LAB #3

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Asus Xtion PRO LIVE

RGB, Depth and Microphones

- Depth Image Size
  - (640x480) : 30 fps
- Field of View
  - **Horizontal: 58^o**
  - Vertical: 45^o
  - Diagonal: 70^o

Depth Sensing

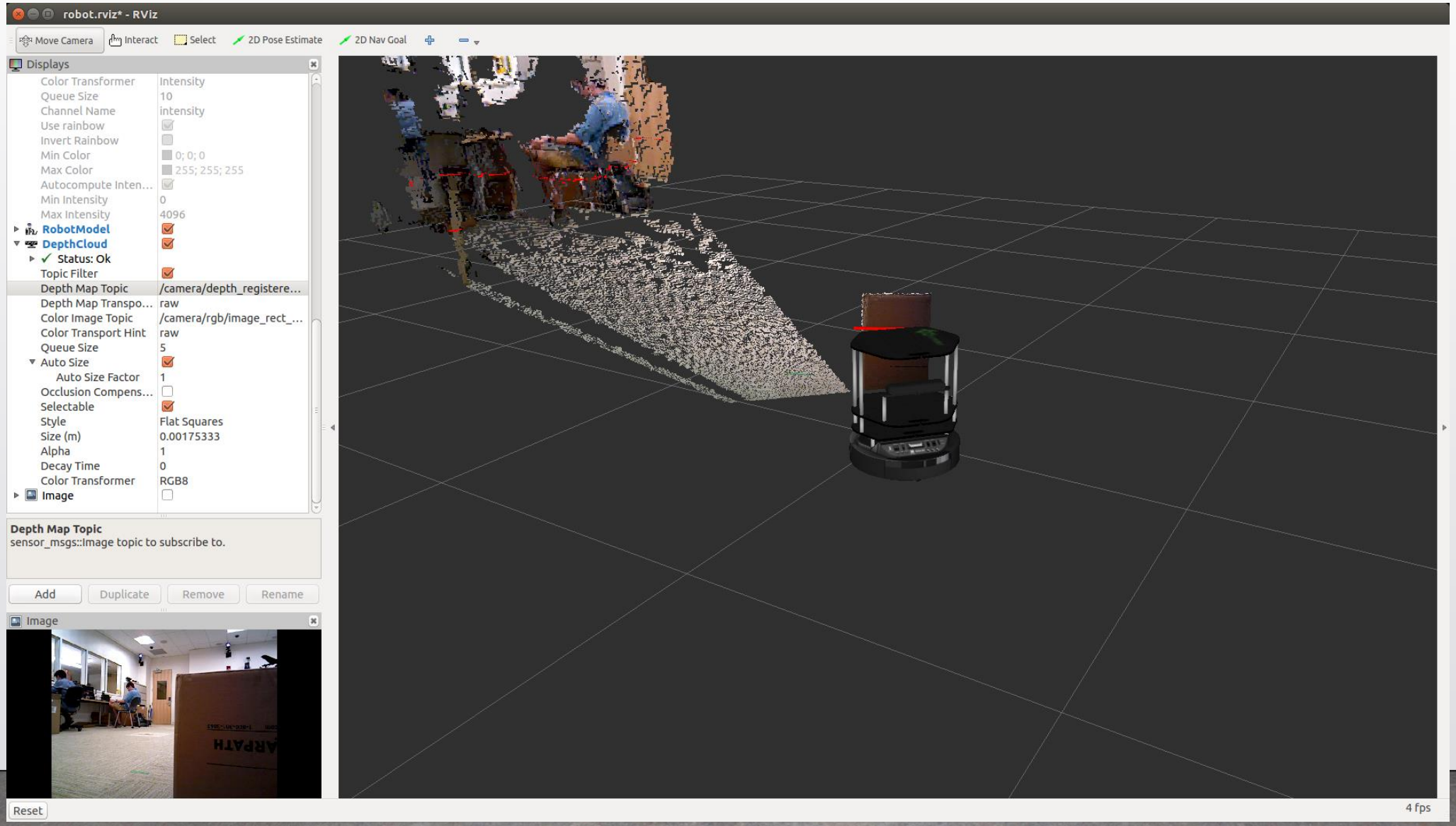
- Structured Light (Active Depth Sensing)
  - Project a speckle pattern of infra red laser light (Transmitter)
  - Capture and Analyze the results (Depth Camera)
- Depth from Blur and Stereo Vision (Passive Sensing)
  - Blur: Things further away – Astigmatic Lens
  - Stereo Vision: Thing viewed from two vantage points,
  - Look different based on distance

