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

Thidapat (Tam) Chantem[†], Pamela Murray-Tuite[‡], Ryan Gerdes[†], and Kevin Heaslip[†]

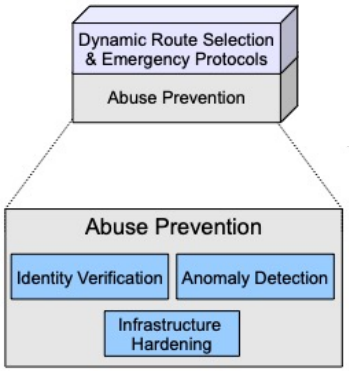
Challenges:

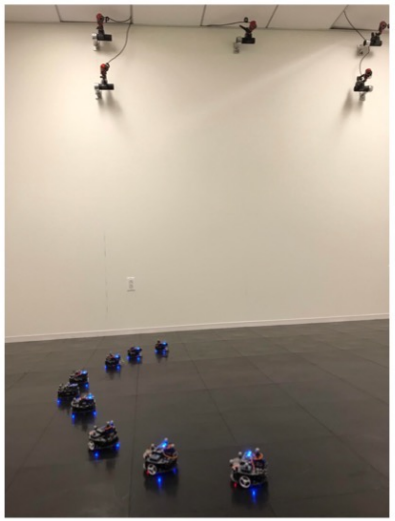
- Handling uncertainties in traffic network and cyber network conditions
- Developing optimization methods to coordinate travel and resolve intersection conflicts
- Establishing and communicating guidance maneuvers, which may have differing levels of connectivity
- Ensuring system security

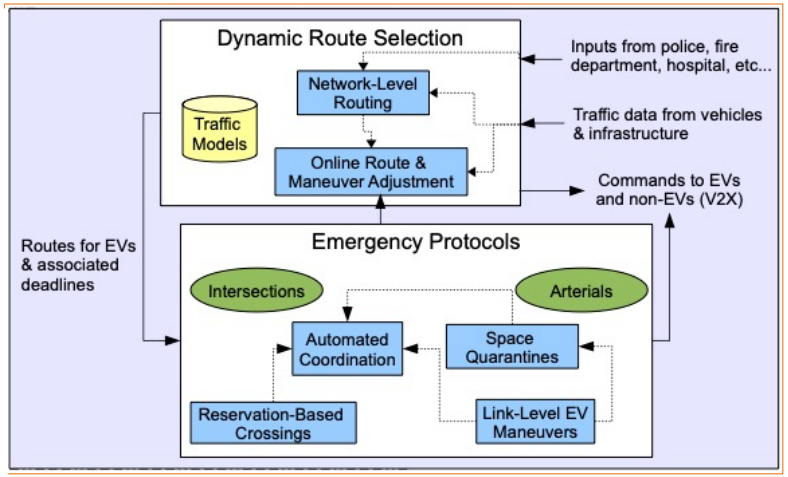
Solution:

- Adaptive algorithms to dynamically select routes
- Situation-aware emergency protocols that exploit connected vehicle technology to facilitate intersection crossings of EVs and optimize
- the behavior of non-EVs on arterials to further improve emergency response times
- Automation module that can be plugged into current and future vehicles to assist with decision making and maneuvers,
- An infrastructure hardening framework to prevent cyber abuse

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







Scientific Impact:

- Methods for handling uncertain environments,
- The idea of having an automation module can be adapted to optimize the behaviors of individual nodes/agents in other CPS.
- Research applicable to other CPS applications that require a high degree of coordination such as evacuation systems, networks of surgical or military robots, and factory automation.

Broader Impact:

- Safer travel for everyone on the road (35-81% less interactions among vehicles)
- 9% reduction in travel time for police and other first responders to reach and transport those in need
- Less burden for non-emergency drivers via automated decision
- Involvement of 10+ high-school students, many of whom were the first in their family to attend college.

Award #1658225 (08/10/16) and #1812524 (09/01/17)
[†]Virginia Tech, [‡]Clemson University, tchantem@vt.edu