The traffic condition has become a major problem around the world. Active traffic management (ATM) is a scheme which can be used to relax congestion and improve traffic flow on freeways.

Variable speed limit (VSL) belongs to the ATM strategy, which enables one to change the posted speed limits dynamically on the basis of the real-time traffic and weather conditions. VSL has been widely implemented around the world (including Germany, England, Sweden, and the United States).

With the development of autonomous vehicles (AVs), various novel methods on the basis of such technologies have been developed during recent years. Enhanced outcomes can be achieved through integrating VSL control with AVs.

**Design of Control Algorithm**

- The modified cell transmission model (CTM) is used. The fundamental diagram (FD) is simplified as having a triangular relationship between flow and density.
- The CTM has been adopted in many studies to develop a first-order VSL control strategy. However, the control model failed to involve vehicle types.
- When modeling mixed traffic flows, the other classes of vehicles are converted to the passenger car equivalent class (PEC).
- A dynamic price value that involves physical characteristics of vehicles and prevailing speeds on freeways is considered.
- CTM for VSL Control

**Solution Algorithm**

- The average speed mean speed of vehicle type / on cell / during time interval k is determined according to the following traffic conditions.
- The second term is the speed variation between speed

**Case Study**

- A real-world freeway corridor is selected.
- The freeway stretch is 5 miles long. The freeway is used from 9:00 am to 9:00 am on weekdays.
- The field data is aggregated into 5 min. intervals.
- The length of the selected freeway corridor is about 5 miles.
- The length of the selected freeway corridor is about 5 miles.

**Simulation Results**

- A scenario is simulated with a 30 minute from 9:00 am to 6:00 am warm-up period is conducted.
- The speed limit that minimizes the objective function over a given prediction horizon (i.e., 10 min).
- The speed limit changes every minute (i.e., T = 1 min).
- The discrete step size used in the control model is 10 m/s.
- The water depth and the dimension of the selection are used.
- The simulation results are used in the proposed 5 design scenarios (in which the TTT, average delay, average number of stops, and emission are computed).
- Improving the operating efficiency
- Reducing the greenhouse gas emissions

**Conclusion**

- A proof-of-concept study on developing a VSL control strategy in a CAV environment for a freeway corridor is performed.
- The VSL control is developed on the basis of the extended CTM.
- The proposed VSL control model takes the mixed traffic flow (including human-driven cars, trucks, and AVs) into consideration.
- The simulation results demonstrate that the developed VSL control can be used to greatly improve the operating efficiency, freeway mobility, and reduce the emissions of greenhouse gas.