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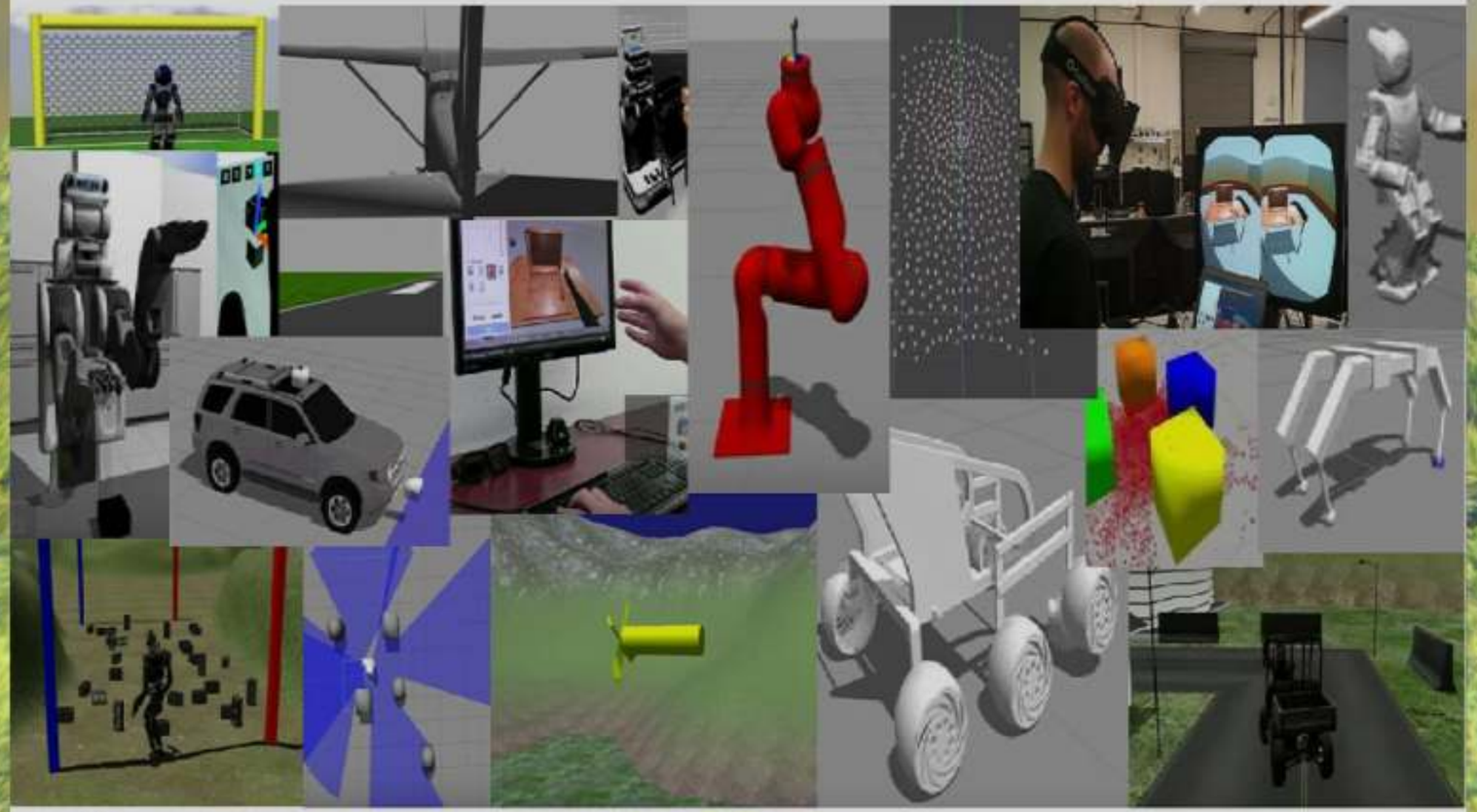
Making room under Gazebo:
Accommodating newcomers and power users alike
Louise Poubel
May 11th, 2017
@chapulinaBR
OSCON
OPEN SOURCE CONVENTION
Open Source Robotics Foundation

