

Autonomous Driving System

— A Convex and Robust Distributed Model Predictive Control for Heterogeneous Vehicle Platoons

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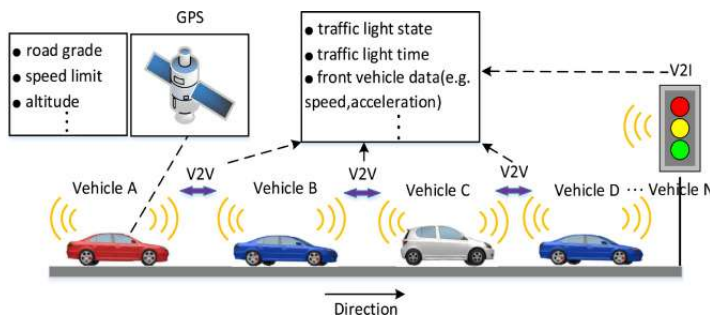
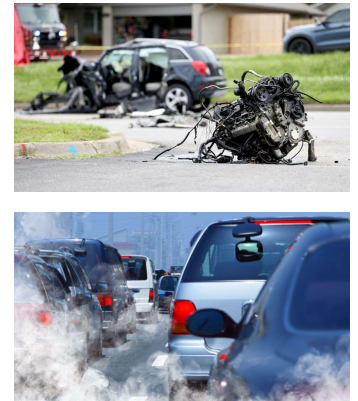
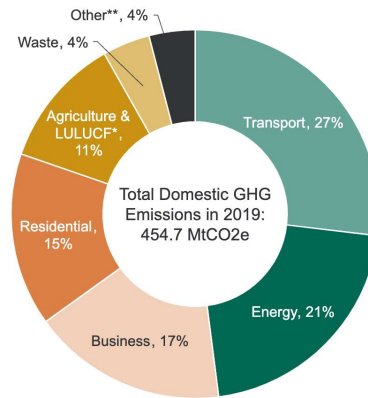
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Background

As society develops, transportation has become an essential part of human life. However:

- Transport = **27%** of greenhouse gas in 2019;
- Net Zero Strategy - **Zero emission** for all new road transport by 2040;
- Dangerous driving - **24,530** people were killed or seriously injured on UK roads last year;
- The **rapid change** of transportation system.



Autonomous Driving System - Vehicle Platoon:

Autonomous driving technology has the potential to address these problems, and vehicle platoon control is a sub-topic that has received significant attention from researchers.

Methodology:

My research partially addresses the platooning problem of heterogeneous CAVs. Key features can be described as follows:

- Distributed Control System;
- Convexification on the spatial domain;
- Tube-based Model Predictive Control;
- Theoretical analysis guarantees feasibility.

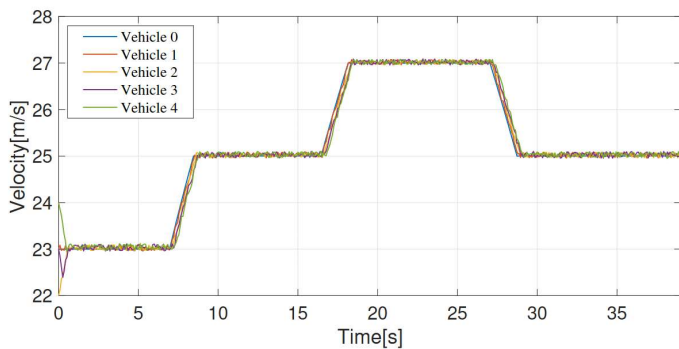
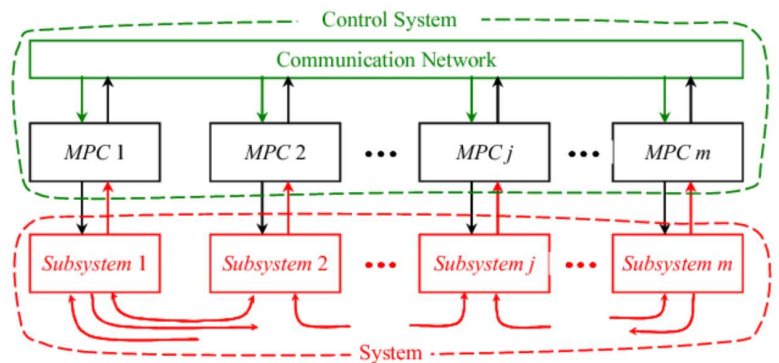


Fig a

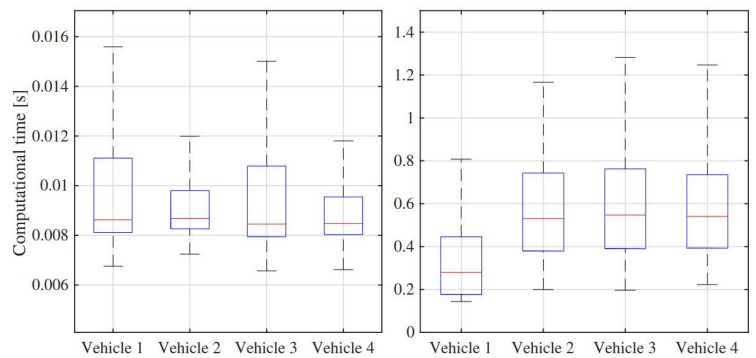


Fig b

Simulations

- Fig a: The effectiveness of the proposed distributed control method;
- Fig b: This convex algorithm is 50 times faster compared to a non-convex algorithm;
- Fig c: If the tube-based MPC is removed, agents of this platoon violate constraints.

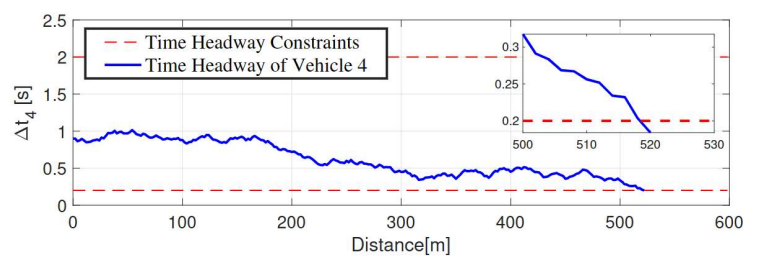


Fig c