**Primary Requirements:**

1. The system shall turn on when the vehicle operator hits the cruise control on button followed by the set speed system done in many cars for example Ford.
   a. This is done to ensure no false starts occur from the user end, similar to a two-step verification process.
2. The system shall have the option of lane keeping being on or off.
   a. An improved lane system could solve this issue.
   b. Using a camera such as MPC3, the vehicle could use the vehicle in front of it as a guide through construction sites, but this could be a huge liability for the system.
3. The system shall have a mounted camera located on the top of the windshield for monitoring changing road conditions.
4. The system is able to detect any type of vehicle.
   a. The sensors should be trained on models of all types of vehicles such as motorcycles and trucks
5. The system shall be only activated at speeds not exceeding 40 mph.
   a. This ensures safety and does not give the driver the chance to lose focus when operating at high speeds.
6. The system shall be able to detect if it is a highway or city roadway, avoiding operation in close conditions such as populated areas to prevent complications.
7. The system shall be able to maintain a user-modifiable following distance from other vehicles.
   a. This distance must not go under a safe threshold.
8. The system shall be able to detect weather conditions to account for inclement weather that could be hazardous.
9. The system should alert the driver for harsh braking or lane switching.
   a. Distance variables should trigger audio alerts, and lane departure should trigger vibrating of the steering wheel as well as an audio alert.
10. The system shall have a user-friendly interface for enabling and configuring Traffic Jam Assist features.
    a. It shall display relevant information to the driver, including status and settings.
    b. The driver shall be able to easily activate and deactivate the Traffic Jam Assist system.

**Secondary Requirements (Nice-to-Have):**

1. If equipped with a forward-looking camera, the system shall offer lane following functionality using lane markers to keep the vehicle in the center of the lane.
2. The Traffic Jam Assist system shall be designed to minimize driver distraction and avoid constantly alarming the driver with false alarms or notifications.
   a. It should provide clear and concise information when necessary and ensure that its actions do not divert the driver's attention from the primary task of driving.

**Global Invariants:**

1. The system shall prioritize safety by continuously monitoring the surroundings and ensuring a safe following distance from the target vehicle.
a. It shall not take any actions that compromise the safety of the vehicle occupants or other road users.
2. The system shall be compatible with limited access highways and shall only activate the traffic flow adaptation feature on such roads.
   a. It shall work seamlessly with existing vehicle hardware and software.
3. The system shall allow the driver to retain control over the vehicle, with the ability to override or disable Traffic Jam Assist features at any time.
   a. It shall not interfere with the driver's ability to change lanes, but it may provide warnings or resist abrupt lane changes.

Questions for the Customer:

1. What is your desired timeline for this project?
2. What are the primary use cases and scenarios in which you expect drivers to use Traffic Jam Assist? Are there any specific preferences or requirements regarding the behavior of the system during traffic jams and lane changes?
3. In cases of construction or bad weather, how might the system change its behavior?
4. Does the vehicle fleet for which this system is intended have the necessary hardware (radar, camera) for ACC and lane following features? If not, are there plans to equip vehicles with the required sensors?
5. What are the user interface requirements and preferences for drivers to enable and configure Traffic Jam Assist? Are there specific display or control options you'd like to include to enhance the user experience?
6. Is this system for a traditional fuel combustion car only, or should we be designing a universal model?
7. Have you heard of MPC3 cameras in cars and if so would this be a technology that you would like to use or what other route would you like to take?
8. Are we creating an in-house solution for ourselves, or are we going to be functioning as a supplier for several clients? If the latter is the case, are there any brand-specific requirements that we should be aware of?
9. How will we distinguish ourselves from our competitors? Are there any concerns you have about the overall design process? What is the budget for the project?
10. Particularly when slowing down or accelerating these actions being harsh. How do we ensure the smoothness of the drive while not impeding traffic?
11. Are we implementing a brand new solution or modifying a previous implementation? If we are to consider modifying an existing solution, what should our main focus be on, are there any problems with the current system?
Works Cited


