

The Basics of ROS Applied to Self-Driving Cars

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What is ROS?



“The Robot Operating System (ROS) is a set of software libraries and tools that help you build robot applications. From drivers to state-of-the-art algorithms, and with powerful developer tools, ROS has what you need for your next robotics project. And it's all open source.”



Why Use ROS?

Without ROS

- Build Device Drivers
- Build a Communications Framework
- Write algorithms for perception, navigation, and motion planning
Implement logging, control, and error handling



With ROS

- Logging, error handling, communications framework, drivers for standard devices
- Algorithms for perception, navigation and motion planning
- Tools for visualization, simulation and analysis

How Do SDCs Work?

Perception



Decision Making



Actuation



ROS Nodes

ROS splits these high level tasks in low level ones and spawns a Unix thread for each of them.

Perception

Camera GPS
LIDAR Wheel Encoder
Radar

Decision Making

Path Planning
Trajectory Sampling
Deep Learning

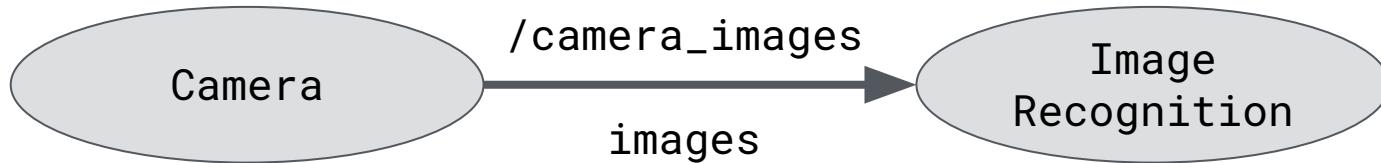
Actuation

Steering
Brakes
Throttle

ROS Topics

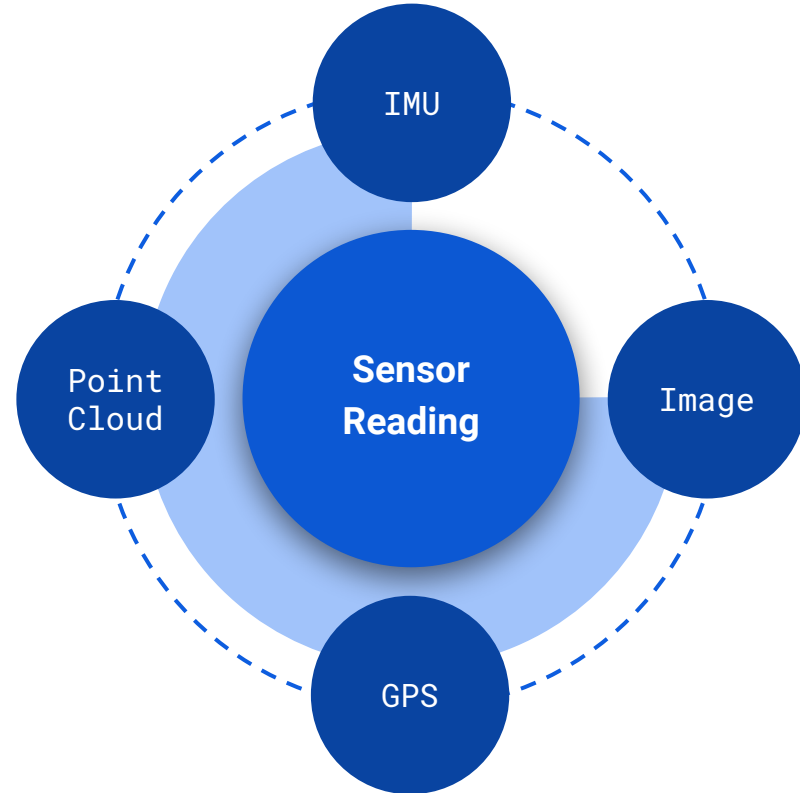
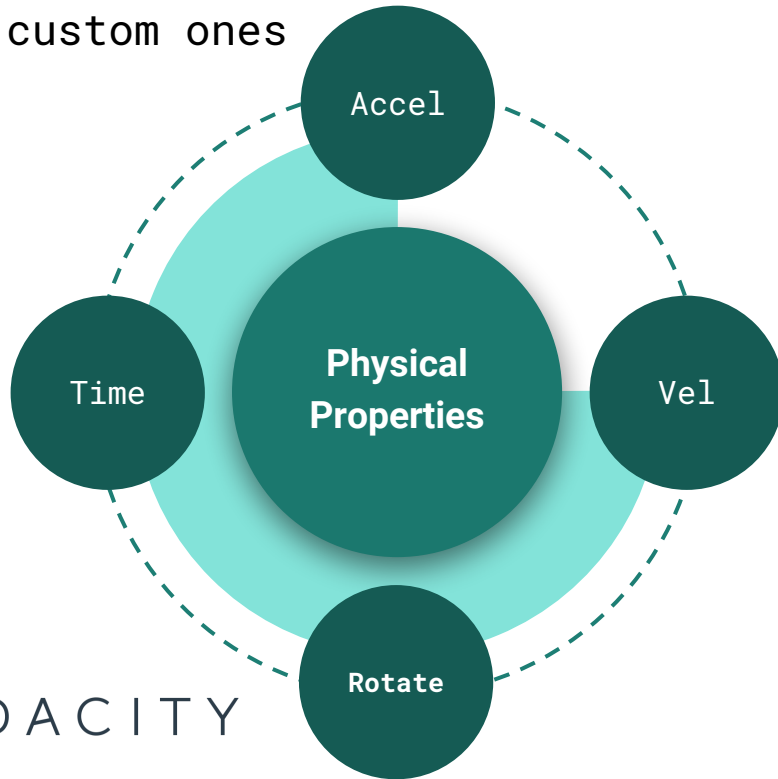
ROS nodes communicate with each other over **topics**

