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15-494 Cognitive Robotics
2/21/20

Lab 5 Writeup

Problem 1:

This code is in “SuccessFail.fsm”, and there isn’t much to say about it. Below are the terminal outputs for two sessions running the FSM, in each of the two cases (success (top) and failure (bottom, where Cozmo was blocked by a cube)).

```
hrockwel@fili: ~/cogrob/lab5
File Edit View Search Terminal Help
hrockwel@fili:~/cogrob/lab5$
hrockwel@fili:~/cogrob/lab5$ simple_cli
2020-02-21 20:31:56,050 cozmogeneral INFO App connection established. sdk_v
ersion=1.4.10 cozmoclad_version=3.4.0 app_build_version=00003.00004.00000
2020-02-21 20:31:56,051 cozmogeneral INFO Found robot id=1
2020-02-21 20:31:56,065 cozmogeneral INFO Connected to Android device seria
l=G0W0KK0265050PTU
2020-02-21 20:31:56,207 cozmogeneral INFO Robot id=1 serial=0ca00c9c initia
lized OK
C>
C> runfsm('SuccessFail')
<SuccessFail successfail>

C> launching opengl event loop
navplan= <NavPlan ['drive']> steps= [<NavStep drive [(0.0, 0.0), (300, 50)]>]
ReceivePlan: draw_path= [<RRTNode (0.0,0.0)@0 deg>, <RRTNode line to (300.0,50.0
)@9 deg>]
nav step <NavStep drive [(0.0, 0.0), (300, 50)]>
DriveContinuous: current position is (0.0, 0.0) @ 0.0 deg.
path index advanced to 1: [300.0, 50.0] tgtQ is 9.5 deg.
DriveContinuous: current position is (306.0, 49.6) @ 8.7 deg.
path index advanced to 2
DriveContinuous: path complete. Stopping.
```

```
hrockwel@fili: ~/cogrob/lab5
File Edit View Search Terminal Help
2020-02-21 20:30:00,547 cozmogeneral INFO App connection established. sdk_v
ersion=1.4.10 cozmoclad_version=3.4.0 app_build_version=00003.00004.00000
2020-02-21 20:30:00,548 cozmogeneral INFO Connected to Android device seria
l=G0W0KK0265050PTU
2020-02-21 20:30:00,553 cozmogeneral INFO Found robot id=1
2020-02-21 20:30:00,783 cozmogeneral INFO Robot id=1 serial=0ca00c9c initia
lized OK

C>
C>
C> runfsm('SuccessFail')
<SuccessFail successfail>

C> launching opengl event loop
PilotRRTPlanner: Goal collides! GoalCollides(<RRTNode (300.0,50.0)>, <Rectangle
(307.1,36.2) 54.0x54.0 -95.0 deg Cube-3>, 'Cube-3')
Speaking: 'I'm sorry Dave, I'm afraid I can't do that'

C> cube3.pose
<Pose <Position x: 306.28 y: 40.58 z: 19.19> <Quaternion q0: 0.68 q1: 0.00 q2: -
0.00 q3: -0.73 (angle_z: <Angle -1.65 radians (-94.41 degrees)>)> origin_id=17>

C>
```

Problem 2:

The naive approach to this problem, simply turning when a door is not visible and passing through new ones, doesn't allow Cozmo to navigate his Shack. So, I extended it in "Exploration.fsm", to back up by a few centimeters when a new Aruco marker is seen, and to continue a bit further when passing through a door. I should note that the idea to back up in reaction to a new marker was not mine; it came up in conversation with Tyler Johnson, though otherwise I did not collaborate with him on this lab.

This extended approach works, some of the time, though its behavior is not like you might expect. Cozmo sees one of the markers on the second door while passing through the first, so he backs up a bit right after passing, then starts turning, backing up further each time he sees a marker on one of the inside walls. This ends up with him in a position, after rotating about 400 degrees, to see the second door and pass through it, if he hasn't collided with a wall of the shack.

Below are several screenshots of the world viewer, in order (left to right, then top to bottom), from a successful trial.

