

Assignment Week 8

Localization & Navigation



Map Comparison

- GMapping uses laser scan data along with odometry data
- Hector algorithm only uses laser scan data, so no IMUs are required
- Hector algorithm cannot account to drift since it does not use odometry, so GMapping is superior for detecting straight lines such as long hallways
- Hector relies on scan matching, so it will struggle on featureless environments.
- We would choose GMapping algorithm for higher robustness

Tuneable Parameters

- Map size: maximum map size in pixels, affects algorithm speed
- Number of particles: Higher = more accurate, higher computational effort
- Maximum distance of laser scanner: To reflect limitations of sensor
- Linear/Angular update rate: can be adjusted to update map quicker for better results

Difference Between AMCL & Particle Filter

- The Adaptive MCL algorithm is computationally more efficient and will converge faster than a simple particle filter.

DWA Local Planner

- See video [hector_livingroom_2DNavGoal_orig_nosound_crf28.mp4](#)
- `costmap_common_params_burger.yaml` was tuned slightly
 - Inflation radius was decreased to 0.125 so that the robot can fit in tighter spaces. The inflation radius was about 10 times as much as the physical radius of the robot which was problematic for the local planner
 - Cost scaling factor was increased to 5.0 which decreases the cost slightly for the same reason to help navigating tight spaces