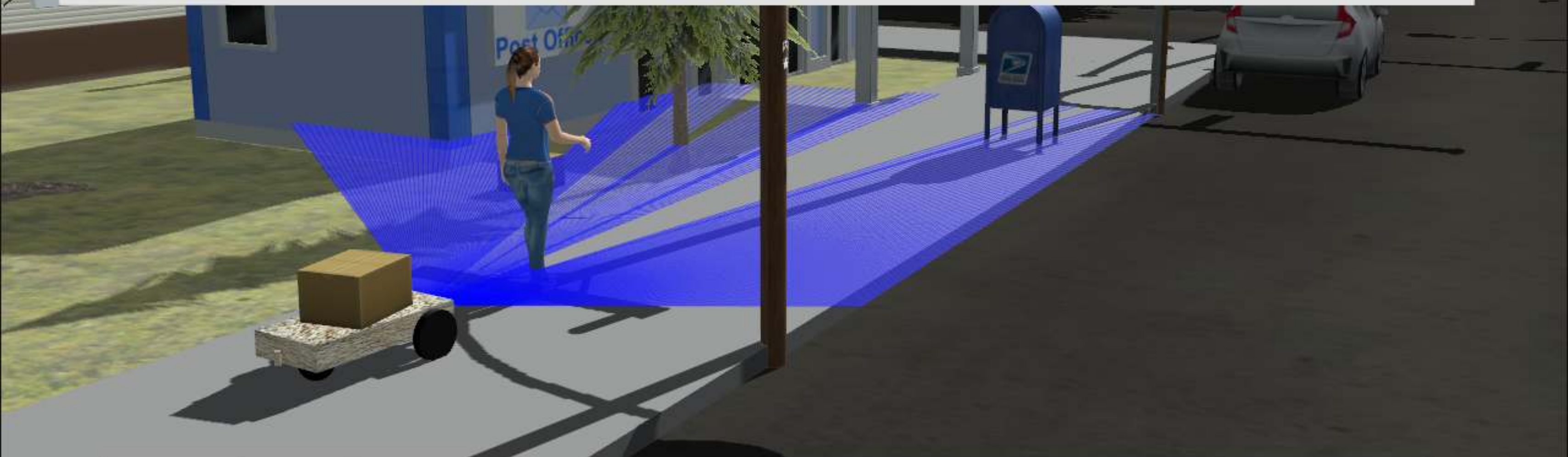




これからの  GAZEBO

ROS(2)のシミュレーションの次世代



@chapulinaBR

#ROSConJP2019

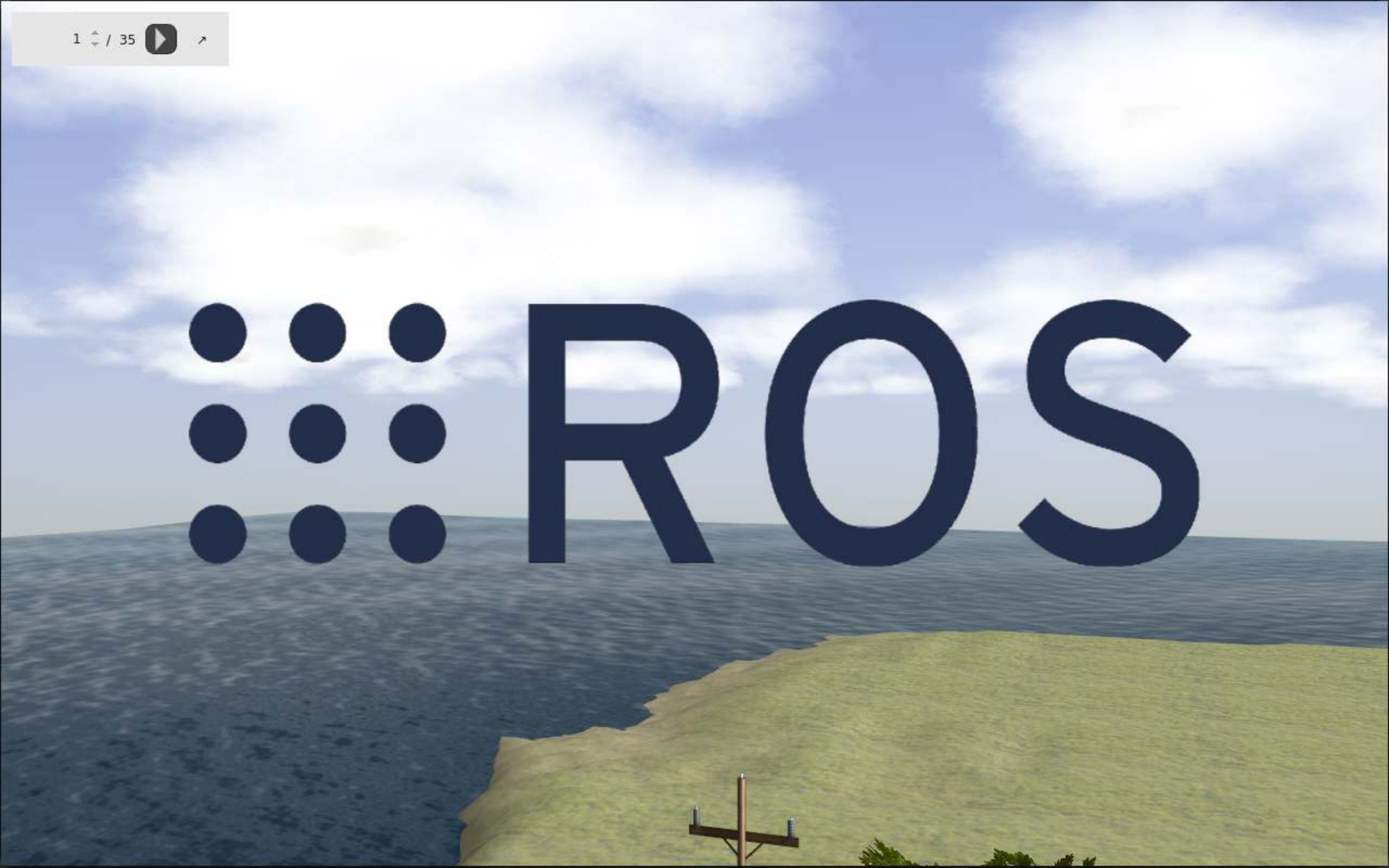


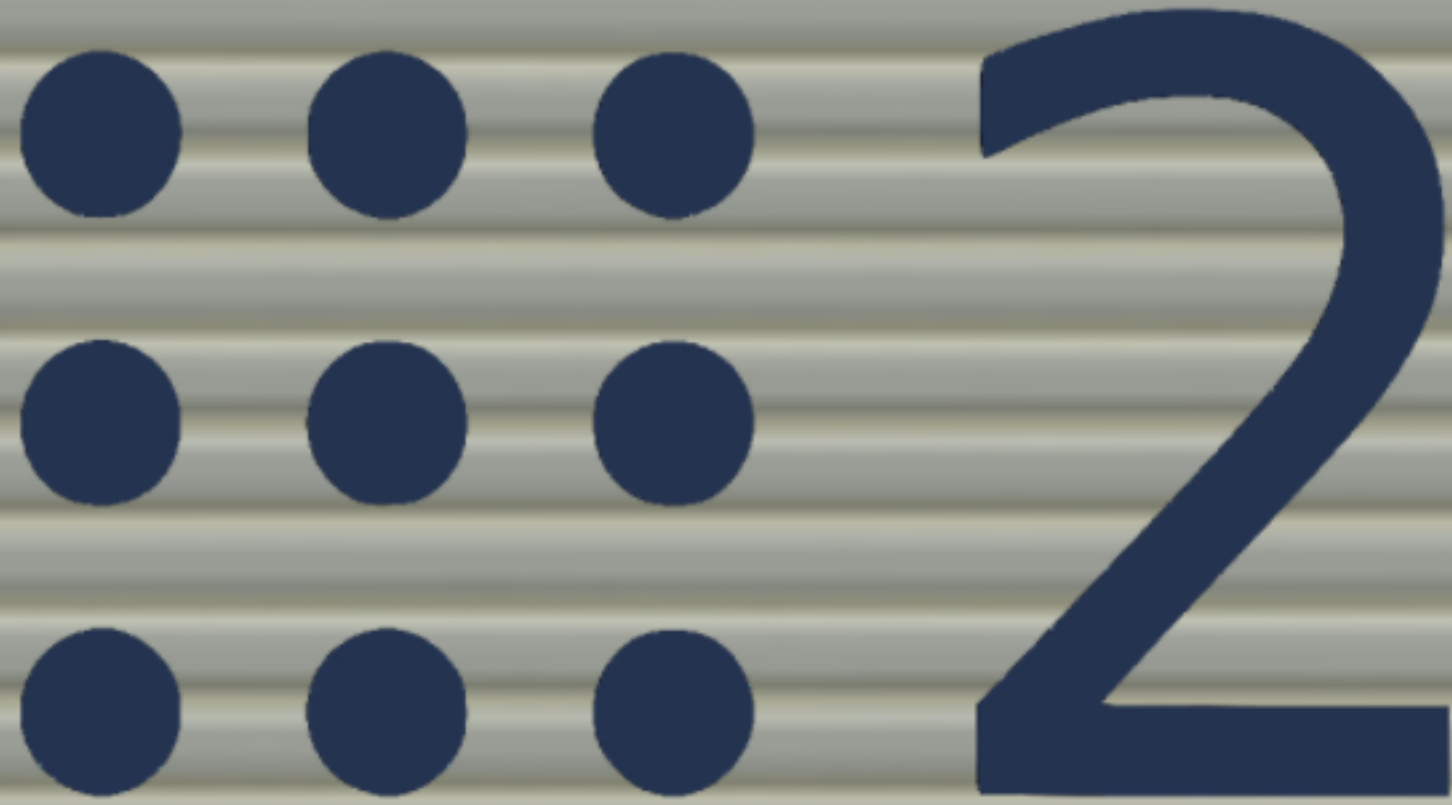
GAZEBO





PROS







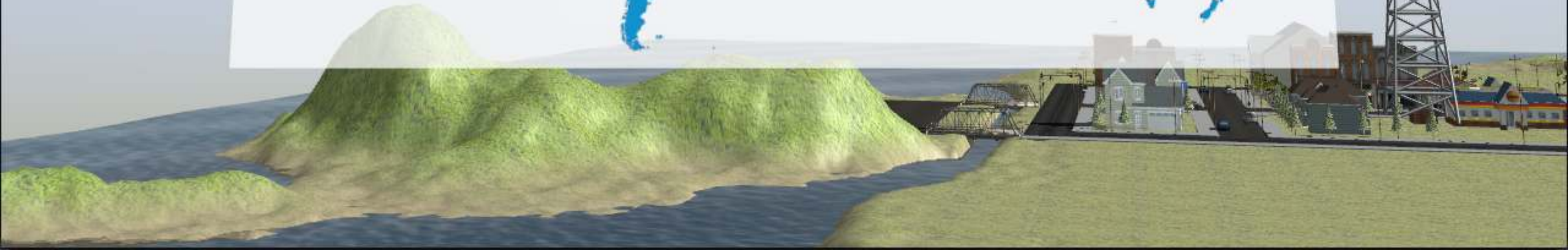
Louise Poubel
ポウベル・ルイーゼ

<http://louise.world>

 @chapulinaBR

 open