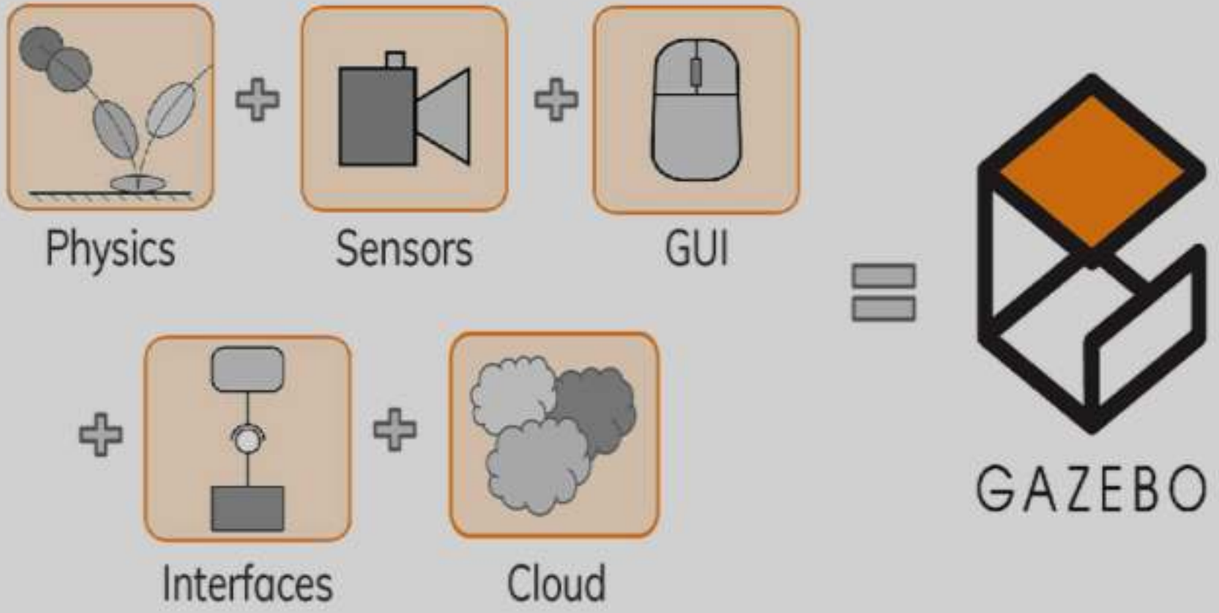
What is Gazebo?



https://youtu.be/R3xUKYcG_bc

What is Gazebo?

Goal: Best possible substitute for physical robots



Stats

Gazebo 7 (current LTS)

Birth	Fall 2002
Downloads	1k/month
Lines of code	298k
Lines of comments	99k
Test function coverage	52.9%
Test branch coverage	44.5%
Tests	1222
Contributors	100+

*Not counting SDFormat, Ignition, tutorials...

