Department of Information Technology Indian Institute of Engineering Science and Technology, Shibpur

4th Semester Mini Project Under Supervision Of:

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Analyze real-world traffic data to understand, model, and predict human driving trajectories

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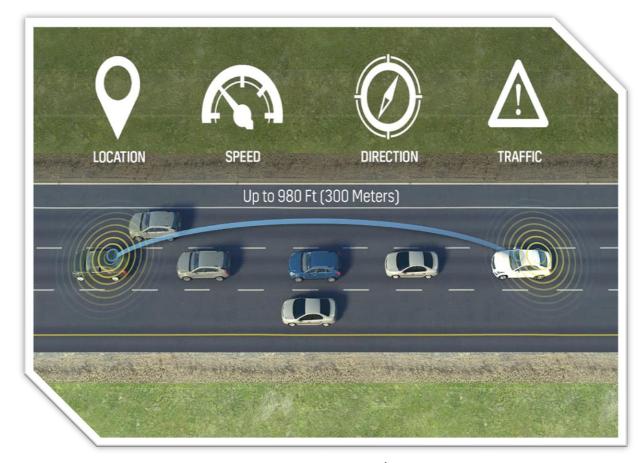


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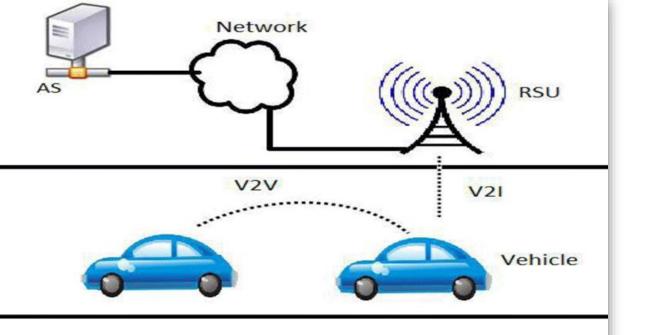


- > Traffic congestion- a major problem in recent times.
- ➤ Leading to wasted time, increased fuel consumption, and increased greenhouse gas emissions.
- ➤ Accurate understanding of human driving behavior and trajectory modelling necessary.
- ➤ Need to design more efficient and safer transportation systems i.e. Intelligent Transport System(ITS).



- > Delays and increased travel time
- ➤ Road rage : Aggressive Driving
- Emergencies: blocked traffic may interfere with the passage of emergency vehicles
- ➤ Increased fuel consumption and emissions
- > Increased road accidents





RSU to RSU Communication. RSU to Car Car to Car Communication Image Source:CC BY-NC.

V2V Communication

Solution

- Communication between vehicles
- Exchange of information
- ❖ Use of RSUs and OBUs
- Analysis of real world traffic data
- Improving Road Safety
- Reducing of congestion



Simulation of Urban Mobility(SUMO)

- open-source, microscopic traffic simulator to model and analyze the behavior of individual vehicles on a road network.
- ❖ Used for testing and evaluating intelligent transportation systems (ITS).
- ❖ Takes into account factors such as vehicle dynamics, traffic flow, and road conditions.
- ❖ Used to create network with all vehicles set to same route to analyze the problem of congestion in our project.



Image Source: SUMO Official Website

OMNET++

- ❖ open-source discrete event simulation framework
- ❖ widely used in the field of computer networks and distributed systems.
- ❖ Framework based on C++ language.
- ❖ Used to setup RSUs and have control over the simulation in our project.



Image Source: OMNet++ Official Website

Vehicles in Network Simulation(VEINS)

- ❖ open-source framework that allows for the simulation of vehicular communication networks in the OMNeT++ simulation environment.
- ❖ Built on top of SUMO (Simulation of Urban Mobility) and OMNeT++.
- ❖ Supports simulation of both vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication.

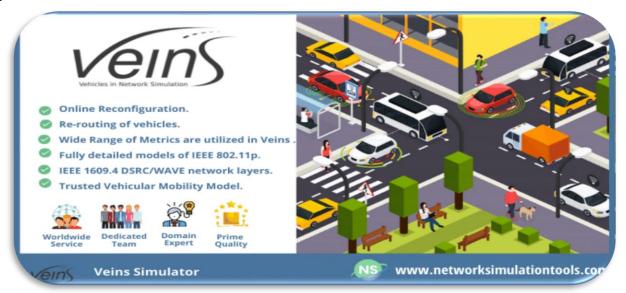
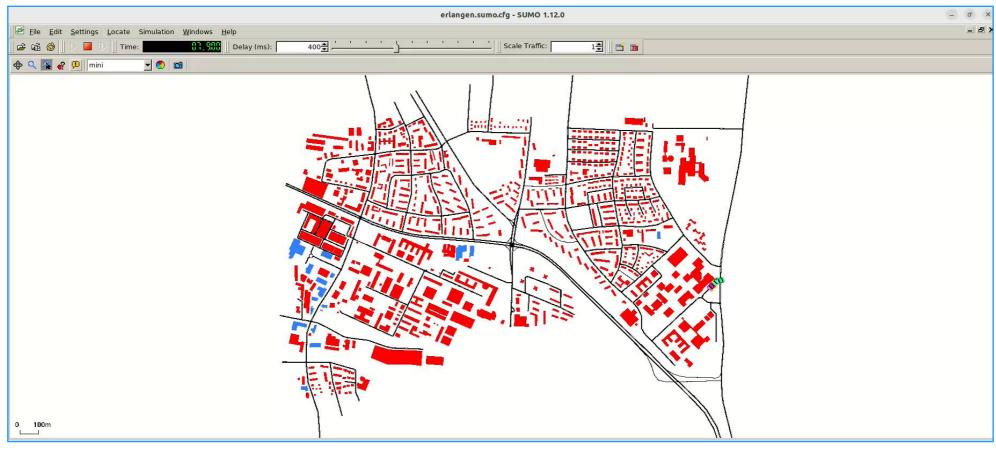


