

What's new in Gazebo?

Upgrading your simulation user experience!

Louise Poubel & Steffi Paepcke
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 @chapulinaBR @Steffibot



Open Source
Robotics Foundation

What is Gazebo?

A dynamics simulator, useful for:

Simulating robots in complex indoor
and outdoor environments

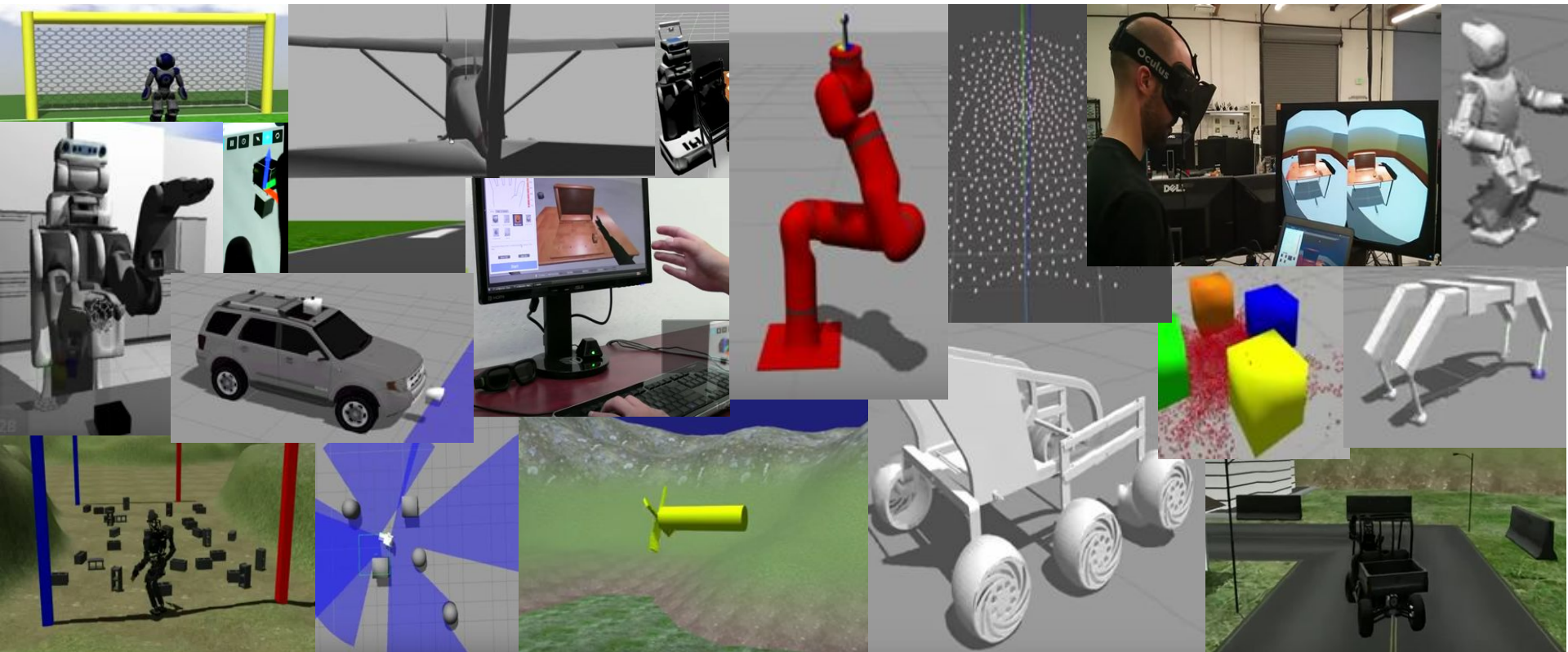
Plays nicely with ROS

Prototyping, continuous integration, faster integration
on new algorithms, competitions, education, etc.

