

Name: Minh Quan Tran

## FRED QUESTIONS

**Project name:** Autonomous Robot Car for Environmental Mapping

**Description:** This project involves creating a robot car equipped with RPLIDAR and MPU sensors to autonomously navigate and map dangerous or hard-to-reach environments, such as disaster zones or collapsed buildings. Using the sensors, the car will build a real-time map of its surroundings while avoiding obstacles. The system can assist rescue teams by providing a clear layout of areas unsafe for human entry.

- **Functionality of the Autonomous Robot Car**

1. Can you break down what are the core functionalities of this Autonomous Robot Car? (e.g. Navigating, Mapping...)
2. What kind of mapping format will the system generate? (e.g. 2D mappings, 3D mappings...)
3. How should the map data be stored and transmitted?
4. If multiple sensors (RPLIDAR, MPU) are providing data simultaneously, how will the software integrate this to improve mapping function?
5. How will the robot's position and orientation be estimated and corrected?
6. How will the software update the map dynamically as the robot moves and new data is received?
7. How will the robot handle self-avoidance when meet with an obstacle?
8. How will the robot differentiate between temporary and permanent obstacles?

- **User Interface**

9. What are the requirements in the user interface for controlling and monitoring the robot's status?
10. What communication protocols (e.g., I2C, UART, SPI) will the software need to support to interface with the RPLIDAR, MPU, and motor controllers?
11. What communication protocols (e.g., I2C, UART, SPI) will be used to communicate between the robot and user interface?
12. Will there be different access levels in the system (e.g., admin, user, technician)?
13. Will the software support remote intervention?
14. Will the software allow for mission planning (predefined routes or mapping areas)?
15. What should happen in case of network disruptions or data transmission failures?

- **Testing**

16. How will the software be tested in simulated environments?

17. What testing methodologies will be used for the software?

18. What criteria will be used to determine the success performance of the software?

- **Documentation**

19. What kind of user documentation will be needed for the software?

20. Will there be documentation on how to troubleshoot common problems?