

MotorTek-Case Study

Assessor Guide

The Situation (Information given to the participant)

You are Deepak John, the newly appointed Head of the Innovative Research Excellence at MotorTek Research & Development India (MRDL). As one of your first tasks on the new job you have received an appeal from Sudha Kopker, Market Research Manager, to help revive a Research Project that has been suspended by your predecessor, Harish Jain.

The Project (Information given to the participant)

The project is related to Vehicle-to-vehicle communication (V2V). Put simply, this technology will allow vehicles on the road to communicate with each other wirelessly in case of an emergency. For this, two-wheelers will need to be equipped with sensors to measure speed, braking, location, etc. Vehicle-to-vehicle communication's ability to wirelessly exchange information about the speed and position of surrounding vehicles will help avoid crashes, ease traffic congestion, and improve the environment.

Reference Information for the Assessor

Introduction to V2V Communication

V2V (vehicle-to-vehicle) is a communication technique that aids in crash avoidance. It makes use of VANETs (vehicular ad hoc networks), which are wireless networks that allow vehicles to communicate and share information about their driving habits. The data comprises speed, geolocation, braking, stability, and travel direction. This technology is critical for improving road safety by sending out incident notifications before a driver notices them.

Vehicle-To-Vehicle communication technology allows vehicles to transmit data using a mesh network that is wireless, to send and receive signals. These nodes can detect traffic conditions several miles ahead of a driver, giving the driver enough time to manage their vehicle. Under the V2V umbrella, there is the Vehicle Systems for Infrastructure (V2I) which includes traffic signs and various fixed devices.

Current vehicle safety programs, such as embedded technologies that permit adaptive cruise control, blind-spot detection, rear parking sonar, and backup cameras, are in comparison less powerful than V2V technology. V2V technology provides 360-degree awareness of surrounding risks, which improves performance and safety. This technology would initially be used to essentially inform the driver while not altering the vehicle's motion to avoid a collision. The following implementations may improve the steering and braking systems, allowing for complete control of the vehicle's behaviour:

Vehicle-To-Vehicle Communication Technology

An intelligent transportation system is generally defined as a system that uses on-board vehicle sensors to provide advanced information, data, and communication technology. The

information will improve transportation safety while also lowering public transportation's environmental effect. In dynamic driving settings, wireless devices will be designed to communicate between automobiles and adjoining infrastructure.

Vehicle-To-Vehicle Communication can be carried out using WIFI or IoT. The capacity to combine data for the connection of autonomous vehicle operations has been made possible by technological breakthroughs. The following are some of the most modern wireless technologies that enable autonomous vehicles to stay connected:

Satellite-Based Global Positioning System (GPS)

It integrates object location and time references for accurate and consistent position tracking. Typically, this technology is employed to assist people in moving between predetermined locations.

Inertial Navigation System (INS)

With on-board sensors, this technology monitors and estimates a vehicle's position, direction, and speed.

Laser Illuminated Detection and Ranging (LIDAR)

On-board laser detecting devices will aid a vehicle's understanding of its surroundings and terrain. To establish the speed and relative orientation to its environment, precision measurements of distance to objects rely on reliable data. Sensors installed in traditional traffic equipment such as traffic cones and other roadside safety indicators communicate with on-board laser systems.

Vehicle-To-Vehicle Communication Protocol

Wireless communication technology underpins the vehicle-to-vehicle communication protocol. Because it is based on wireless technology, the V2V communication protocol is fairly simple to create. We can communicate with more than two automobiles using an NRF Transceiver Module. 3 strategies can be put to use to warn the driver: LCD alert, audio alert, and LED alert. The proximity sensor provides the distance measurement. A proximity sensor detects the presence of nearby items without making direct contact with them.

Vehicle-To-Vehicle Communication Applications

Among the most important vehicle-to-vehicle communication applications are:

Information on traffic in real-time

Roadside support tailored to the driver's needs

Vehicles having the opportunity to monitor and change their position/route etc.

