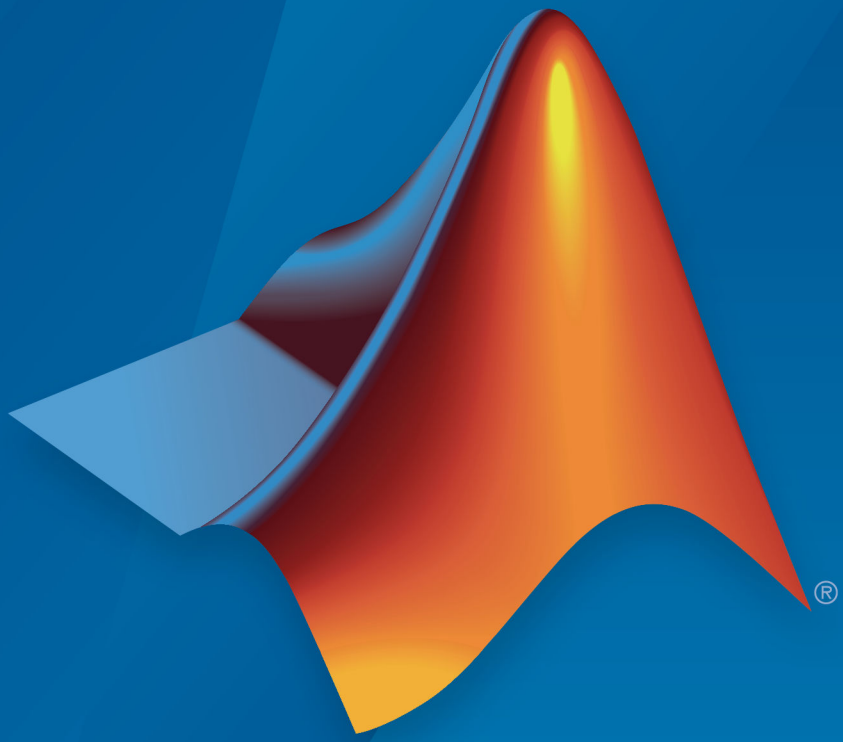
ROS Toolbox

Getting Started Guide



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R2019b

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Revision History

September 2019	Online only	New for Version 1.0 (R2019b)

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Product Overview

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ROS Toolbox Product Description

Design, simulate, and deploy ROS-based applications

ROS Toolbox provides an interface connecting MATLAB® and Simulink® with the Robot Operating System (ROS and ROS 2), enabling you to create a network of ROS nodes. The toolbox includes MATLAB functions and Simulink blocks to import, analyze, and play back ROS data recorded in rosbag files. You can also connect to a live ROS network to access ROS messages.

The toolbox lets you verify ROS nodes via desktop simulation and by connecting to external robot simulators such as Gazebo. ROS Toolbox supports C++ code generation (with Simulink Coder™), enabling you to automatically generate ROS nodes from a Simulink model and deploy to simulated or physical hardware. Support for Simulink external mode lets you view messages and change parameters while your model is running on hardware.

ROS Toolbox Supported Hardware

As of this release, ROS Toolbox supports the following hardware. See “Get and Manage Add-Ons” (MATLAB) for information on installing add-ons and support packages. You can also use `rosAddons` for ROS Toolbox add-ons.

Support Package	Vendor	Earliest Release Available	Last Release Available
“ROS Toolbox Support Package for TurtleBot-Based Robots”	TurtleBot®	2016a	Current

View the Hardware Catalog for details on all supported hardware.

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Getting Started

Robot Operating System (ROS)

Robot Operating System (ROS) is a framework of tools, libraries, and software to aid in robot software development. It is a flexible system for programming robots and controlling robotic platforms. ROS was developed by an open-source collaborative community to help grow the world of robotics. Applications for working with hardware, robotic simulation models, path planning, localization and mapping, and many other algorithms are available. For an introduction to ROS, see the ROS Introduction on their website.

For more information about ROS and its functionality, see the ROS Website and the ROS Wiki. The wiki contains documentation and tutorials for ROS, software packages, core libraries, and supported robots and hardware.

ROS 2 is the second version of ROS. See ROS 2 Overview for more details about ROS 2 specifically.

ROS Toolbox allows you to access ROS functionality in MATLAB. Use MATLAB to communicate with a ROS network, interactively explore robot capabilities, and visualize sensor data. You can develop robotics applications by exchanging data with ROS-enabled robots and robot simulators such as Gazebo. You can also create Simulink models that exchange messages with a ROS network. Verify your model within the Simulink environment by receiving messages from, and sending messages to, ROS-enabled robots and robot simulators. From your model, you can also generate C++ code for a standalone ROS application.

Both MATLAB and Simulink support the TCPROS transport layer (see TCPROS). The UDPROS transport is not supported.

ROS Toolbox supports ROS Indigo and Hydro platforms, but your own ROS installation may have different message versions. If you would like to overwrite our current message catalog, you can utilize “ROS Custom Message Support” to generate new message definitions. For ROS 2, ROS Toolbox supports the Bouncy Bolson platform.

The first thing to do when working with ROS is to set up or connect to a ROS network. Here is a link to an explanation of the ROS network setup and some examples to get started using ROS in MATLAB and Simulink:

MATLAB

- “ROS Network Setup”

- “Get Started with ROS”
- “Connect to a ROS Network”

Simulink

- “Get Started with ROS in Simulink®”
- “Configure ROS Network Addresses”
- “Connect to a ROS-enabled Robot from Simulink®”

To get started with ROS 2, see:

MATLAB

- “Get Started with ROS 2”
- “Connect to a ROS 2 Network”
- “Work with Basic ROS 2 Messages”

Simulink

- “Get Started with ROS 2 in Simulink®”
- “Publish and Subscribe to ROS 2 Messages in Simulink®”
- “Feedback Control of a ROS-enabled Robot over ROS 2”