

Using MATLAB and Simulink in Robotics

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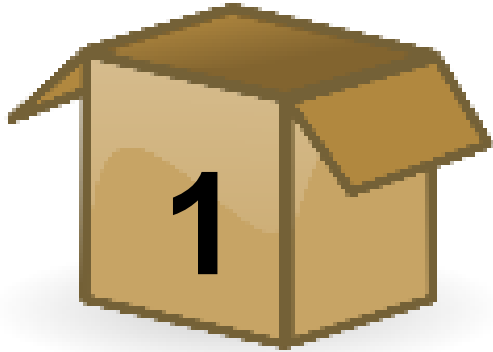


Agenda

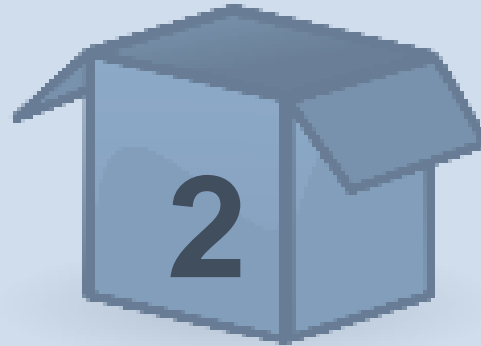
- **Using MATLAB and Simulink for**
 - Building Robots
 - Developing Robotics Applications using Existing Robots
 - Teaching/Learning Robotics

- **Demonstrating Robotics System Toolbox (R2015a, March 2015)**
 - Robotics Algorithms
 - MATLAB-ROS Interface
 - Simulink-ROS Interface

What Are You Doing with Robotics?



Build
Robots



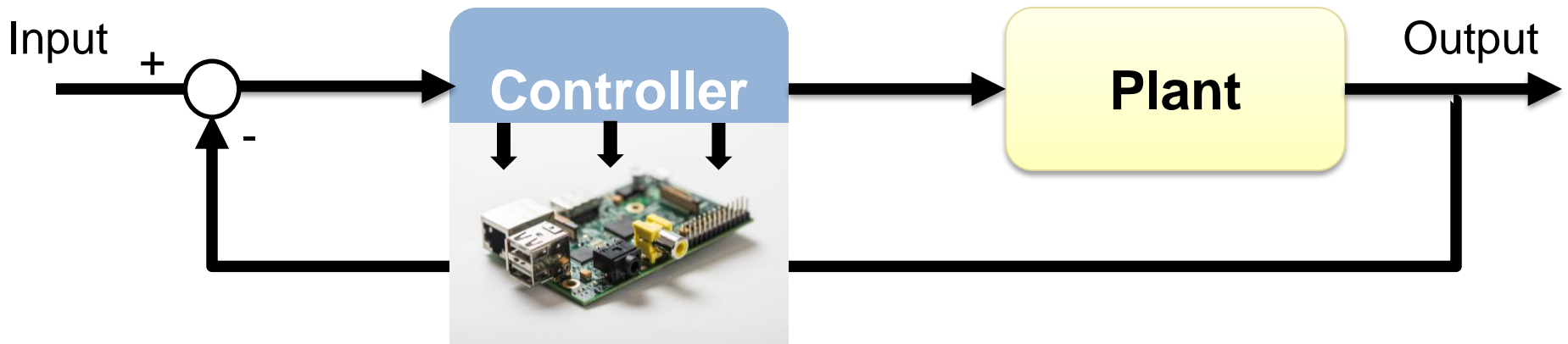
Develop Robotics Applications
Using Existing Robots



Teach/Learn
Robotics

My Focus Today

Using MATLAB and Simulink for “Building Robots”



Festo Bionic Arm



DLR Humanoid Robot



YZU Robot Hand

Recorded Webinar: [How a Differential Equation Becomes a Robot](#)

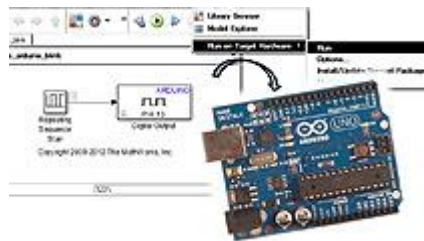
Using MATLAB and Simulink for “Teaching/Learning Robots”

Build Robots with Low-Cost Hardware?



