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9 week internship

Evaluate the use of a Roomba robot as a mobile node in a wireless sensor platform

Thursday 13 September 2012

Plan

I. Internship Environment
II. Subject and requirements
III. Devices and softwares
IV. Solutions and Results
- Setting up the robot
- Charging batteries
- Using odometry
- Using navigation

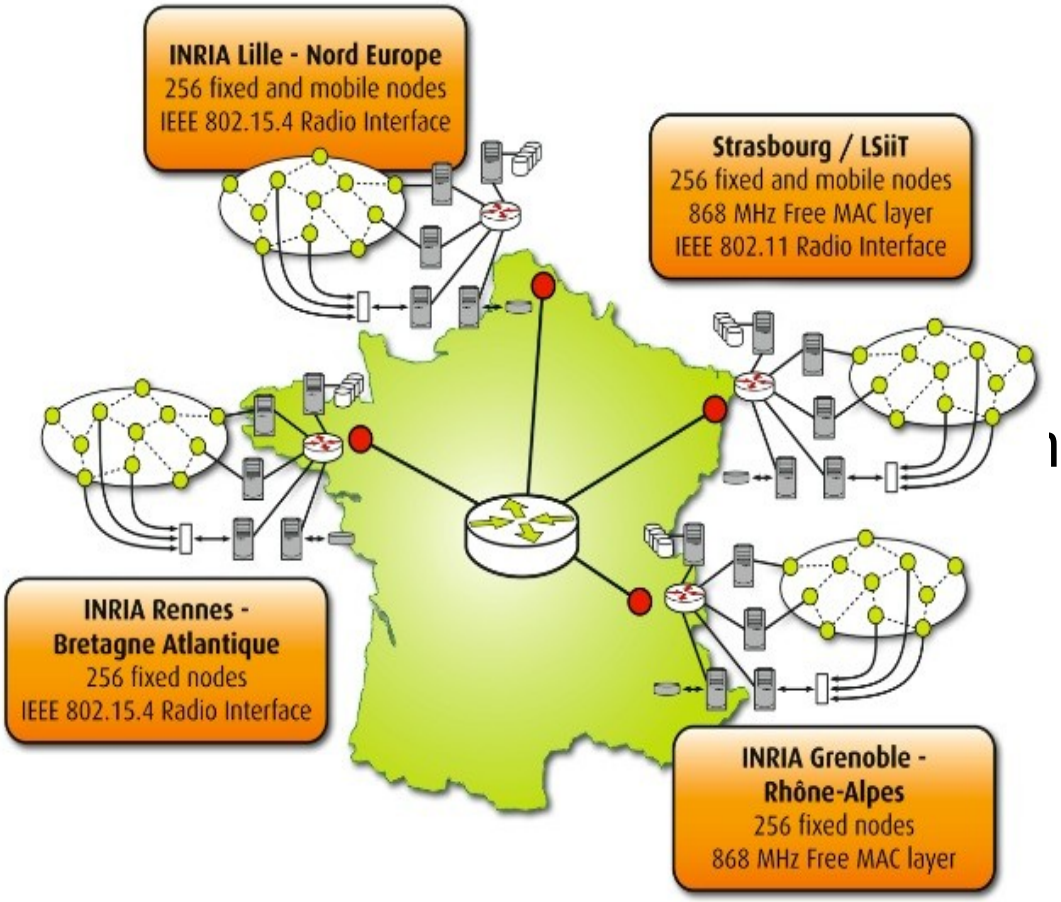
V. Conclusion

I. Internship environment

- INRIA
- SED (Service of Experimentation and Development)