Warning drivers if they are drifting out of their lane

Slowing down/crash alert if the vehicle gets too near to the other vehicles/objects around them

Vehicle-To-Vehicle Communication Advantages

Improving Traffic Management

Vehicle-to-vehicle communication is essential for enforcing traffic laws as it facilitates traffic monitoring and management by using real-time vehicle alerts to relieve traffic congestion. Officials use communication with vehicles to divert traffic, track vehicle locations, ensure obedience to speed limits, and adjust traffic schedules. For drivers, V2V communication helps them avoid traffic jams and keep a reasonable distance from other vehicles.

Driver Assistance

V2V communication allows drivers to have complete control over their vehicles. For drivers operating huge fleet vehicles or moving oversized cargo, timely warnings such as the height of a nearby bridge are extremely valuable. The technology may also aid in safe parking, such as parallel parking, which is made possible by delivering notifications about surrounding vehicles.

Improved Fuel Efficiency

Vehicle-To-Vehicle Communication allows for close formation driving, which improves fuel economy. All vehicles are forced to modify their speed and placement according to a communication stream by forming a continuous formation

Route Optimization

One of the main reasons fleets invest so extensively in fleet management systems is to optimize routes. This technology aids drivers in getting to their destinations faster. Vehicle-To-Vehicle Communication is intended to provide drivers with important travel information directly through installed devices, among other things. This technology can send information such as the optional routes to the destination, maps, and route optimization advice.

Crash Prevention

The numbers of road accidents continue to rise even as new motorways and high-speed vehicles are introduced. As a result, road safety is a top priority. Despite all efforts by stakeholders to raise awareness about the necessity of safe driving, human error continues to be the leading cause of road accidents. V2V communication can help reduce accidents on the road because of crash prevention pre-warning. The futuristic idea is to even take control the vehicle in case human control does not happen on time.

Vehicle-To-Vehicle Communication Limitations

While vehicle to vehicle communication comes with a slew of benefits, this technology definitely has certain limitations to its utility and performance. Some of the reasons holding this innovation back are:

Privacy Concerns

Individual driver data is processed by the vehicle-to-vehicle integrated network. Private companies and the government can readily track automobiles because there are no concrete restrictions governing the technology. They can also monitor drivers and their driving patterns at the same time. Automated License Plate Readers (ALPR) can monitor and collect

data involving automobiles that communicate with one another via V2V. Should this data be hacked or misused, it may jeopardize personal privacy and raise other security problems.

Security Risks

Any security failure caused by V2V-enabled vehicles has the potential to be disastrous, with business wars and criminality accounting for a significant portion of road hijacking. Comprehensive security measures are required for vehicle communication to be fully integrated. Losing control of an automobile to another person as a result of a hacked system could result in the car doors closing up or the engine exceeding the speed limit etc.

Liability Issues

The V2V communication technology is still in its infancy, and clear norms are yet to be drafted. Liability considerations may arise from incidents involving automobiles equipped with V2V. If, for example, the V2V communication system prompts do result in an accident, determining who was at fault in the first place would be difficult.

Potential Driver Distraction

Human intervention is required for vehicle-to-vehicle communication to work. To run the system, the driver must perform some actions, like texting or talking on the phone. There is still a lot of work to be done to ensure that drivers are not distracted by the systems which may lead to an accident.

Future Scope of Vehicle-To-Vehicle Communication

In terms of mobility, V2V technology can help to alleviate traffic congestion in a variety of ways. First, the fact that cars connect with a central hub provides real-time traffic data to transportation authorities, allowing them to better manage their facilities to maximize efficiency and decrease congestion. The V2V communication system could potentially allow vehicles to collaborate on the roadway by moving closer together in a platoon with other vehicles traveling in the same direction. As a result, roadways improve capacity by accommodating more vehicles in the same amount of area.

