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

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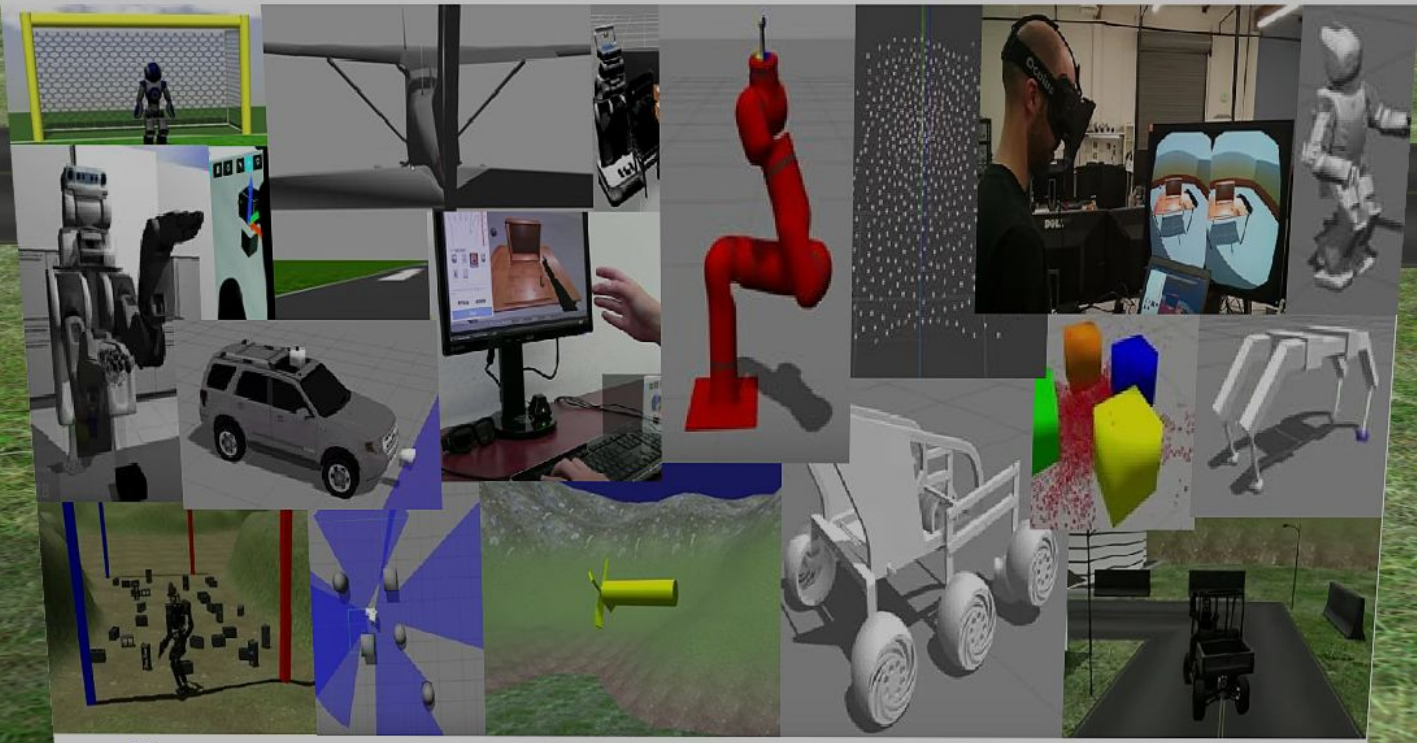
Use Cases