robotics

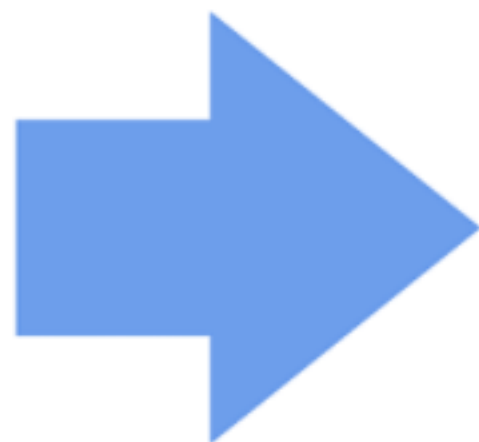
 GAZEBO  ROS





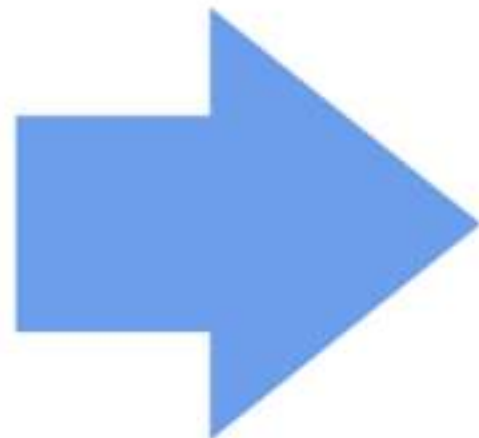


GAZEBO





GAZEBO



ignition
robotics



Simulation Description Format



<ambient>

1

0

0

1

</ambient>

<ambient>

0

1

0

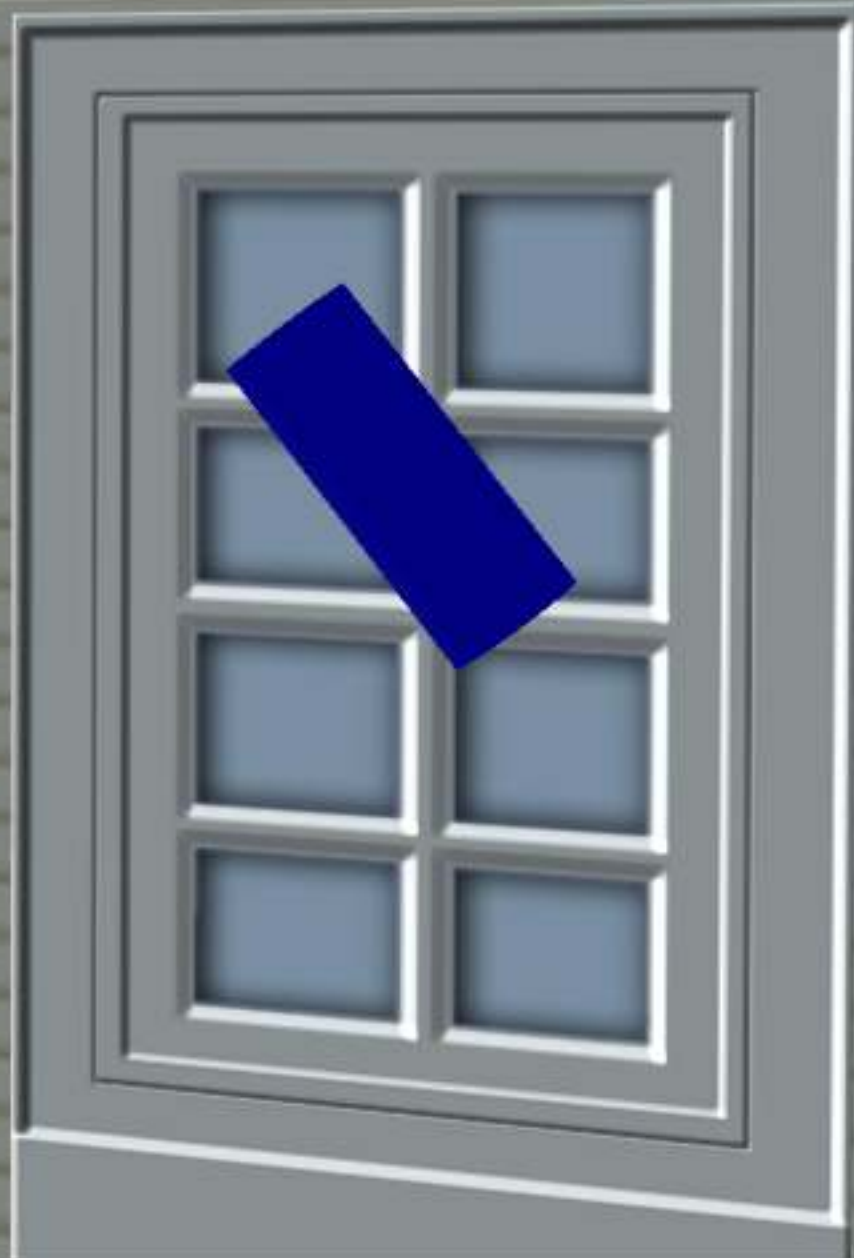
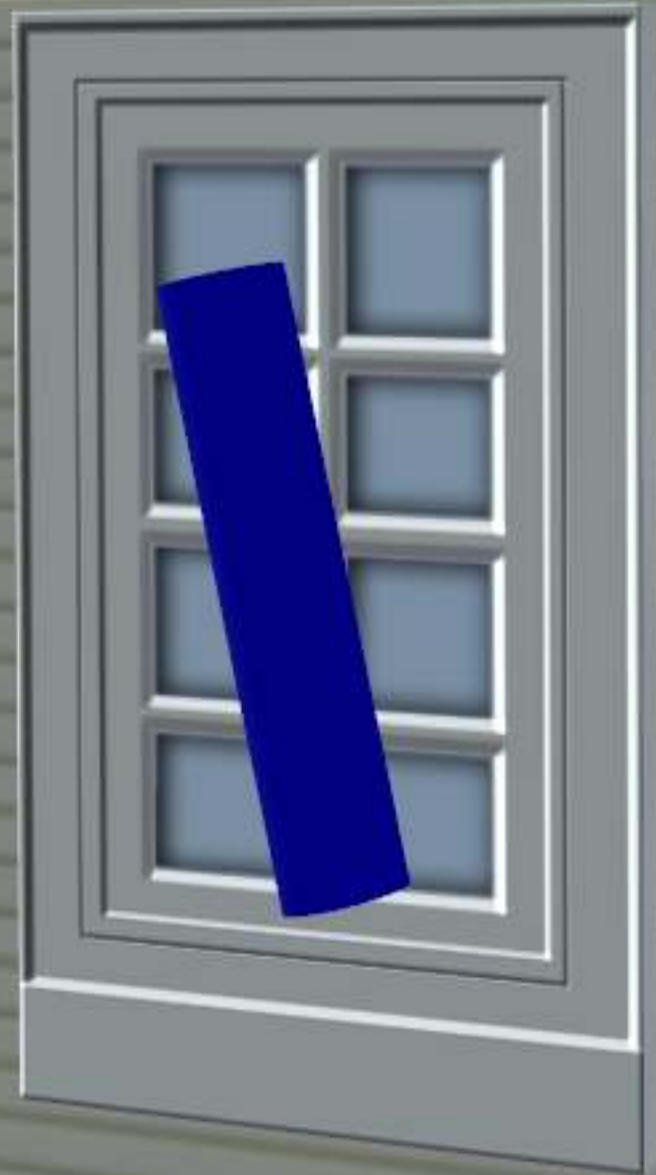
1