- If you want to send messages, you **publish** to a topic
- If you want to receive messages, you **subscribe** to a topic

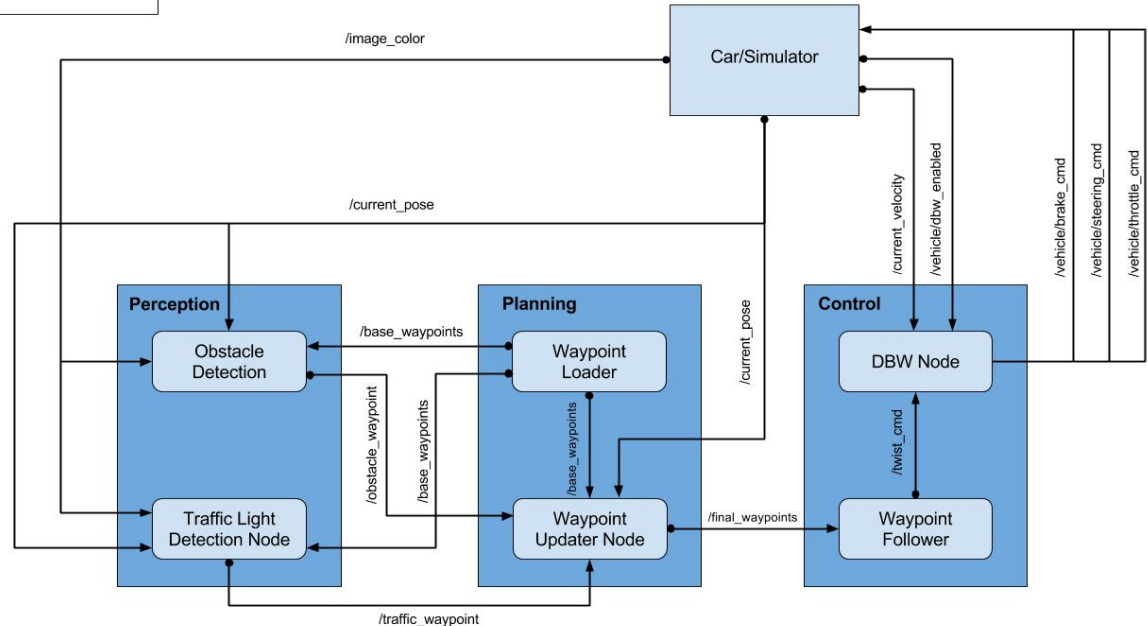
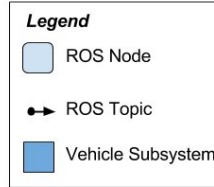