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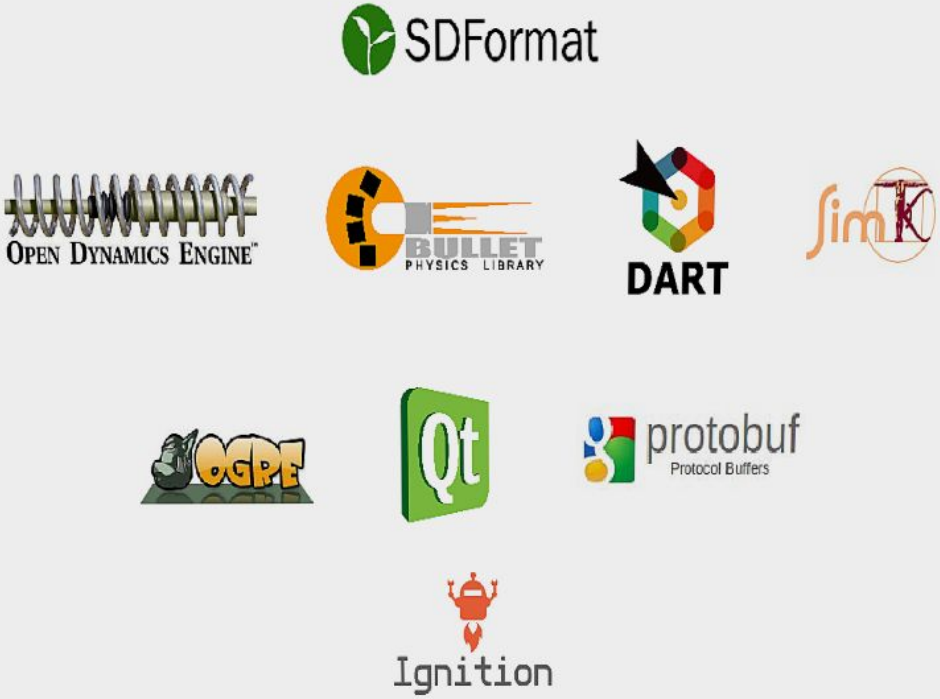
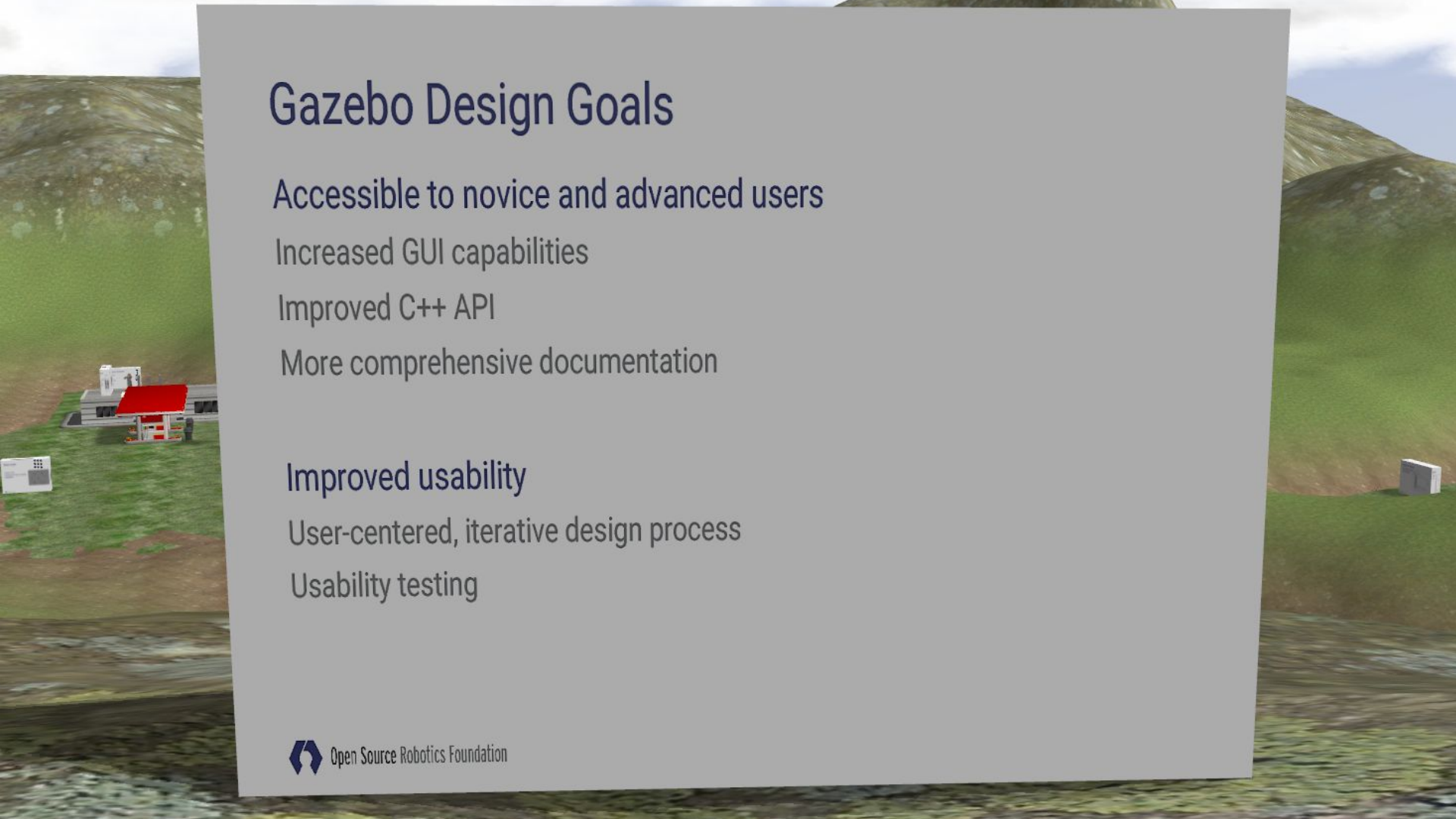
https://youtu.be/R3xUKYcG_bc

