What’s new in Gazebo?
Upgrading your simulation user experience!

Louise Poubel & Steffi Paepcke
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@chapulinaBR  @Steffibot
What is Gazebo?

A dynamics simulator, useful for:

- Simulating robots in complex indoor and outdoor environments
- Plays nicely with ROS
- Prototyping, continuous integration, faster integration on new algorithms, competitions, education, etc.
Use Cases

https://youtu.be/R3xUKYcG_bc
Gazebo 7 Dependencies

- SDFormat

- Open Dynamics Engine™
- Bullet Physics Library
- DART
- SimTK
- OGRE
- Qt
- protobuf
- Ignition

Open Source Robotics Foundation
Gazebo Design Goals

Accessible to novice and advanced users
Increased GUI capabilities
Improved C++ API
More comprehensive documentation

Improved usability
User-centered, iterative design process
Usability testing
User-centered, Iterative Design Process

Waterfall (Bad!)

UX → Engineering

Slap-it-on-at-the-end (Worse!)

Engineering → UX

User-centered, iterative design (Good!)

UX → Engineering → UX

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Project time
New Features
Better worlds

- Scripted trajectories (actors)
- Heightmap Digital Elevation Models (DEM)
- Roads
Better worlds

- Nested models
- Populations of models in specified configurations
Better control

- Graphically apply force/torque
- Undo
- Orthographic view
- View angles
Introspection visualizations

- Links Frames
- Joints
- Collisions
- Center of Mass
- Inertia
- Wireframe
- Contacts
Building Editor:

- Import floorplans
- Walls, windows, doors, stairs
- Colors, textures
- 2D view
Model Editor:

- Schematic view
- Simple shapes
- Inspectors
- Align tool
- Nested models
- Joint creation

- Meshes
- Add plugins
- Extrude SVG

Attach model here
Plotting

Graphically plot variables
- Gazebo topics
- Physics data
Sensor support

- Camera
  - multi
  - wide angle
  - depth
- GPS
- Altimeter
- Magnetometer
- Sonar
- Logical sensors
- Sensor noise
Logging and Playback

- Create log files within GUI
- Play log files back
New plugins

- ArduCopter
- Arrange
- BlinkVisual
- FiducialCamera
- Harness
- KeyboardGUI
- LinearBattery
- Wind

... and more!
Hardware Integration

- Oculus, OpenVR
- Razer Hydra
- OptiTrack
- SpaceNav
- 3D glasses
- Polhemus
What’s next?

GUI-specific
Terrain Editor
Visual redesign (Material Design)
GUI Console
Graphical inertia resizing
Graphical tools for physics valid.
..and more!

Other
PropShop integration
CloudSim + gzweb
Improve SDF/URDF support
Support for deformable shapes
...and more!
Now what? Using Gazebo with ROS

- Default Gazebo-ROS combos

<table>
<thead>
<tr>
<th>ROS version</th>
<th>Gazebo version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigo - 1.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Jade - 1.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Kinetic - 1.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>

- Also possible to make your own combination


- From Gazebo 7, releases are synced with ROS!
Gazebo Resources & Documentation

http://gazebosim.org
http://gazebosim.org/tutorials
http://answers.gazebosim.org

Thank you.