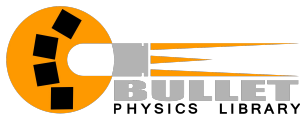


GAZEBO

Use Cases



Gazebo 7 Dependencies



Gazebo Design Goals

Accessible to novice and advanced users

Increased GUI capabilities

Improved C++ API

More comprehensive documentation

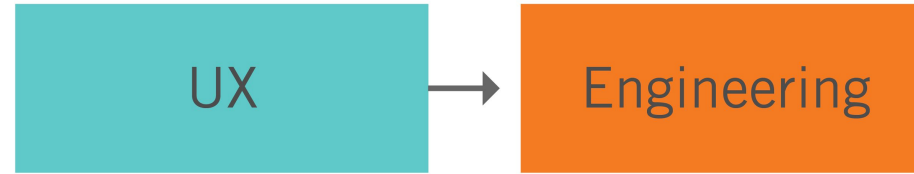
Improved usability

User-centered, iterative design process

Usability testing

User-centered, Iterative Design Process

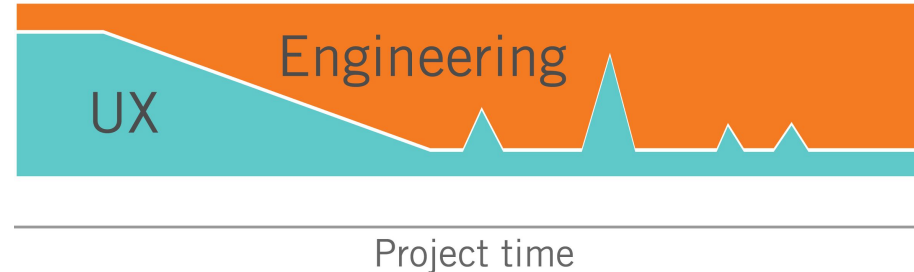
Waterfall (Bad!)



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



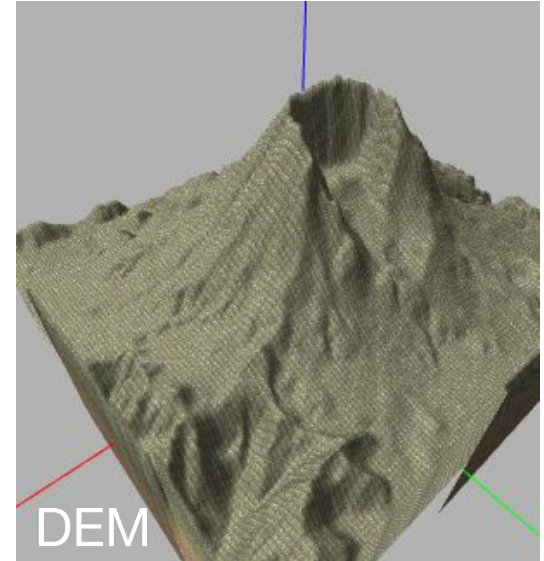
User-centered, iterative design (Good!)