Gazebo 7 Dependencies




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
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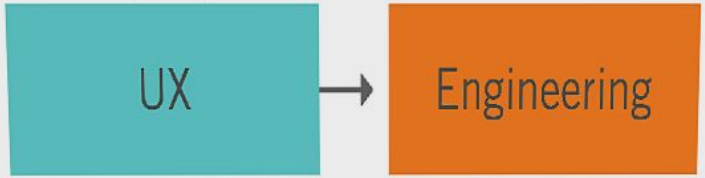
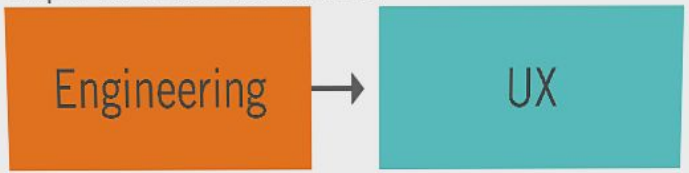
User-centered, Iterative Design Process

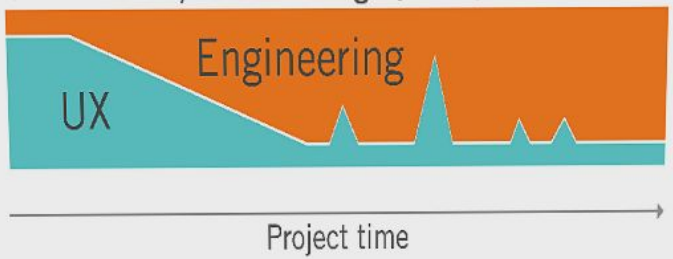
Waterfall (Bad!)



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



User-centered, iterative design (Good!)



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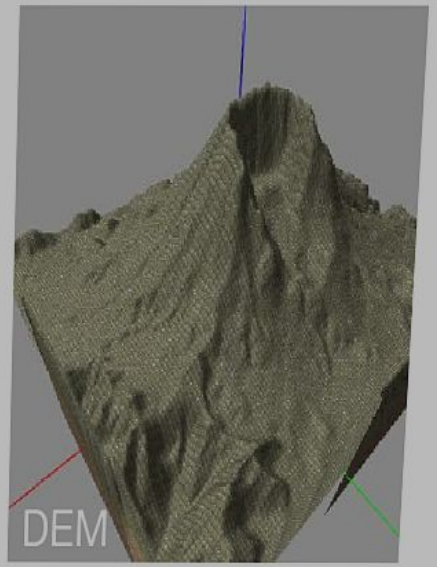
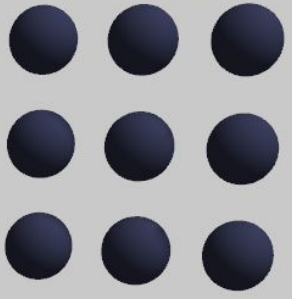
New Features

Better worlds

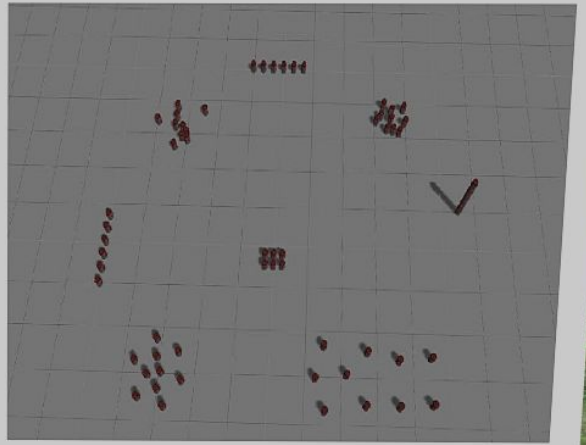
- Scripted trajectories (actors)
- Heightmap Digital Elevation Models (DEM)
- Roads



