

CPS: Synergy: Collaborative Research: Semi-Automated Emergency Response System

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Project Details

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Institution(s):	Virginia Polytechnic Institute and State University
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Abstract: The objective of this research is to design a semi-automated, efficient, and secure emergency response system to reduce the time it takes emergency vehicles to reach their destinations, while increasing the safety of non-emergency vehicles and emergency vehicles alike. Providing route and maneuver guidance to emergency vehicles and non-emergency vehicles will make emergency travel safer and enable police and other first responders to reach and transport those in need, in less time. This should reduce the number of crashes involving emergency vehicles and associated litigation costs while improving medical outcomes, reducing property damage, and instilling greater public confidence in emergency services. At the same time, non-emergency vehicles will also be offered increased safety and, with the reduction of long delays attributed to emergency vehicles, experience reduced incident-related travel time, which will increase productivity and quality of life for drivers. Incorporating connected vehicles into the emergency response system will also provide synergistic opportunities for non-emergency vehicles, including live updates on accident sites, areas to avoid, and information on emergency routes that can be incorporated into navigation software so drivers can avoid potential delays. While the proposed system will naturally advance the quality of transportation in smart cities, it will also provide a platform for future techniques to build upon. For example, the proposed system could be connected with emergency care facilities to balance the load of emergency patients at hospitals, and act as a catalyst toward the realization of a fully-automated emergency response system. New courses and course modules will be developed to recruit and better prepare a future workforce that is well versed in multi-disciplinary collaborations. Video demos and a testbed will be used to showcase the research to the public. The key research component will be the design of an emergency response system that (1) dynamically determines EV routes, (2) coordinates actions by non-emergency vehicles using connected vehicle technology to efficiently and effectively clear paths for emergency vehicles, (3) is able to adapt to uncertain traffic and network conditions, and (4) is difficult to abuse or compromise. The project will result in (1) algorithms that dynamically select EV routes based on uncertain or limited traffic data, (2) emergency protocols that exploit connected vehicle technology to facilitate emergency vehicles maneuvers, (3) an automation module to assist with decision making and maneuvers, and (4) an infrastructure and vehicle hardening framework that prevents cyber abuse. Experiments will be performed on a testbed and a real test track to validate the proposed research.

Related Artifacts

Presentations

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Publications

- [Moose-Wilson Road use levels, types, patterns and impacts in Grand Teton National Park](#)



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