赛题 23

2D/3D Localization Improvements

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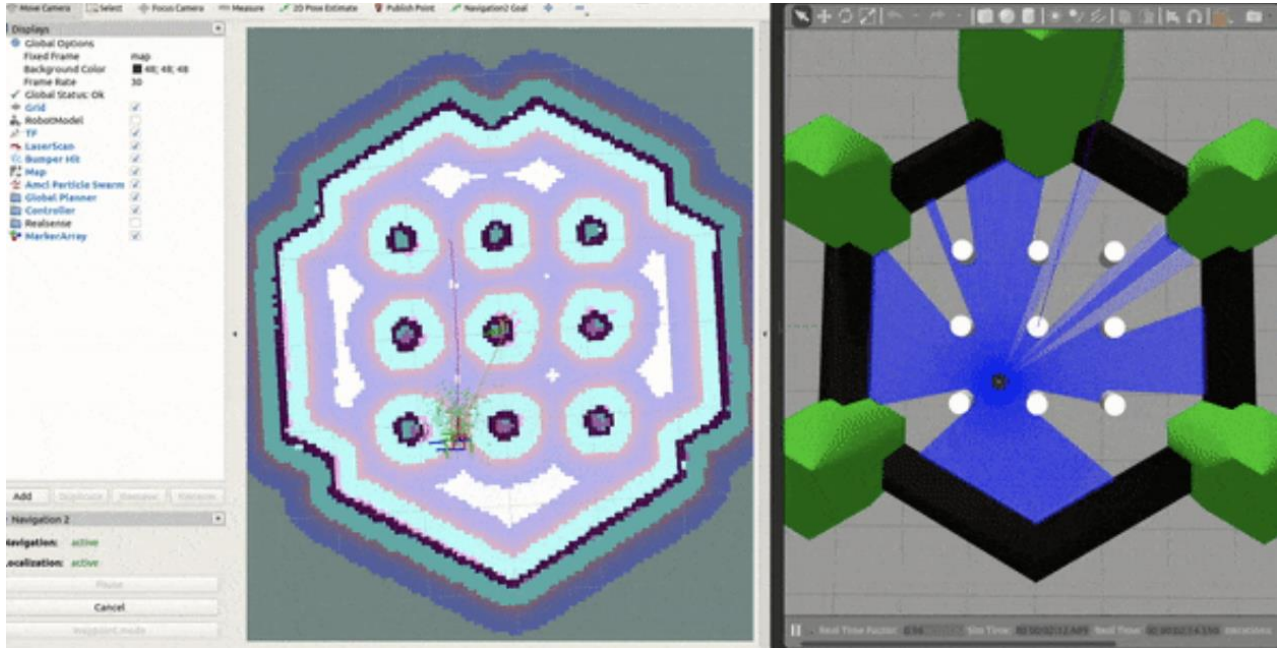
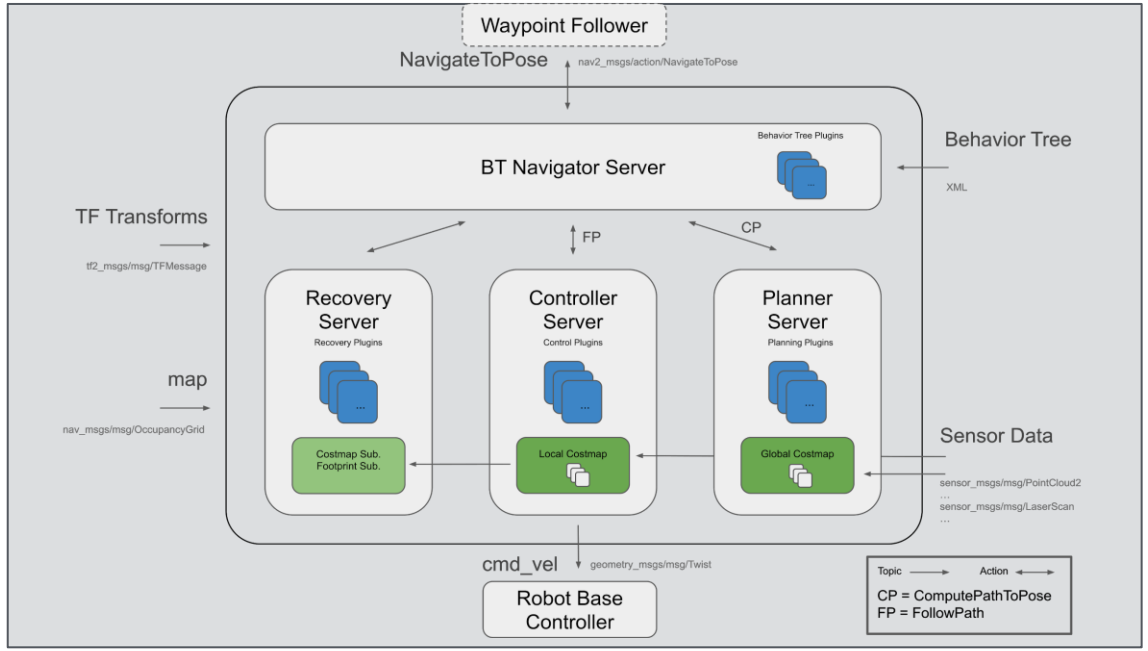
ROS(Navigation2) 赛题介绍





NAV2

Servers
- Planner
- Controller
- Recovery

Map
- Costmap
- Layers
- Filters

Misc
- Map Server
- Plugins
- Behavior Tree

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23. 2D/3D Localization Improvements

Background

The Navigation2 stack uses AMCL as its primary localization engine. Over the last 10 years, essentially no updates to AMCL has been made. This is due to the code base for this implementation of an Adaptive Monte Carlo Localizer is written in embedded C, not well structured, and very sensitive to changes. A-MCL implementations have been a hallmark of localization for over a decade but this particular implementation should be deprecated.

Project

Designing and creating a new localization engine for the navigation2 stack. The requirements of this are:

- Support 2D laser scanners
- Support 3D laser scanners, where 2D case could potentially be a simplified case
- Accurately track the localization of a robot in a given occupancy grid
- Ref1: reimplementing an A-MCL that is designed to be modified with modular components and support sampling from a 3D lidar.
- Ref2: a NDT-MCL using NDT 2D/3D scan matching.
- (Optional but recommended)Accept the inputs from multiple laser scanners. However it is not strictly required.

The specific method is left open-ended to allow for creativity, novelty, or reimplementation of a what you feel is best.

Project output requirements

2D and 3D localization system based on laser scanners - 65% or higher test coverage - Designed with modular components that can be reliably modified over time

Refs & Links

- ROS2 Installation: https://index.ros.org/doc/ros2/Installation/
- Navigation2 Guides: https://navigation.ros.org/getting_started/index.html
- Behavior Tree in Robotics and AI, An Introduction: https://arxiv.org/abs/1709.00084