

CPE 470/670 Project : Deliverable 1 Task 3 instructions

Part 3a: Visualising LiDAR data

(5 points)

Attach the LiDAR module with a laptop via the USB. This should power up the LiDAR. Read the Serial data from the USB port. Interpret this data and plot it using Python.

1. **Interfacing the LiDAR Module with the Laptop:** Connect the LD19 LiDAR module with the serial USB converter and plug the assembly into a USB port on your laptop. Install the required python3 libraries such as `pyserial` and `matplotlib`.
2. **Read Serial Data:** Use the `pyserial` library to read data from the USB port on which the LiDAR module is connected.
3. **Interpret and Plot Data:** Interpret the data received from the LiDAR module according to its data format. Refer to the LD19 Development Manual to understand the LiDAR data format for accurate interpretation. Use the `matplotlib` library to plot the LiDAR data.

Part 3b: Connecting LiDAR to Raspberry Pi and Using ROS

(10 points)

Connect the Lidar to your RPi. Mount the lidar on your Robot, build a new ROS Package to read from the LiDAR on the Raspberry Pi, and publish the data as a suitable ROS message on a ROS topic and save all the lidar messages sent on the topic as a rosbag. Create a 1-minute long rosbag. Read rosbag help to learn how to create pre-defined time length rosbags.

1. **Setup the LiDAR with Raspberry Pi:** This step is similar to Part 3a. The code for interpreting the serial data stream should work as is on Raspberry Pi. After testing, use it as a part of the ROS node.
2. **Create packages for sharing LiDAR messages:** ROS Noetic should already be installed on your Raspberry Pi. Now, we need to create a ROS package for reading the LiDAR sensor data from the Serial interface and publish it to a ROS topic. This can be done using the `catkin_create_pkg` command in the catkin workspace. Refer to the ROS tutorial on Creating a ROS package.
3. **Write a ROS Node:** In this new package, create a python file which will read the data from the LiDAR and act as the publishing node. Refer to the ROS tutorial for creating a publishing node. As LD19 is a 2D LiDAR, LaserScan is the most suitable pre-built ROS message for sending these messages. Refer to the ROS tutorial on ROS messages for a 2d LiDAR and another one on Laser Scanner Data. Test, if the messages are coming out on the set topic.
4. **Save LiDAR Data as a ROS Bag:**
Now, use the `rosbag` command-line tool to record data from the LiDAR topic for the specified duration. Refer to the ROS tutorial on rosbags

Include instructions for running your ROS node, recording and playing the rosbag, code.