Organic Traffic Control (OTC^3)

DFG SPP 1183 Organic Computing

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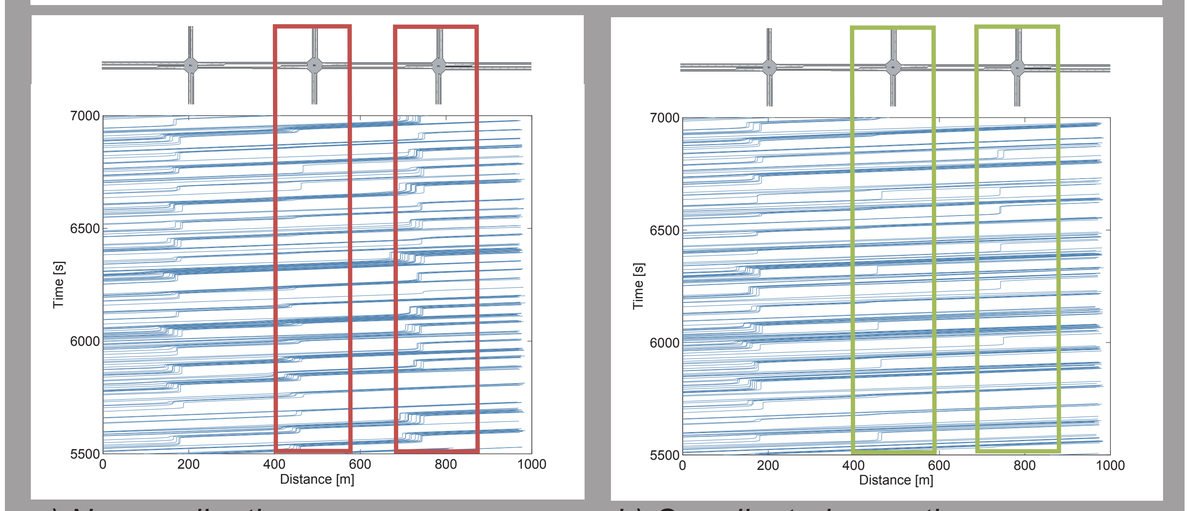
www.aifb.uni-karlsruhe.de/EffAlg/Projekt/otcqe

OTC^3 aims at the realisation of an integrated organic traffic control system capable of controlling and optimising traffic signals (Phase 1), coordinating intersections in urban road networks dynamically (Phase 2), and guiding traffic in response to changing demands (Phase 3).

Phase 2: Possibilities and limitations of decentralised coordination

Progressive signal systems decrease the network-wide number of stops by coordination.

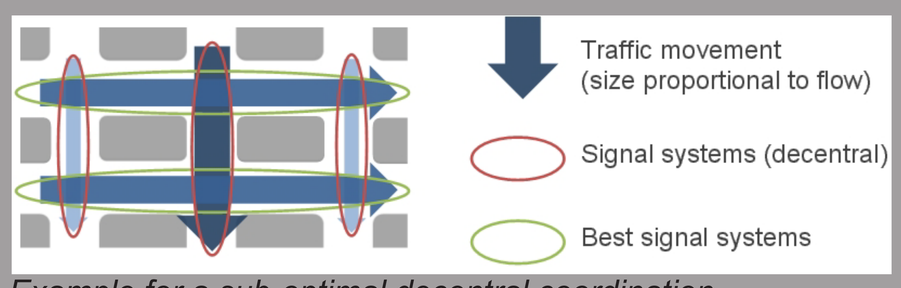
Example: An arterial road with three consecutive intersections



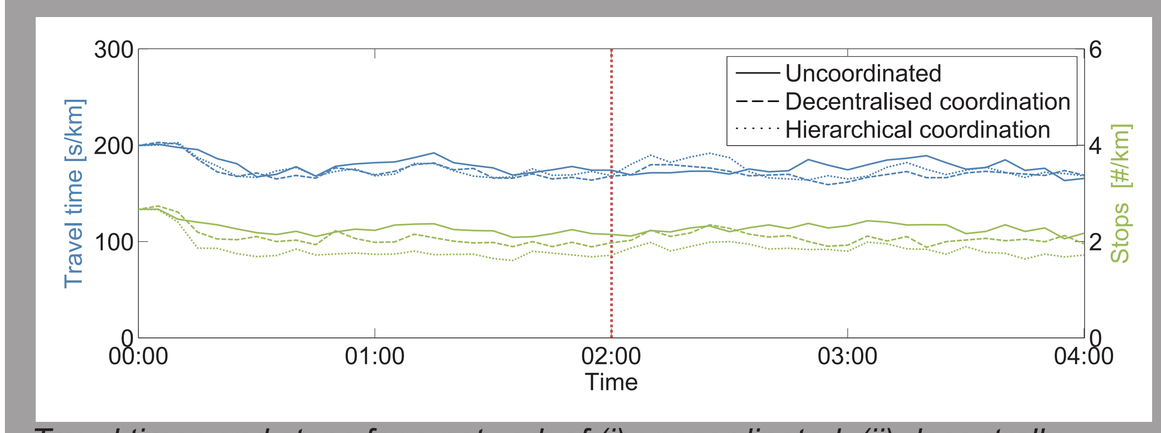
a) No coordination *b) Coordinated operation*

Vehicle trajectories for the arterial: Coordination leads to a reduction of stops.

A decentralised coordination mechanism can lead to sub-optimal solutions for some traffic demands. Here, an additional hierarchical component can be beneficial.