II. Subject and requirements

- Senslab project



- Mobile
  with a
- Require
  1) run an
  2) move
  3) receiv
     (locali

III. Devices and software

- Willow Garage

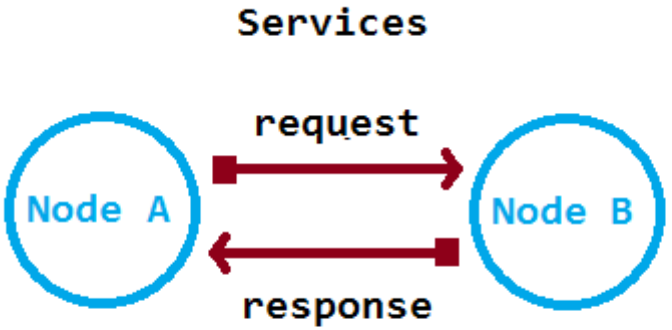
- Turtlebot :

- Not sold in France → inspired by it
- Equipped with :
  - Microsoft Kinect
  - iRobot Roomba 531
  - Portable computer

Low cost : ~1000€

III. Devices and software

- ROS (Robot operating system) :
  - Powerful structure : nodes, parameters, topics, services



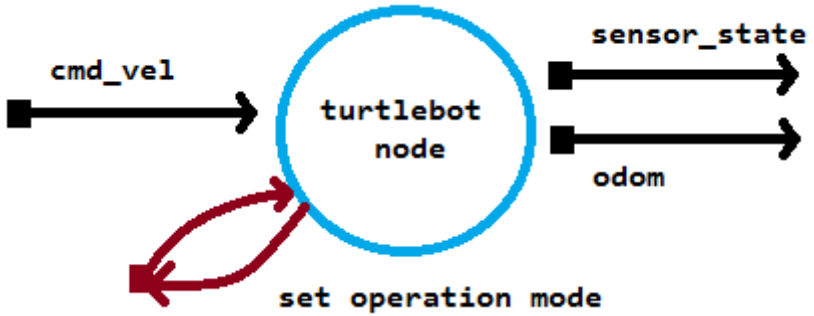
- No graphical interface with user
- Many available device drivers
- Standardised
- Visualizers, diverse applications such as navigation

IV.1 Setting up the robot

- Kinect powered by batteries of Roomba
- Serial communication between PC & robot
- Communication to PC using SSH protocol

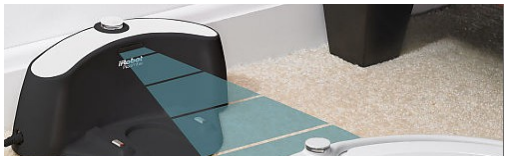
First tries :

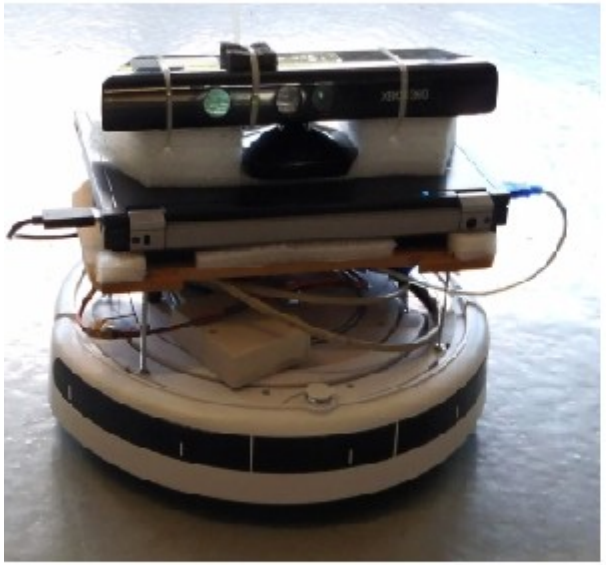
- Starting up ROS and the turtlebot node



- Creating small programs

IV.2 Recharging the batteries





Results : function works under certain conditions
- no interference
- robot has to be facing the dock

