Intersection Management with Constraint-Based Reservation System

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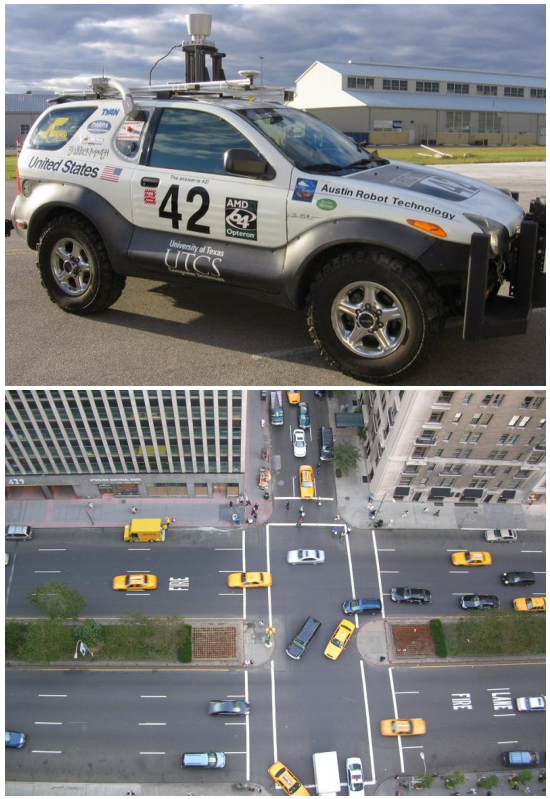
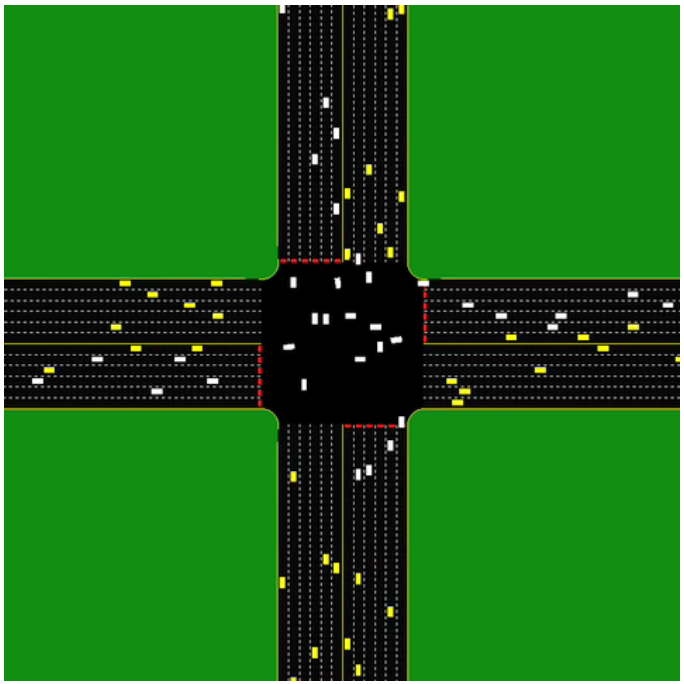
Transportation Infrastructure: Present and Future

- Todays transportation infrastructure is designed for human drivers.
- In the future: Autonomous Traffic Management
  Utilize the capacity of autonomous vehicles to improve traffic in transportation systems.

