A Simulation Tool for Automated Platooning in Mixed Highway Scenarios

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Introduction

Aims of platooning

- Solve traffic congestion problems
- Decrease pollution
- Increase safety
- Decrease severe injuries/deaths

Current solutions

- Mainly totally automated (e.g., California PATH project)
- Recent change of perspective (SARTRE project)

Source: http://www.path.berkeley.edu
Motivation

What is missing?

- Network protocols for the management of platoons in mixed highways
  - Create, join, merge, split, leave, etc.
- Testing environments (simulators)

Our proposal

- A simulation framework for platooning
  - Simulate realistic traffic scenarios
  - Simulate realistic wireless communications
Simulation framework

Based on Veins which couples

- SUMO road traffic simulator
- OMNeT++ network simulator

Necessary Changes

- Introduce a new car following model in SUMO
  - Acts as human or as an automated controller
  - Implements CC, ACC and CACC
- Extend Veins
  - Access functionalities provided by the new model
  - e.g., activateACC, setCCSpeed, etc
Simple Platooning Protocol

Enter

Join

Follow

Leave
Evaluation of the protocol

**Fig:** Distribution of the number of known platoons upon join failure

**Fig:** Distribution of platoon sizes
Conclusion

Our contribution can be summarized as follows

- Development of a new simulation framework
- Simulate automated plus human driven cars
- Evaluate performances of platooning protocols

Future work

- What is the best way to organize/manage platoons?
- How can we deal with the presence of human-driven cars?
- Can we really improve throughput/safety and reduce CO$_2$ emissions?

Thank you for your attention!
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