Semi-Autonomous Intersection Management

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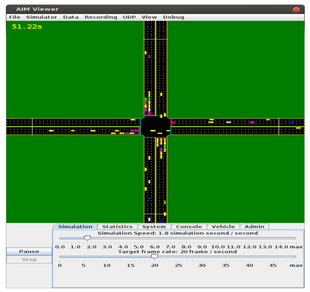
Will be presented again at AAMAS 2014!

Previous Work: Autonomous Intersection Management (AIM)

The AIM protocol exploits the fine control of autonomous vehicles to allow more vehicles simultaneously to cross an intersection, thus effectively reducing the delay of vehicles by orders of magnitude compared to traffic signals.



Our Autonomous Vehicle!

Drawbacks of AIM

AIM is designed for the time when vehicles are autonomous. There will be a long transition period during which most vehicles have some but not all capabilities of fully autonomous vehicles.

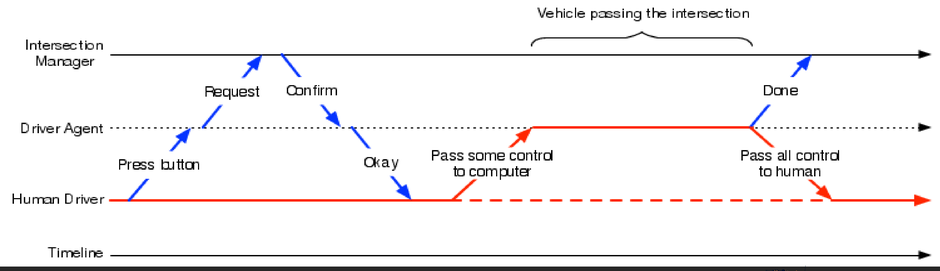
We use the term **semi-autonomous vehicles** to refer to vehicles with limited autonomous driving and wireless communication capabilities.

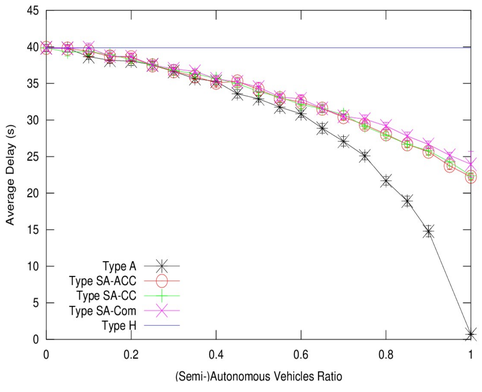
Semi-Autonomous Vehicles

Our proposed reservation system is general enough to accept reservation requests from any semi-autonomous vehicles that are capable of following some trajectories and communicating with the IM. We currently focus on the types of semi-auto vehicles on the right.

Vehicle Types	Communication Device	Cruise Control	Adaptive Cruise Control
SA-ACC	X	X	X
SA-CC	X	X	
SA-Com	X		

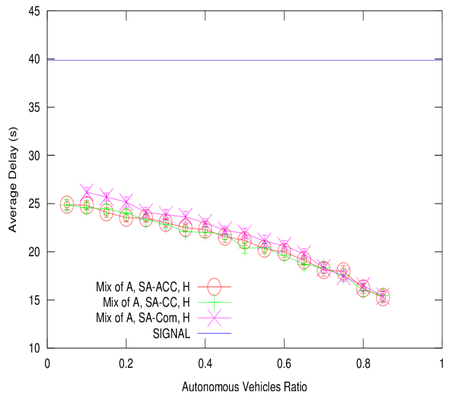
Interaction Model





Experiment results:
the performance of semi-autonomous vehicles is very similar to fully autonomous vehicles when the ratio to human-driven vehicles is below 40%. Beyond 40%, fully autonomous vehicles increasingly outperform semi-autonomous vehicles

Experiment settings:
*.Intersection: 3 lanes on each road.
*.Traffic: 360 veh/hour/lane
*.Type of vehicles: Fully Autonomous, Adaptive Cruise Control, Cruise Control, Communication Device and Traditional Human-driven



Conclusion

This poster introduces SemiAIM, a new multiagent constraint-based autonomous intersection management system that enables human-driven vehicles and semi-autonomous vehicles, in addition to fully autonomous vehicles, to make reservations and enter an intersection within the AIM paradigm.

Our initial experiment showed that our system can greatly decrease traffic delay when most vehicles are semi-autonomous, even when few (if any) are fully autonomous

Acknowledgement

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References

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Etc.