

Research Proposal

Domain: IoT, WSN, Autonomous Vehicles and communications in V2V and V2X, Internet of vehicles, vehicular ad hoc network, edge computing.

My research area of interest includes IoT, WSN, VANET, Communications in V2V and V2X.

Nowadays, Autonomous vehicles are becoming more popular. Driver Assist technologies like following the same lane are included in some normal vehicles to assist the driver and make their life simpler.

Research: I am planning to do research on **Truck Platooning**, which includes autonomous vehicles as well as normal vehicles. If two or more trucks are travelling from the same city to the same destination city, they are grouped like one following another within less than 10 meters distance. The first truck will be driven by a driver, the following two or more trucks will be autonomous, following the first driver-driven truck.

If the first truck applies the brakes, the following trucks are notified of the driving changes and apply the same adjustments. The same is done for lane changes, acceleration and deceleration. It also communicates with Road Side Units (RSUs) to determine fuel levels and find nearby fuel stations to refuel, as well as the speed at which they are traveling at a given place and time.

Advantages: As they are grouped and follow one another, it reduces air drag and, in turn, reduces fuel consumption. This also reduces CO2 emissions. It reduces traffic on highways and in intersections. Also, manual error is minimized. It also solves the problem of skilled driver availability.

Technology: It uses IoT technology, Wireless Sensor Communication, VANET, and Vehicle 2 Vehicle Communication and Vehicle 2 Everything (RSU – Road Side Unit) Communication.

We can use BLE for communication between vehicles. Beacon/GPS for position maintaining and validation. LoRa-WAN for Road Side Unit (RSU) communications. And the Internet for RSU to Cloud.

Testing: Using Simulator:

The vehicular traffic management can be simulated by the Sumo simulator, where a stretch of road can be considered in any country. Some xml config files can be created containing all information regarding the road portion: the IDs of the two lanes of the roadway with the information of their direction, the maximum speed in m/s and so on; the vehicles travelling information with: acceleration and deceleration values, ID, length, maximum speed in m/s and minimum gap with the previous vehicle, and so on. Sumo allows importing the road network via Open Street Map, simplifying the process of developing the mobility model.

Using Models: A Group of robot models with the first robot lane detection algorithm with a Camera. Following robots with BLE communication modules to communicate between them and to actuate the sensors, like applying the brake and acceleration and deceleration. These robots can communicate with the RSUs - Road Side Units using LoRa-WAN. The RSUs can, in turn, communicate with Cloud via the internet to store data from vehicles.

Interpretation or Analysis of Data: We can manipulate or analyze the data stored in the cloud for various purposes, like how much fuel is consumed between distances, time taken between distances, traffic analysis, and capacity planning for additional highways or roads.