FORD OTOSAN

Connected Automated Vehicles Team

Application Assignment:

Electronic Emergency Brake Light Warning

July 2021

Koç

Ford

Ford Otosan Automated Driving Development Vehicle, F-Max

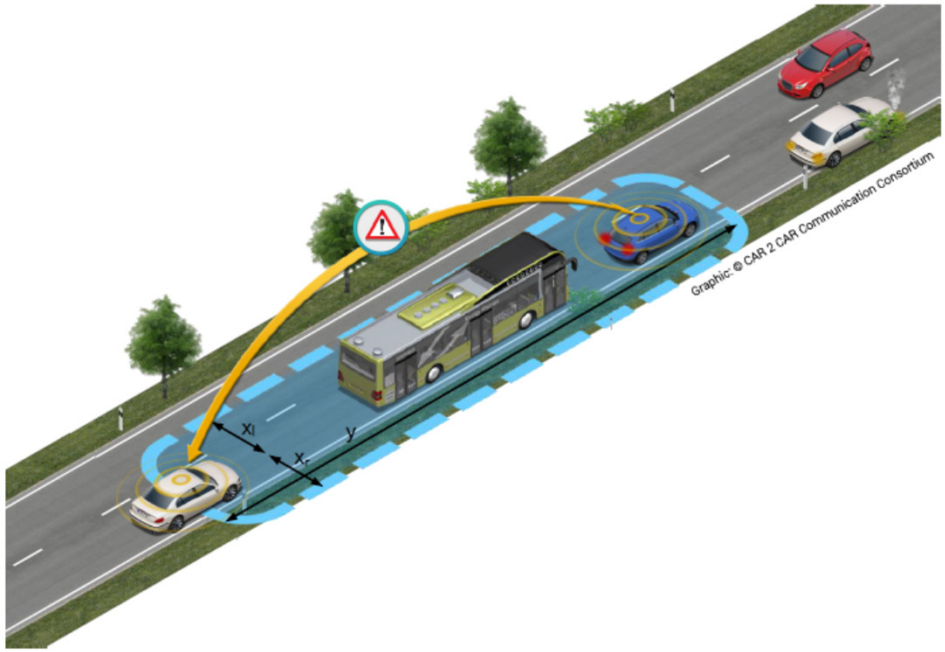
EEBL* WARNING APPLICATION

Case:

There are two passenger vehicles traveling on the same lane having a bus in the middle as seen in the picture on the right.

The passenger vehicles have Vehicle-to-Vehicle (V2V) communication modems onboard, meaning that they can exchange information. Modern cars have such modems on board enabling many driver assistance, and safety functions to be implemented.

Note: See ETSI use cases (google “ETSI EEBL Warning Use Case”) for more information on potential V2V applications.



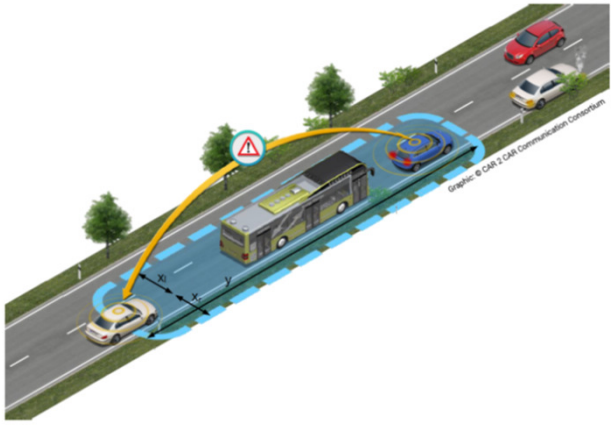
**Electronic Emergency Brake Light Warning*

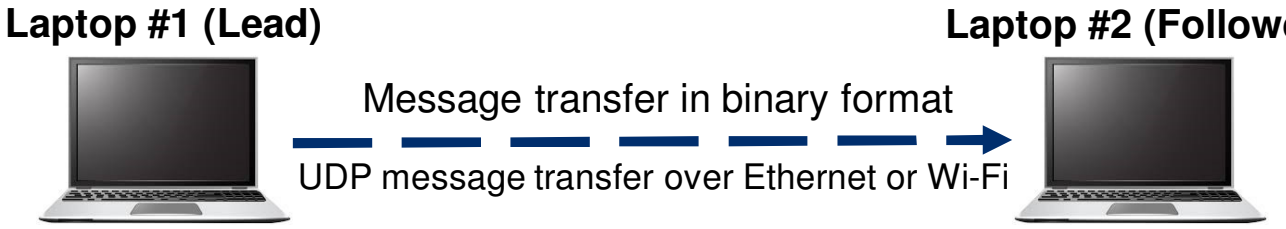
EEBL WARNING APPLICATION

Your Task:

Ford Otosan CAV Team requests you to write an application software so that when the lead vehicle (blue) starts an emergency braking, the follower vehicle (white) receives this information simultaneously, and displays the warning to the driver. For this purpose:

- Design an algorithm for deciding whether an emergency brake event is present (tell us how you detected an emergency braking event)
- Code the design (application) in C or C++ that monitors emergency brake event, and generates a message to be broadcasted to other road users
- Transfer that message from your laptop to another. In this case, your laptop is the lead vehicle, and another laptop follower vehicle. You are expected to transfer the EEBL event to the other laptop with input variables set to generate the EEBL condition.
- Please address any challenges in this application, and mention about potential solutions





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EEBL WARNING APPLICATION

- Assume that laptops are the V2V modems on the vehicles
- Operating system of the laptops does not matter
- You may code in C or C++
- Transfer the message as UDP over Ethernet or Wi-Fi
- Push your code to a Git Repository
- Add application “Read Me” file to your Git Repo including a short video showing an EEBL event
- Input signals given below. Please design your own UDP string to be transmitted to the follower vehicle

Signals available on both vehicles that may be used for designing the application:

- Ego Speed – Range: 0-90 (km/h)
- Ego Deceleration – Range: 0-10 (m/s^2)
- Ego Brake Pedal Position – Range: 0-100 (%)
- Ego Global position (X,Y) – Range: 0-10000 (m) (For simplicity, assume that the world is a square map that is perfectly flat with dimensions of 10000m*10000m, and global positioning signal gives X,Y position of the vehicle on the map. You may make any necessary assumptions here)

Note: If you cannot access two laptops for this project, you may do it in one laptop + Wireshark SW (or any other tool)