IV.3 Using odometry to localize the robot

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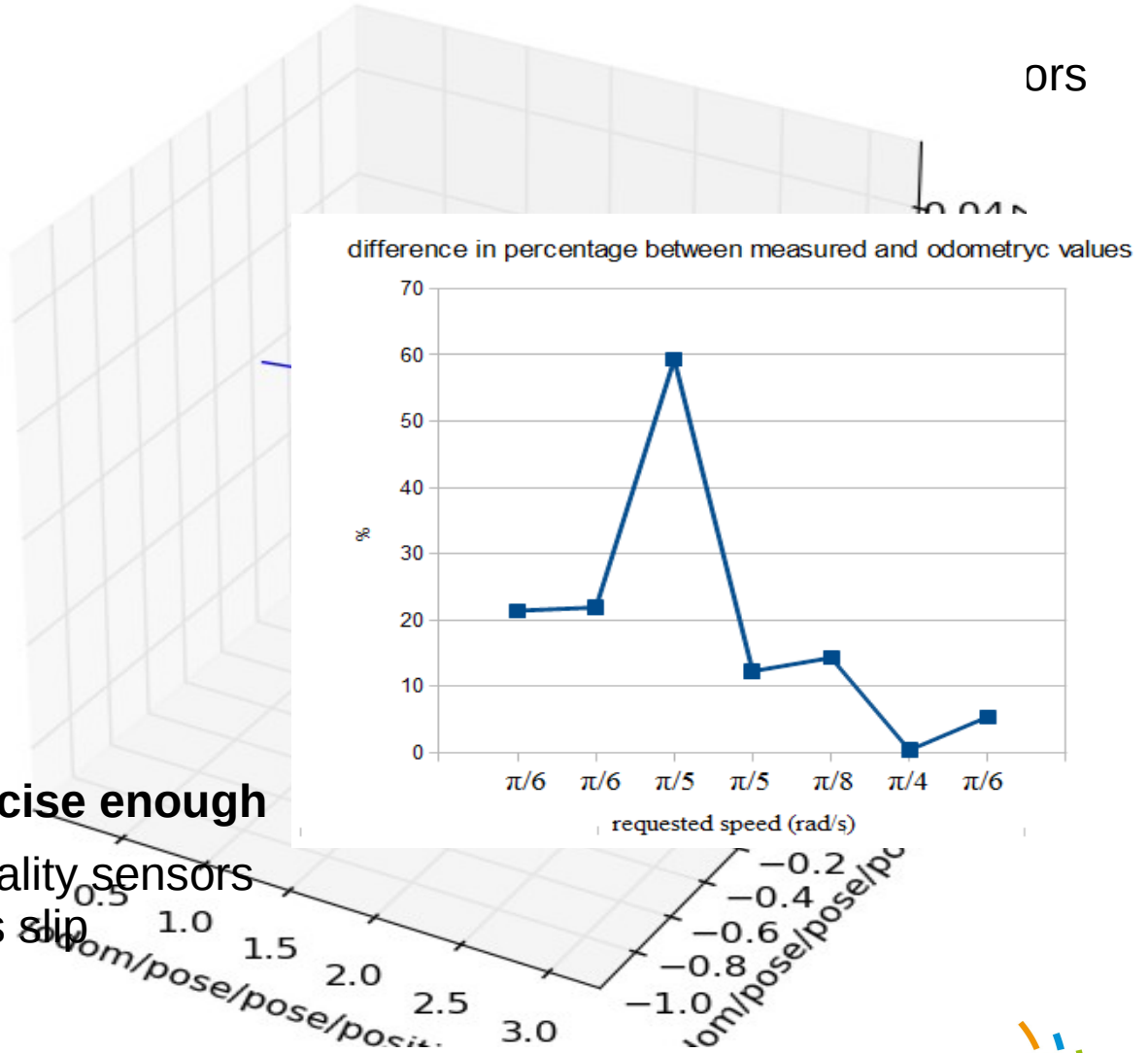
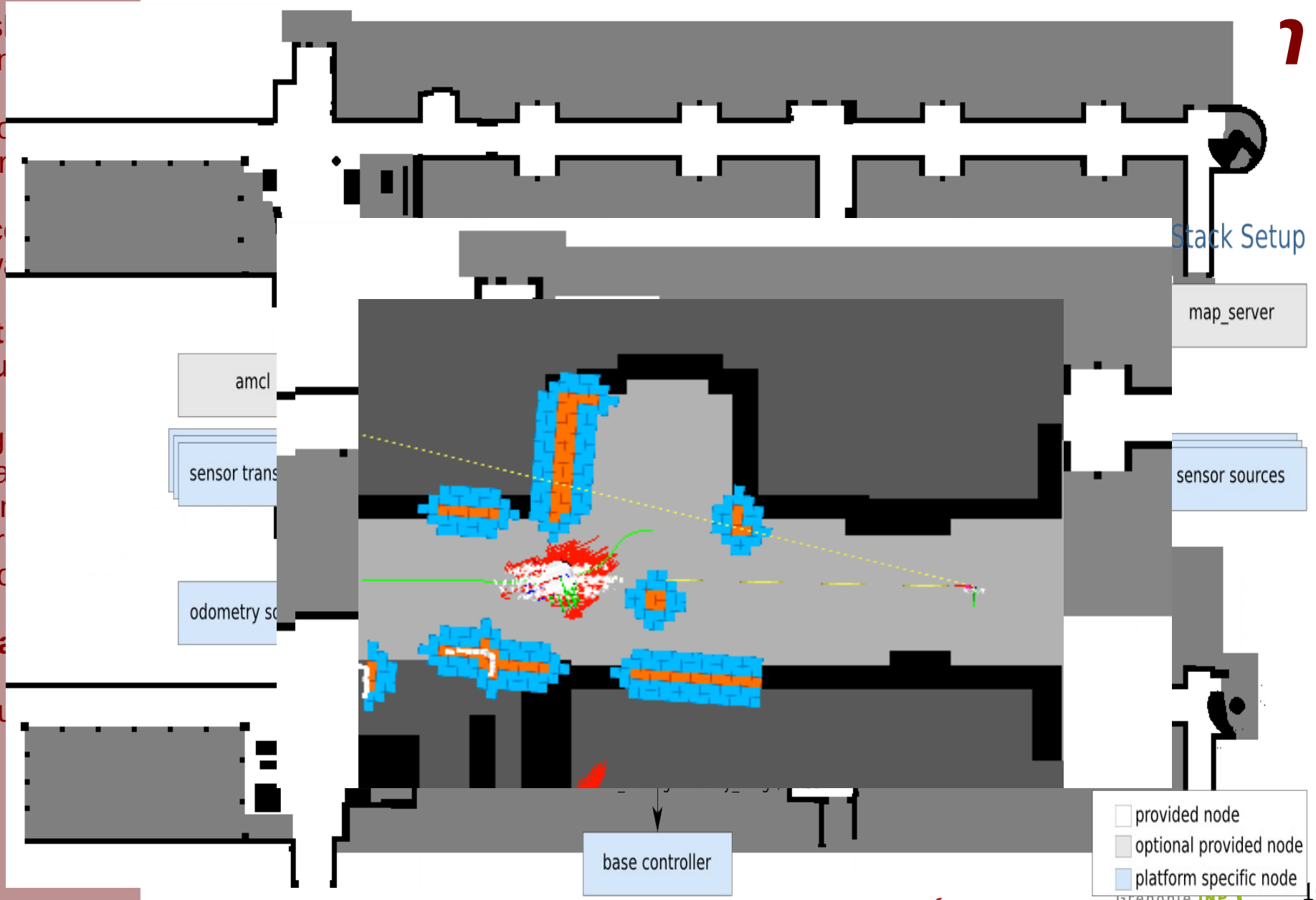
Resul



