CPS: Synergy: Semi-Automated Emergency Response System

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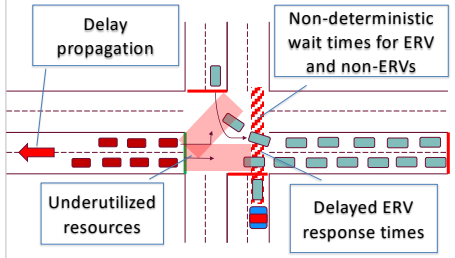
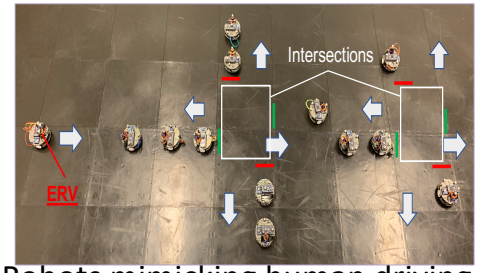
https://cps-erv.ece.vt.edu

Objectives: (a) Facilitating emergency vehicles' response using a real-time server-based approach to provide timeliness guarantees for Emergency Response Vehicle (ERV) traversal while minimizing traffic delays across urban traffic intersections, **(b)** Facilitating the movement of ERVs in a two-way transportation link to improve ERVs' travel times and safety between ERVs and non-ERVs.

Motivation:



HIL Setup:



Robots mimicking human driving through urban network.

Future Work:

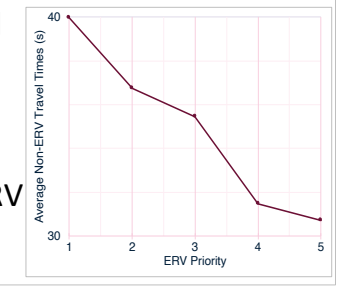
- Facilitate multiple simultaneous ERVs through a road network.
- Edge-supported traffic control.

Solution:

- Leverage V2X connectivity to disseminate ERV information.
- ERVs with priority levels and associated delay tolerance based on triage scale to guarantee timely response.
- Optimize non-ERV traffic **before, during,** and **after** the ERV traversal.

Results: 15-37% faster ERV response decentralized approaches. 17-43% reduction in non-ERV wait-times.

Reduced non-ERV delays with lower ERV priority.



Motivation:

- Importance of safety and travel time for ERVs.

Proposed Model:

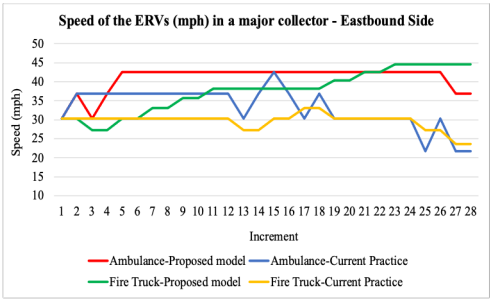
- Identify the fastest ERV path along with the downstream non-ERVs' assigned positions.
- Multiple ERVs with different characteristics in one/both direction.
- Possibility of using contraflow for ERVs in each direction.

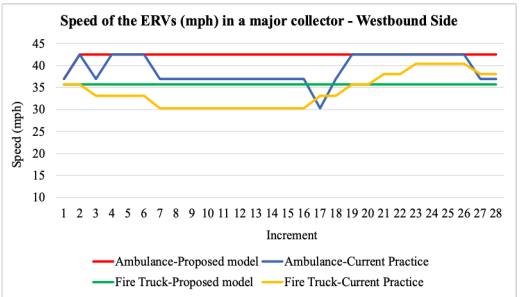
Results:

- Setup: 2 ERVs in major collector in each side of the road (more traffic congestion on the eastbound side)
- 19-21% improvement in ERVs' travel time for eastbound side.
- 5-8% improvement in ERVs' travel time for westbound side.
- More improvement in eastbound side due to using contraflow
- 50-60% avoidance of weaving and passing among non-ERVs.

Future Work:

- Extend the model for use in a transportation network.





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