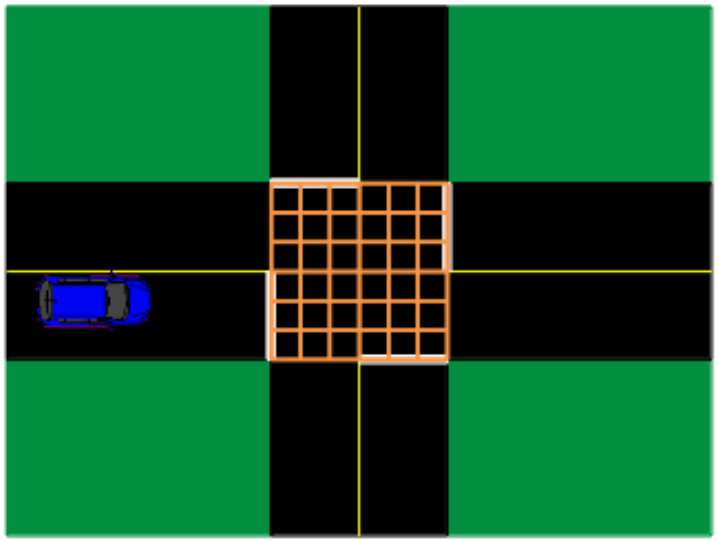


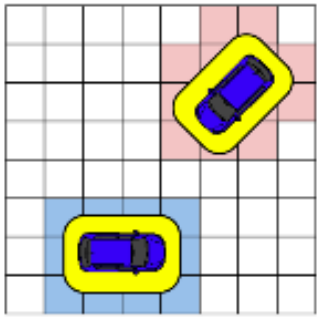
Autonomous Intersection Management



- Dramatically reduce the traffic delay.
- Reduce the overhead of fuel consumption by approximately two thirds.
  Kurt Dresner and Peter Stone. A Multiagent Approach to Autonomous Intersection Management. JAIR 2008.

Grid-Based Collision Detection





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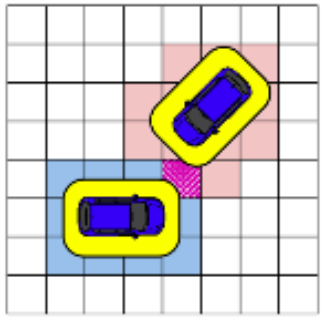

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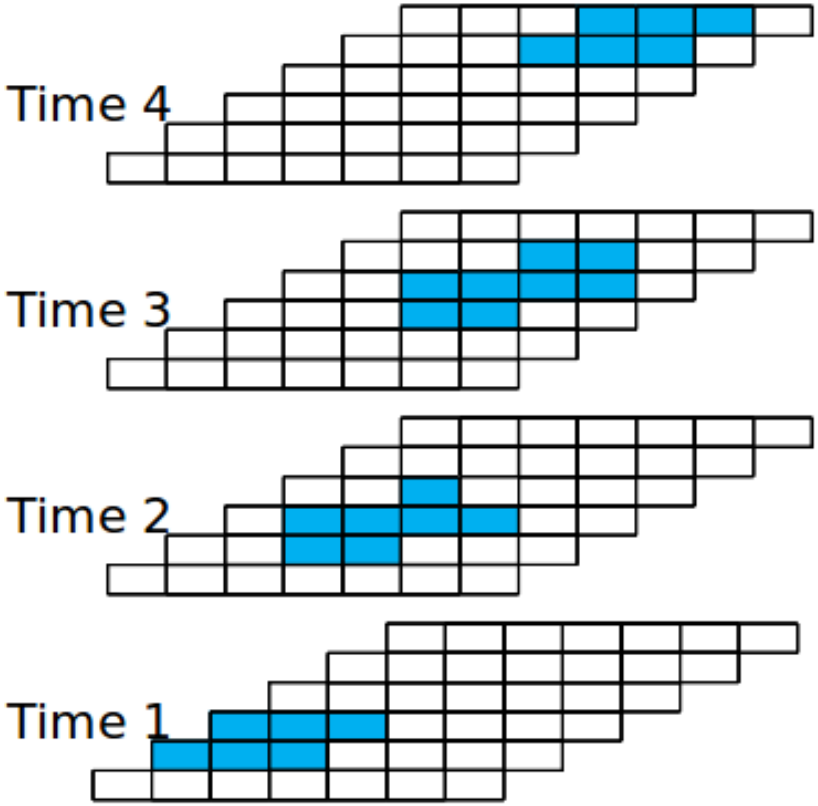
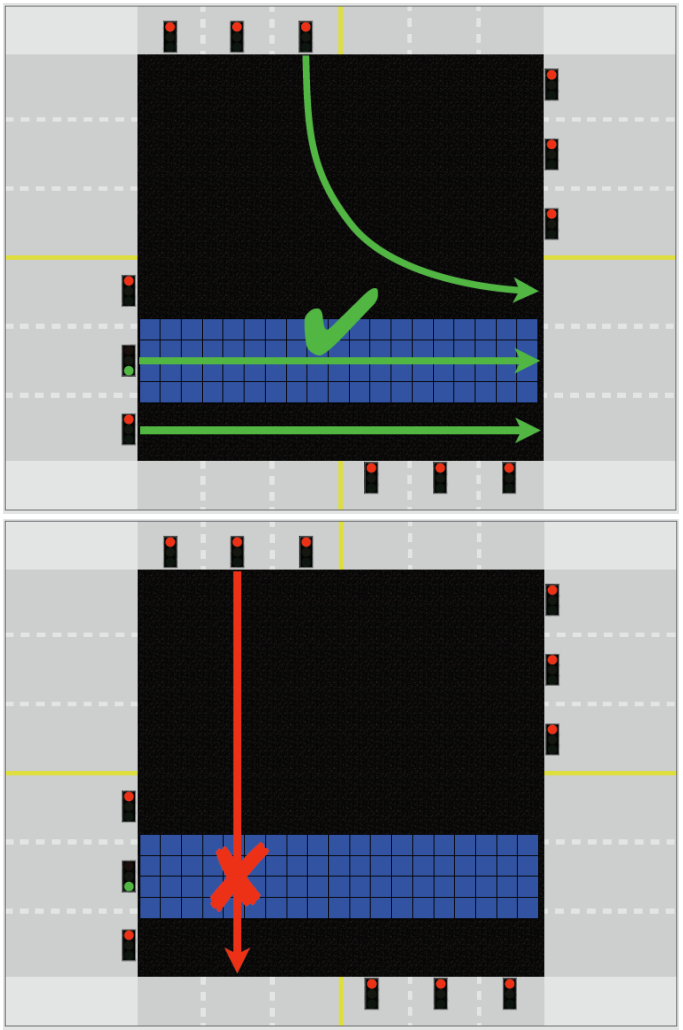