New Features

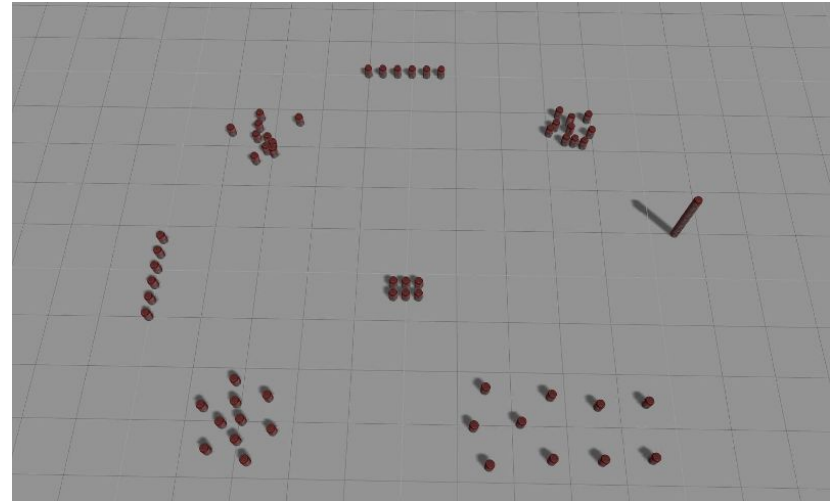
Better worlds

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



Better worlds

- Nested models
- Populations of models in specified configurations



Better control

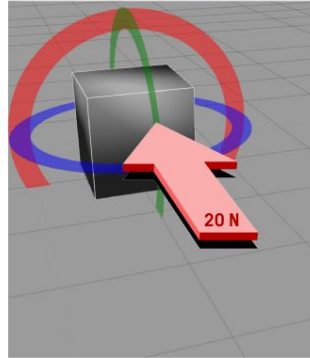
- Graphically apply force/torque
- Undo
- Orthographic view
- View angles

Force & Torque Application: v2 (1.29.15)

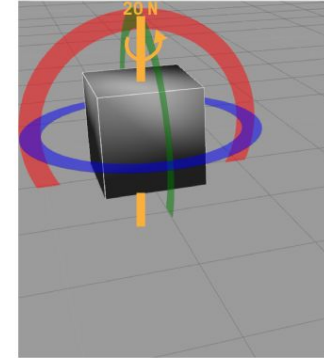
3D Markers and Arrow Control

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

Force



Torque

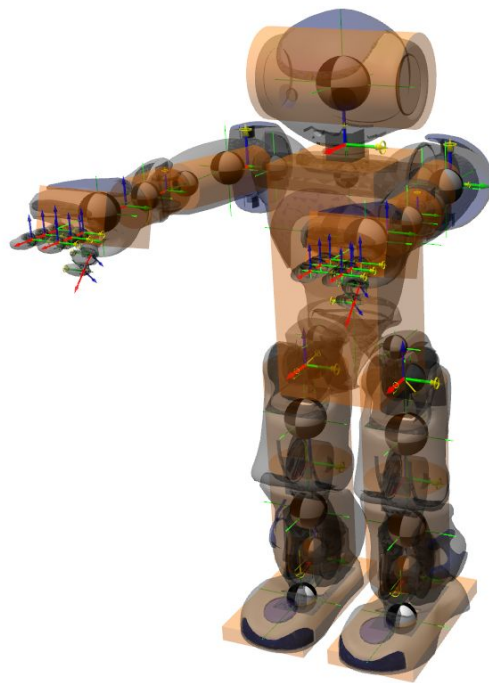


We select a default magnitude and direction. Magnitude readout changes as dialog is edited or as mouse scroll wheel is scrolled.