- No need C/C++/Python
- Drivers Provided
- Comprehensive Algorithms

Hardware Support Package

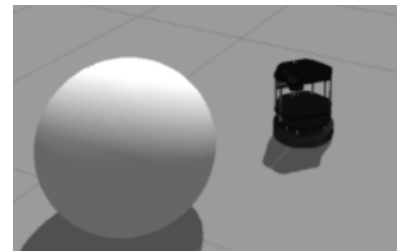


Use Powerful Robots Running ROS?



- ROS/Gazebo Interface
- ROS Node Generation
- Comprehensive Algorithms

Robotics System Toolbox



Visit:

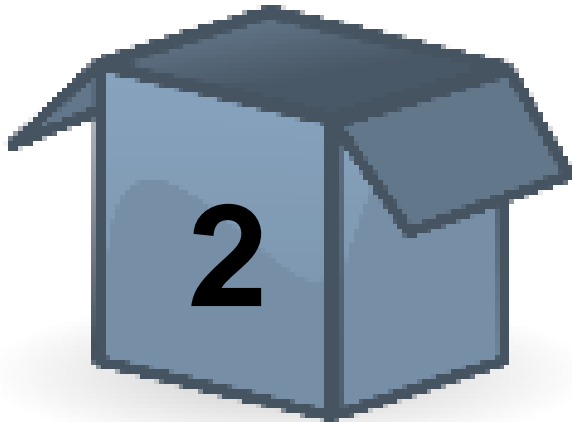
www.mathworks.com/hardware

Visit:

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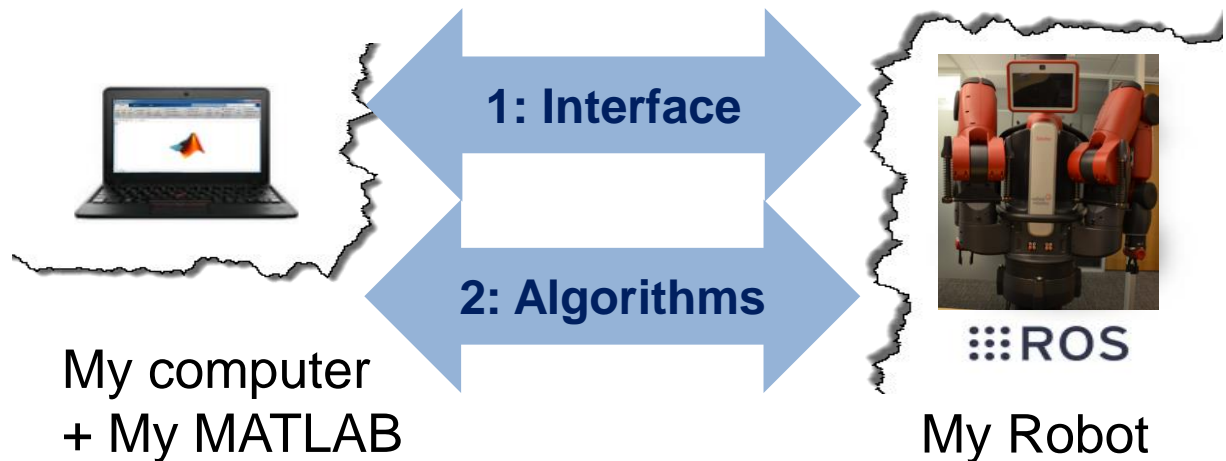
Using MATLAB and Simulink for “Developing Robotics Applications”

- What you have and need?



Example:
Develop a Human
Robot
Interaction
Application

Developing Robotics
Applications using
Existing Robots



Key Features of Robotics System Toolbox (v1.0)



- MATLAB-ROS Interface
- Simulink-ROS Interface
- Robotics Algorithms
- Comprehensive Demos



ROS

Demo...