Although we are still a long way from having a linked vehicle road transport system, there are technologies already available today that can bridge the gap between existing and V2V technologies. Adaptive cruise control uses radar to scan adjacent vehicles and adjusts speed accordingly. Some premium automobiles have lane departure warning systems that can alert you if your vehicle is drifting out of its lane. Both of these high-tech elements assist drivers in being more aware of their surroundings.

Before a connected-vehicle transportation system can be fully effective, a few obstacles need to be resolved. All vehicles on the road need to be fitted with the technology, legislation must be enacted at several levels, and the issue of liability for automated systems must be addressed. There is, however, no doubt that a connected vehicle system, in which vehicles and the roads they ride on are linked in ways we have never seen before, will be a part of our future. We cannot afford to ignore the tremendous possibilities for safer and more efficient roadways.

Sudha Kopker

Sudha Kopker is a Market Research Manager with MotorTek Research & Development India (MRDL). She works with the Innovative Research Excellence of which Deepak John is the newly appointed Head.

Sudha is a 40 year old divorcee with a young son. She is very passionate about her work. She is also extremely ambitious and would like to make an impact with her work. She however can get quite possessive about it and can be laden with confirmation bias where her work is concerned. She therefore has problems acknowledging that some of the projects that she is working on might genuinely be unviable.

She had a volatile relationship with the previous Head of the Innovative Research Excellence Harish Jain. She feels that her potential is not fully utilised and that she has always either been put on insignificant projects or that her projects have suspended without sufficient reason.

When the V2V project was shelved a couple of months before Harish left for greener pastures, Sudha had had a showdown with Harish, which resulted in harsh words being flung at each other. Although the exchange happened in Harish's closed cabin, some of the team witnessed the signs of the exchange through the glass walls. The team was aware that words were exchanged, but were not sure of what it was about.

Since then Sudha had been asked to join the Flue Efficiency Project, which was an ongoing one. While it was a project that she affirmed to, she was irked about the fact that most tasks were already assigned when she joined the team and she had very little opportunity to make her presence felt in an impactful manner. It did not help the Uma Vishwanathan, her fiercest competitor at work had already been assigned a meaty role and was well ensconced in it.

Sudha was hoping that Deepak John would revive the V2V project and that she could see it through to great success.

Harish Jain

Harish the previous Head of Innovative Research Excellence was known to be a level headed person. He had a keen eye for innovation and was able to influence his stakeholders with his energy and enthusiasm. He had delivered some very successful projects in his time. He had however in the past got carried away with some of his ideas as well. The V2V communication project was one such project. Harish was a great advocate of vehicle safety innovations and had got carried away with its possibilities. He was even able to influence the stakeholders for some initial funding.

He realised the futility of continuing with the V2V communication project a few months into it. It was too large a project for MotorTek to consider at this point. He also realised that being ahead of the competition on this project was not prudent since the project could be viable only if all vehicles were equipped with it. Research

also revealed that government regulations and the government's investment in infrastructure did not look like a possibility in the immediate future.

He had believed in Sudha Kopkar's capability in Market Research. He had been confident that she would deliver even if the situation was tough. He however found her to be too pushy and unreasonable when challenged. He had had difficulty in handling her emotional outburst on a few occasions. When he had explained to Sudha that the V2V communication project had to be suspended, she had taken it quite personally. He also understood that being a single mother was not easy for Sudha and that her personal life sometimes did get in the way of her objectivity. He however respected Sudha for her candour and her passion for her work. Harish had intended to re-accommodate Sudha in a good role. He however did not have one at time of the shelving of the V2V project. He had explained that Fuel Efficiency Project was interim and that Sudha would be offered a better role as soon as one became available.

Deepak John (The Assessor)

You are the newly appointed Head of Innovative Research Excellence at MotorTek. You were handpicked for your current role by Sanjeev Ghani the MD of MRDL and Ashish Malhotra the CEO of MIL. You bring to the table 25 years of experience in the automobile industry of which 8 years are in core R&D. You may make any relevant and appropriate assumptions about your role as the situation warrants.