Unleashing the GIS Toolbox on Real-Time Robotics

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Spatial Analysis in Mobile Robotics

• Understand real-time and historical state of an environment

• Explore spatial relationships

• Generate higher order datasets

• Communicate results
RVIZ for Spatial Analysis

• Data exploration is expensive
  • RVIZ plugin development
  • Custom data processing nodes

• Visualization can be clumsy
  • Eg. republish data in a label-friendly format

• Sharing results is not first-class
  • Screen image/video capture
Let’s use GIS!
What is a Geographical Information System (GIS)?

- Access
- Visualization
- Exploration
- Processing
- Publication
What is QGIS?

- Open Source
- Linux, Windows, MacOS
- Qt4, Qt5
- C++ API
- Python API Bindings
- Plugin based
- Initial Release: 2002
- https://www.qgis.org
Introducing QGIS-ROS

- QGIS Plugin
- Access **live** and **bagged** ROS data
- Supports vector, raster, non-spatial layers
- Supports custom message types by implementing `Translator` subclasses.
- [github.com/locusrobotics/qgis_ros](https://github.com/locusrobotics/qgis_ros)
Examples
Example 1: Processing Pipelines
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<table>
<thead>
<tr>
<th>Parameters</th>
<th>Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radius or Shape</td>
<td>0.400000</td>
</tr>
<tr>
<td>Poses</td>
<td>/p3_153/global_state [USER:100026]</td>
</tr>
<tr>
<td>SLAM Map</td>
<td>/map [USER:100026]</td>
</tr>
<tr>
<td>Collisions</td>
<td>[Create temporary layer]</td>
</tr>
<tr>
<td>Open output file after running algorithm</td>
<td></td>
</tr>
</tbody>
</table>
Example 1: Processing Pipelines
Example 2: Data Visualization
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Example 2: Find Robot Congestion
Example 3: Analyze Non-Spatial Data
Example 3: Analyze Non-Spatial Data

wireless_msgs/Connection

geometry_msgs/Pose2d(ish)
Example 3: Analyze Non-Spatial Data
Future Work...

- Better documentation, examples, sample data
- Map Frame -> World Frame using map projections
- Publish data into ROS environment
- Performance improvements for high volume data
- ROS2 support

...Collaboration Welcome!
Thank you.

github.com/locusrobotics/qgis_ros

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LocusRobotics.com/careers