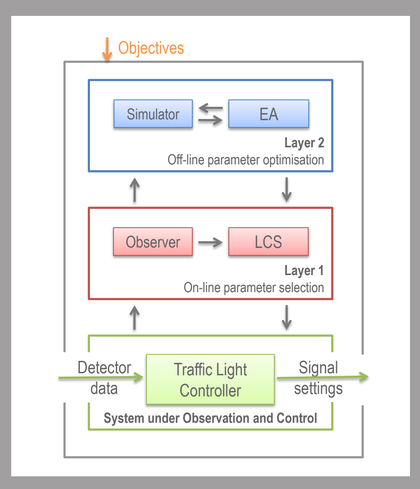


Example for a sub-optimal decentral coordination



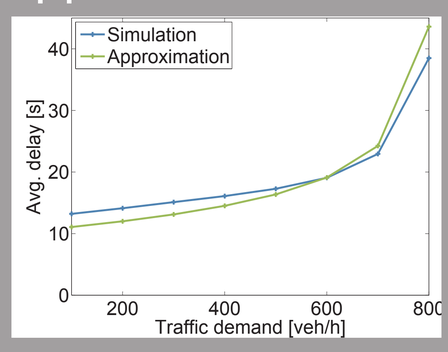
Travel times and stops for a network of (i) uncoordinated, (ii) decentrally coordinated, and (iii) hierarchically coordinated intersections

Phase 3: Refinement of the OTC architecture



The OTC architecture

Fast and precise delay approximation:

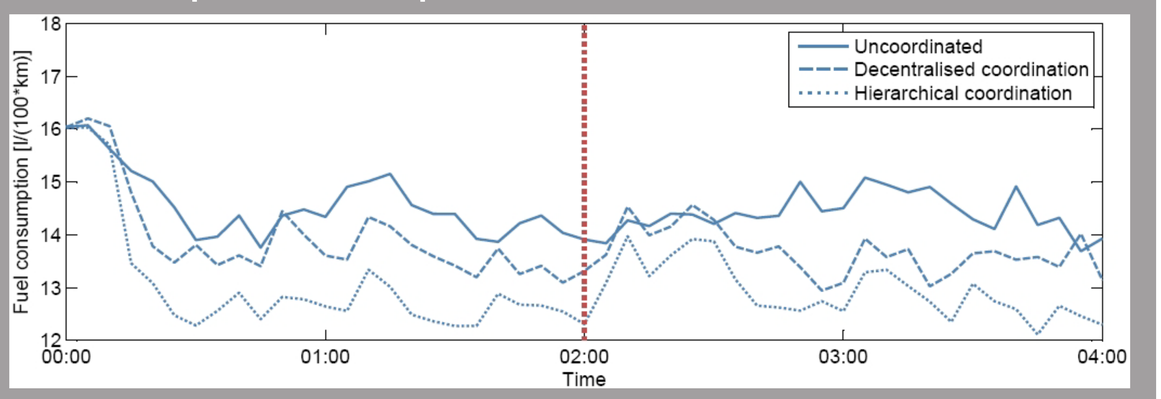


100 simulations 81 seconds

100 approximations <1 second

Delay approximation and simulation results

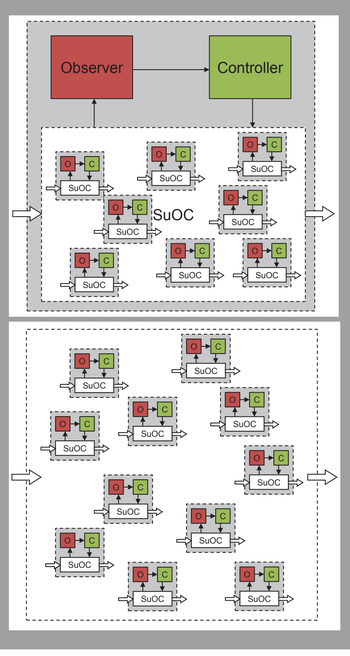
Flexibility w.r.t. objectives: Reduction of fuel consumption and pollution emission

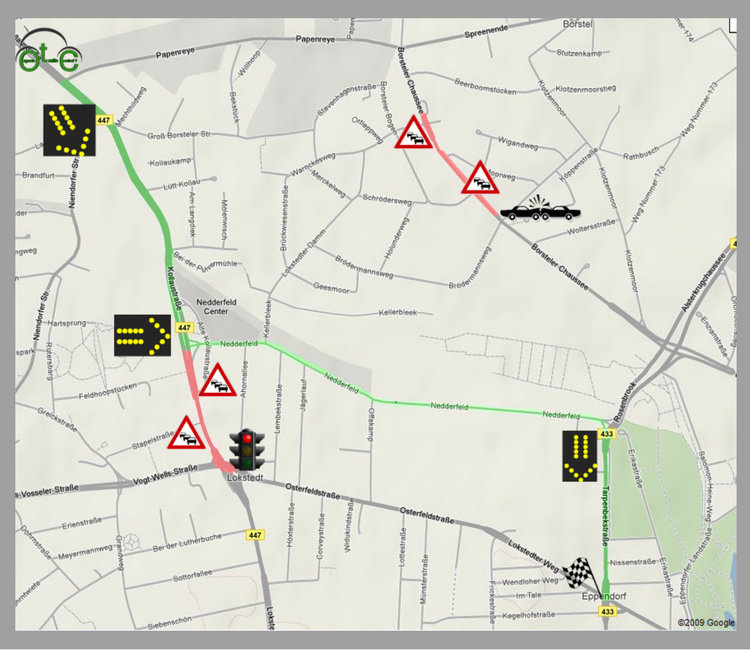


Fuel consumption for the example network for (i) uncoordinated, (ii) decentrally coordinated, and (iii) hierarchically coordinated intersections

Phase 3: Dynamic route guidance

- Decentralised and hierarchical traffic guidance
- Individual route recommendations





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