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

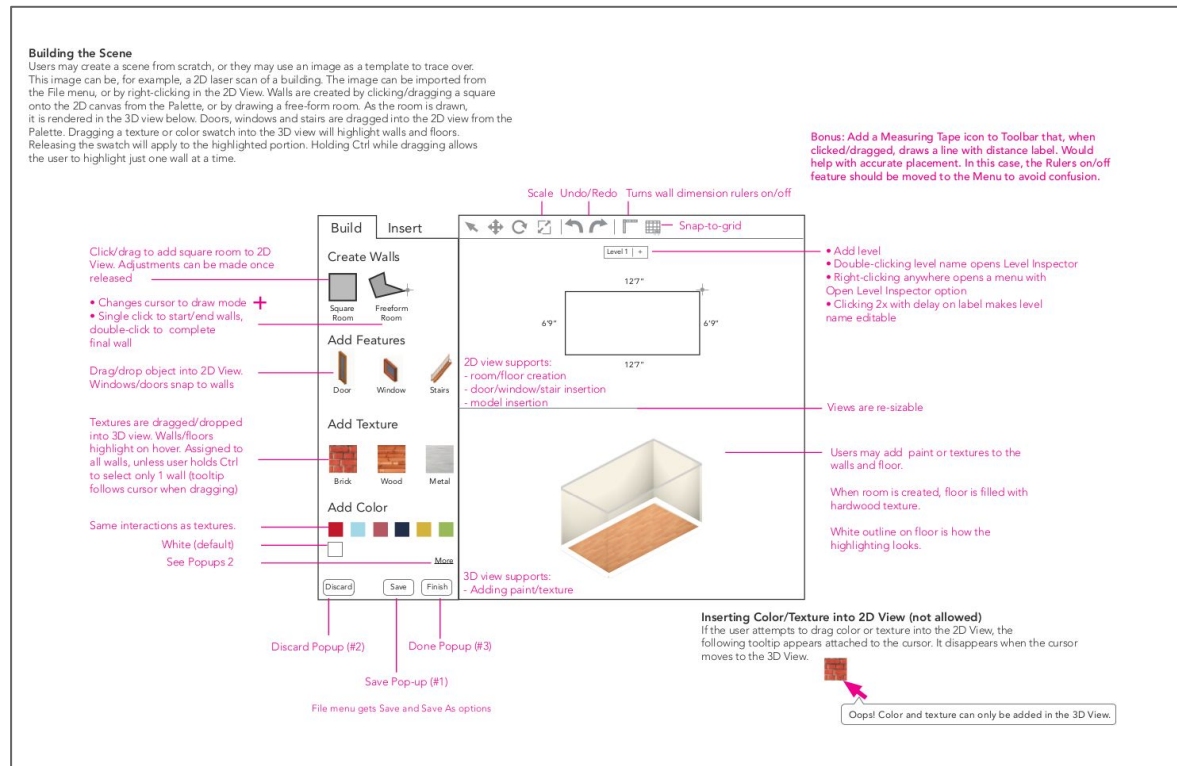
Introspection visualizations

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



Building Editor:

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

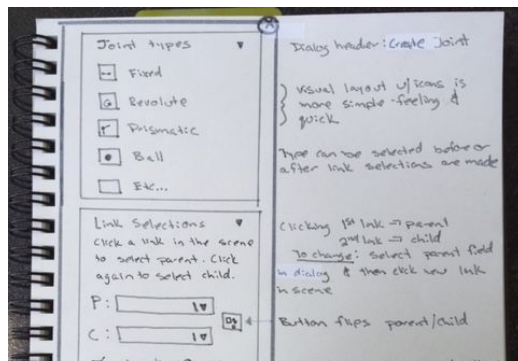


Model Editor:

- Schematic view
- Simple shapes
- Inspectors
- Align tool
- Nested models
- Joint creation
- Meshes
- Add plugins
- Extrude SVG



Attach model here



Extrude Popup
For .svg only. If .stl or .dae --> skip this popup and import link.



Shape can be extruded manually by entering a numerical thickness.
On extrusion, dots included in .svg become lines.

Collapsed by default. We provide default number.

FOR LATER: If cursor hovers in this window, it becomes this extrude cursor (like in Sketchup).
Clicking on the shape and dragging scales the z-axis, and thickness updates to the right.

This requires a 3D view in the pop-up, and is important because users currently receive no feedback about the thickness they've set. Did it work? Does it look like I thought it would?

Opens Inspector in separate window, where user can edit material
and tweak default values we provide for mass and inertia

