

Vodenje robotov – ROS GAZEBO

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www.robolab.si
www.cobotic.si

GAZEBO

Simulacijsko okolje

- Strojna oprema ni vedno na voljo
- Preizkušanje algoritmov

GAZEBO:

- Simulacija robota in senzorjev
- Nadomestek realnega robota v fizičnem svetu
- Vizualizacija realnega stanja robota
- Dodatni objekti
- Plug-ins

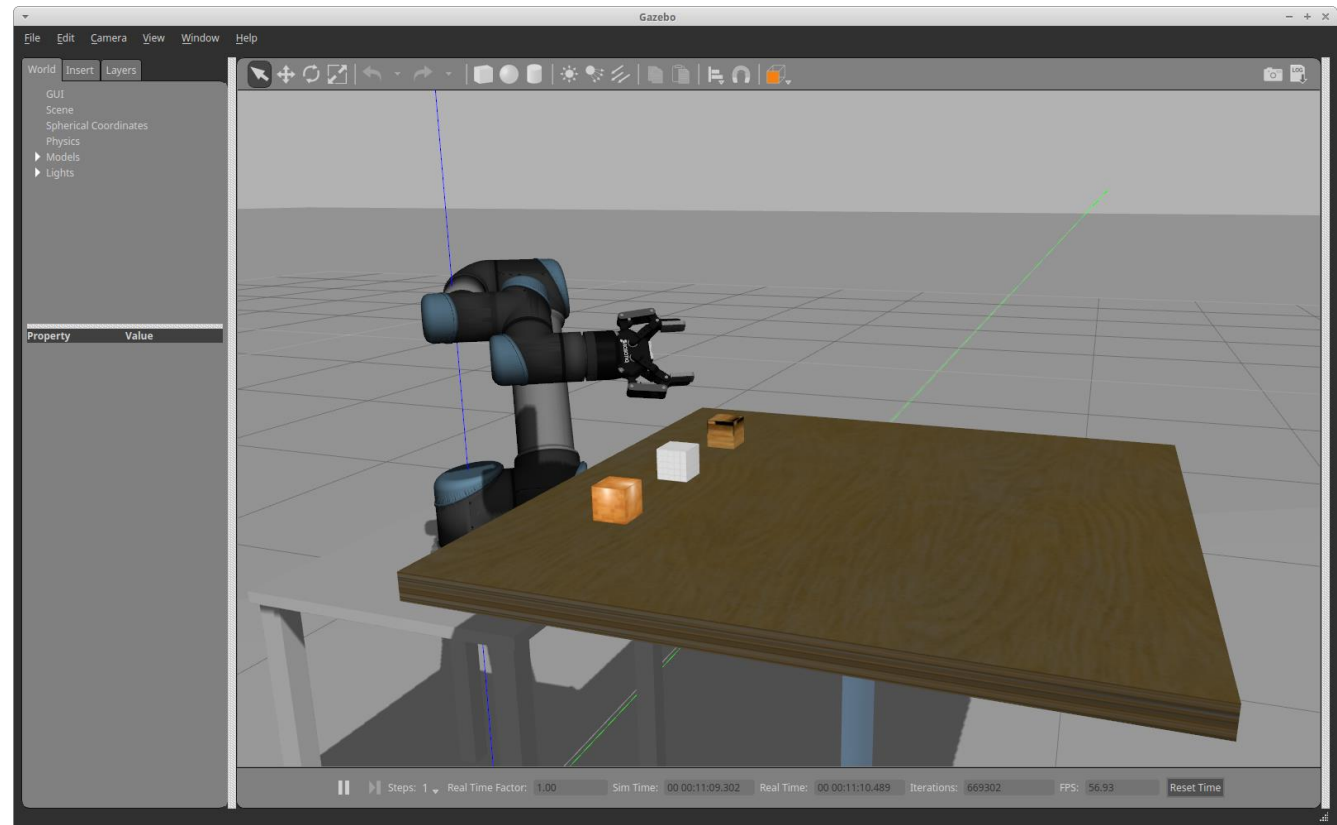
<http://gazebosim.org/>



GAZEBO

```
>> gazebo
```

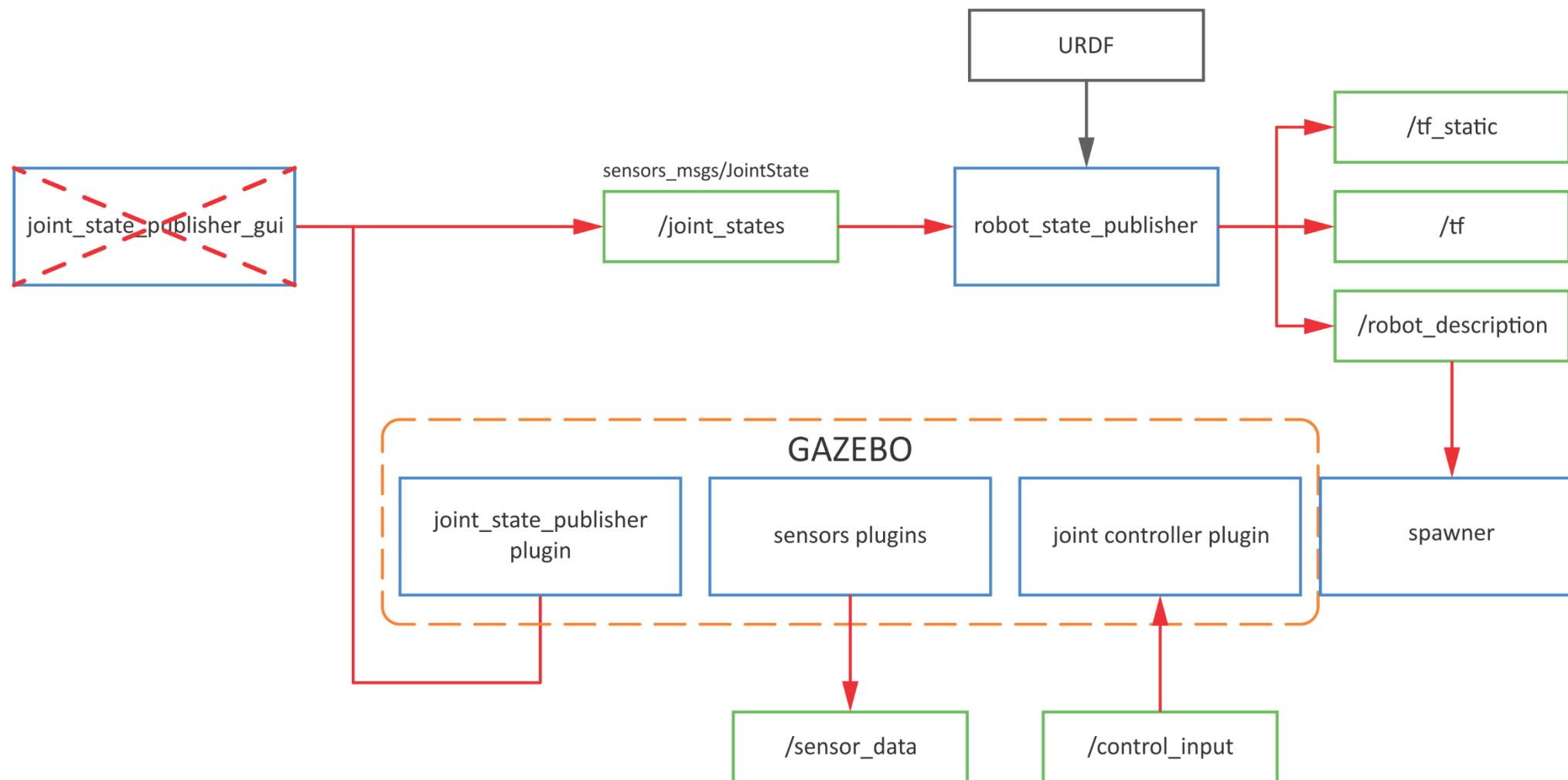
```
>> gazebo worlds/seesaw.world
```



GAZEBO

- Translation tool
- Rotation tool
- Start/Pause/Stop
- Apply Force/Torque
- Reset world: Ctrl + R

GAZEBO – ROS



SDF datoteke

URDF:

- opis robota

SDF (Simulation Description File)