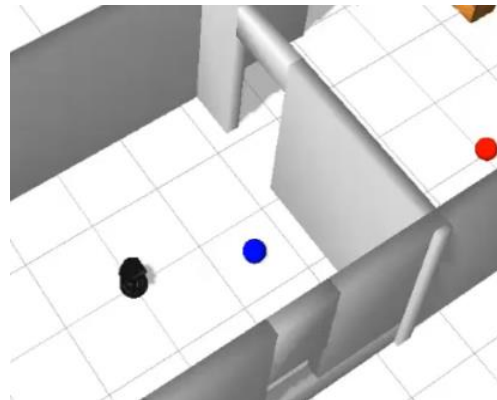
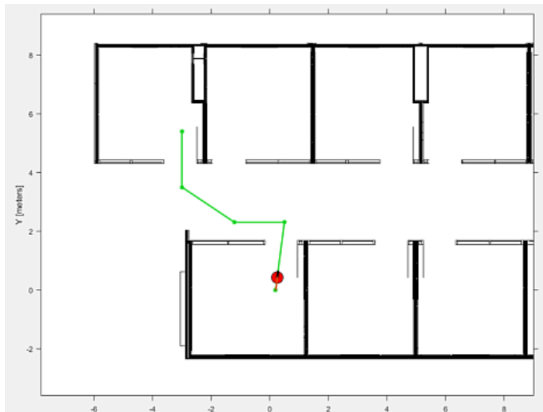
Design and Test Robotics Algorithms with ROS-enabled Robots or Simulators (such as Gazebo)

Demo Overview: Design and Test Robotics Algorithms

Prototype algorithms
(e.g., Path Planning)
in **MATLAB**

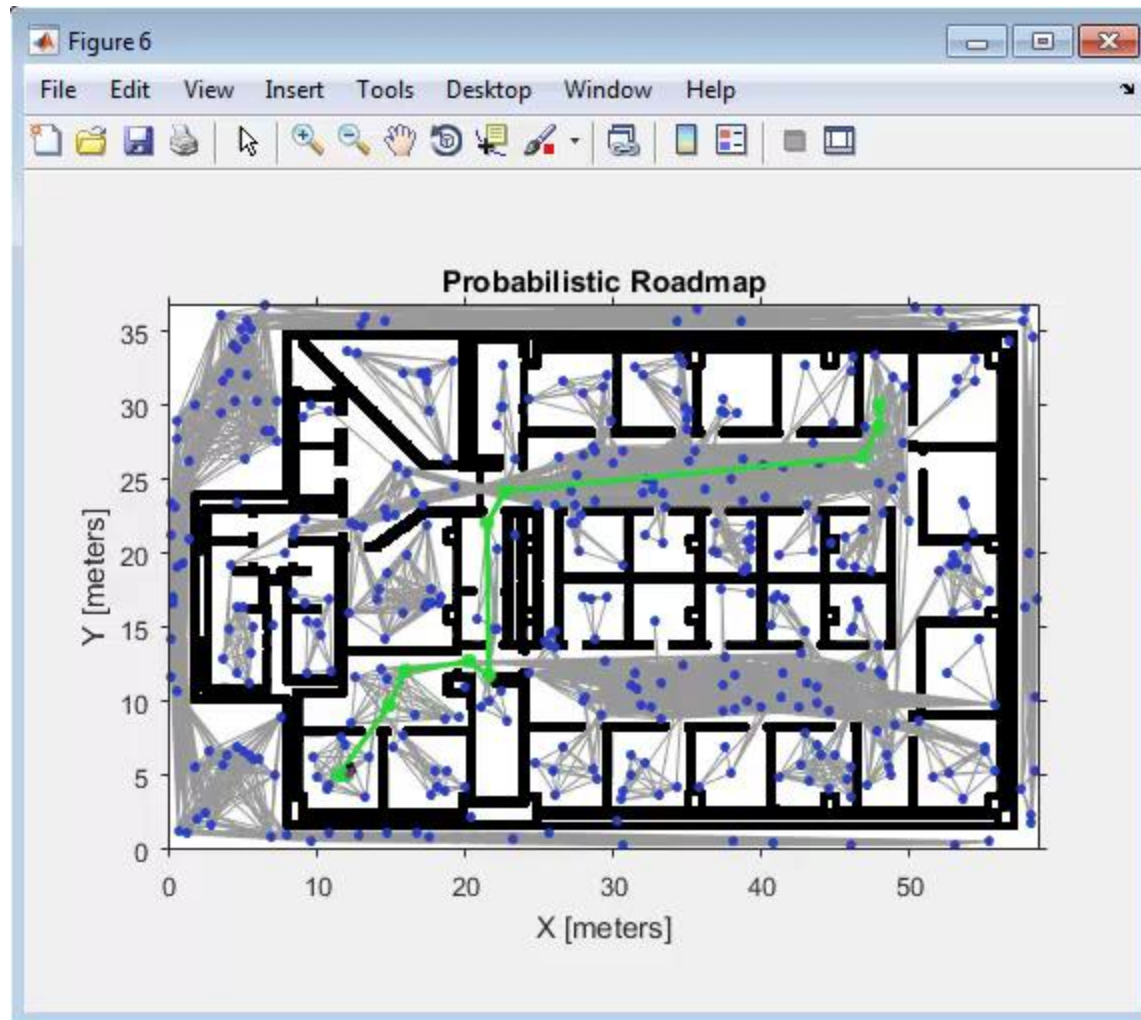
Test algorithms with ROS-enabled Simulators such as **Gazebo**