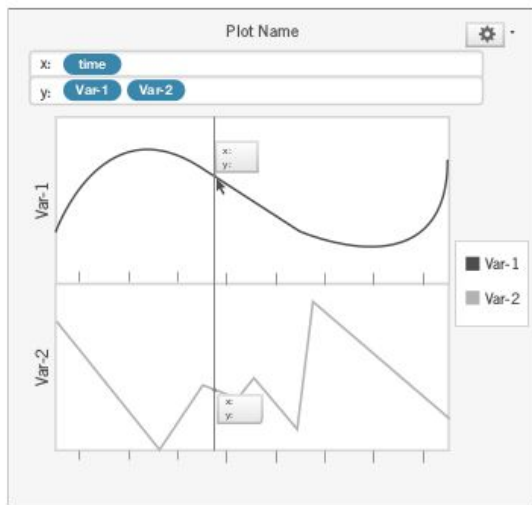
Plotting

Graphically plot variables

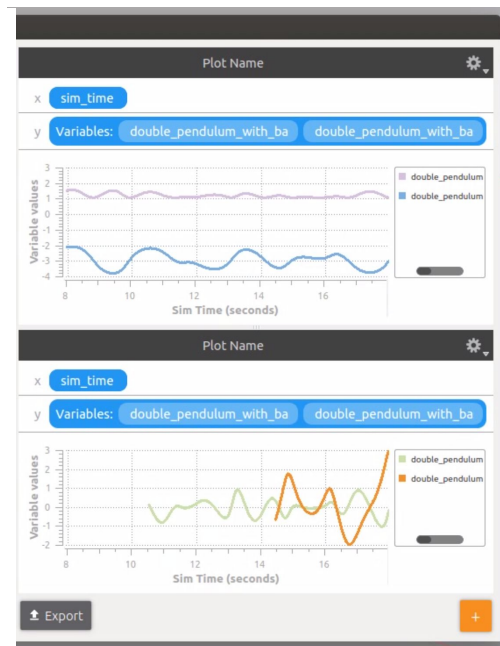
- Gazebo topics
- Physics data

Plotting v5 (1.26.16)

Interactions (2 of 3)



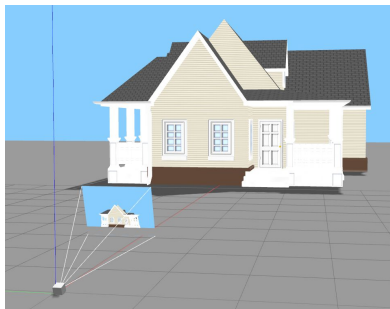
Low-fidelity prototype



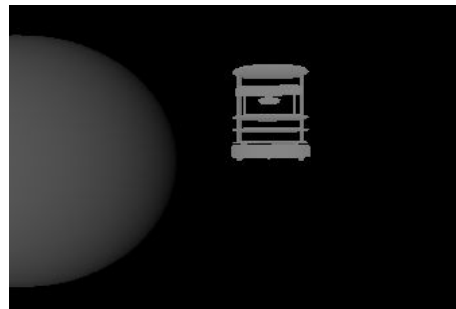
Final design

Sensor support

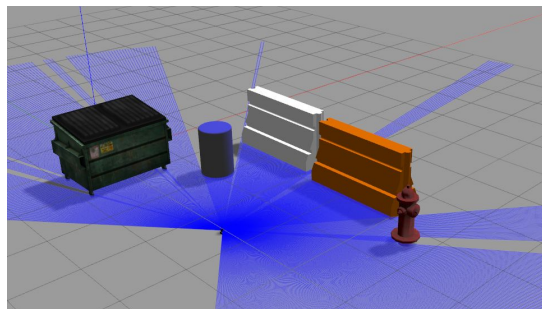
- Camera
 - multi
 - wide angle
 - depth
- GPS
- Altimeter
- Magnetometer
- Sonar
- Logical sensors
- Sensor noise



RGB camera



Depth camera



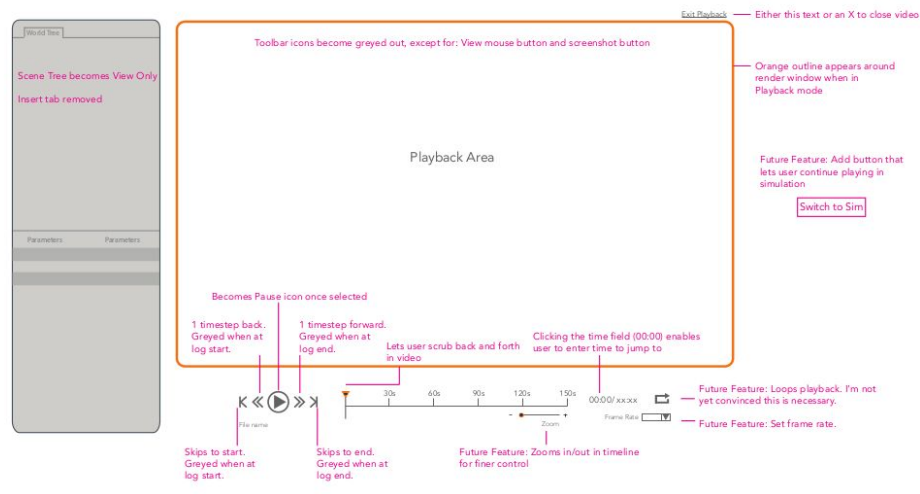
Ray sensor

Logging and Playback

- Create log files within GUI
- Play log files back

Logging & Playback Specs v3 (3.09.15): Playback Annotations in pink.