Image Source: https://www.networksimulationtools.com



Sim-1:Problem of Congestion

• Aims to portray the problem of traffic congestion by setting all the vehicles on the same route.



Move towards V2V....

• RSUs communicated with vehicles in the vicinity by sending directional messages.

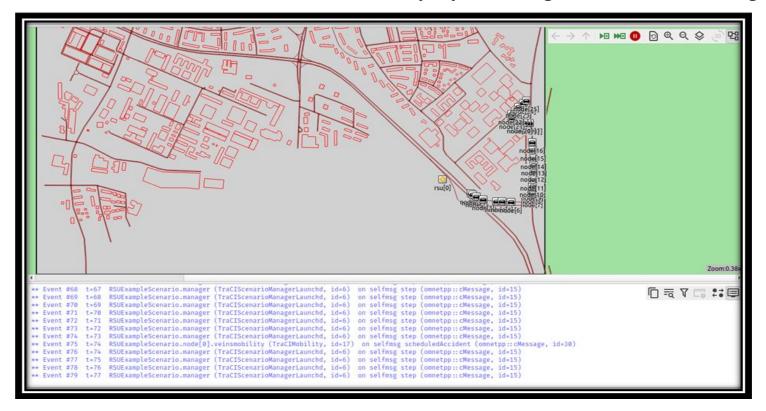


Fig: Road Side Units(RSUs)

Move towards V2V....

• On receiving the messages, vehicles change their routes and select the best possible route to the

destination.

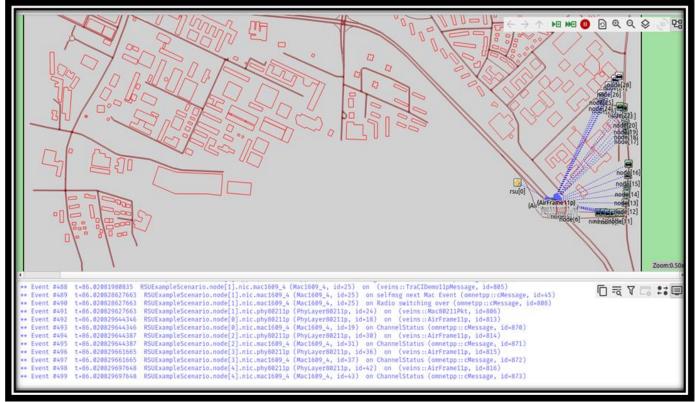


Fig: Live V2V Communication

Sim 2:Implementation of V2V

- SUMO simulation is observed where the vehicles are seen taking the least crowded path and reaching their final destination.
- This solves the problem of congestion to a certain extent.





- Designing vehicles to communicate each other
- > V2V Communication
- > Use of alternate route
- > Reduces the congestion

- > All the vehicles taking the same route
- Congestion is increasing on a single route
- > Slow down of the vehicles





- ❖ Use of V2V communication made possible for the vehicles to communicate with each other
- Which further helped the vehicles to understand the flow of traffic relative to them
- * Resulting in providing a better option to the driver for free flow of traffic
- * Reducing the traffic congestion



References

- ❖ V. Srivastava, M. Motani, Cross-layer design: a survey and the road ahead, IEEE Communications Magazine 43 (12) (2005) 112–119.
- ❖ R Tomar, M Prateek, GH Sastry, Vehicular Ad-Hoc Network(VANET)-An Introduction, IJCTA, International Science Press 9(18) 2016, pp. 8883-8888.
- ❖ Wikipedia (2016, October 04). Retrieved from https://en.wikipedia.org/wiki/OpenStreetMap
- ❖ Wikipedia(2017, January 04). Retrieved from http://www.sumo.dlr.de/wiki/TraCI
- Open Sim Ltd, OMNET++ Webpage (2016, October 04). Retrieved from https://omnetpp.org/documentation/3632
- Christoph Sommer and Team, VEINS Homepage(2016,October 04) Retrieved from http://veins.car2x.org

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THANK YOU