- opis robota
- opis okolja
- opis elementov v okolju

URDF >>> SDF

GAZEBO TAGS

Dodatne informacije o

- segmentih:

```
<inertial> ... </inertial>
```

- sklepih:

```
<dynamics damping="10.0" friction="10.0"/>
```

- materialu:

```
<gazebo reference="my_link">
```

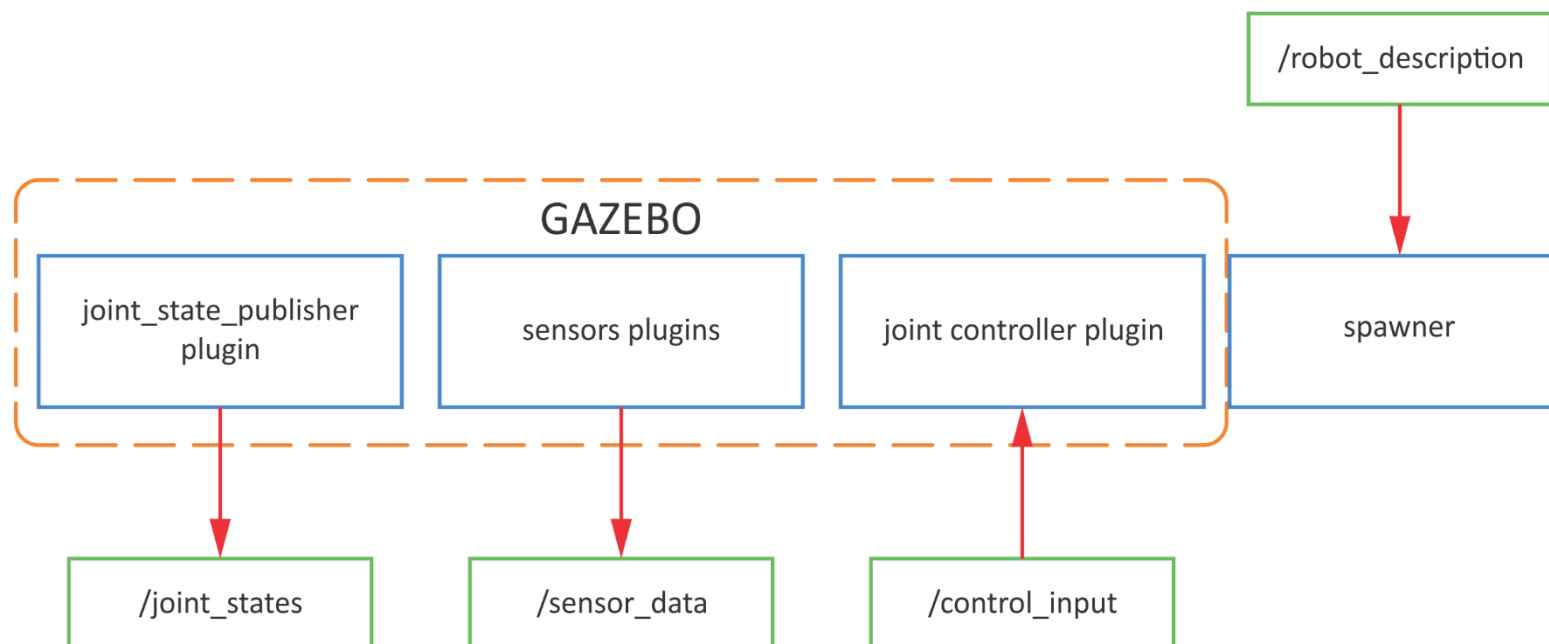
```
  <material>Gazebo/Black</material>
```

```
</gazebo>
```

GAZEBO PLUGINS

Povezava med ROS in GAZEBO:

- vodenje
- vrednosti sklepov
- senzorji



GAZEBO JOINT STATE PUBLISHER

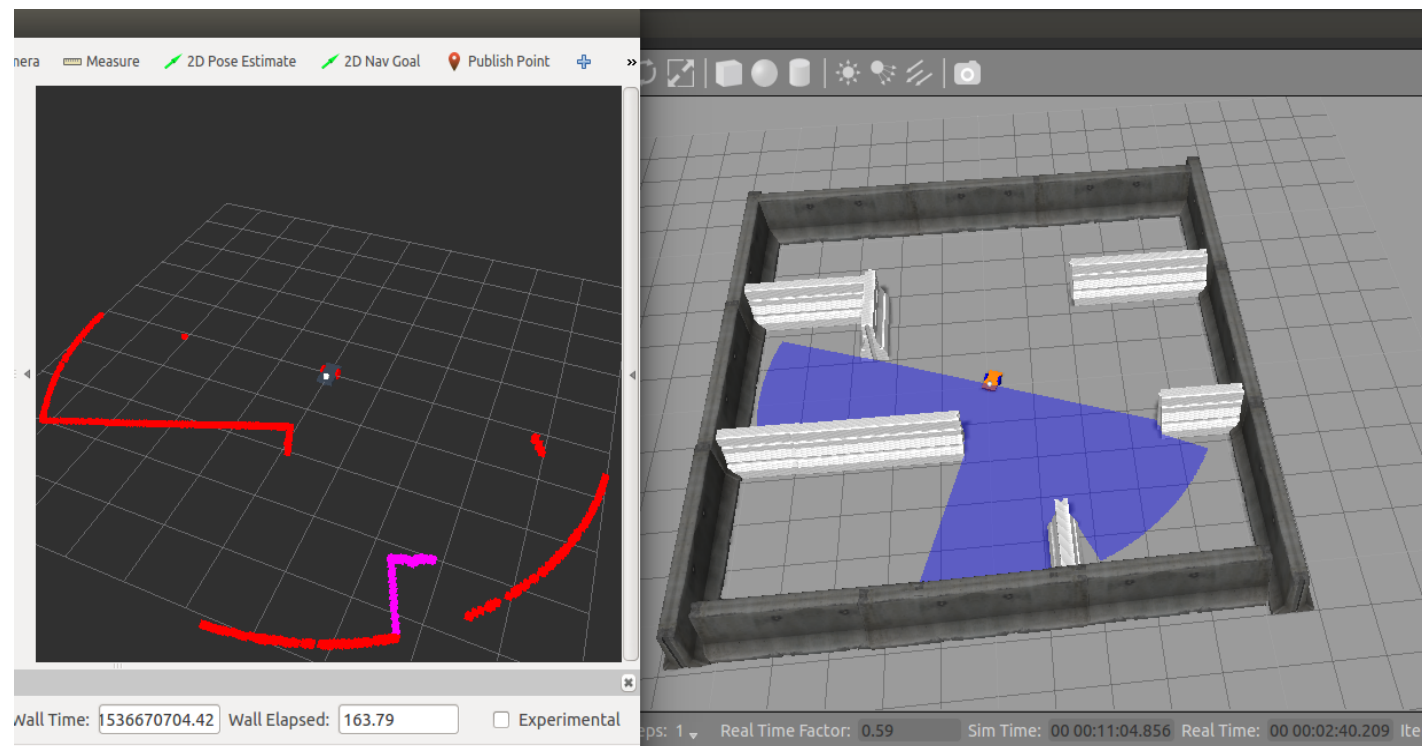
```
<gazebo>
  <plugin name="joint_state_publisher"
    filename="libgazebo_ros_joint_state_publisher.so">
    <robotNamespace> /ime_robota </robotNamespace>
    <jointName> skle1, skle2 </jointName>
    <updateRate> 100 </updateRate>
  </plugin>
</gazebo>
```

GAZEBO CONTROL

```
<gazebo>  
  <plugin name="gazebo_ros_control" filename="libgazebo_ros_control.so">  
    <robotNamespace> /ime_robota </robotNamespace>  
    <robotSimType>gazebo_ros_control/DefaultRobotHWSim</robotSimType>  
  </plugin>  
</gazebo>
```

GAZEBO SENZORJI

- Vsak senzor mora imeti pripadajoči segment (LINK)
- Določiti moramo
 - Tip senzorja
 - Vtičnik
 - Parametre za senzor/vtičnik



http://gazebo.org/tutorials?tut=ros_gzplugins

LIDAR

```
<gazebo reference="lidar_link">
  <sensor name="lidar" type="ray">
    ...any parameters common to all sensor types...
    <ray>
      ...any parameters specific to the ray sensor...
    </ray>
    <plugin name="laser_controller" filename="libgazebo_ros_laser.so">
      ...any parameters specific to the ROS ray sensor plugin...
    </plugin>
  </sensor>
</gazebo>
```

SISTEMSKI ČAS

ROS uporablja UNIX čas (število sekund od 1. 1. 1970)

GAZEBO uporablja čas simulacije

- izvajanje v realnem času
- upočasnjeno izvajanje
- pohitreno izvajanje

nastavitev parametra `/use_sim_time` na `true`

.launch datoteka

```
<!-- load robot description -->
<param name="robot_description" default="$(find ime_paketa)/urdf/robot.urdf"/>

<!-- use simulation time -->
<param name="/use_sim_time" value="true"/>

<!-- GAZEBO -->
<include file="$(find gazebo_ros)/launch/empty_world.launch" />
<node name="spawn_urdf" pkg="gazebo_ros" type="spawn_model" args="-param
robot_description -urdf -model ime_robota" />
```