Evaluation

Sharing the Road with Human Drivers

- AIM is designed for the time when vehicles are autonomous.
- Autonomous vehicles wont displace manual-controlled vehicles in one day. Some people enjoy driving.
- One solution: FCFS-light = First-Come First-Served Policy + Traffic Signals



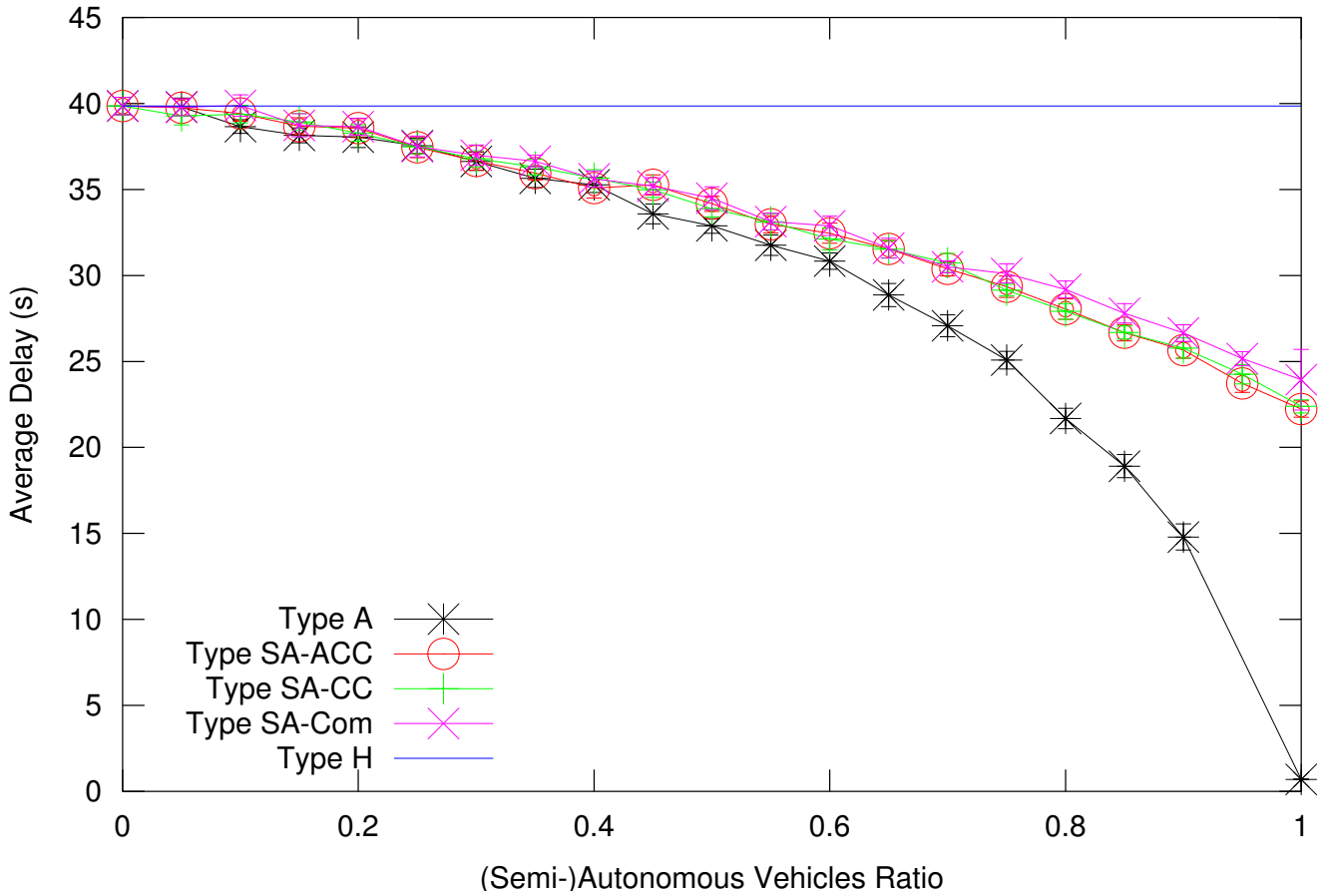
Definition

semi-autonomous vehicles: vehicles with limited autonomous driving and wireless communication capabilities.
They are able to follow a limited number of predictable trajectories at intersections more precisely than human drivers.

