

# Lesson 3 ROS Documents and Terms

## Instruction

### 1. The Composition of ROS File System

ROS file consists of Packages and Manifests (package.xml).

Packages: The function packages, the most basic unit of the Ros software, contains node source code, configuration files, data definition, etc.

Manifest (package xml): The description file of function package is used to define dependencies between the meta information related to the function package, including version, maintainer, license agreement, etc.

### 2. Understand the Basic Terms of ROS

The following table provides explanation on some of ROS basic terms.

Terms	Instruction
ROS Master	The connection and message communication between nodes.
Node	The smallest processing unit running in Ros is usually an executable file. Each node can use topic or service to communicate with other nodes.
Message	The variables of int, float, boolean and other data types.
Topic	A one-way asynchronous communication mechanism. The data can be transmitted between nodes through publishing message to topics or subscribing topics. The

	type of topics are determined by that of corresponding message.
Publish	Send data with the message type corresponding to the topic content.
Publisher	To execute publishing, the publisher nodes register their topics and other various information on the master node, and send messages to subscriber nodes that wish to subscribe.
Subscrib	Receive data with the message type corresponding to the topic content.
Subscriber	To execute subscribing, the subscriber node registers its own topic and other various informations on the master node and receives the inforamtion from the master node about all publisher nodes that have published the topic to which this node needs to subscribe.
Service	A two-way synchronous communication mechanism. The service client requests the service corresponding to the specific purpose task and the service server replys to the service.
Service Server	The node with request as input and respond as output
Service Client	The node with respond as input and request as output

### 3. Learn about ROS Common Files

Terms	Instruction
urdf file	It is a model file describing all elements of robot including link, joint, axis, dynamics, visual and collision.
Srv file	It is stored in srv folder for ROS service message definition and contains two parts, request and reply. The symbol "--" is used to separate the request from the reply.
Msg file	It is stored in msg folder and used for ROS topics message definitions.
package.xml	Describe the property of function package including its name, version, author, etc.
CmakeLists.txt	Compile configuration files by using Cmake.
Launch file	Launch file. It contains the node and services needed to systematically boot up the robot.

### 4. Learn About Common Commands

ROS commands can be divided into five types: ROS shell commands, ROS execution commands, ROS information commands, ROS catkin commands, ROS function package commands. The followings are some of commonly used basic commands:

#### ◆ ROS shell commands

Command	Explanation	Instruction
roscd	ros+cd(changes directory)	Come to the specified ROS package directory.
rosls	ros+ls(lists files)	Display the file and directory of ROS package
roscd	ros+ed(editor)	Edit the files of ROS package
roscp	ros+cp(copies files)	Copy the files of ROS package
rospd	ros+pushd	Add directory to ROS directory index
roscd	ros+directory	Display the directory in ROS directory index.

#### ◆ ROS Executing Command

Command	Explanation	Instruction
roscore	ros+core	Boot ROS master node management
roslaunch	ros+run	Run ROS node
roslaunch	ros+launch	Start launch file
rosclean	rosclean	Check or delete ROS log file

#### ◆ ROS Information command

Command	Explanation	Instruction
rostopic	ros+topic	Confirm ROS topics information
rosservice	ros+service	Confirm ROS service information
roscall	ros+node	Confirm Ros node information
rosparam	ros+param(parameter)	Confirm and modify ROS parameter information
rosviz	ros+bag	Record and replay ROS message
rosmmsg	ros+msg	Display ROS message type
rossrv	ros+srv	Display ROS service type
rosver	ros+version	Display ROS package and version information
roswtf	ros+wtf	Check ROS system

#### ◆ ROS catkin Command

Command	Instruction
catkin_create_pkg	Automatically generate function package

catkin_make	Build all function packages in diectory on the basis of catkin build system.
catkin_eclipse	Modify the package generated with the catkin build system to work in Eclipse environment.
catkin_prepare_release	Update CHANGELOG.rst file generated by “catkin_generate_changelog”
catkin_generate_changelog	Generate or upadate CHANGELOG.rst file when publishing
catkin_init_workspace	Initialize the workspace directory of the catkin build system
catkin_find	Find all warkspace directories in use

◆ **ROS Package Command**

Command	Explanation	Instruction
rospack	ros+pack(age)	View information related to ROS funcation package
roinstall	ros+install	Install the ROS add-on package
rosdep	ros+dep(endencies)	Install the dependency files for the specified function package

rosllocate	ros+locate	Display the information related to ROS function package
roscrcate-pkg	ros+create-pkg	Automatically generate ROS function package (Use for old rosbuidl system)
rosmake	ros+make	Build ROS function package (used for old rosbuidl system)