Lab 2

Deadline: As listed on Piazza

Driver

Your driver will be very similar to Lab 1. The NMEA string is ‘GNGGA’ instead of ‘GPGGA’. You should also modify your code slightly to add the GNSS fix quality (rtk float or rtk fix). The fix quality will be useful for analysis.

Data Collection Policy

- Plan data collection schedules amongst your teammates. You can talk to your teammates and ask questions on Piazza.
- Data acquisition can be done collectively in a team.
- Analysis on the collected dataset should be done individually.

Hardware and Sensors

- 2 x GNSS/ RTK Processing boards
- 2 x GNSS Antennas
- 2 x 915 MHz Telemetry Radios

Product	Processing Board	Radio Connection	Appendix
Ardusimple simpleRTK2B-F9P	UBLOX ZED-F9P	915 MHz Radio pair	Appendix D

Appendix List

- Ardusimple setup

	Please make sure you follow the instructions ***exactly as listed*** in the appendix for setting up the RTK hardware. These instructions are vital to make sure the hardware is not accidentally bricked.

After setting up, you should have a system where you have the base RTK, rover RTK and a laptop working together. The base is stationary and sending corrections to the rover over radio and the laptop is connected to the rover via usb-serial to receive the corrected gnss fix solution in NMEA string.

Data collection

1. Go outside and set up your rtk pair at a spot with which is completely clear (eg. open park or roof of Columbus parking garage)

    a. Average your base station (Don’t move it after setup)

    b. Make sure your rover is in either RTK float or RTK fix mode.

2. Collect a 10-minute stationary data set

3. Collect another dataset in this location with the ROVER moving in a structured path (eg. forward X mts, right Y mts and back X mts etc.), coming back exactly to the same starting point with the same heading.

4. Collect two more datasets (stationary and moving rover) at a spot with partial occlusion and reflections nearby eg. Outside of ISEC

Analysis

Examine the utm data for each of the datasets by plotting it or doing statistics on it

a. What does this say about RTK GNSS navigation? Look at the error estimates.
b. What can you say about the distribution of noise in the signal?

Report

Write this lab up into a report in pdf format, highlighting your analysis. Please post to both Gitlab and Canvas.

Grading Rubric (10 Points)

- 1 points for working device driver with fix status
- 3 points for data collection
- 4 Points for Analysis
- 2 Points for Report

How to Submit Lab 2:

1. In your class repo ‘EECE5554’, create a directory called LAB2/src

2. Copy the ros driver package used for this assignment to LAB2/src.

3. Inside LAB2/src/<your_gnss_ros_package>, create sub-directory ‘analysis’

4. Copy the Matlab or Python code used for data analysis under ‘analysis’

5. Place your report in pdf format in the analysis directory and also upload the report in pdf format on Canvas Assignments.

6. Push your local commits to (remote) gitlab server. You can verify this by visiting gitlab.com and making sure you can see the commit there.

7. Upload your report in pdf format to Canvas Assignments under Lab2

Your repo structure should look similar to:

‘<Path_to_repo>/EECE5554/LAB2/src/<your_gnss_ros_driver_package>’

‘<Path_to_repo>/EECE5554/LAB2/src/<your_gnss_ros_driver_package>/analysis/<youranalysis files>’

‘<Path_to_repo>/EECE5554/LAB2/src/<your_gnss_ros_driver_package>/analysis/report.pdf