

Domesticated DinoSARs

Prior map



First Mapping Try : Go with robot build the map



Learn in practice Mapping tips: No large motion Avoid following

. . .

Prior Map for SLAM



Object detection



```
Input: new_detection, global_frame, dist_thr
if confidence(new_detection) > 50\% then
   glob_pos = global_coordinates(new_detection)
   if class(new_detection) is not in detections then
       detections.add_class(new_detection)
   end if
   for reg_obj in detections[class(new_detection)] do
      d = dist(reg_obj, glob_pos)
      if d < dist_thr then
          update(reg_obj, glob_pos)
          break
      end if
   end for
   if glob_pos was not matched to detections then
       detections.add_new(glob_pos)
      save_img()
   end if
   update_CSV()
end if
```

Object detection





x: 14.83	x: -	x: 14.97	x: 13.89	x: -
y: -3.95	y: -	y: -5.24	y: -4.00	y: -
z: -0.14	z: -	z: -0.08	z: 0.01	z: -
n: 106	n < 3	n: 17	n: 10	n < 3





GOAL: Test code in realistic simulation for errors when robot not available.



Simulation



Problem: Simulation too slow \bigcirc \checkmark \rightarrow Coarser mesh (Terraforming in Blender)



(Sim running with single waypoint, artefact models added to gazebo world)



SMB driving to waypoint in simulation, detecting artefact on its way









(not really needed in the end, as backup to test code but good to have had



Carefully save waypoints. Check localization in RViz before saving.

Visualize camera image to optimize waypoints for camera coverage.

Simple waypoint to waypoint mission.

Add timer to abort waypoint using smach.

success = self.client.wait for result(rospy.Duration.from sec(self.timeout))



(Probably) saved the robot during Challenge 1.

Struggled on the bump outside the ramp before eventually aborting waypoint.















Label	X	Y	Z	#detections	id
stop sign	13.79	6.38	1.03	7	0
stop sign	24.22	2.23	1.53	4	1
stop sign	23.41	1.11	1.10	6	2
umbrella	14.83	-3.95	-0.14	106	0
umbrella	14.97	-5.24	-0.08	17	2
umbrella	13.89	-4.00	0.02	10	3







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How it started





How it ended





Challenges : Robot



Localization in the starting zone

- Optimize starting position. Avoid navigating that area.
- Lower max angular velocity.

Get out of the ramp.

- Don't put a waypoint while going up to avoid a planning stop.
- Patience.

Robot back and forth.

- Relax global and local planner goal tolerance.
- Tune optimization weight for enforcing a minimum turning radius.

Challenges : Deployment



Automate and simplify deployment

- Roslaunch files
- Still lost time because of human errors. Forgot to cancel challenge ros bag
- Path error in the mission path file

Learning to use some tools right before or during the challenge

- Figuring out tmux
- USB sticks in a terminal

GUESS WHAT!! We learned about Exploration in Challenge 2



Exploration Sequence

Map of the environment

Frontier-Based Exploration

Back_command after finishing exploration

- Create a node to check for unexplored frontiers
- Check color of all marker points. If no blue frontiers left, make the vehicle get back to the origin.



Blue frontier explore



Red frontier cannot explore

Exploration done, get back to the origin