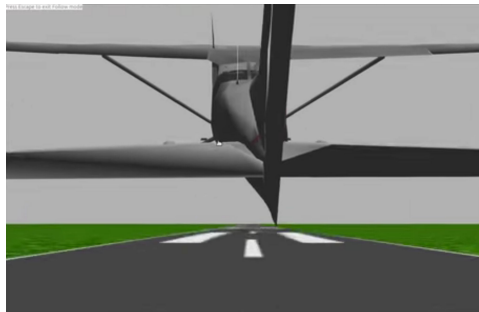
To load a log file, File > Load log file (we may want to add another menu item and put the option there instead). If user will lose the current world, show them a warning first. Edit menu is disabled during playback.



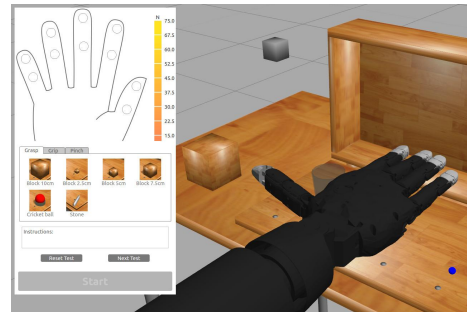
New plugins

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

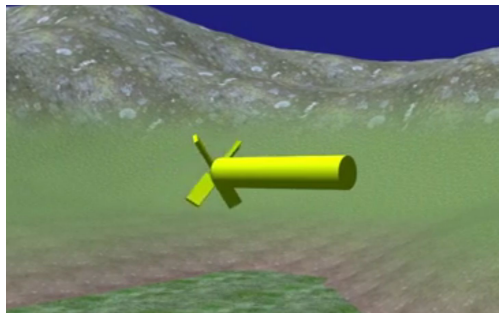
... and more!



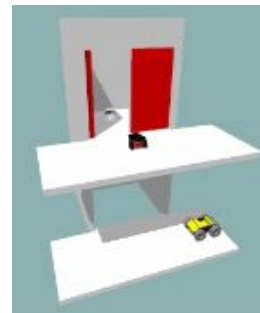
Lift / Drag



GUI overlay



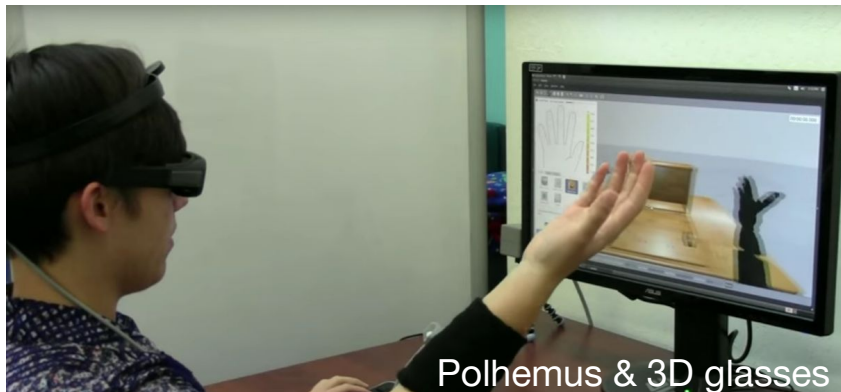
Buoyancy



Elevator

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

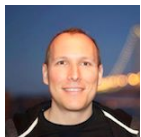
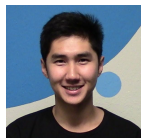
- From Gazebo 7, releases are synced with ROS!

Gazebo Resources & Documentation

<http://gazebo.org>

<http://gazebo.org/tutorials>

<http://answers.gazebo.org>



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Thank you!

Questions?