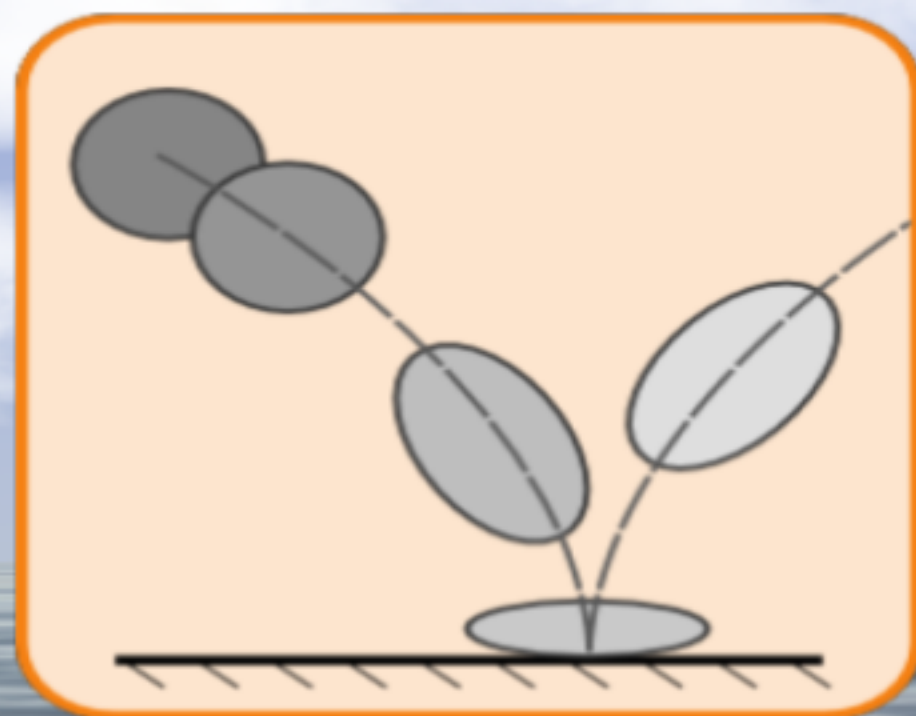
</ambient>



<length>
1
</length>

<length>
0.5
</length>

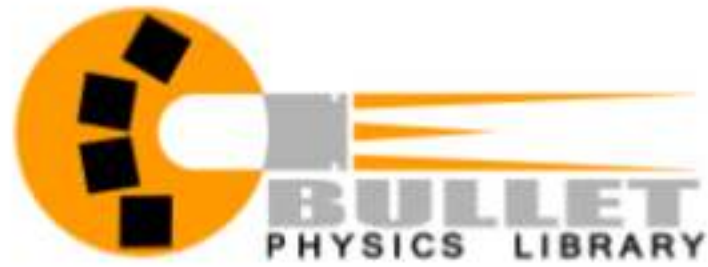




物理

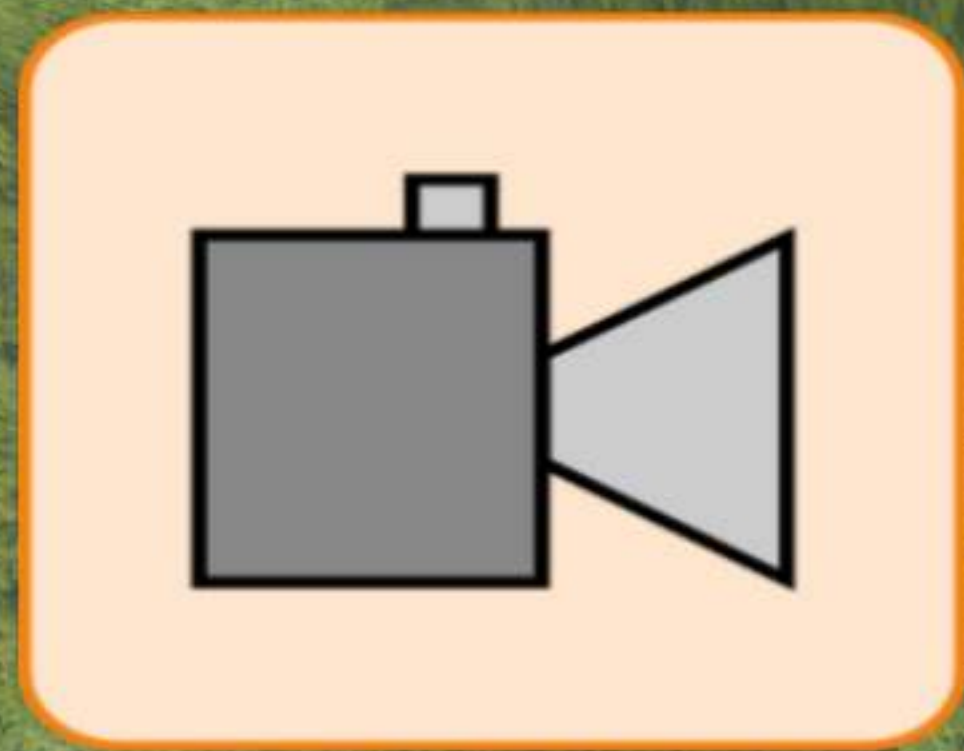


OPEN DYNAMICS ENGINE™



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センサ



- カメラ
- LIDAR
- 深度計測カメラ
- IMU
- GPS
- 高度計
- 磁気センサ
- RFID

。。。 などなど 18以上！

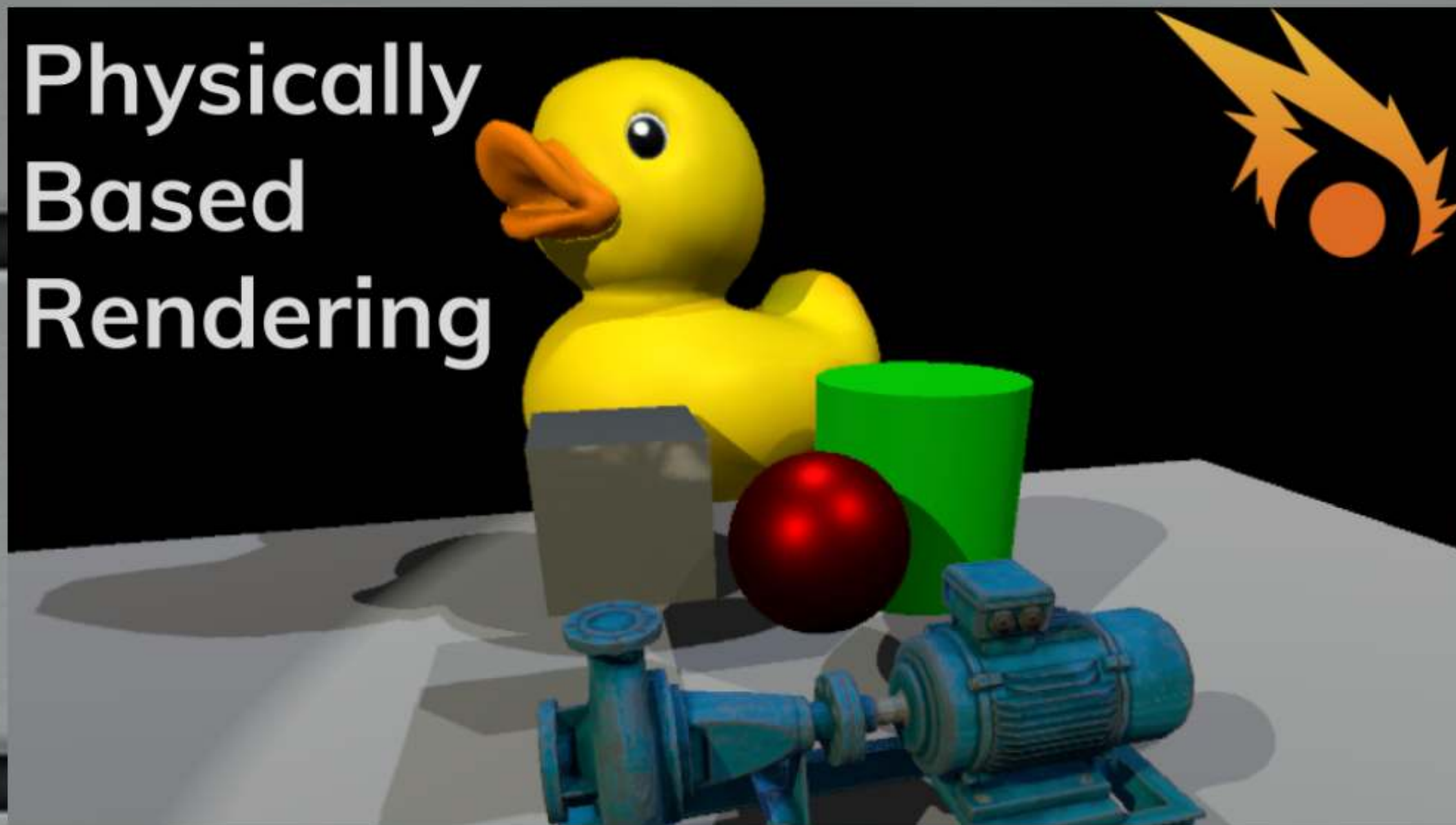


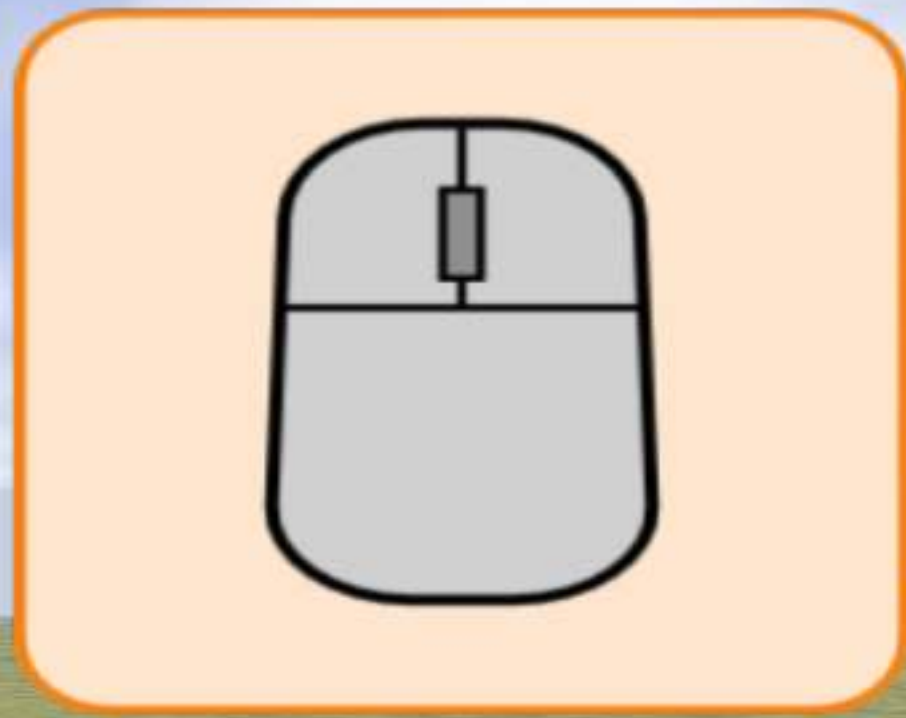
12





Physically Based Rendering



