

TASK2

Relevant Control Behaviours:

1. Following Distance Control: Each driverless truck must maintain a safe following distance behind the preceding truck. The control behaviour involves adjusting the speed and acceleration of the following trucks to keep the desired distance.
2. Lane Keeping: Trucks must stay within their designated lanes and use lateral control mechanisms to maintain proper alignment within the platoon.
3. Collision Avoidance: The system should be equipped with collision avoidance algorithms to respond to obstacles, vehicles merging into the platoon, and other potential collision risks.
4. Communication Handling: The trucks should have communication protocols to send and receive data among themselves and respond to commands and status updates.
5. Emergency Response: In the event of sudden obstacles or a vehicle emergency within the platoon, the control system should respond with appropriate actions, such as emergency braking or lane changes.

Distance Maintenance Control:

To guarantee a safe distance to the preceding truck, a control behaviour can be specified using a state machine.

State Machine: Distance Maintenance

States:

1. Maintain Safe Distance
2. Adjust Speed

Transitions:

- Maintain Safe Distance -> Adjust Speed: When the distance to the preceding truck exceeds a safe threshold.
- Adjust Speed -> Maintain Safe Distance: When the safe following distance is re-established.

Events:

- Receive Distance Measurement
- Receive Control Commands (for speed adjustment)

In this state machine, the system continuously monitors the distance to the preceding truck and makes speed adjustments as needed to maintain a safe following distance.

Communication Failure Handling:

State Machine: Communication Failure Handling

States:

1. Normal Operation
2. Communication Failure
3. Recovery

Transitions:

- Normal Operation -> Communication Failure: Upon detecting a loss of communication with the lead vehicle.
- Communication Failure -> Recovery: When communication is restored or a timeout is reached.
- Recovery -> Normal Operation: When the system successfully recovers and communication is re-established.

Events:

- Receive Distance Measurement (before communication failure)
- Communication Timeout (if communication is lost)
- Communication Restored (if communication is re-established)

In this state machine, the system initially operates in "Normal Operation" with proper communication. If communication is lost, it transitions to "Communication Failure" mode, where the system responds by increasing the following distance and potentially slowing down. It remains in this mode until communication is restored or a timeout is reached. Once communication is re-established, the system transitions back to "Normal Operation."

