Washkewicz College of Engineering

Indoor Navigation with TurtleBots

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Purpose

The Cleveland State University campus can be confusing to visitors trying to find their way around for the first time. We set out to make CSU more friendly by giving visitors an easy way to be guided around the campus. We achieved this goal using autonomous mobile robot platforms, called Turtlebot.
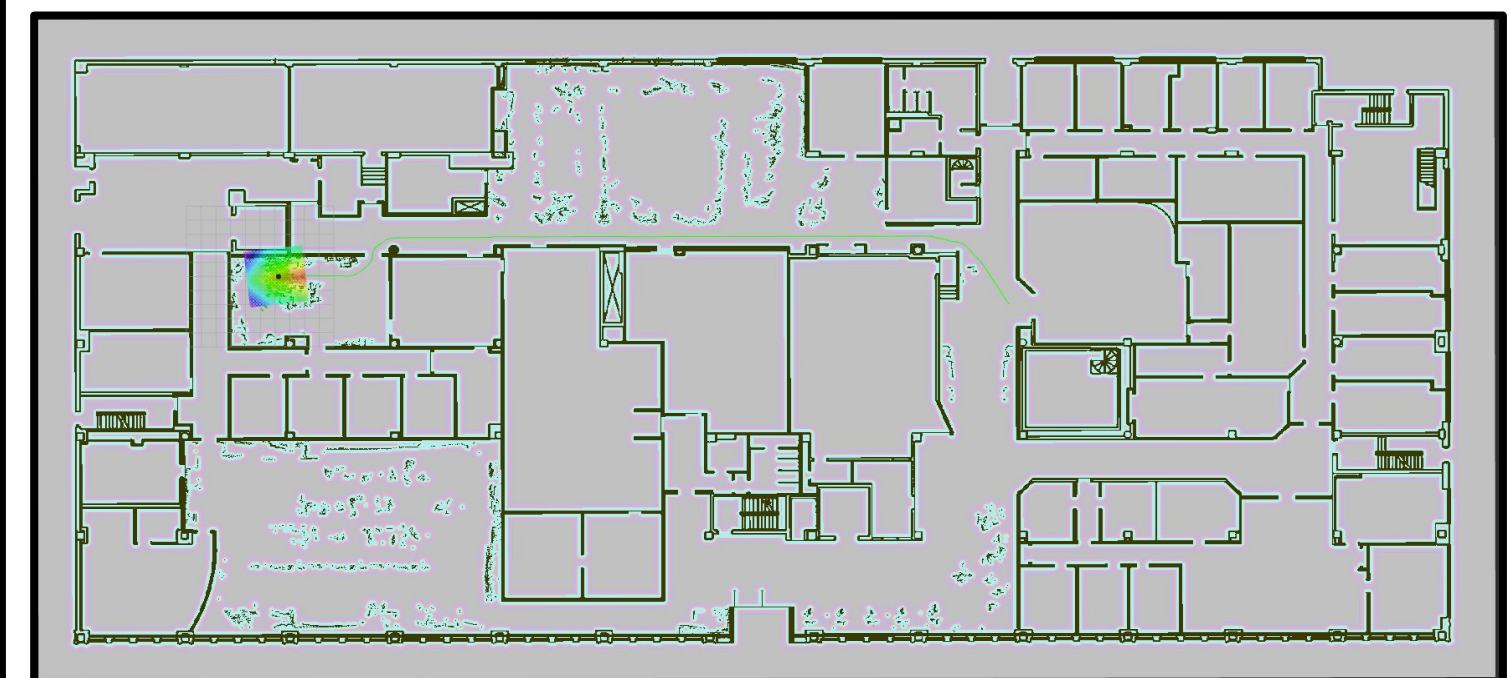

Technology

ROS

- **R**obot **O**perating **S**ystem
- An open-source, meta-operating system for robots.
- It provides services, like an operating system, for software to interact with and collect data from the hardware.

RVIZ

- A 3D visualizer for displaying sensor data and state information from ROS.

TURTLEBOT

- Is a low-cost, personal robot kit.
- TurtleBot was created by Melonee Wise and Tully Foote.
- Components:
  - Orbbec Astra RGB-D camera
 - Front Bumber Sensor
  - Odometer
  - Motorized wheels

SLAM

- **S**imultaneous **L**ocalization **A**nd **M**apping is the computational problem of constructing or updating a map of an unknown environment while simultaneously keeping track of a robots location within it.
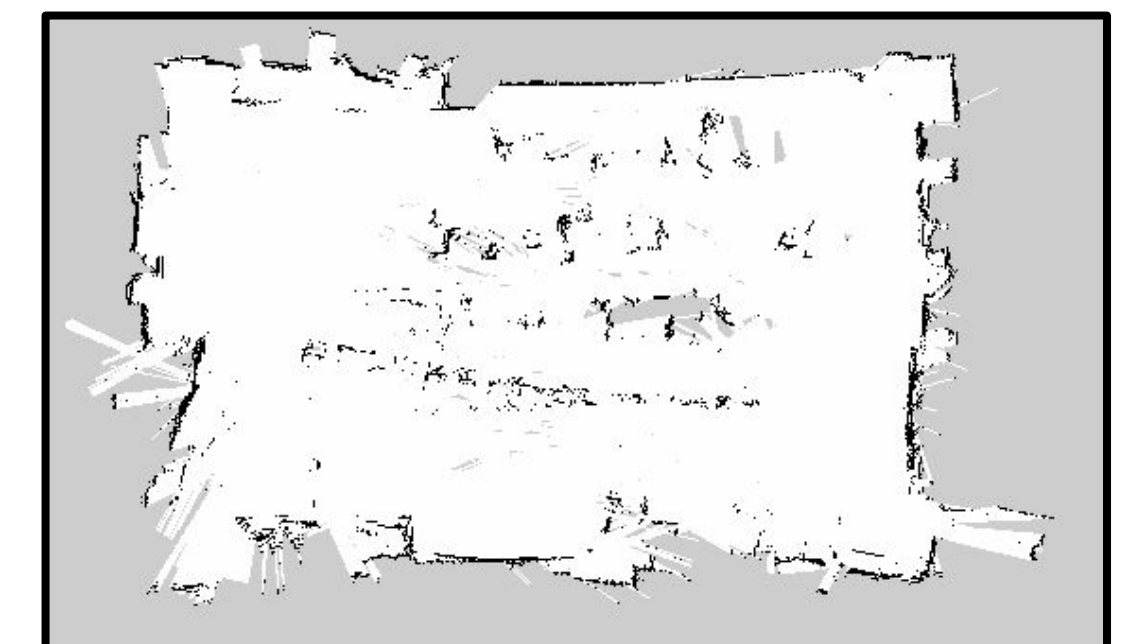
Navigating the Campus

