Coding exercise 1 for CS 498

Total points: 150

In this coding laboratory, we will collect data from a ground robot and process it.

The learning outcomes are:

1. Obtain data from robot, process data from robot, plot and analyze
2. Understand the concept of node, topic and message in ROS
3. Understand the challenges of dead reckoning for position using velocity data
4. Understand how to plot the data using RVIZ and ROS

Questions for the lab report and points:

Q1: The teaching team collected data from a robot driving over a field. The data collected includes RTK-GPS data, encoder velocity and inertial sensor data. Make a list of the names of the topics in the rosbag mentioning if it is a subscriber or publisher, and the type of message used by each topic. (50)

Q2. Create a ROS node to read the messages from the rosbag and determine the robot's position along of the trajectory. Publish the position, the linear and angular velocities and the heading (in quaternions representation) of the robot using a Odometry ROS message. Finally, plot the final trajectory made by robot using RVIZ. (50)

Q3: Using the GPS information, create an Odometry ROS message and plot (in RVIZ) the trajectory made by the robot. (50)