Robot Operating System-Based SLAM for a Gazebo-Simulated Turtlebot2 in 2d Indoor Environment with Cartographer Algorithm

Authors : Wilayat Ali, Li Sheng, Waleed Ahmed

Abstract : The ability of the robot to make simultaneously map of the environment and localize itself with respect to that environment is the most important element of mobile robots. To solve SLAM many algorithms could be utilized to build up the SLAM process and SLAM is a developing area in Robotics research. Robot Operating System (ROS) is one of the frameworks which provide multiple algorithm nodes to work with and provide a transmission layer to robots. Manyof these algorithms extensively in use are Hector SLAM, Gmapping and Cartographer SLAM. This paper describes a ROS-based Simultaneous localization and mapping (SLAM) library Google Cartographer mapping, which is open-source algorithm. The algorithm was applied to create a map using laser and pose data from 2d Lidar that was placed on a mobile robot. The model robot uses the gazebo package and simulated in Rviz. Our research work's primary goal is to obtain mapping through Cartographer SLAM algorithm in a static indoor environment. From our research, it is shown that for indoor environments cartographer is an applicable algorithm to generate 2d maps with LIDAR placed on mobile robot because it uses both odometry and poses estimation. The algorithm has been evaluated and maps are constructed against the SLAM algorithms presented by Turtlebot2 in the static indoor environment.