- Through the user interface(above) the robot can be given a location or room number to navigate to.
- Once given the navigational location the Turtlebot plans a path with the use of a map of the campus it has stored.
- With the route planned it uses real time 3D sensors(top & bottom far right) to navigate around new obstacles including pedestrians.
- It can then lead a person(right) to his or her desired location with ease.
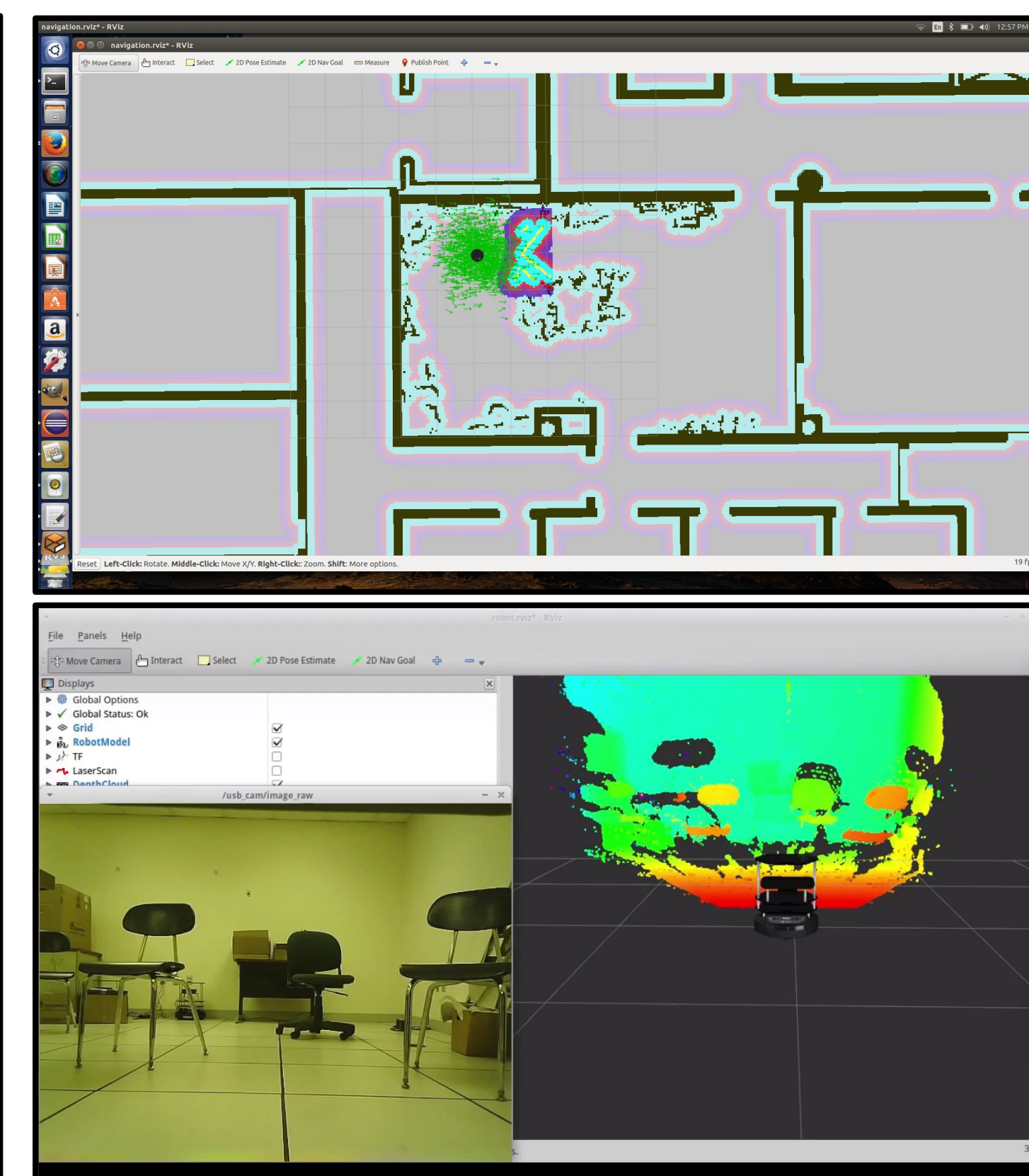
References:
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- Zhang, Shiqi, et al. "Mobile Robot Planning Using Action Language BC with an Abstraction Hierarchy." International Conference on Logic Programming and Nonmonotonic Reasoning. 2015.