Test algorithms on a **Robot** and analyze the performance with **rosbag**



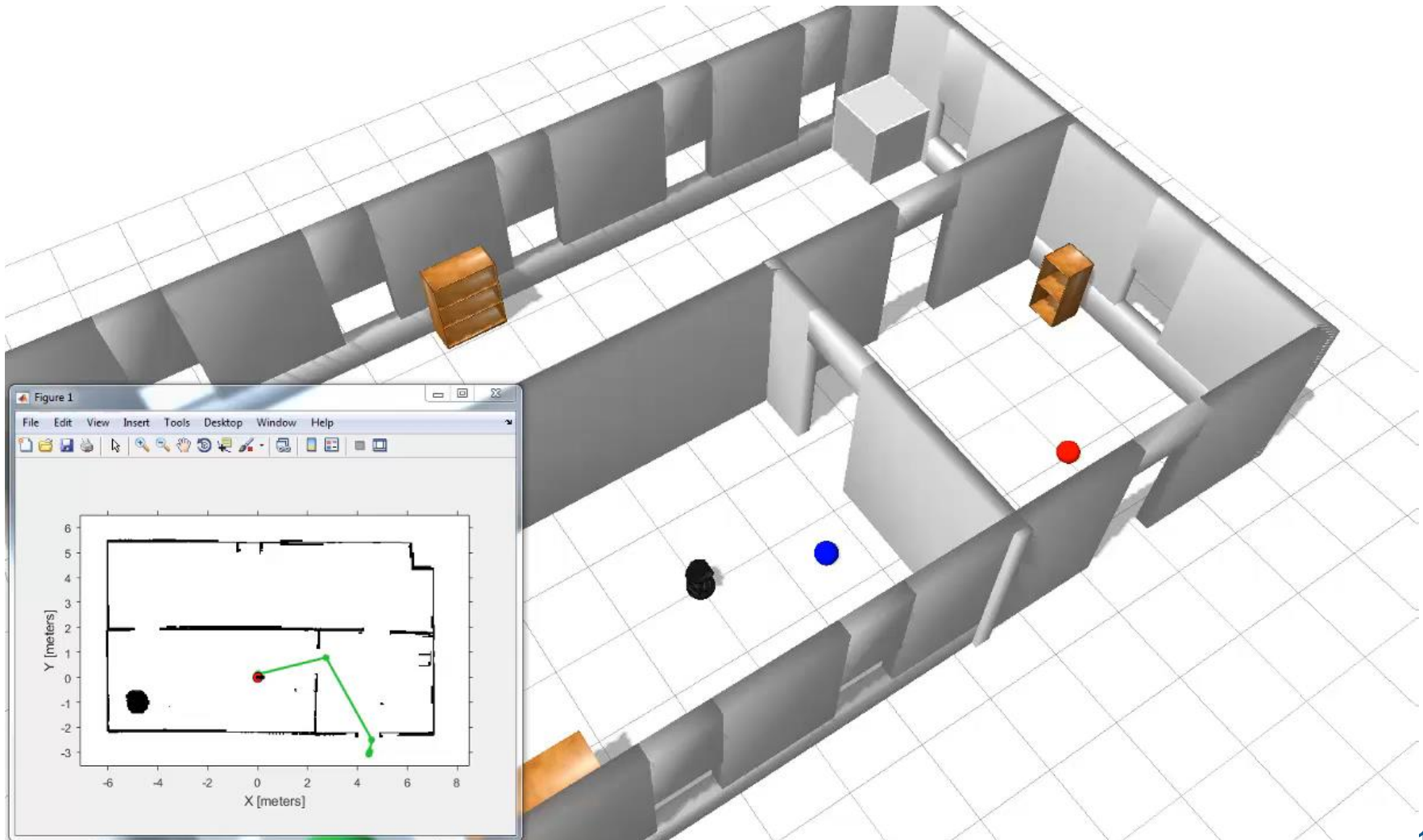
Demo: Design and Test Robotics Algorithms