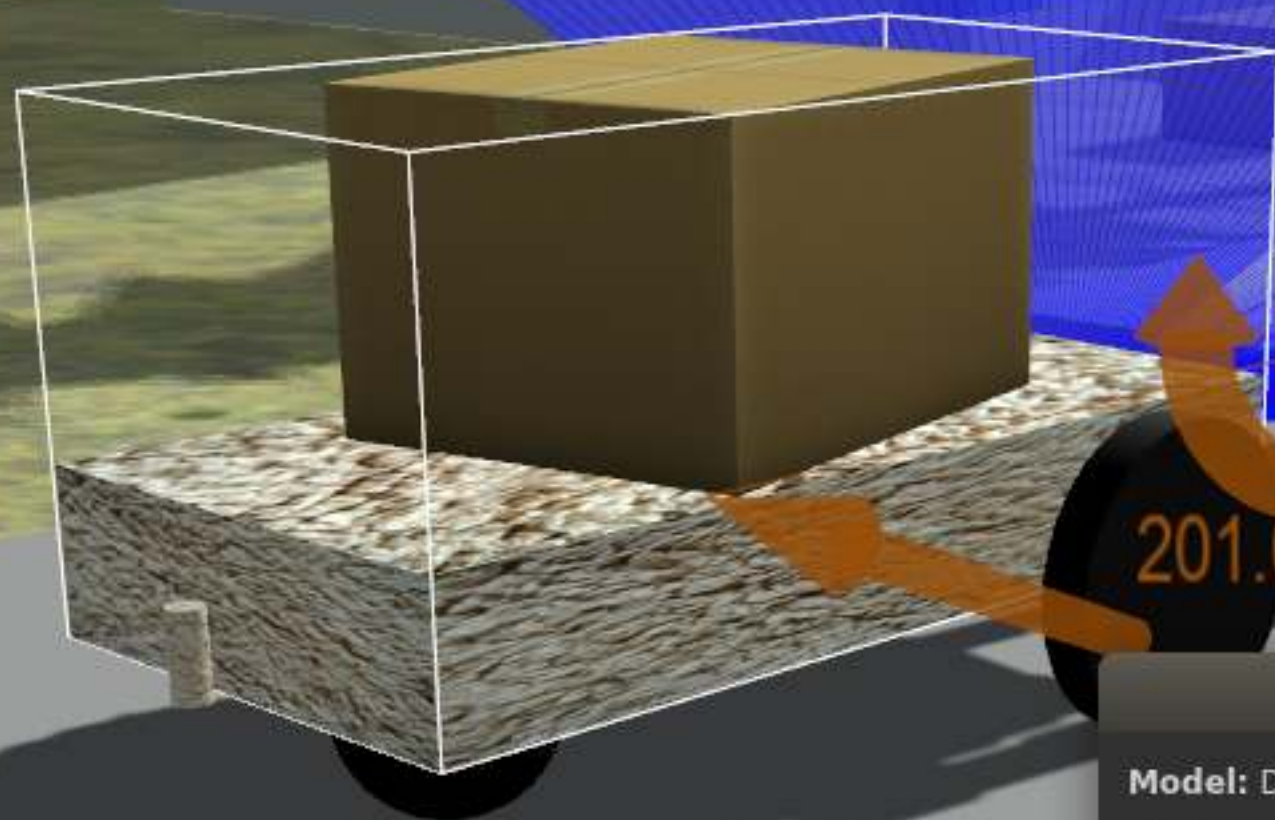


GUI



交流





0.000Nm
201.000N

Apply Force and Torque

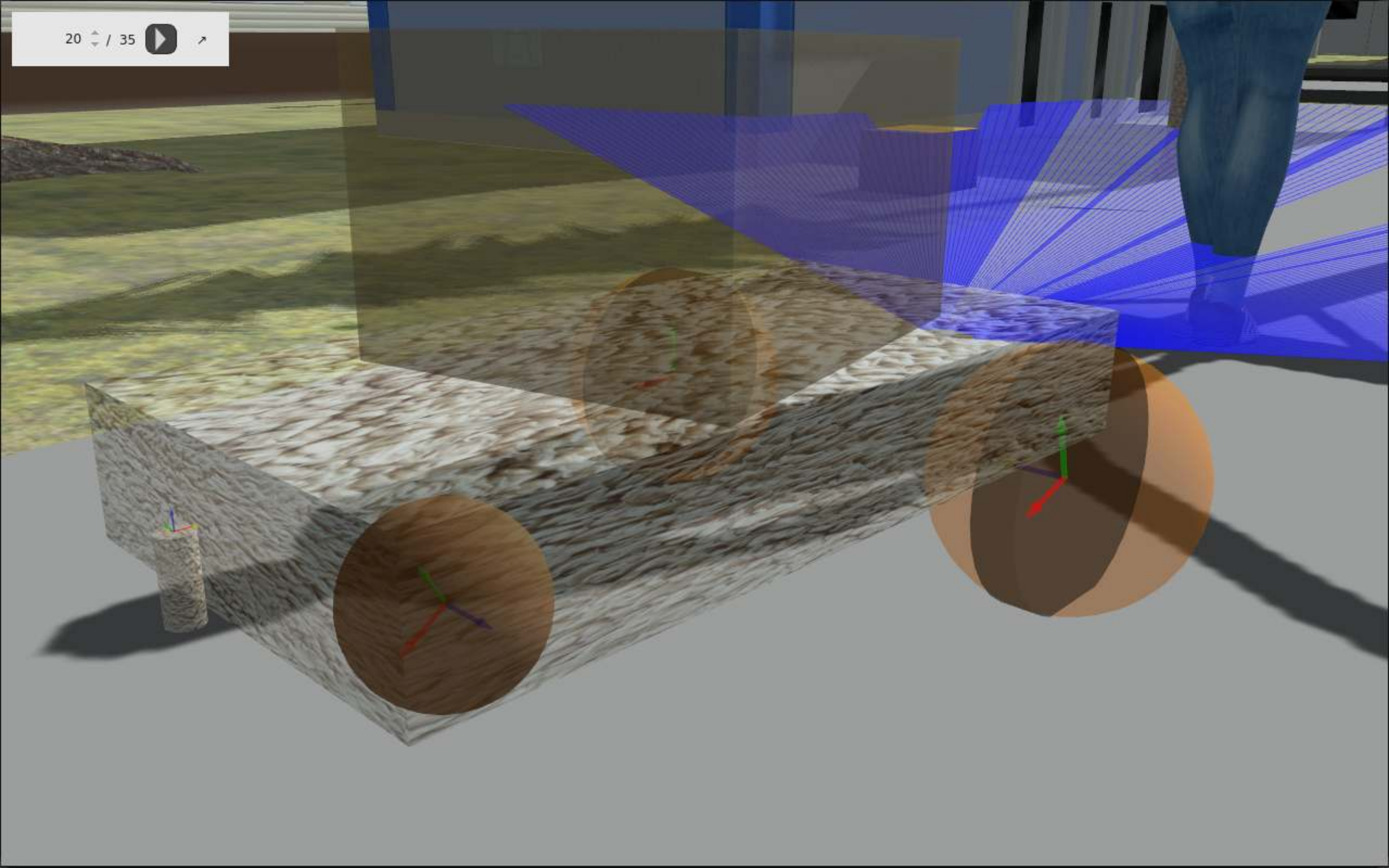
Model: Dolly
Apply to link: chassis

Force		Application Point:		Torque	
X: -184.122 N	<input type="checkbox"/>	Center of mass	<input checked="" type="checkbox"/>	X: 0.000 Nm	<input type="checkbox"/>
Y: -0.002 N	<input type="checkbox"/>	X: 0.000 m	<input type="checkbox"/>	Y: 0.000 Nm	<input type="checkbox"/>
Z: 80.624 N	<input type="checkbox"/>	Y: 0.000 m	<input type="checkbox"/>	Z: 0.000 Nm	<input type="checkbox"/>
Mag: 201.000 N	<input type="checkbox"/>	Z: 0.000 m	<input type="checkbox"/>	Mag: 0.000 Nm	<input type="checkbox"/>
<input type="button" value="Clear"/>				<input type="button" value="Clear"/>	
<input type="button" value="Apply Force"/>				<input type="button" value="Apply Torque"/>	
<input type="button" value="Cancel"/> <input type="button" value="Apply All"/>					



