Dear Applicant,

You are presented with two datasets one is a ROS bag and the second one is the data for assessing your AI problem-solving skills.

Problem #1

- You need to create a ROS package to localize the robot using only the GPS, Odometer and INS sensor information. You can use the EKF- package for developing your project.
- To stand out, instead of using ROS EKF or UKF package, you can code your own EKF, UKF or any other sensor fusion algorithm from scratch. You will be evaluated based upon your mathematical problem formulation and coding skills.

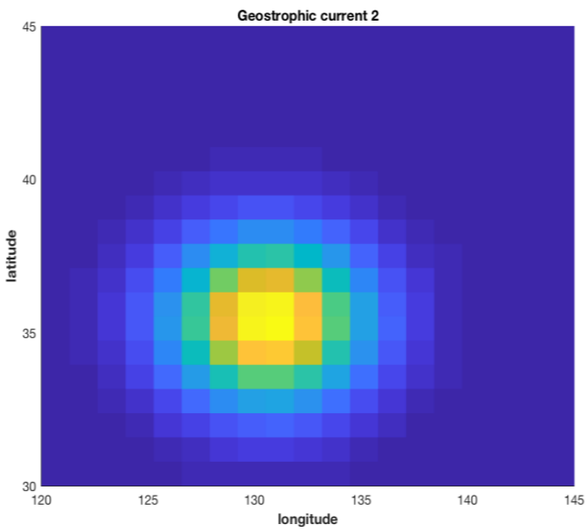
Problem #2

You need to create a ROS navigation package for clearpath warthog for waypoint navigation. You can follow the links below for basic installation and launch files.
https://www.clearpathrobotics.com/assets/guides/kinetic/warthog/index.htmlhttps://github.com/warthog-cpr
Your final result should look like this:
https://www.youtube.com/watch?v=hP6NiGzOLmI&t=8s

Problem # 3

Try to implement a swarm of 6 robots to map an area of 100 meters squared collectively. All Unmanned ground vehicles are equipped with an Odometer, IMU, GPS, LIDAR, telemetry to communicate with other robots and a temperature sensor.

1. You need to create a random temperature gradient as shown in the figure. The grid lines represent Latitude and Longitude values. Each cell of 1 meter squared represents only 1 temperature reading.
2. Initialize robots from random latitude and longitude points within the range of the scan area.
3. The trajectory of each robot should not overlap so that the swarm robots scan the area collectively with minimum cost.
4. Display the robot trajectories and the recovered heat map using information from all robots.



Note: You can use MATLAB, ROS, Python, C++ or any programming language of your choice to implement this problem. You can use any two-wheeled or four-wheeled robot in this case.

Problem #4

You are provided with two excel files as input and output. You need to find a way to map the inputs to the respective outputs with minimum possible error. We need to see your code with results and your problem-solving journey. You may explain which techniques you applied and the reasons for using the selected technique.

Note: Use the below link to download the data to work with. This data is for the problem 1 and 4.

https://drive.google.com/file/d/1EM156rBUJaoYJ4ufo3duqR3vOWbqORBE/view?usp=sharing

Regards,
Hiring Team
DEWA R&D