- Prototype a path-planning algorithm in MATLAB



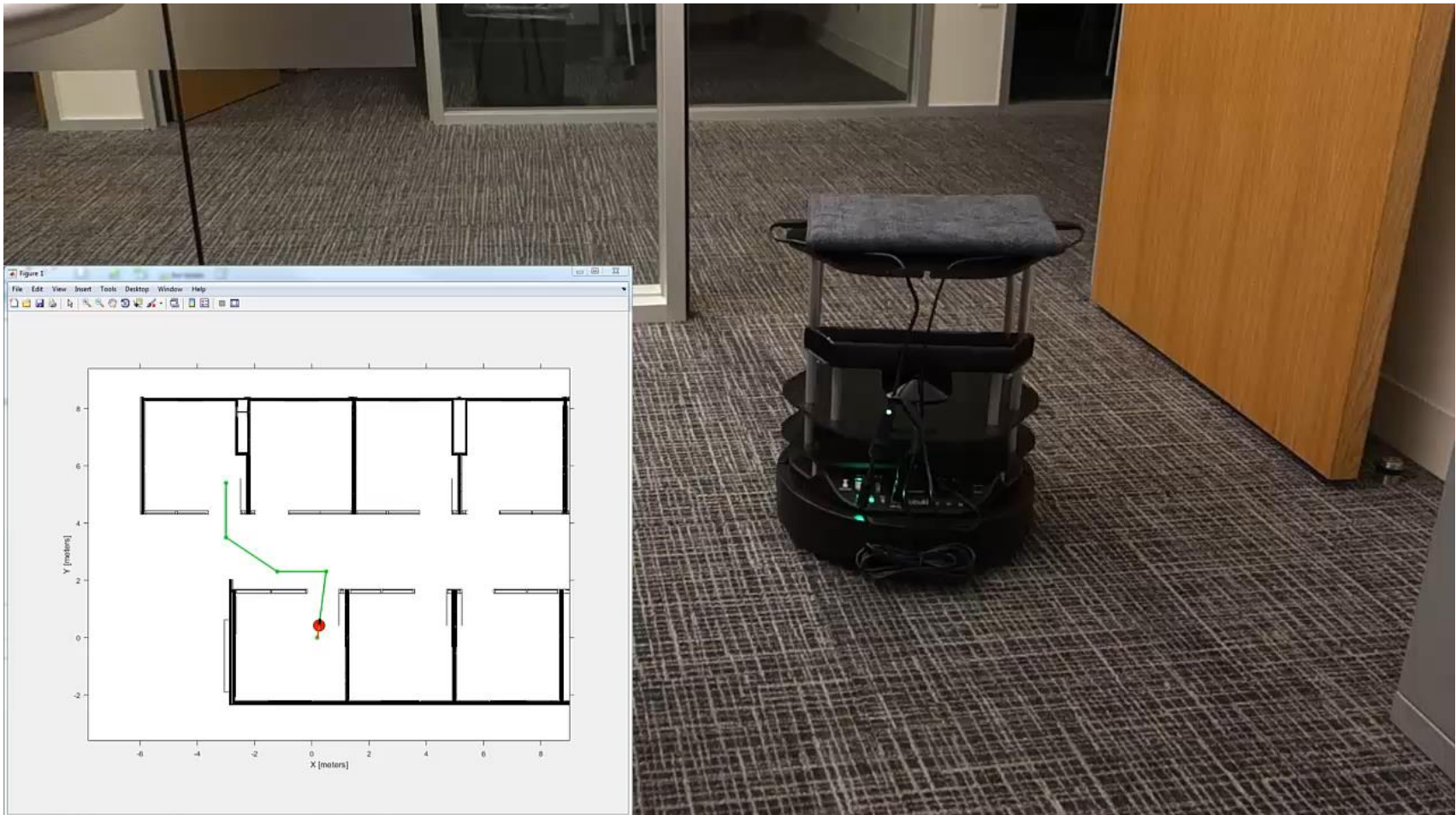
Demo: Design and Test Robotics Algorithms

