Terrapin-ros

* Produce a 2D occupancy grid map and 3D point cloud
* Autonomously navigate an unknown environment
* Detect and identify objects in a room
* Calibrate camera to mask textures

Hardware Requirements:

* Turtlebot 2
* A USB cable (that works, ensure it does) to connect the Kobuki Base and Laptop
* A Laptop running Ubuntu 16.04 and ROS Kinetic
* A camera:

Xbox Kinect v2 connected to the 12v 5 amps socket on the Turtlebot. Please note the existing cable for this is poor and will need a permanent solution with proper parts.

OR:

- Zed Camera

Installation (assumes knowledge of catkin workspaces):

1. Install Turtlebot packages (replacing for kinetic, some will not work)

http://wiki.ros.org/turtlebot/Tutorials/indigo/Turtlebot%20Installation

1. Install RTABMAP-ros following the commands found here <https://github.com/introlab/rtabmap_ros>
2. Clone and catkin\_make in a catkin workspace: <https://github.com/bnurbekov/Turtlebot_Navigation>
3. Install the Google Cloud SDK <https://cloud.google.com/sdk/downloads>
4. Enable the SDK for the Google Vision API and install the client library <https://cloud.google.com/vision/docs/reference/libraries>
5. Clone and catkin\_make in a catkin workspace: <https://github.com/mcgeorgiev/terrapin-ros>

Camera Installation (Follow the installation instructions for each piece of software exactly!):

1. Kinect v2:
2. <https://github.com/OpenKinect/libfreenect2>
3. https://github.com/code-iai/iai\_kinect2
4. Zed Camera:
5. <https://www.stereolabs.com/blog/index.php/2015/09/07/use-your-zed-camera-with-ros/> (Including the SDK instruction)

How to run the package (Run each command in a new terminal):

1. Ensure that the catkin workspace directory is sourced for all terminals used. Usually:

Source ~/catkin\_ws/devel/setup.bash

1. Run the launch file specific to your camera, either:
2. roslaunch terrapin-ros
3. roslaunch terrapin-ros

This will launch the turtlebot\_bringup, rtabmap\_ros, rtabmap visualisation, specific camera node and depthimage\_to\_laserscan nodes.

1. Run the object detection programme:

roslaunch terrapin-ros stream.py

1. Run RViz:

kllk

1. Run the frontier exploration nodes:

rosrun final\_project control.py

rosrun final\_project mapping.py

Turtlebot should start mapping! However autonomous navigation can be replaced with tele-operation. Replace step 4) with:

roslaunch turtlebot-telep keyboard.launch

A calibration tool can be ran which will create a text file with calibration details. Point at an area and press ‘q’ or ‘p’:

python calibration.py