Dependencies

Cloud

CloudSim

Simulations in the cloud

The Prop Shop

Online sharing simulation resources

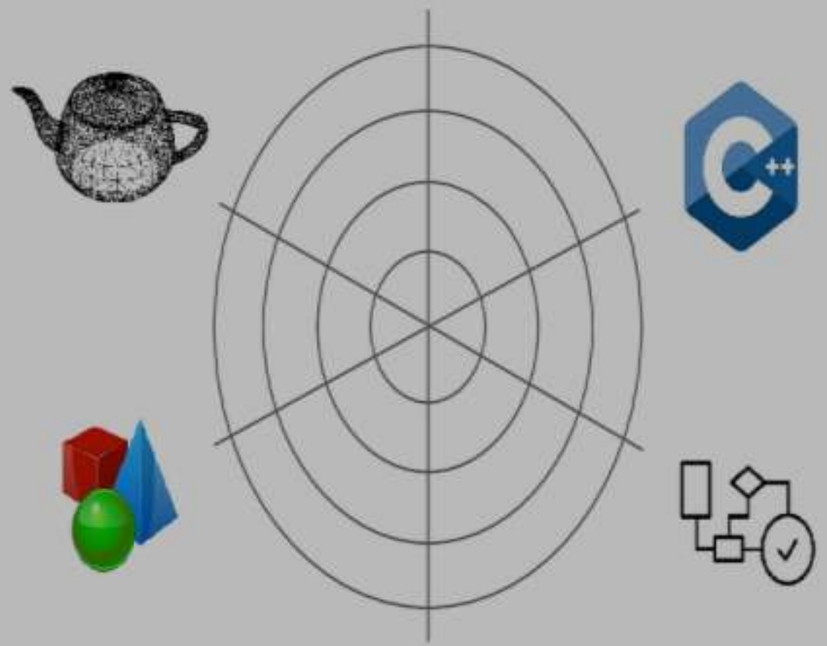
Web, desktop & mobile interfaces

Use cases

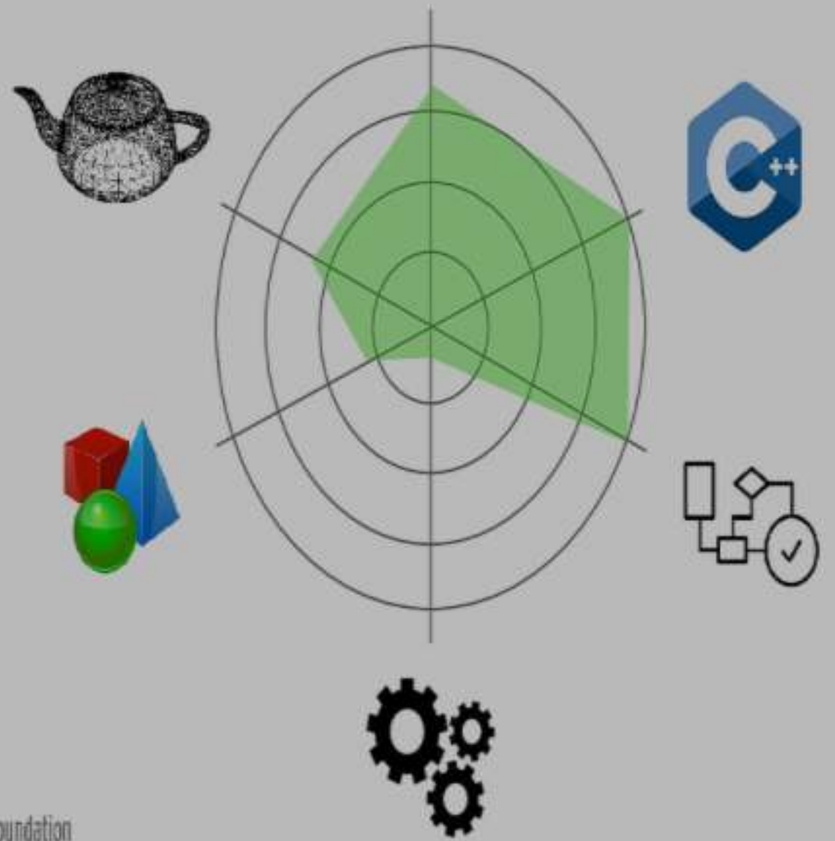
- Iterate on algorithms
- Prototyping
- Education
- Competitions
- Continuous integration
- ...

Who are Gazebo's users?