- Test it with Gazebo through MATLAB-ROS Interface



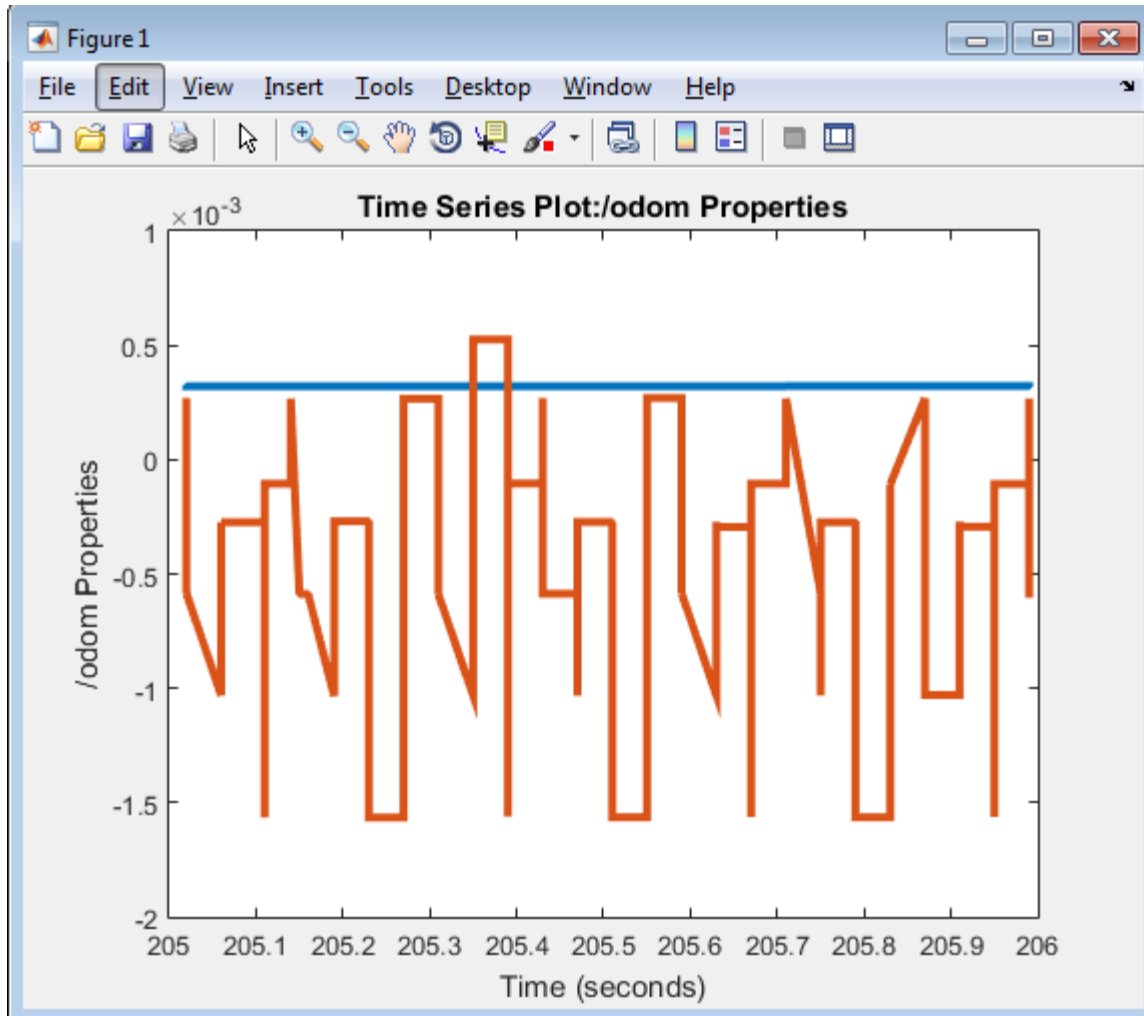
Demo: Design and Test Robotics Algorithms

