Simulation sensors

This guide demonstrates how to use different sensors in your Gazebo simulation. If you have followed the installation instructions, you have downloaded some default sensors, which you can find at ***~/simulation/ros_catkin_ws/src/ardupilot_sitl_gazebo_plugin/ ardupilot_sitl_gazebo_plugin/urdf/sensors.*** As our research is mainly involved with visual SLAM algorithms, I focus on mounting camera's on the Erle-Copter. Take note that a laser range sensor is provided as well.

- First, we will prepare your workspace, so that it includes the custom camera files that I made. Go to the ***src/ardupilot_sitl_gazebo_plugin/ ardupilot_sitl_gazebo_plugin/*** on your ROS workspace and delete the ***urdf*** folder.
- Next, go to ***/Tech report/ros_catkin_ws***/***src/ardupilot_sitl_gazebo_plugin/ ardupilot_sitl_gazebo_plugin/*** in this portfolio and copy the ***urdf*** folder. Place it in your ROS workspace on the location where you deleted the old urdf folder.

Generic camera

- Open the ***erlecopter.xacro*** file in the ***urdf*** folder.

- If you want to mount a generic RGB camera on the Erle-Copter, uncomment the *'Generic RGB camera front'* section on lines 204 – 217 and comment the *'Custom RGB-D Camera'* right below it. You will notice that camera parameters such as image resolution and horizontal field of view can be adapted in this code. Also, you can change the pose of the camera relative to the drone by changing values in the <origin> tag. I have set the camera to be 25 centimeters in front of the drone base.

- Launch the simulation. You can visualize the camera image by running:
    rosrun image_view image_view image:=/erlecopter/front/image_front_raw
  To record the image in a bagfile, run:
    rosbag record -O rgbcam_bag /erlecopter/front/image_front_raw

Depth camera

- Erle-Robotics provided a Kinect camera file in the ***urdf*** folder. I copied this file and placed it in ***/urdf/sensors/custom_depth_cam.urdf.xacro***. There, I adapted the dimensions and geometry of the camera, so that it would be easier to mount it on the Erle-Copter simulation without causing troubles flying it.

- To use this custom depth camera, comment the *'Generic RGB camera front'* section on line 204 – 217 and uncomment the *'Custom RGB-D Camera' right* on lines 221 – 225.

- Launch the simulation. You can visualize the camera RGB image by running:
    rosrun image_view image_view image:=/camera/rgb/image_color
  To visualize the depth image, run:
    rosrun image_view image_view image:=/camera/depth_registered/sw_registered/image_rect_raw

- The RGB-D images can also be recorded in simulation. However, controlling the Erle-Copter and recording depth camera images at the same time requires a lot of computational resources. If your machine does not provide these resources, there is a big chance that Erle-Copter will lose stability and crash. The command to record the images in a bagfile is:

  rosbag record --chunksize=256 -b 2048 -O kinect_bag /camera/rgb/image_color /camera/rgb/camera_info /camera/depth_registered/sw_registered/image_rect_raw /camera/depth/camera_info