

Turtlebot Monte Carlo Localisation (AMCL)



Ali Nagaria Watch TurtleBot navigate with a Map.

<https://www.youtube.com/watch?v=u5n2jhF3UrU>

Gaitech EDU] Map-based Navigation (Part 1): Finding the locations of points of interest 3:24

<https://www.youtube.com/watch?v=sWFDk1BxSyA>

Map-based Navigation (Part 2): Explaining and running the map-navigation code 10:26

<https://www.youtube.com/watch?v=r5kK9pIOcNQ>

Odometry Error Covariance Estimation for Two Wheel Robot Vehicles

Lindsay KLEEMAN Intelligent Robotics Research Centre Department of Electrical and Computer Systems Engineering Monash University

<https://ecse.monash.edu/centres/irrc/LKPubs/MECSE-1995-1.pdf>

Chapter 5 Position Estimation

<http://people.scs.carleton.ca/~lanthier/teaching/COMP4807/Notes/5%20-%20PositionEstimation.pdf>

SLAM General Discussion

https://en.wikipedia.org/wiki/Simultaneous_localization_and_mapping

ROS SLAM Techniques- Comparison

<https://pdfs.semanticscholar.org/6b9c/afcf9aef5b4c0c338c44a581236d54caddbd.pdf>

Mapping and TurtleBot

http://wiki.ros.org/turtlebot_bringup

minimal.launch - The base launch file for TurtleBot. Starts the basic nodes (`kobuki_node` or `create_node`), `laptop_battery_monitor`, `robot_state_publisher`, `diagnostic_aggregator`, and `robot_pose_ekf`. Includes `app_manager.launch`.

http://wiki.ros.org/kobuki_node

Examine Kobuki Kobuki's topics

<http://wiki.ros.org/kobuki/Tutorials/Examine%20Kobuki>

Use the navigation stack to create a map of the Gazebo world and start navigation based on it.

http://wiki.ros.org/turtlebot_gazebo/Tutorials/indigo/Make%20a%20map%20and%20navigate%20with%20it

A 2D navigation stack takes in information from odometry, sensor streams, and a goal pose and outputs safe velocity commands that are sent to a mobile base.

<http://library.isr.ist.utl.pt/docs/roswiki/navigation.html>

The `move_base` package provides an implementation of an action (see the [actionlib](#) package) that, given a goal in the world, will attempt to reach it with a mobile base. The `move_base` node links together a global and local planner to accomplish its global navigation task.

http://library.isr.ist.utl.pt/docs/roswiki/move_base.html

AMCL

`amcl` is a probabilistic localization system for a robot moving in 2D. It implements the adaptive (or KLD-sampling) Monte Carlo localization approach (as described by Dieter Fox), which uses a particle filter to track the pose of a robot against a known map.

<http://library.isr.ist.utl.pt/docs/roswiki/amcl.html>

Many of the algorithms and their parameters are well-described in the book *Probabilistic Robotics*, by Thrun, Burgard, and Fox. The user is advised to check there for more detail. In particular, we use the following algorithms from that book: `sample_motion_model_odometry`, `beam_range_finder_model`, `likelihood_field_range_finder_model`, `Augmented_MCL`, and `KLD_Sampling_MCL`.

As currently implemented, this node works only with laser scans and laser maps. It could be extended to work with other sensor data.

<http://wiki.ros.org/amcl>

<https://www.youtube.com/watch?v=DLVyc9hOvk8>

The video shows how to navigate TurtleBot in **Gazebo** among the obstacles and publish the distance to the bookcase, etc. In Python. 35:00

ROS tutorial #2.2: Python walkthrough of publisher/subscriber lab



Justin Huang

BOOKS

ROS By Example VOLUME 1 R. PATRICK GOEBEL

8. NAVIGATION, PATH PLANNING AND SLAM Pg 75

Volume 2 3. TASK EXECUTION USING ROS

3.3 A Brief Review of ROS Actions

COMPLETE SLAM MAPPING COURSE

SLAM Course - 01 - Introduction - Cyrill Stachniss



Cyrill Stachniss

<https://www.youtube.com/watch?v=V9qQc5X7O0k>

SLAM Course - 02 - Bayes Filter - Cyrill Stachniss

<https://www.youtube.com/watch?v=jgOOuGAEnX8>

SLAM Course - 10a - FastSLAM - Part 1 - Cyrill Stachniss

<https://www.youtube.com/watch?v=MIh-1EACaJc>

SLAM Course - 11 - Particle Filters - A Short Intro (2013/14; Cyrill Stachniss)

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