WallE:
Final Project AAMR

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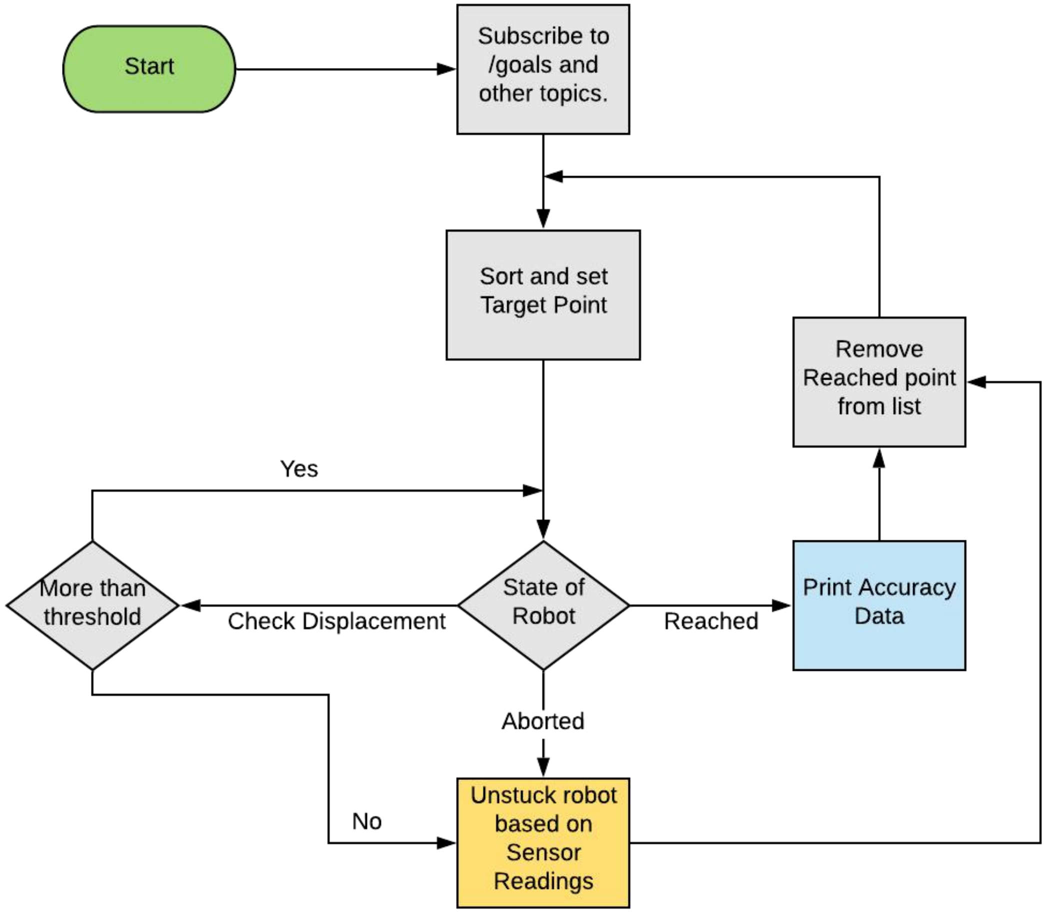
How is Everything Working ?

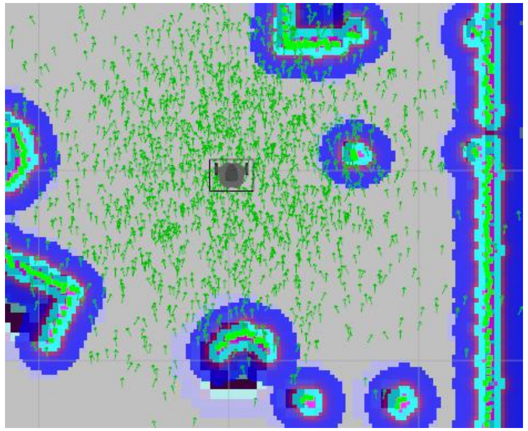
- Uses a Navigation Stack with ***/move_base**, **/amcl**, **/map_server*** nodes.


Start
Subscribe to /goals and other topics.
Sort and set Target Point
Remove Reached point from list
Yes
More than threshold
Check Displacement
State of Robot
Reached
Print Accuracy Data
Aborted
No
Unstuck robot based on Sensor Readings

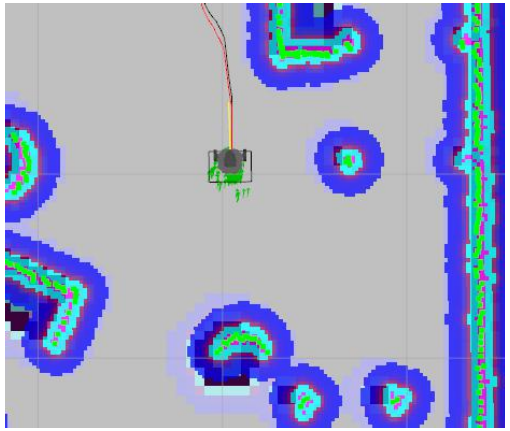
360° Rotation on start-up

- WallE need to fully know its current positions before it starts for a target.
- Calls a function to rotate *360° degree* in *10* seconds $\xrightarrow{yields}$ Converged particle cloud.

- ***Why:*** If this is not done it poses problem when robot is spawned very near to a goal point.



Evenly Spreaded



After Convergence

Where to go first?

- Simple heuristics to maximize reward while being lazy.
- ***Greedy:*** Searches through whole target set.
- ***Not that smart:*** In cases, it ends up travelling more.

