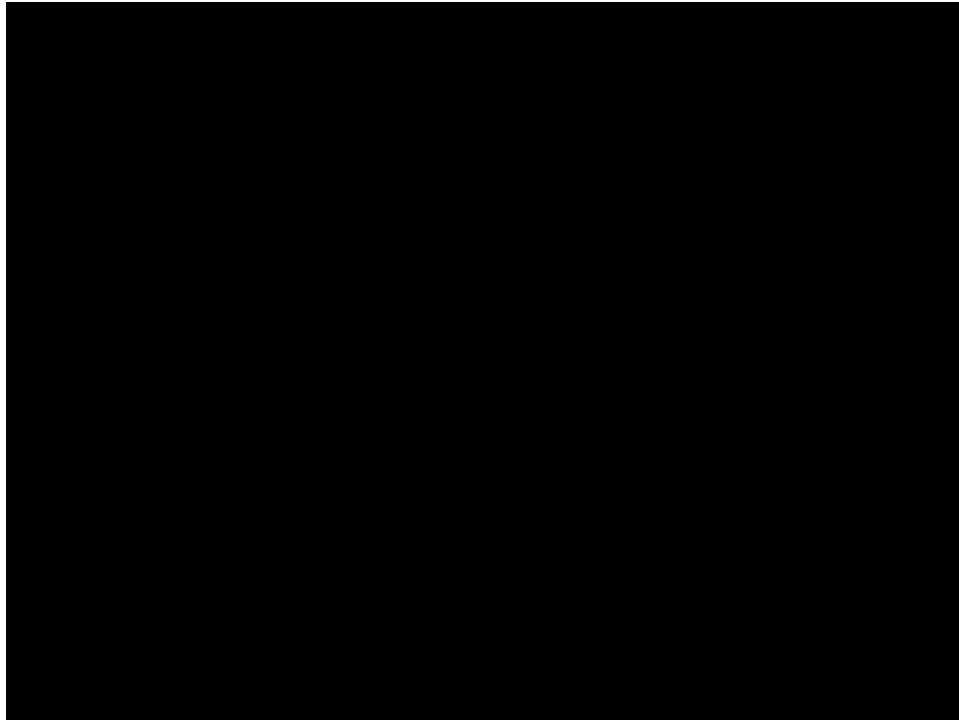
How did we do it?

- Pallet localization
  - Tried detecting colored tape the corner of the pallet; this was a disaster
  - Aruco markers work much better (only 9mm wide)
- Pickup procedure
  - Drive towards the first marker Cozmo sees to get a better look
  - Decide on a good approach location and drive to that point and angle
  - Determine the height of the pallet and the corresponding lift height
  - Pick up the pallet by driving towards it and lifting

Demo

Results

- We were able to pick up pallets
  - Usually works first time
  - Retries if necessary
- It works with pallets that are on top of things
- It works with pallets that are somewhat far away
- We found that Aruco markers work better than tape markers
  - There was not enough illumination from the IR LED to distinguish the retroreflective tape
  - There was too much noise in the colour image to recognize bright yellow tape
  - Aruco markers were better for recognizing and also gave us the pose of the pallet

Future Work

- Pick up more things
- Seamless support for multiple pallets
- Special actions like flip pallet