Better worlds



- Nested models
- Populations of models in specified configurations



Better control

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

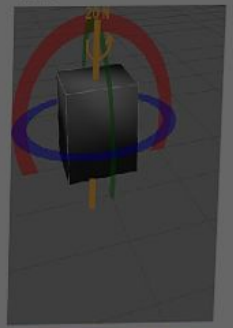
Force & Torque Application: v2 (1.29.15)

3D Markers and Arrow Control

Manipulating the rotate markers repositions the arrow/line. Scrolling mouse wheel changes magnitude.

Force

Torque



We select a default magnitude and direction. Magnitude readout changes as dialog is edited or as mouse scroll wheel is scrolled.

Let's see how orange looks for the Force arrow, and yellow for Torque.

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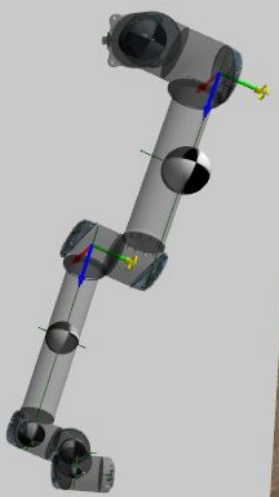
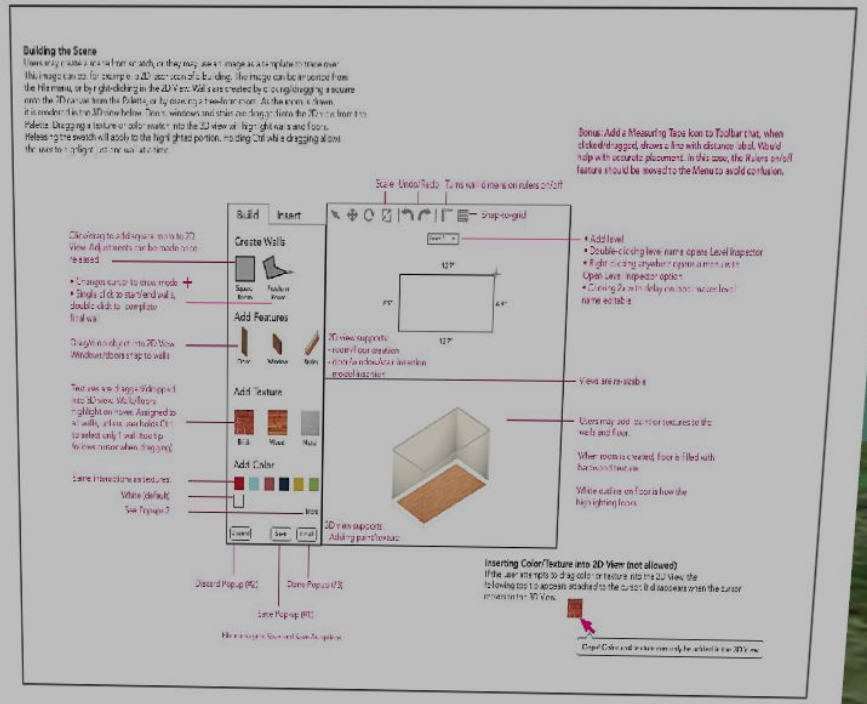
Introspection visualizations

- Links Frames
- Joints
- Collisions
- Center of Mass
- Inertia
- Wireframe
- Contacts



Building Editor:

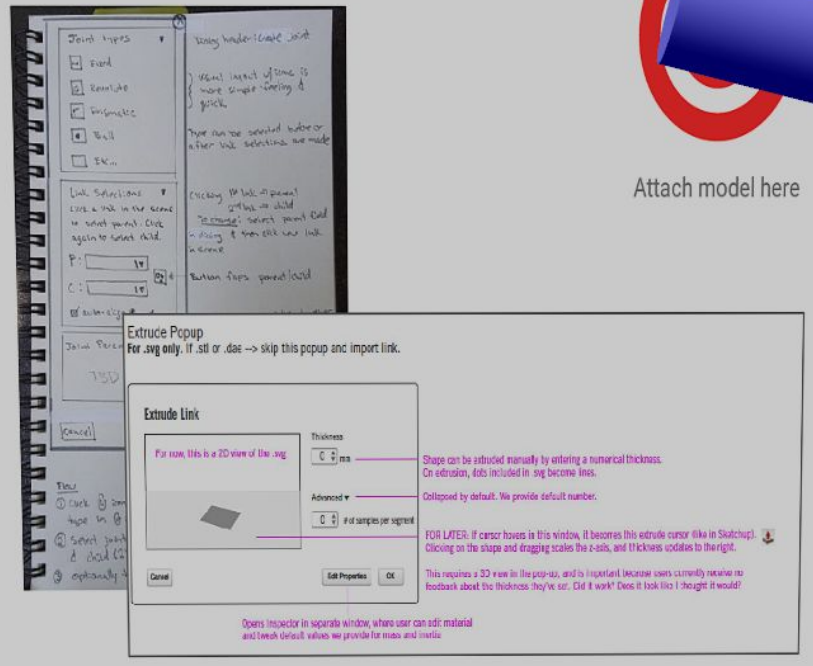
- Import floorplans
- Walls, windows, doors, stairs
- Colors, textures
- 2D view

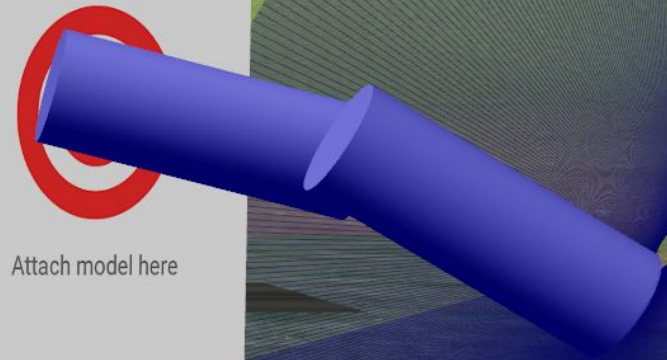


Model Editor:

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

- Meshes
- Add plugins
- Extrude SVG





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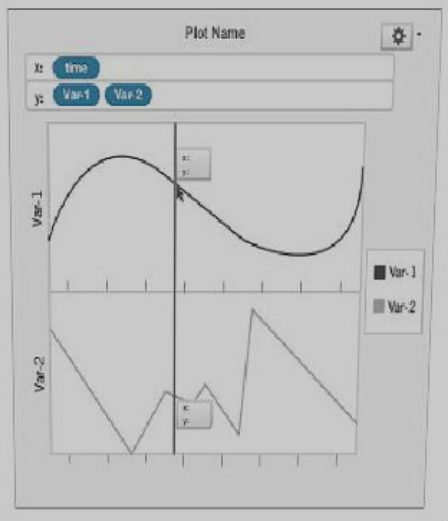
Plotting

Graphically plot variables

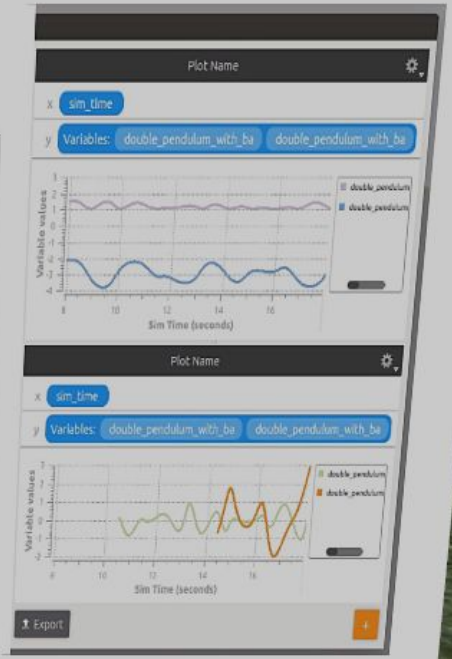
- Gazebo topics
- Physics data

Plotting v5 (1.26.16)

Interactions (2 of 3)