Type of Semi-Autonomous Vehicles

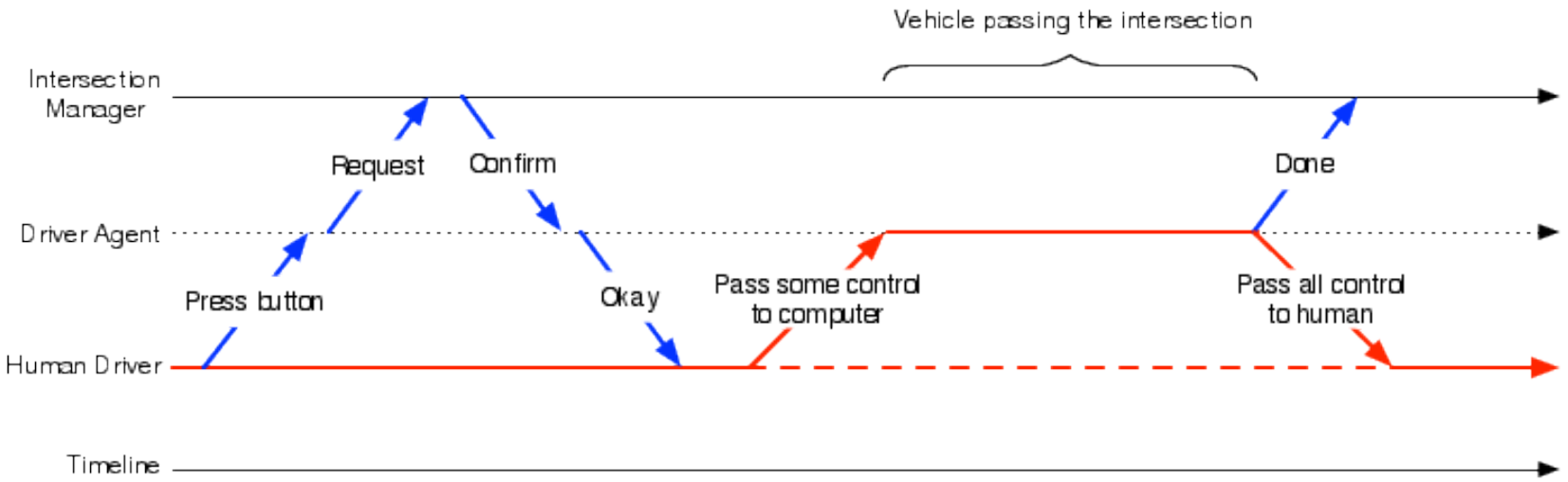
Vehicle Type	Communication Device	Cruise Control	Adaptive Cruise Control
SA-ACC	X	X	X
SA-CC	X	X	
SA-Com	X		

Evaluations



(Semi-)Autonomous vehicles vs. Human-Driven vehicles. Traffic level = 360 vehicles/lane/hour.

Interaction Model



Thank you!

Sources:
http://www.cs.utexas.edu/ pstone/Courses/394Rspring13/resources/index.html

http://www.cs.utexas.edu/ pstone/Courses/343spring12/resources/index.html