ROS Messages

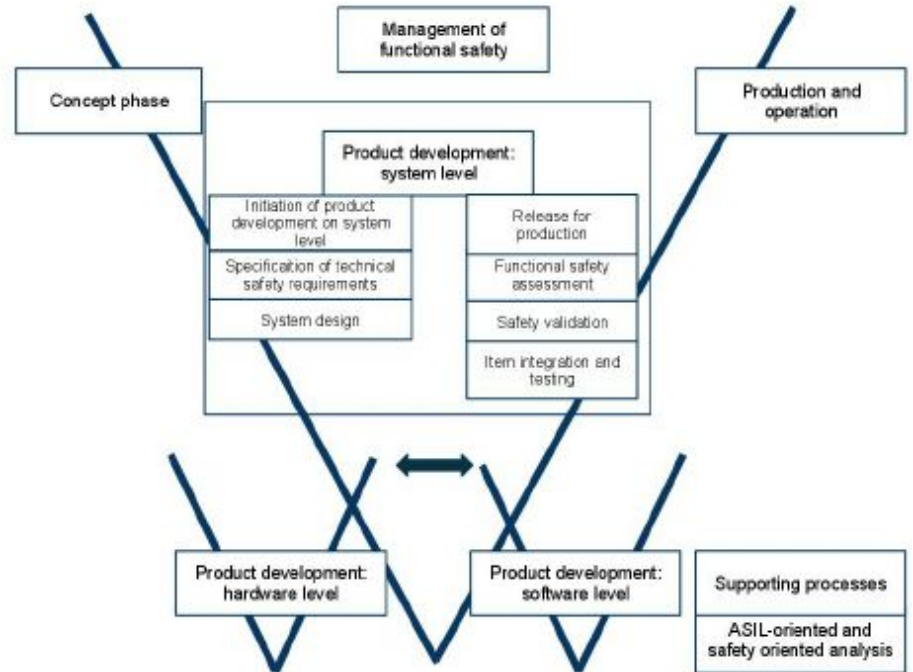
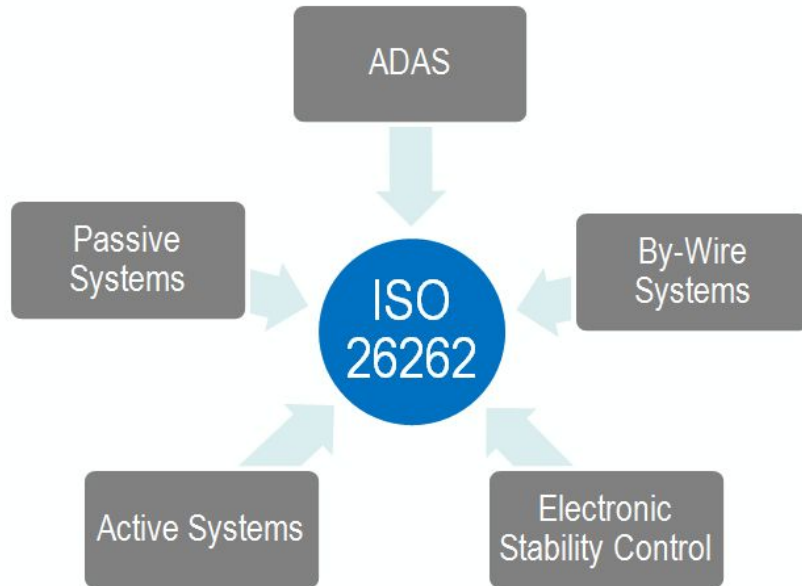
ROS provides over 200 predefined messages and the ability to create custom ones



SDC Example



ROS Limitations



SDC Nanodegree Program

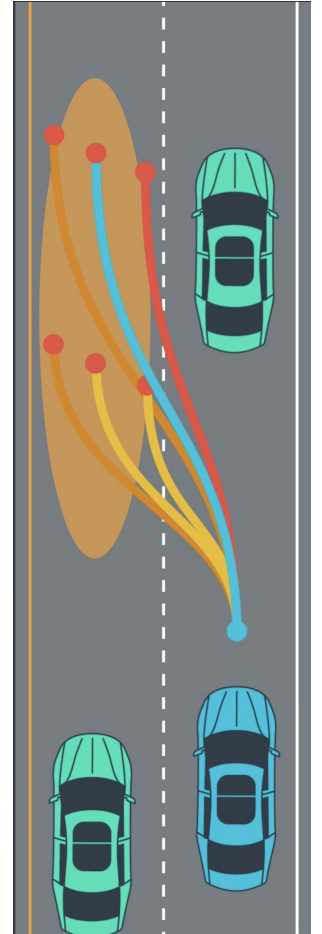
NANODEGREE PROGRAM

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UDACITY

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