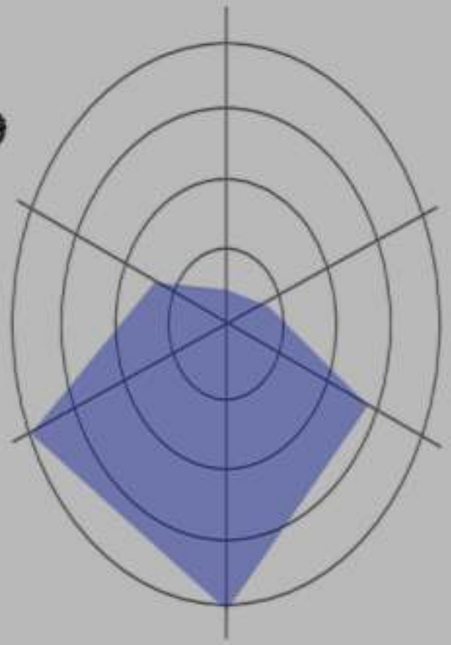
Skills



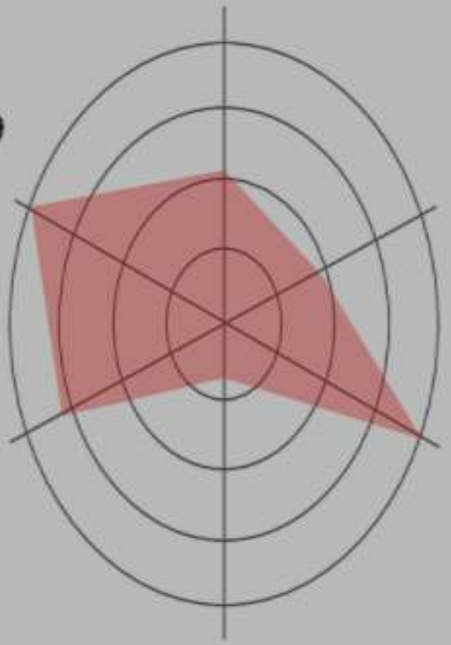
Skills

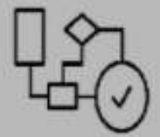


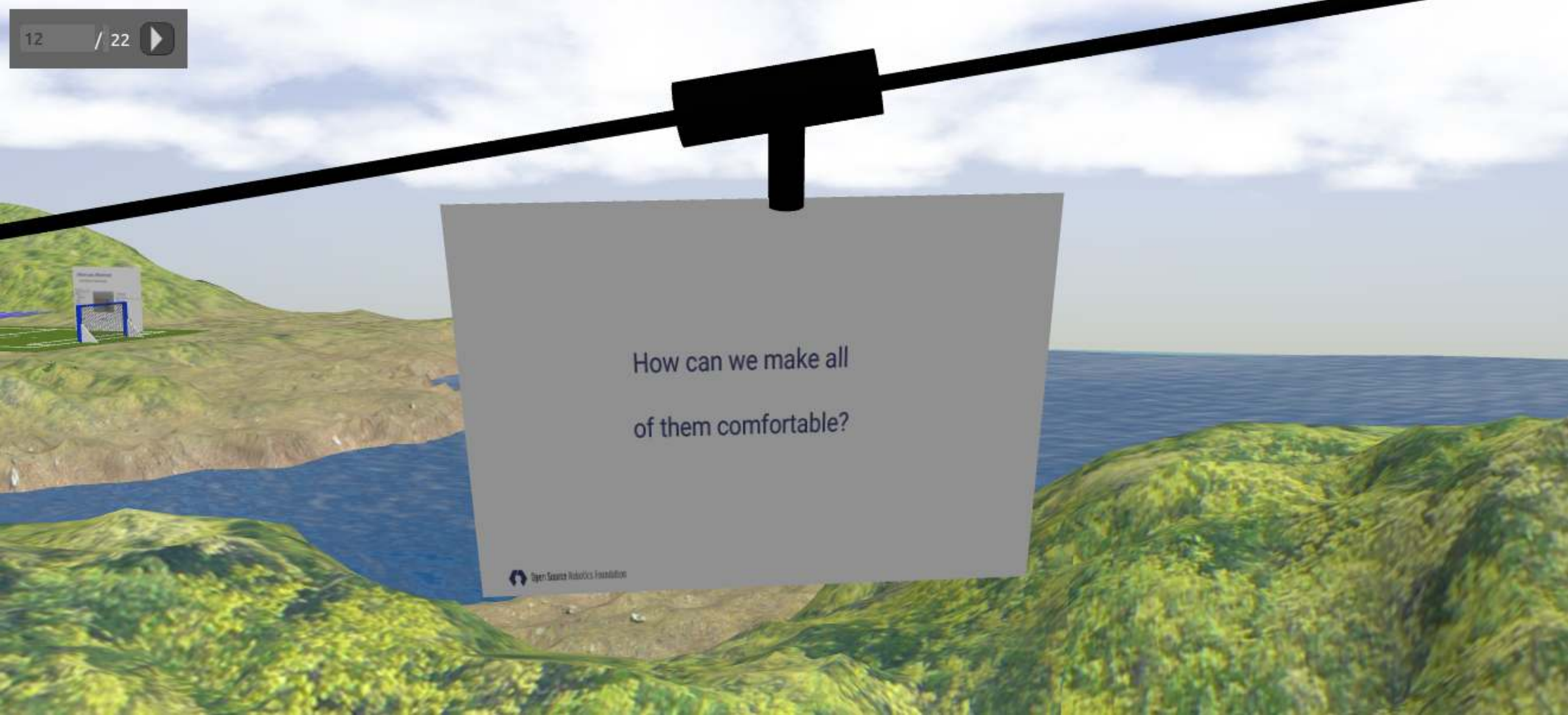
Skills



Skills





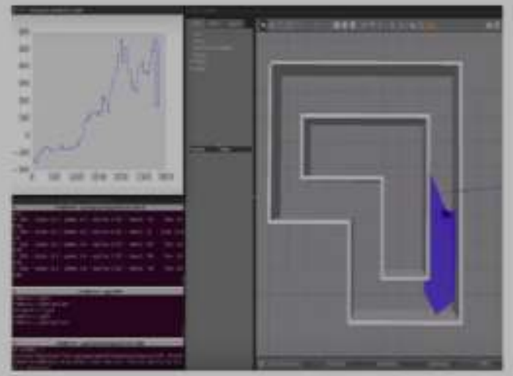

How can we make all
of them comfortable?
Open Source Robotics Foundation

Open source

- Encourage sharing
- Take advantage of each other's strengths

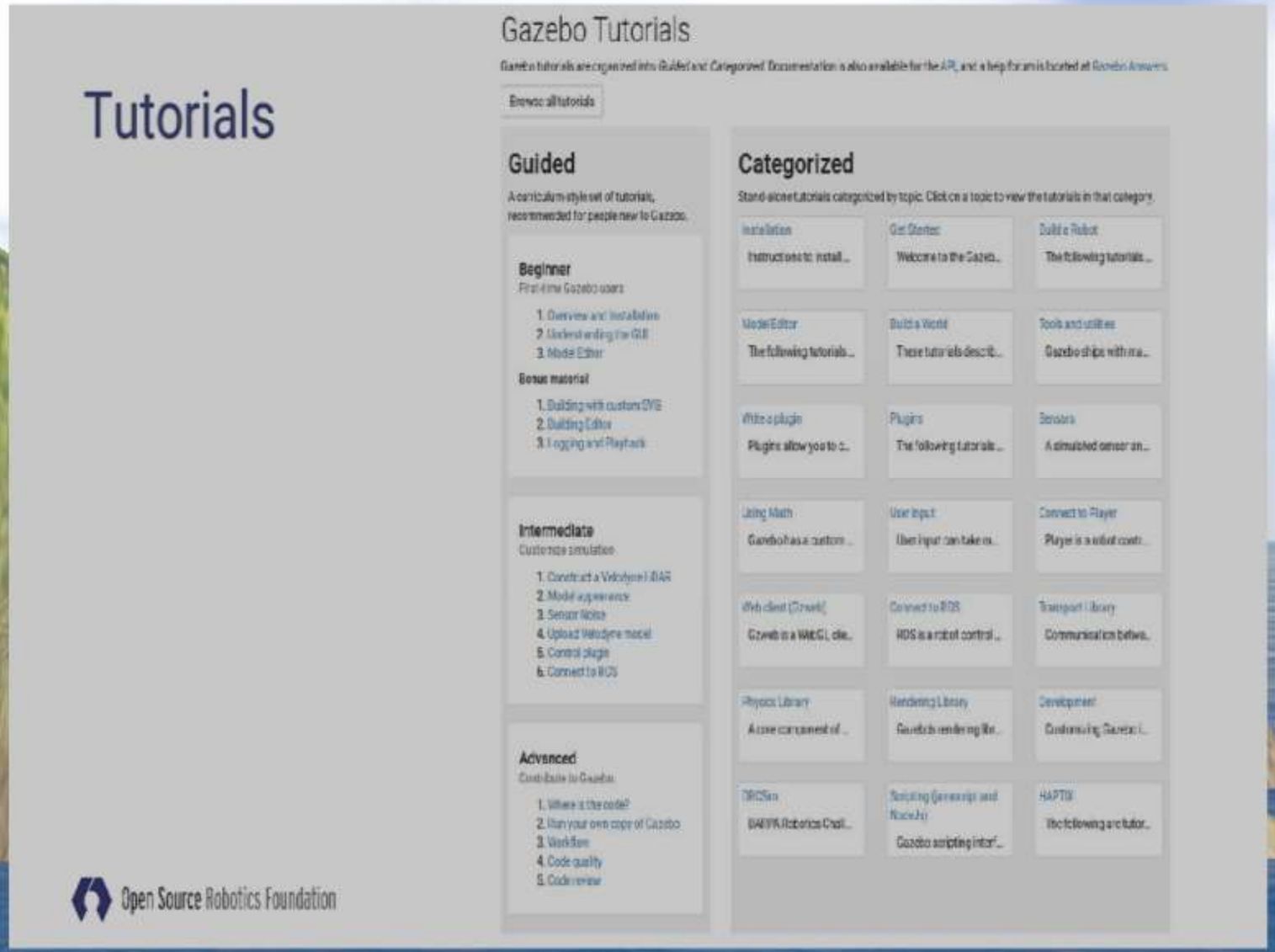
github.com/RethinkRobotics

github.com/uuvsimulator



github.com/erlerobot

Tutorials


Gazebo Tutorials
Browse all tutorials
Guided
A curriculum-style set of tutorials, recommended for people new to Gazebo.
Beginner
First-time Gazebo users
1. Overview and Installation
2. Understanding the GUI
3. Model Editor
Bonus material
1. Building with custom CMake
2. Building Editor
3. Logging and Playback
Intermediate
Customize simulation
