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=jgOQuGAEnX8

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