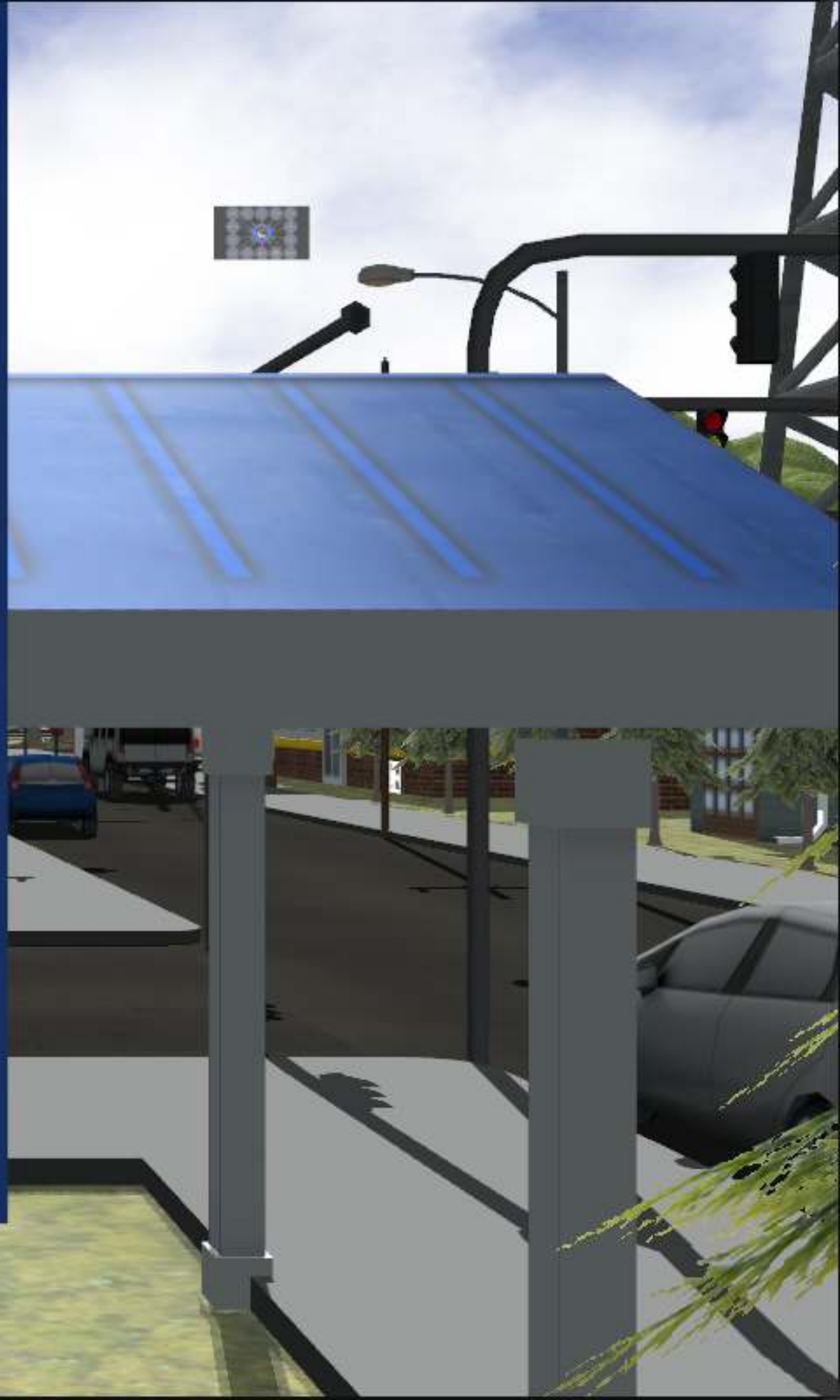
内省

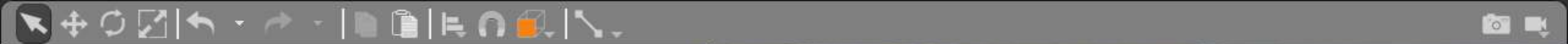




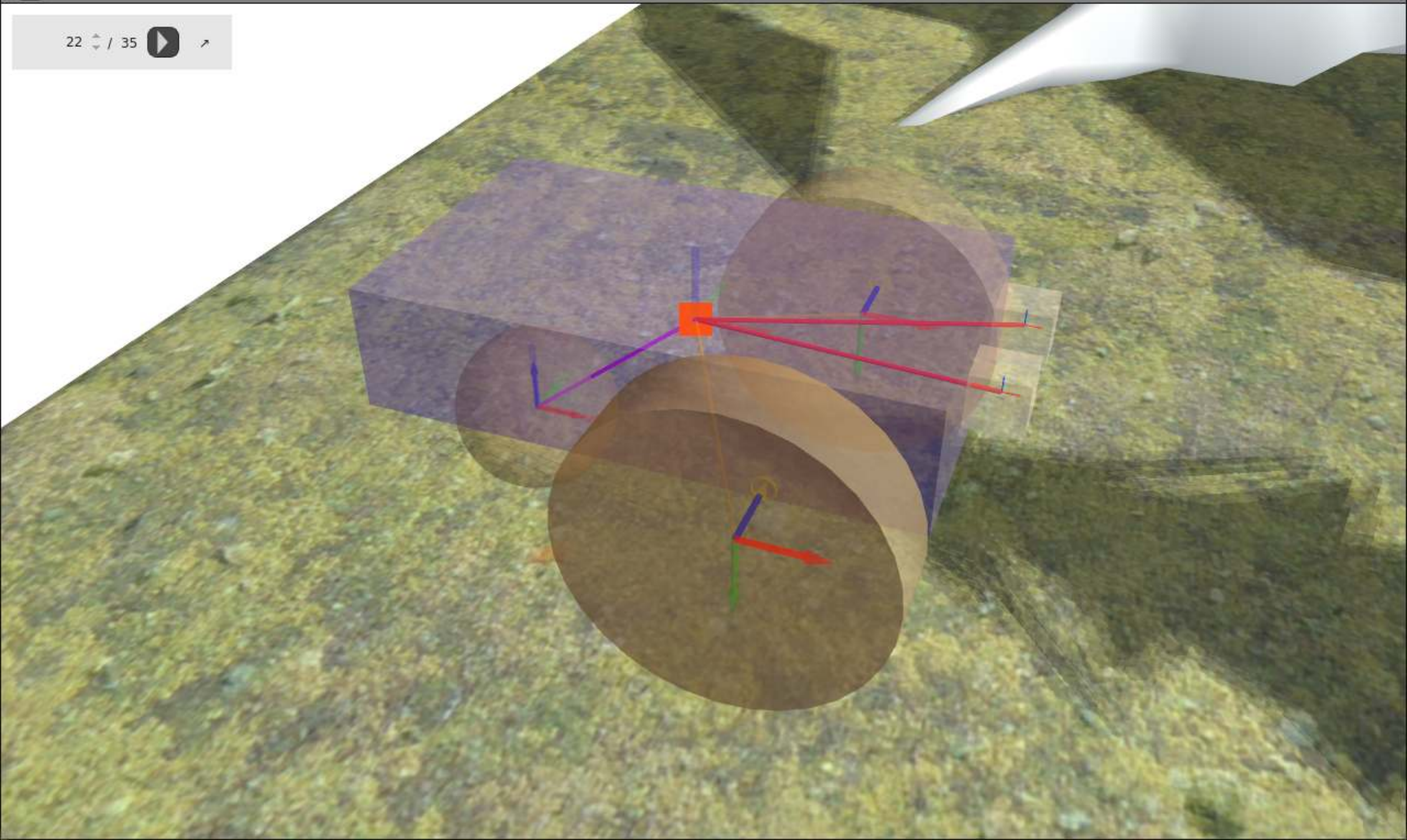


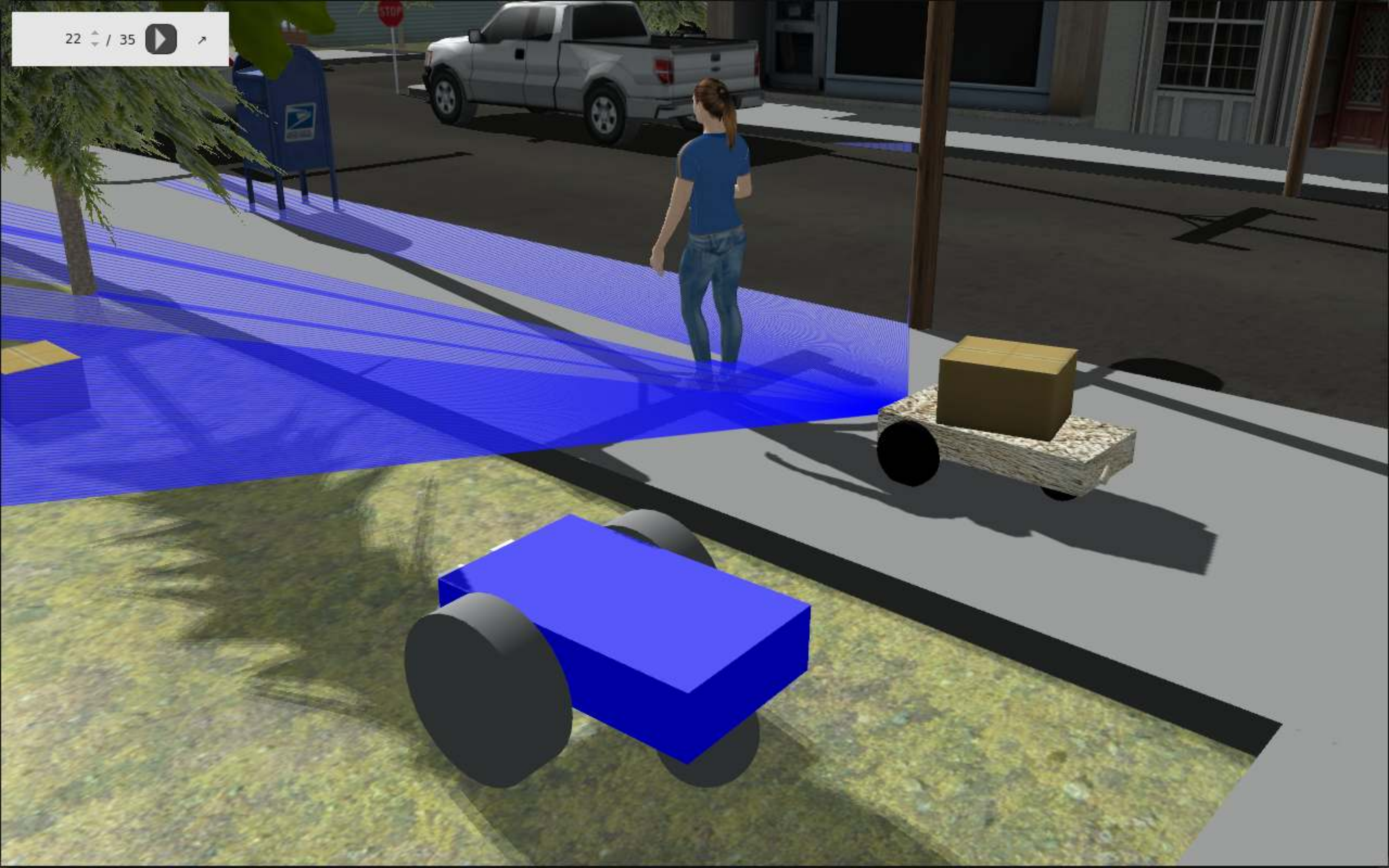
作成

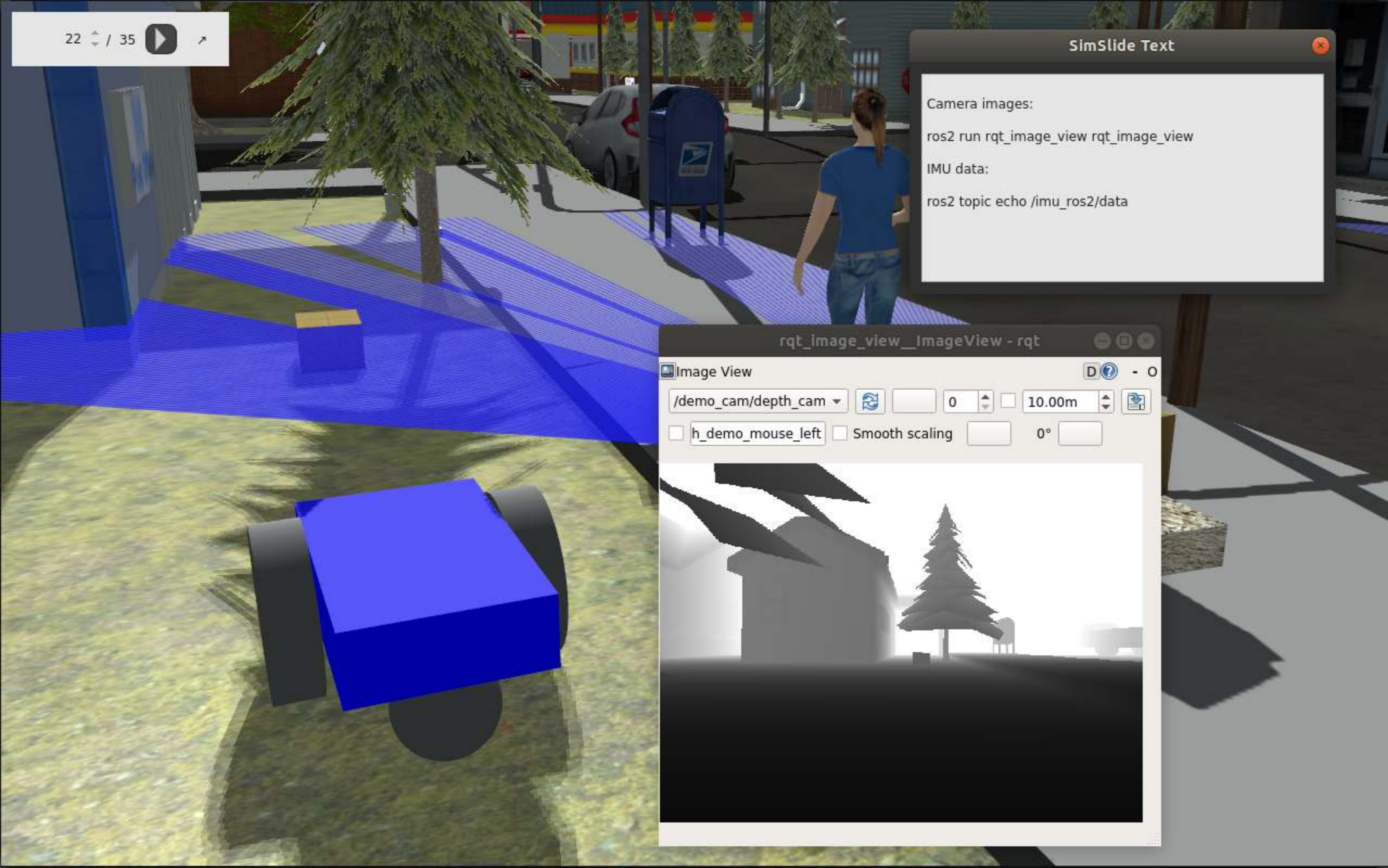




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SimSlide Text

Camera images:

```
ros2 run rqt_image_view rqt_image_view
```

IMU data:

```
ros2 topic echo /imu_ros2/data
```

rqt_image_view__ImageView - rqt

Image View