Launch 3dSensor

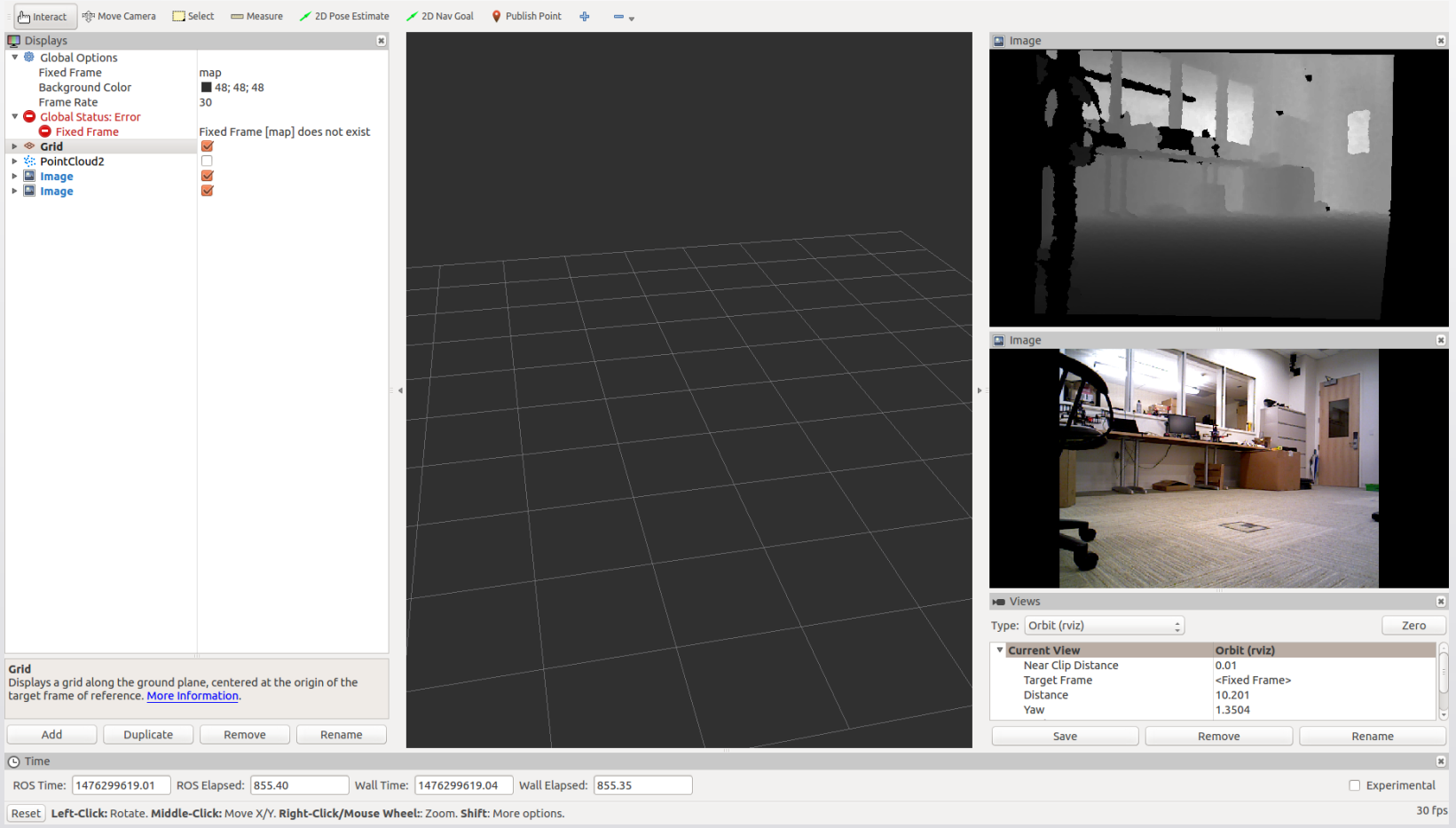
- ssh into your turtlebot
- ***roslaunch turtlebot_bringup minimal.launch***
- ***roslaunch turtlebot_bringup 3dsensor.launch***
- ***rostopic list***
  - You should see a number of new topics being published
  - **rostopic echo /scan**

Visualize Kinect data in Rviz

- On your Lenovo Laptop, open a terminal
- ***Rosrun rviz rviz***
- ***Global Options->Fixed Frame = base_footprint***
- ***Grid->Reference Frame = odom***
- *Click on the **'Add'** button, from the **'By Display Type'** tab select* ***DepthCloud, RobotModel and LaserScan***
  - Color Image Topic
    - Select ***camera/rgb/image_raw***
  - *Depth Map Topic*
    - Select ***camera/depth_registered/image_raw***


robot.rviz* - RViz
Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Displays
Color Transformer Intensity
Queue Size 10
Channel Name intensity
Use rainbow
Invert Rainbow
Min Color 0; 0; 0
Max Color 255; 255; 255
Autocompute Inten...
Min Intensity 0
Max Intensity 4096
RobotModel
DepthCloud
Status: Ok
Topic Filter
Depth Map Topic /camera/depth_registere...
Depth Map Transpo... raw
Color Image Topic /camera/rgb/image_rect_...
Color Transport Hint raw
Queue Size 5
Auto Size
Auto Size Factor 1
Occlusion Compens...
Selectable
Style Flat Squares
Size (m) 0.00175333
Alpha 1
Decay Time 0
Color Transformer RGB8
Image
Depth Map Topic
sensor_msgs::Image topic to subscribe to.
Add
Duplicate
Remove
Rename
Image
Reset
4 fps

Visualize Kinect data in Rviz



How to subscribe to the virtual(fake) laser data

- Data Type:
  - **#include <sensor_msgs/LaserScan.h>**
  - In python: **from sensor_msgs.msg import LaserScan**
- Subscribe:
  - /scan topic
  - Read ***ranges[0-639]***
  - *Values range from 0.44 to 10 (meters), some will be NaN (not a number)*

AMR Lab #3 – Due Thu 10/27/2016 during Lab hours

Use the Asus Xtion Pro (kinect) sensor for the following behaviors:

1. Use the cruise controller developed in the first lab assignments, set a speed and make the robot stop at 1m from any obstacle in front of the turtlebot.
2. run an obstacle avoidance behavior. Use the turtlebot box as the obstacle to avoid. Implement a go-to-goal behavior making the robot move 4m ahead while avoiding the obstacle.
3. Implement a follow-me behavior. Make the turtlebot follow you around the lab
4. extra: use the camera on the xtion sensor to recognize and follow a specific object (e.g., a red ball, your face, your backpack, a drawing on a piece of paper, etc.)