- Test it with a physical robot running ROS



Demo: Design and Test Robotics Algorithms

- Analyze the performance by reading rosbag files

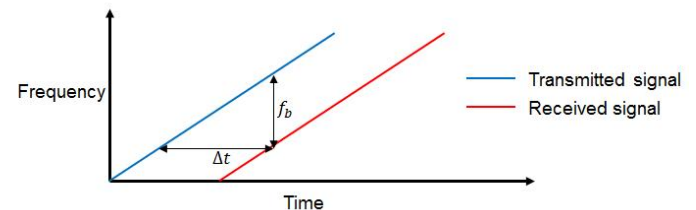
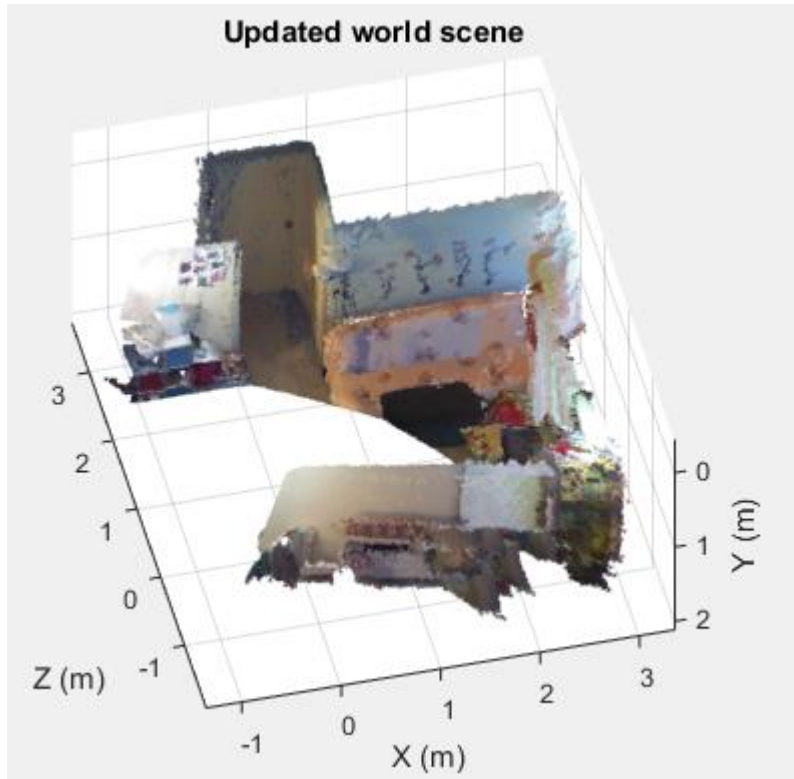


Switch to Demo 

Key Capabilities Demonstrated

- **MATLAB-ROS Interface**
 - Create a ROS node inside MATLAB
 - Design and test robotics algorithms on a robot simulator such as Gazebo
 - Test robotics algorithms on a physical robot
 - Import rosbag log files into MATLAB
- **Simulink-ROS Interface (Refer to Doc Examples)**
 - Simulink I/O with ROS networks
 - ROS node generation from Simulink models
- **Algorithms in Robotics System Toolbox**

Robotics Algorithms with Other MathWorks Products



Computer Vision System Toolbox

Phased Array System Toolbox

Thank You...

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