ROS GPS PLUGIN
ROBOTICS PROJECT AA 2016/2017

Emiliano Gagliardi
Emanuele Ghelfi

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1 Package structure

The ros-gps-plugin contains the following files:

- faultygps: directory of the scripts.
- model.sdf and model.config: examples of a gps sensor using the faultygps plugin.
- doc: documentation of the project

2 Plugin description

The file FaultyGPSPlugin inside the directory faultygps is the plugin of the gps sensor.

In the load method it gets the parameter from the sdf file (parameters are decribed later) and publishes on the ros topic '/fix' messages of type 'NavSatFix' (after having advertised it).

The plugn connects to the update method of the gps and at each update it decides what to do according to a probability distribution.

With a certain probability the plugin changes status to LossSignal for a certain amount of time (between 5 and 10 seconds), measurements are not published on the topic. If the signal remains active with a certain probability changes status to MultiPath for a certain amount of time, measurements of latitude and longitude are translated of some degrees.

If the two events do not happen the status is Correct for a certain amount of time, in the correct status measurements from gps sensor are directly published.

3 Installation Instruction

- Create the build folder inside the faultygps directory

```
cd faultygps
mkdir build
cd build
cmake ../
make
```

- Link the plugin

```
export GAZEBO_PLUGIN_PATH=$HOME/ros-gps-plugin-path/faultygps/build:$GAZEBO_PLUGIN_PATH
```

- Link the folder inside the .gazebo/models folder in order to be able to include the gps model provided.
- Launch gazebo inside ros

```
roslaunch gazebo_ros empty_world.launch
```

- Add the gps to the world and check if the topic /fix has been advertised

4 Parameters

Include in the plugin tag the folllowing parameters (in the model.sdf file are already included):

- multiPathProbability: probability of a translated measurement from the gps sensor.
- lossProbability: probability of loss of signal from sensor.
- maxLongTranslation: max amount of translation in the longitude. The translation is between -maxLongTranslation and +maxLongTranslation.
- maxLatTranslation: the same as before for the latitude.

Example:

```
<sensor type="gps" name="mGps">
            <gps>
                <position_sensing>
                    <horizontal>
                        <noise type="gaussian">
                            <mean>0.0</mean>
                            <stddev>0.5</stddev>
                        </noise>
                    </horizontal>
                    <vertical>
                        <noise  type="gaussian">
                            <mean>0.0</mean>
                            <stddev>5.0</stddev>
                        </noise>
                    </vertical>
                </position_sensing>
            </gps>
            <always_on>1</always_on>
            <update_rate>1</update_rate>
            <plugin name="faulty_behavior" filename="libFaultyGPSPlugin.so">
                      <lossProbability>0.0001</lossProbability>
                      <multiPathProbability>0.0001</multiPathProbability>
                      <maxLongTranslation>0.0001</maxLongTranslation>
                      <maxLatTranslation>0.0001</maxLatTranslation>
                </plugin>
</sensor>
```

5 Reference

- Project repository: https://github.com/EmilianoGagliardiEmanueleGhelfi/ros-gps-plugin