

### Final Project Writeup

For my final project, I worked with the Cozmo interface to help contribute to Cozmo's ability to navigate and move through "Cozmo's Dreamhouse", the custom house model built that currently stands in the REL at Newell Simon. This mainly included my use of Cozmo's ability to identify and localize itself through the use of Aruco Markers, which are images of specific recognizable bar codes posted on walls throughout the house. Through use of the WorldObject Class, I was able to clean up previous code for the DreamHouse, and encode all three floors of the house, including walls, rooms, and elevator compartments for each floor into the world map. Each floor was given its own area on the 2d-plane, separated by even margins. Additionally, I wrote and encoded the class of WorldObject, ButtonObj, which was used to encode the buttons that Cozmo can use to summon the elevators from within the DreamHouse. I was able to write a basic path planning algorithm where Cozmo could maneuver himself around the elevator room such that he could position himself with enough distance and the right angle to press the elevator button.

The first initial barrier to this project initially was working with the particle filter as there was a mix-up of how the Aruco markers were being mapped onto the display such that Cozmo would see a marker, but have it landmarked in two different locations; this messed up the positional estimate. I fixed this error with help from Dr. Touretzky after using a new particle filter that was mapped differently and much accurately. Secondly, the error was getting Cozmo to generate enough momentum / force to push the button, which we adjusted for by hoisting a tougher white board eraser in front to provide more surface area for Cozmo to apply force, which we were able to successfully attach so that Cozmo could hit the button.

Additionally, I helped document Cozmo traveling from room to room on the same floor using Dr. Touretzky's PilotToPose path planning algorithm as well.

Here are the links to the demo videos

#### **ButtonPress Videos**

<https://www.youtube.com/watch?v=HqNtzqZyiIk>

<https://www.youtube.com/watch?v=mUHKTgZiilw>

<https://www.youtube.com/watch?v=EVYgANJ0hVQ>

#### **PilotToPose Videos**

<https://www.youtube.com/watch?v=eTltrzlcOQ>

<https://www.youtube.com/watch?v=wrwC7iUHC8Q>