1. Construct a Velodyne HDAR
2. Model appearance
3. Sensor Noise
4. Upload Velodyne model
5. Control plugin
6. Connect to ROS
Advanced
Contribute to Gazebo
1. Where is the code?
2. Run your own copy of Gazebo
3. Workflow
4. Code quality
5. Code review
Categorized
Stand-alone tutorials categorized by topic. Click on a topic to view the tutorials in that category.
Installation
Instructions to install...
Get Started
Welcome to the Gazeb...
Build a Robot
The following tutorials...
Model Editor
The following tutorials...
Build a World
These tutorials describ...
Tools and utilities
Gazebo ships with ma...
Write a plugin
Plugins allow you to c...
Plugins
The following tutorials...
Sensors
A simulated sensor an...
Using Math
Gazebo has a custom ...
User Input
User input can take m...
Connect to Player
Player is a robot contr...
Web client (Gzweb)
Gzweb is a WebGL clie...
Connect to ROS
ROS is a robot control...
Transport Library
Communication betwe...
Physics Library
A core component of ...
Rendering Library
Gazebo's rendering lib...
Development
Customizing Gazebo i...
TRCSim
DARPA Robotics Chall...
Running Gazeboapi and RoscoJni
Gazebo scripting interf...
HAPTIX
The following are tutor...
Open Source Robotics Foundation
Open source
• Encourage sharing
• Take advantage of each o

Tutorials

Every single step

Compiling this code will result in a shared library, `~/gazebo_plugin_tutorial/build/libfactory.so`, that can be inserted in a Gazebo simulation.

```
$ mkdir ~/gazebo_plugin_tutorial/build
$ cd ~/gazebo_plugin_tutorial/build
$ cmake ../
$ make
```

Make the shapes

Make a models directory with a box and a cylinder inside

```
$ mkdir ~/gazebo_plugin_tutorial/models
$ cd ~/gazebo_plugin_tutorial/models
$ mkdir box cylinder
```

