

The TurtleBot simulation in Gazebo demonstrates how key ROS 2 components work together to support robot perception and visualization. The /odom topic provides odometry data, allowing the robot to estimate its position and orientation as it moves, which is essential for navigation despite minor accumulated errors. The /laserScan topic supplies distance measurements from the simulated LiDAR sensor, enabling the robot to detect obstacles and understand its surroundings.

RViz2 integrates these data streams into a clear visual representation, showing the robot model, laser scans, and coordinate frames. This makes it easier to interpret the robot's behavior and debug issues. Gazebo serves as the simulation environment where realistic physics and sensor data are generated. Together, these tools create an effective platform for learning and testing mobile robot concepts in a controlled, safe environment.