Projecting Robot Navigation

Paths: Hardware and Software for Projected AR

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Motivation: Where Are They Going?

Zhao Han, Jenna Parrillo, Alexander Wilkinson, Holly A. Yanco, and Tom Williams, “Projecting Robot Navigation Paths: Hardware and Software for Projected AR”, Short Contribution, 2022 ACM/IEEE International Conference on Human-Robot Interaction. bit.ly/hri22
Projecting Robot Navigation Paths

Before

After

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Goal of this Code Paper

- **Detail empirical evidence**
  - Directional projections – arrow, gradient bands, or lines – were all proven effective and improved perception

- **Share a robot-agnostic implementation**
  - ROS – works on more robots
  - rviz – no computer graphics library needed
  - Hardware setup details
    - Robot, projector and power

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Main Features

- **Arrows for paths**
  - Evenly spaced

- **Circle for destination**

- **Generalizability**
  - Any rviz visualization: Point cloud, spheres, cubes, and more

- **Extra evaluation**

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How to Project Navigation Paths

1. Hardware
   1.1. Robot with power
   1.2. Mount off-shelf projector & add TF frame

2. Software
   2.1. Convert probabilistic global path
   2.2. Subscribe output in Rviz via rviz camera_stream plugin
   2.3. Output rviz camera image

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Main Takeaways

1. **Projecting navigation paths** is a **proven** way to **convey nav. intent**

2. With our code, you can **mount a projector** and use ROS & rviz to achieve it (and **any rviz visualizations**)!

3. Read our paper for a **hardware setup** and more: [bit.ly/hri22](https://bit.ly/hri22)