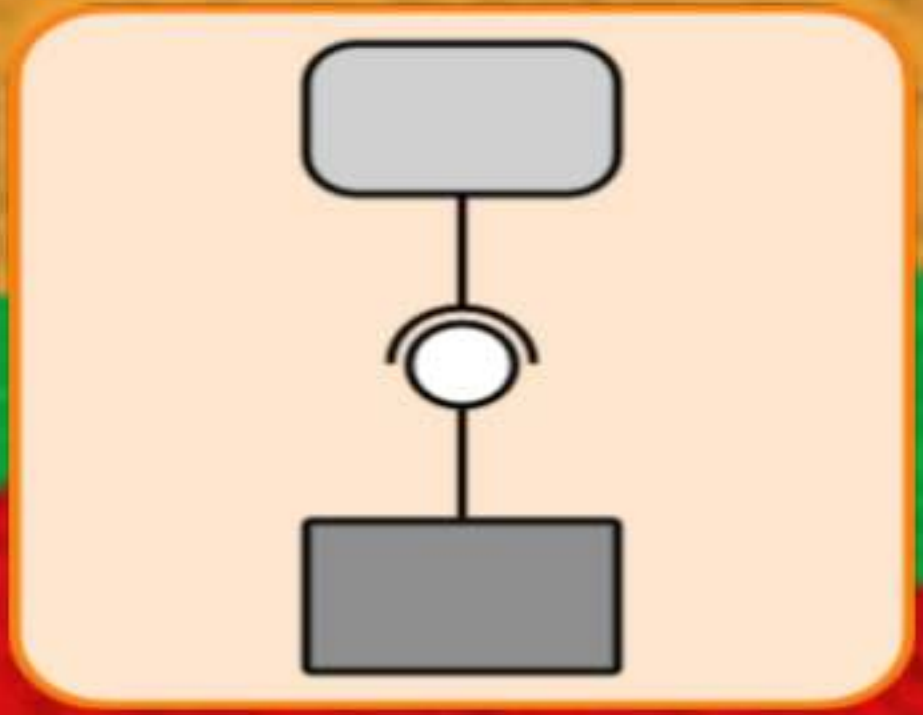
/demo_cam/depth_cam 0 10.00m

h_demo_mouse_left Smooth scaling 0°









インターフェース



World
Model
Sensor
System
Visual
GUI



`gazebo::System`
(world, model, sensor)

`gui::Plugin`

`launch::Plugin`

`rendering::RenderEnginePlugin`

`sensors::SensorPlugin`

`physics::Engine`



ROS

2

ハードウェア



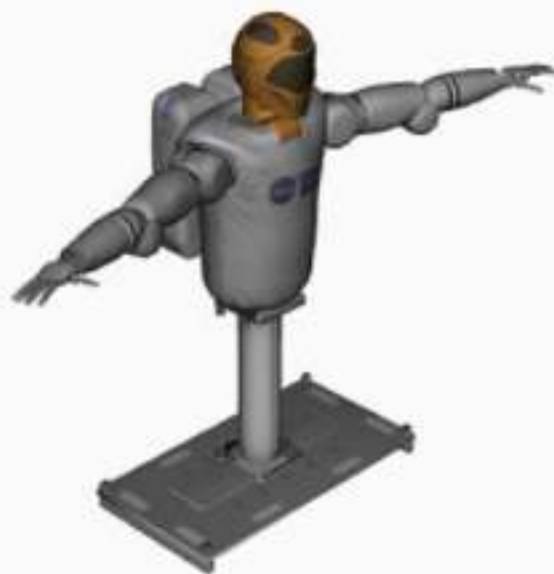


```
$ ign topic ...  
$ ign service ...  
$ ign log ...  
$ ign msg ...
```





クラウド



 **ignition**
robotics.org



CloudSim



ignition

robotics.org



Scene Tree

Scene

Physics

Models

- ground_plane
- gas_station_0
- turtlebot_0
- turtlebot_1
- turtlebot_2

Lights

- sun
- spotlight_0
- spotlight_1

Real Time: 00 00:03:49
Sim Time: 00 00:03:47



GzWeb



2018

2019

2020

2021

2022

2023



Gazebo 9

Gazebo 10

Gazebo 11

Acropolis

Blueprint

Citadel

今日





GazeboSim.org

IgnitionRobotics.org

#SimSlides

@chapulinaBR

