Simultaneous Localization and Mapping Analysis

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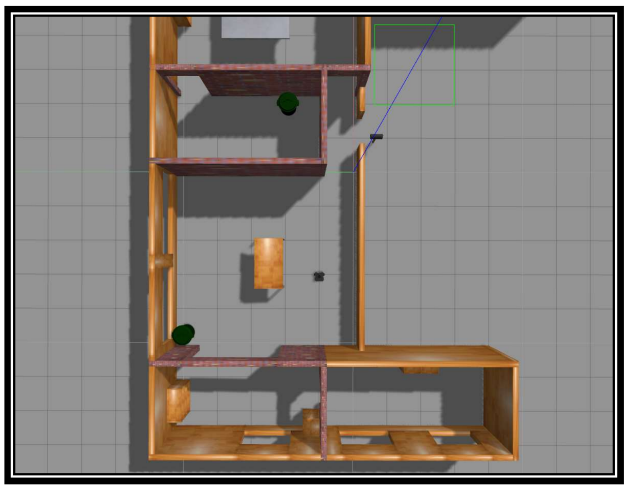
Definitions

- ROS – Robot Operating System. An open source suite of programs designed to be implemented in various robot platforms
- SLAM – Simultaneous Localization and Mapping. The estimation of an unknown map and an agent's location inside it
- Turtlebot – Entry level robotics platform, utilizing open source software

Simulation Example



Objectives

- Simulate virtual robot for test and analysis
- Analyze SLAM solutions using ROS
- Assemble a functional Turtlebot
- Emphasize projects related to current research trajectories for NASA, and general robotics applications

Methods

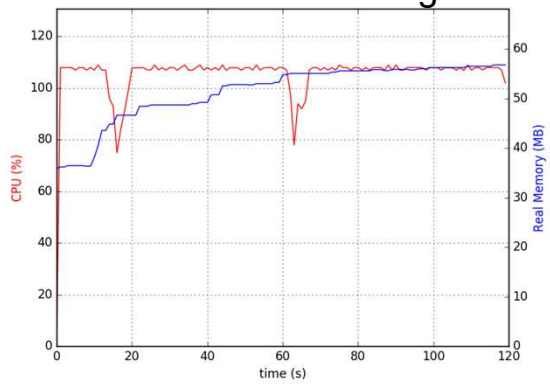
- Settled on parameters to compare: memory and cpu
- Utilized bash scripts to automate initialization and resource collection
- Analyzed and plotted data

Project Future

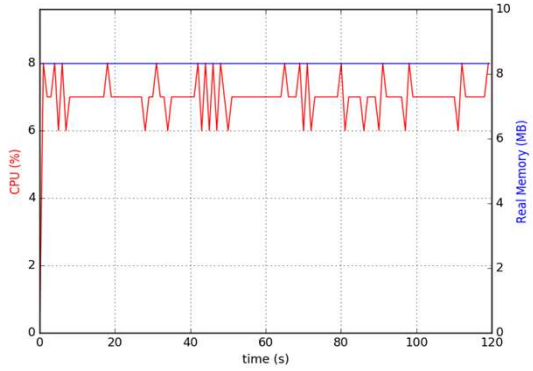
- Iterate on data collection method
- Deploy in different environments:
- Ensures data gathered data isn't tampered by original testing environment
- Gives a chance to test tutorials being written as part of project
- Address I/O concerns

Data

SLAM resource usage



Gazebo resource usage



References

Quigley, M., Conley, K., Gerkey, B., Faust, J., Foote, T., Leibs, J., ... & Ng, A. Y. (2009, May). ROS: an open-source Robot Operating System. In *ICRA workshop on open source software* (Vol. 3, No. 3.2, p. 5).

Durrant-Whyte, H., & Bailey, T. (2006). Simultaneous localization and mapping: part I. *IEEE robotics & automation magazine*, *13*(2), 99-110.

ROS Documentation. (n.d.). Retrieved from ROS Wiki: wiki.ros.org

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