pioneer3at_ETSIDI: Pioneer 3 AT setup at ETSIDI-UPM

This repo hosts ROS packages working on Indigo version. This packages are needed to setup a CATKIN workspace and include all files needed for Pioneer 3 AT robot at ETSIDI-UPM university.

Submodules

Pioneer 3 AT uses the following additional ROS packages showed up as git submodules:

- rosaria: Interface with Aria library to control motors, battery and encoders. (See rosaria docs)
- p2os(indigo-stable): package with some useful configurations for navigation and pioneer urdf models. (See p2os docs).
- LMS1xx: Sick ROS drivers from ClearPath Robotics to use Sick LMS100 ethernet laser scanner. (See LMS1xx docs).
- freenect_stack: For Kinect 1 XBOX 360, (See freenect_stack docs and freenect_launch docs).
- depthimage_to_laserscan: Creates LaserScan data from depthimage devices such as kinect. (See depthimage_to_laserscan docs).
- turtlebot_apps: Interactive implementations reused for P3AT robot such as "follower" demo. (See turtlebot docs).

Catkin workspace

Please, refer to de ROS Indigo installation page and follow the steps to install and set your ROS environment as well as updating rosdep tool.

- ROS Indigo installation wiki.

Steps may change for each ROS version:

1.- `$ sudo apt-get install ros-indigo-desktop-full`

2.- `$ sudo rosdep init`

3.- `$ rosdep update`

All theese files and directories should be placed at src/ directory in a catkin workspace. Follow steps in a terminal:

1.- `$ catkin_init_workspace catkin_ws`

2.- `$ cd catkin_ws/src`

3.- `$ git clone --recursive https://github.com/danimtb/pioneer3at_ETSIDI.git .` (NOTE THE . AT THE END OF THE LINE)

4.- `$ cd ~/catkin_ws`

5.- `$ rosdep install rosaria`

6.- `$ rosdep install freenect_launch`

7.- `$ catkin_make` This will compile all targets placed in you catkin src directory

You'll may also need ros navigation stack and gmapping:

```
$ sudo apt-get install ros-indigo-navigation
```

```
$ sudo apt-get install ros-indigo-gmapping
```

For turtlebot applications to compile and run:

```
$ rosdep install turtlebot
```

```
$ rosdep install turtlebot_teleop
```

Content: pioneer_utils

This is the core of my work. **pioneer_utils** mainly adds some configuration specific parameters to keep all things working.

- Odometry params calibrations used in rosaria.
- Laser IP address.
- Pioneer URDF model with Sick Laser and Kinect.
- Navigation tweaks in costmaps, base and planners.
- depthimage to scan configs (for low, medium and long range obstacles).
- Gazebo settings and launch files with gazebo plugins and urdf model.
- Maps used at ETSIDI-UPM Lab and in gazebo Willow Garage world.
- RViz launch files with specific visualization configs.

And implements easy to use nodes:

- Teleoperation node. `rosrun pioneer_utils teleop_p3at`
- Dead Reckoning node: Let robot move alone and making turns. `rosrun pioneer_utils moving_alone`
- nav-waypoints node (navigation_goals): Send global or local goals to navigation stack. `rosrun pioneer_utils nav-waypoints`
- endurance_test node: implements randomly navigation to a list of pointsSee launch file template: ``roslaunch pioneer_utils endurance_test.launch"List of points as *map_locations.txt* rosparam.

Usage

This repository is intended to be a simple method to setup and run everything needed to use

Pioneer 3 AT. After clonning this github repo in your catkin_ws src/ directory do the following: `$ cd catkin_ws` `$ catkin_make`

Navigation Stack

Now run "roscore" and the nodes needed with the .launch file you'll find in src/ directory. In your terminal run "roscore": `$ roscore`

In another terminal, we'll bring up all drivers for hardware using kinect, laser Sick, and Rosaria with calibration config setup: `$ roslaunch pioneer_utils pioneer3at-rosaria.launch`

Now, you can start navigation stack with amcl like this: `$ roslaunch pioneer_utils global_navigation_p3at.launch`

Pioneer 3 AT Follower (from turtlebot)

Open a terminal and launch the follower: `$ roslaunch pioneer_utils simple_follower.launch`

If you want to guide your robot following you to build a map, run also: `$ roslaunch p2os gmapping.launch`

Pioneer 3 AT Panorama (from turtlebot)

Open a terminal and launch the panorama: `$ roslaunch pioneer_utils panorama-pioneer-3at.launch`

Follow turtlebot's panorama wiki to know how to use this and take nice panorama pics. Also see turtlebot_panorama API.

Gazebo Simulation

Open a terminal and launch the follower: `$ roslaunch pioneer_utils pioneer3at_gazebo_world.launch`

If you want to do some navigation with Willow Garage's map type in other terminal: `$ roslaunch pioneer_utils gazebo-global_navigation_p3at.launch`