

Semi-Autonomous Intersection Management

Tsz-Chiu Au, Shun Zhang, and Peter Stone



Previous Work: Autonomous Intersection Management (AIM)

- The AIM protocol
- A fine control of autonomous vehicles.
 - More vehicles simultaneously to cross an intersection.
 - Effectively reducing the delay of vehicles.



Our Autonomous Vehicle!



Limitations 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		

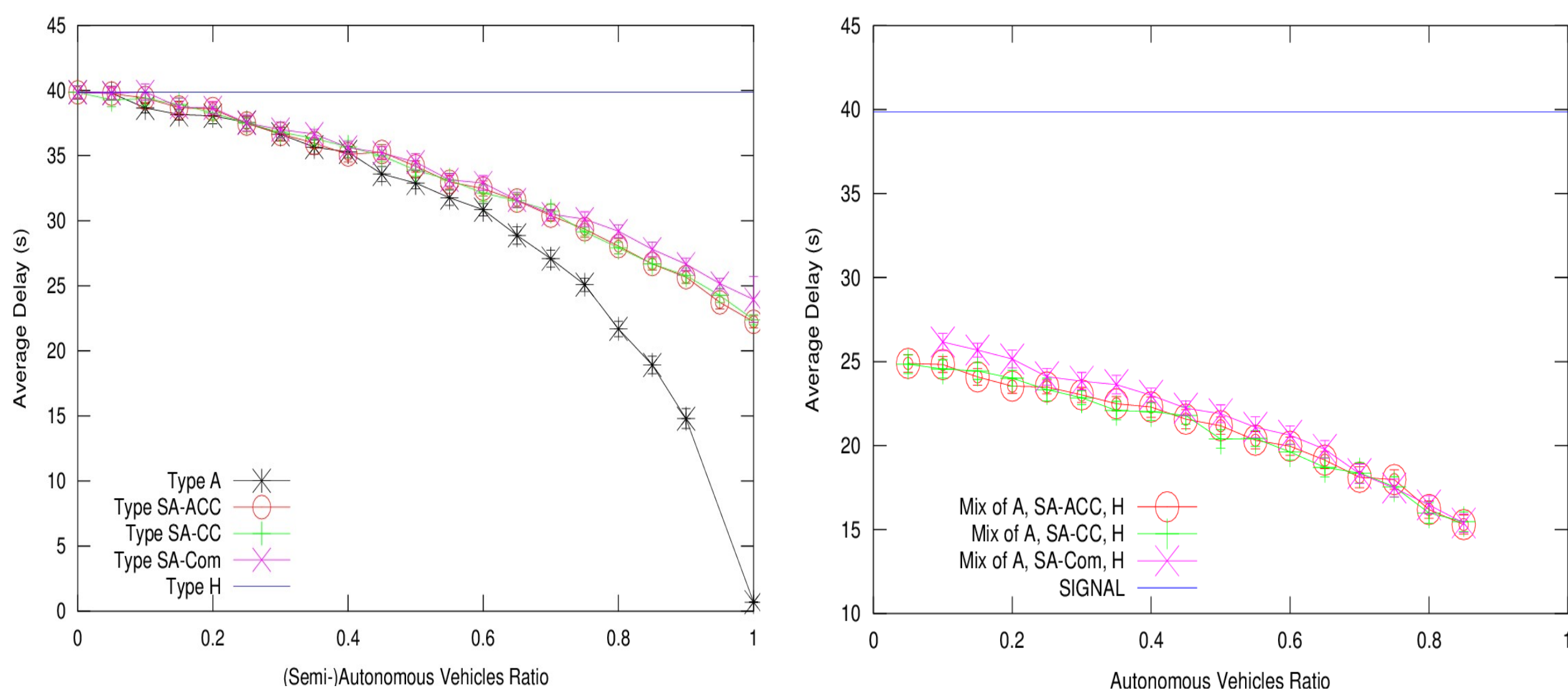
Experiment settings:

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

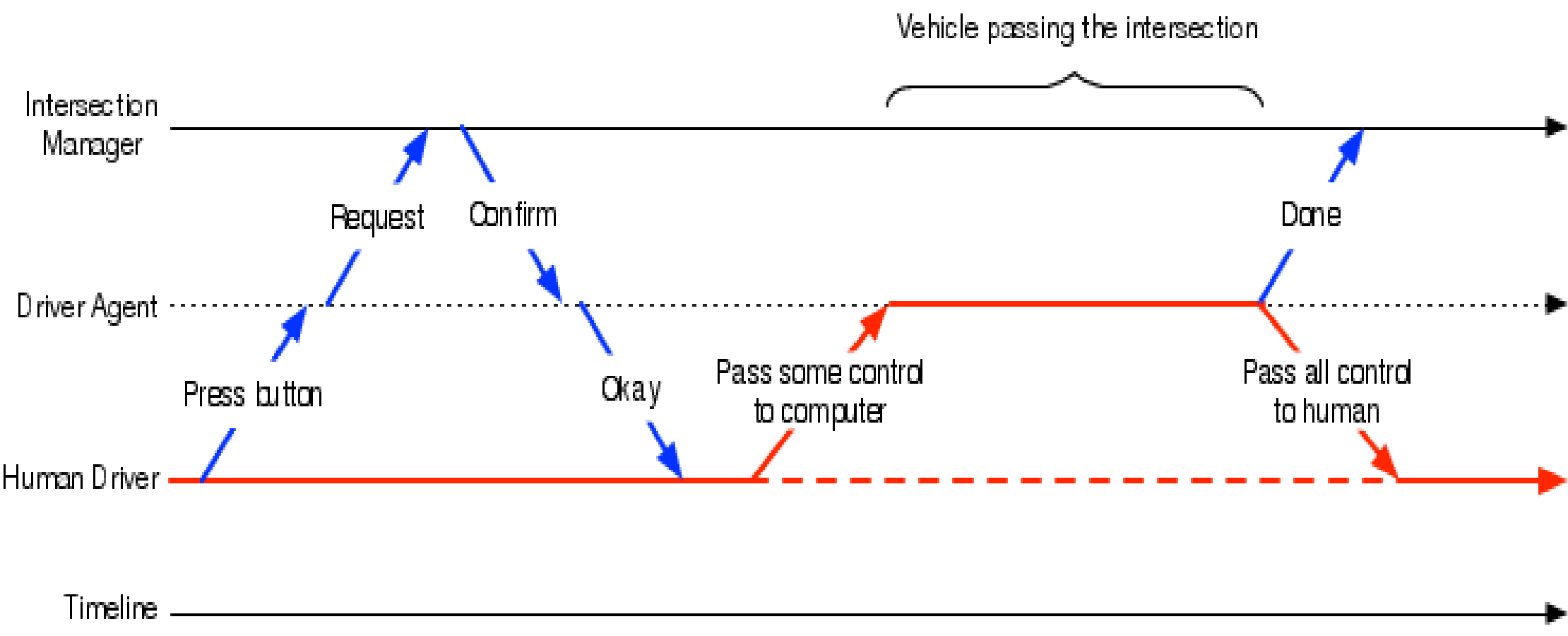
Experiment results:

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Interaction Model



Conclusion

- The first multiagent protocol to enable smooth interactions between human-driven, fully autonomous, and semi-autonomous vehicles.
- Showed that our system can greatly decrease traffic delay when most vehicles are semi-autonomous.

References

[1] DARPA. DARPA Urban Challenge. <http://www.darpa.mil/grandchallenge>, 2007.
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[3] K. Dresner and P. Stone. A multiagent approach to autonomous intersection management. Journal of Artificial Intelligence Research (JAIR), March 2008 Etc.