- ***Most Profit:***

  $goal_{(i)} \; = \; argmax \; (reward_{(i)}/distance_{(i)})$, considering Eucledian-Distance

this is a joke .

What if I am unable to reach the target ?

- Keeps a time window of 10 seconds and checks displacement after the time interval.
  - if ***displacement < threshold***, then append goal to ***later_goal***
- It may be because another robot was standing at goal.
- Or due to inability of path planning.

- After all points from ***all_target*** list are tried once then points from ***later_goal*** are retried for max. 4 times.

If I am stuck due to Planning inconsistency ?

- Robot stucks when Planner estimates cost as negative.
- Need an algorithm to go back to free space.
- ***Max space:*** Identifies the region with max space and re-orients/ re-position.

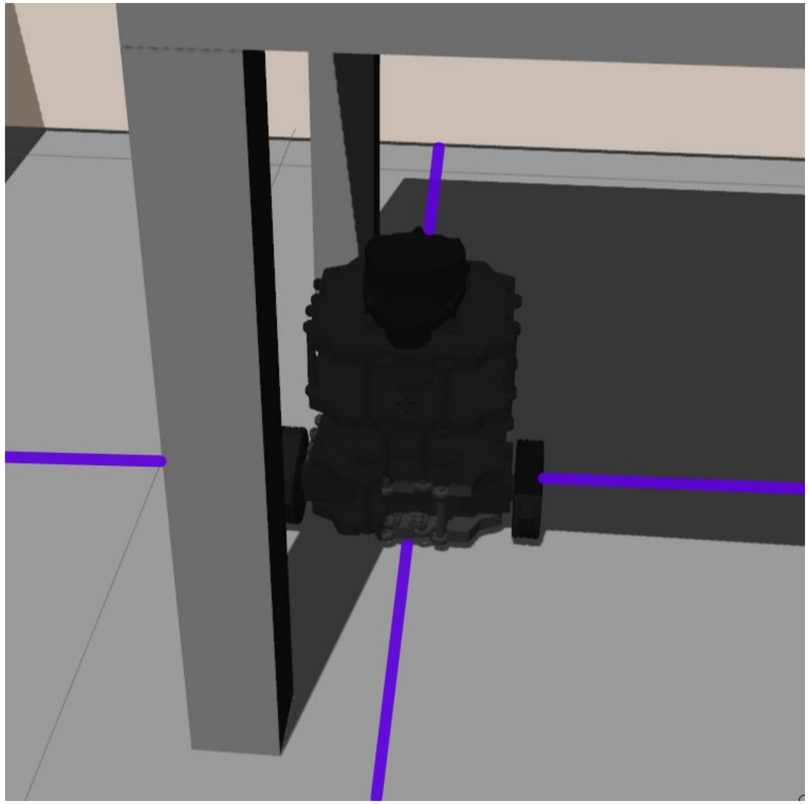
$$Max\ space\ =\ argmin\ (\ min(j\_rays\ in\ region_k))$$

$$region_k\ \in\ \{left, right, front, back\}$$

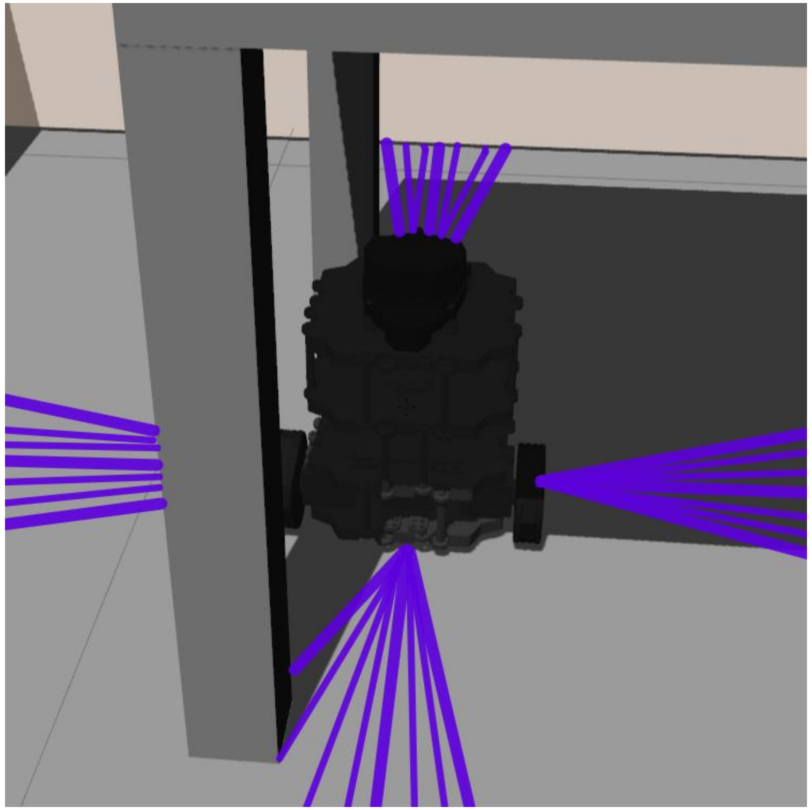
$$j\_rays = set\ of\ 8\ rays\ in\ range\ [-4{,}4]\ deg.\ of\ normal\ to\ region_k$$

„I need to see Outer Space.“

If I am stuck due to Planning inconsistency ?



I cannot see the Table



Now I ***can*** see the Table

Go home if tired !

- After retry algorithm, Walle doesn‘t intend to block path for others.
- It drives to ***origin(0,0)*** and says:

```
if reached_home == True:
        print('Shutting down......... Please kill the node manually.')
if reached_home != True:
        print('HELP........ Somebody please manually replace me to home.')
```

Do you think this robot is smart enough.

Let‘s find out!