Not precise enough

- low quality sensors
- wheels slip

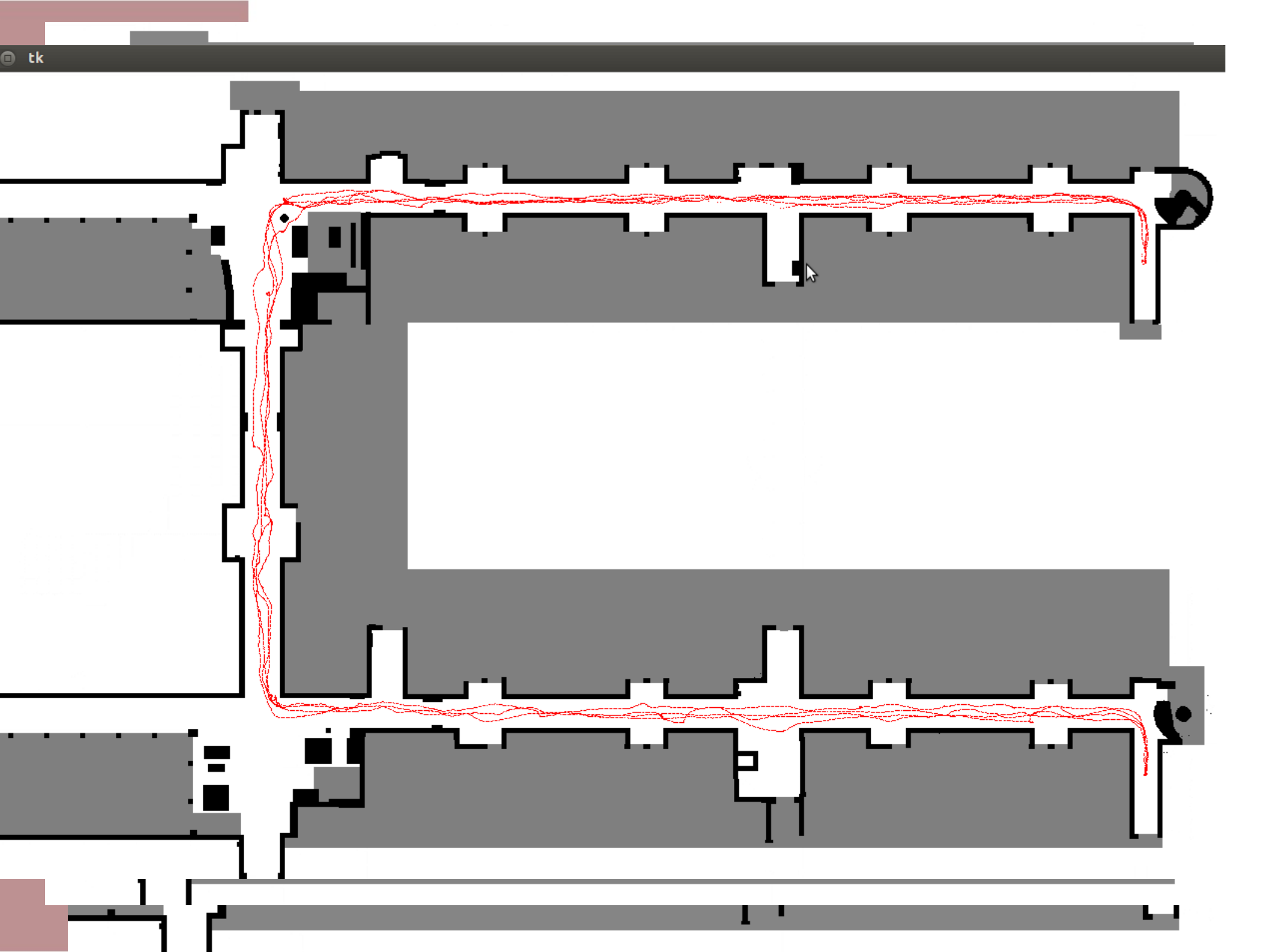
IV.4 Using the Navigation



IV.4 Using the Navigation application

- Creation of a ROS application with the following scenario :

1) start at dock
2) back up
3) go to point A then point B (as many times or as long as wanted)
   During this time :
      if bumpers are hit, the robot stops
      If batteries are low, it goes to recharge
4) go in front of dock
5) call the dock service
6) recharge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V. Conclusion

Questions