Connected and Autonomous Vehicles: Challenges and Design

COMP_ENG 495/395, Winter 2024

Homework 1

Due: February 18, 2024 11:59pm

Upload your answers to CANVAS as a single document, either in pdf or WORD.

Problem 1. (15 pts) Please check out vehicle-related technologies there were presented at CES 2024 (through CES website, news articles, YouTube, …), and select one technology that you think is the most promising or interesting. Please summarize what this technology is and why you choose it.

Problem 2. (25 pts) Autonomous driving technologies have been applied in a variety of applications other than regular passenger vehicles. We have seen robotaxi, food delivery robot, and self-driving stroller in class. Please think of another application of autonomous driving technologies, explain how the system works and what benefits the autonomous driving technologies bring, and discuss potential challenges. Be creative. It would be great if this is a new application that nobody has thought about it before!

Problem 3. (25 pts) As discussed in class, there are currently different opinions on whether LiDAR is needed for enabling level 4/5 autonomous driving. What is your opinion? Please explain your reasoning.

Problem 4. (35 pts) Recall the 8-Puzzle problem discussed in the class (slide #9 in Planning and Control). Could you pick/design an h(n) function and demonstrate how A* works with the following example (showing the steps; if too many, showing the major steps)? Count how many steps are needed, and think about whether you can do better.

Start State

4	1	3
2	6	8
	7	5

Goal State

1	2	3
4	5	6
7	8	