Create a box model

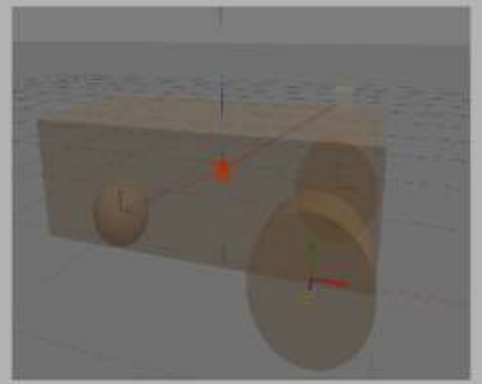
```
$ cd box
$ gedit model.sdf
```

Different users, different tools

Not all robots are created the same

```
<link name="left_wheel">
  <pose>0.1 0.13 0.1 0 1.5707 1.5707</pose>
  <collision name="collision">
    <geometry>
      <cylinder>
        <radius>.1</radius>
        <length>.05</length>
      </cylinder>
    </geometry>
  </collision>
  <visual name="visual">
    <geometry>
      <cylinder>
        <radius>.1</radius>
        <length>.05</length>
      </cylinder>
    </geometry>
  </visual>
</link>
```

SDF file



Model Editor

```
%
  front_wheel_locations.keys.each do |k|
    x0 = front_wheel_locations[k][:x0]
    y0 = front_wheel_locations[k][:y0]
%>
%> "<link name=" + "wheel_" + k + "f" %>
  <pose>%= x0 %> %= y0 %> %= wheel_radius %> %= -Math::PI/2 %> %= -caster_angle %> 0</pose
  <inertial>
    <mass>%= wheel_mass %></mass>
    <inertia>
      <ixx>%= wheel_ixx %></ixx>
      <iyy>%= wheel_iyy %></iyy>
      <izz>%= wheel_izz %></izz>
      <ixy>0</ixy>
      <ixz>0</ixz>
      <iyz>0</iyz>
    </inertia>
  </inertial>
  <collision name="collision">
    <geometry>
```

Templated file

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Examples
The Prop Shop
Open Source Robotics Foundation
bitbucket.org/osrf/gazebo_models

Forum

GAZEBO
ANSWERS
tags
users
badges
ALL
UNANSWERED
FOLLOWED
Search or ask your question
ASK YOUR QUESTION
3201 questions
Sort by » date activity ▼ answers votes RSS
Contributors
Command "roslaunch gazebo_ros empty_world.launch" crashes gazebo
no votes
no answers
7 views
gazebo_ros
crash
2 hours ago Vlad222
install Gazebo in Debian Jessie
no votes
no answers
5 views
debian
jessie
raspberry-pi
5 hours ago bstanard
c++ file in a gazebo model plugin?
no votes
1 answer
16 views
gazebo_plugins
cpp
model_plugin
c++
6 hours ago slowtz
Insert IMU in gazebo model
no votes
1 answer
12 views
6 hours ago chapulina
Joints not independent
no votes
1 answer
27 views
gazebo-ros-control
independent
joints
6 hours ago chapulina
Interesting tags
add
Ignored tags
add
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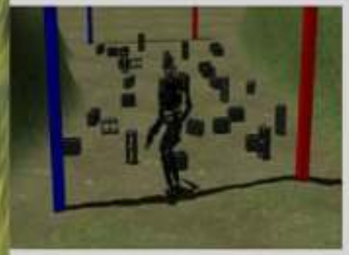
"Eat your own dog food"

DARPA ROBOTICS CHALLENGE

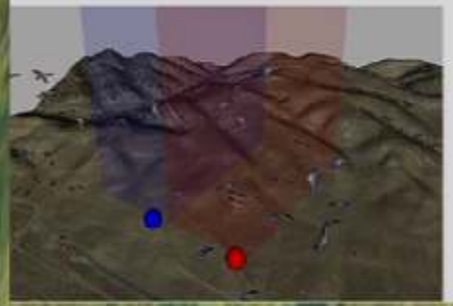


HAPTIX

RoboCup

FIRST

SASC



ARIAC

SPACE ROBOTICS CENTENNIAL CHALLENGE

Mentorship

OUTREACHY

Google
Summer of Code

There’s room for everyone!

Thank you!

http://gazebosim.org

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