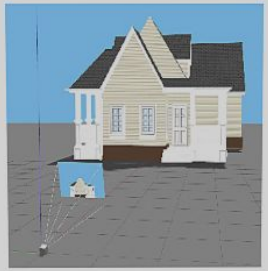
Low-fidelity prototype



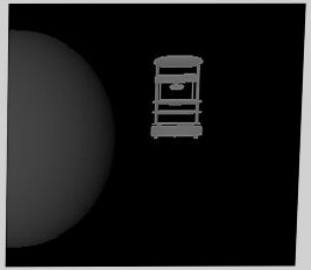
Final design

Sensor support

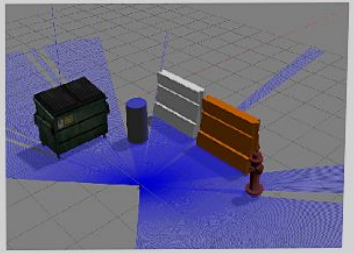
- Camera
  - multi
  - wide angle
  - depth
- GPS
- Altimeter
- Magnetometer
- Sonar
- Logical sensors
- Sensor noise



RGB camera



Depth camera



Ray sensor

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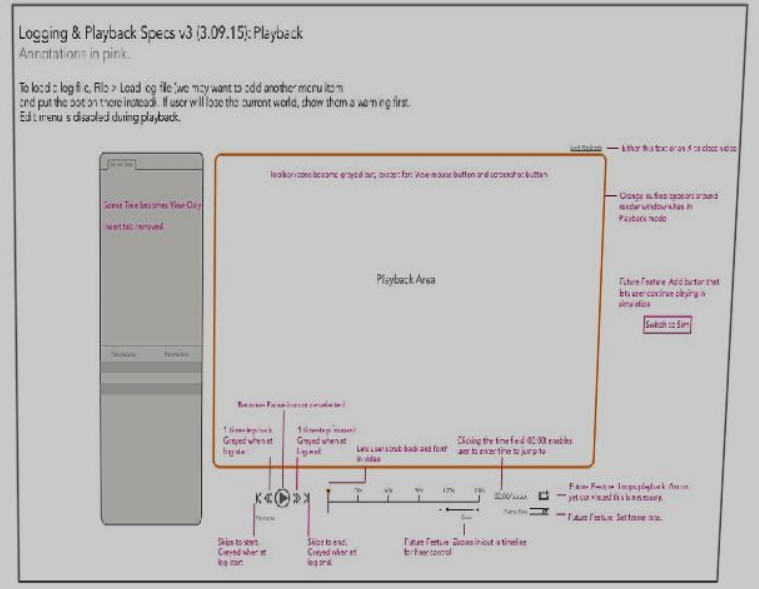
Logging and Playback

- Create log files within GUI
- Play log files back



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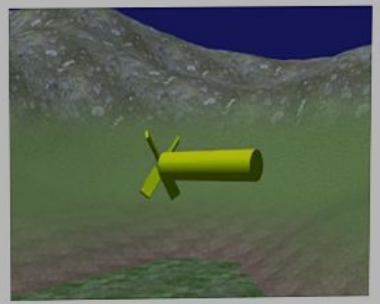
New plugins

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

... and more!

Lift / Drag

GUI overlay



Buoyancy

Elevator

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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 

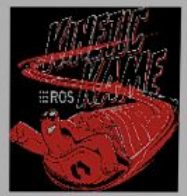
Improve SDF/URDF support

Support for deformable shapes

...and more!

Now what? Using Gazebo with ROS

- Default Gazebo-ROS combos

ROS version			
Gazebo version	2.2	5.0	7.0

- Also possible to **make your own combination**

  http://gazebosim.org/tutorials?tut=ros_wrapper_versions

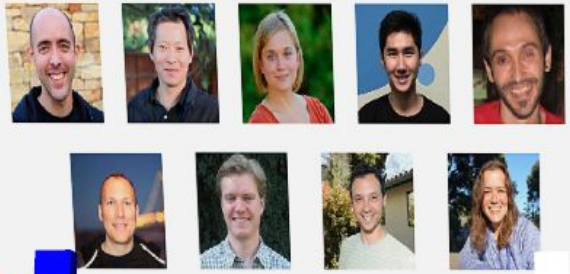
- From Gazebo 7, releases are synced with ROS!

Gazebo Resources & Documentation

http://gazebosim.org

http://gazebosim.org/tutorials

http://answers.gazebosim.org



Thank you

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