Seventh Annual
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Synergy: Anytime Visual Scene Understanding for Heterogeneous and Distributed CPS

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Challenge:

- CPS systems share limited information
- V2V limited to speed/position
- V2I limited by region and traffic re-routing

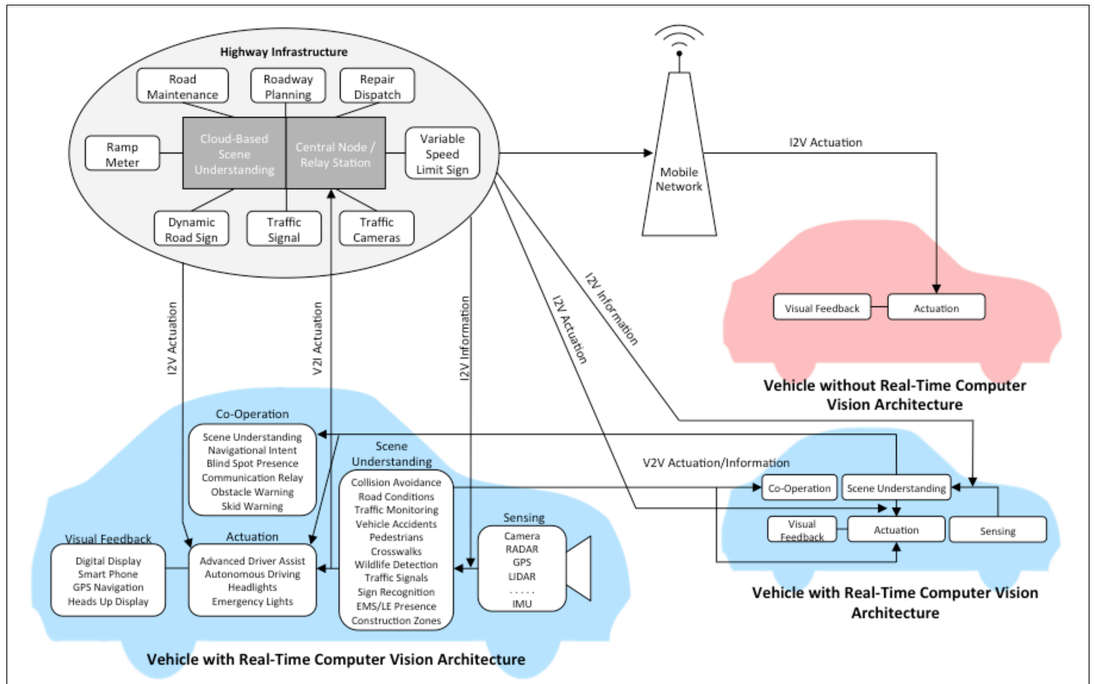
Solution and Scientific Impact:

Vision-based architecture with:

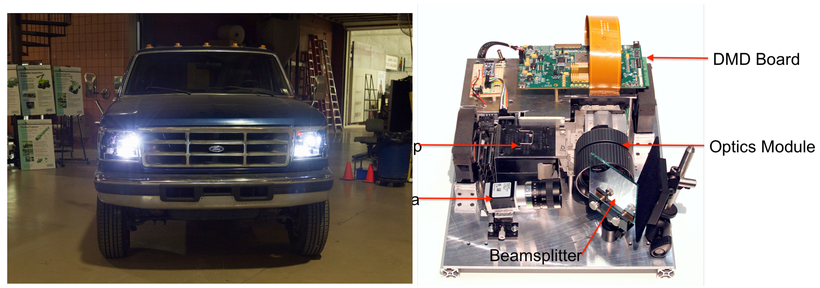
- Integrated edge-cloud processing
- Hardware acceleration of anytime and coop. scene understanding methods
- Seamless communication of scene understanding data (V2V and V2I)
- Managing security and privacy without impacting QoS

Broader Impact:

- Crash fatalities increasing annually
- Synergy between computer vision, machine learning and cyber-physical systems will lead to a safer, cheaper and smarter transportation sector
- Co-advised students, co-taught multi-disciplinary courses, co-organized workshops, deployment on the road



The proposed roadway CPS consists of heterogeneous sub-systems, namely, a vehicle CPS (shown in blue), vehicle-to-vehicle CPS, and a vehicle-to-infrastructure CPS. The sub-systems are capable of sharing rich scene information with each other to ultimately provide useful forms of actuation.



Adaptive automotive headlights can be programmed to react to the road environment in order to improve and enhance visibility for the driver.

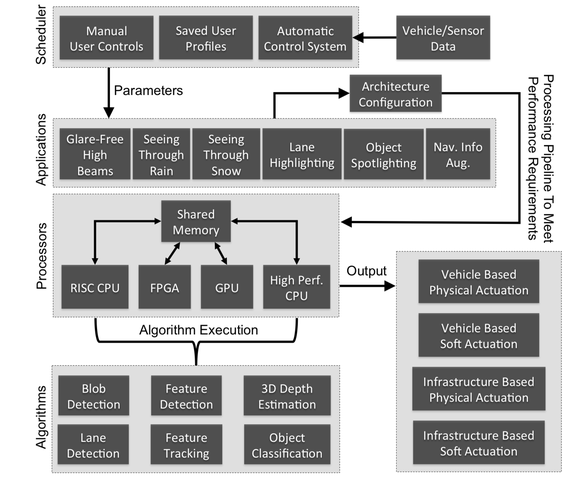
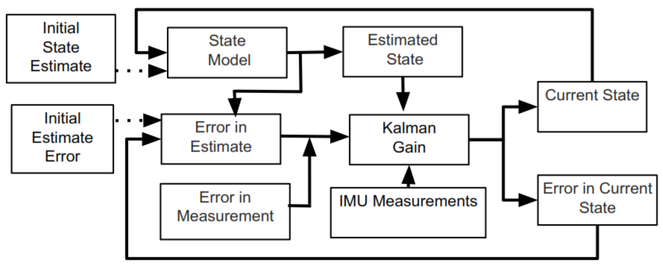
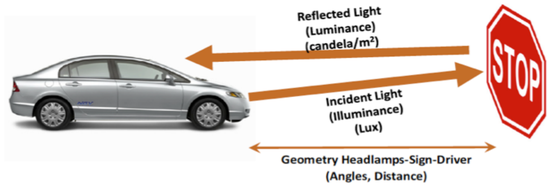


Diagram of roadway CPS architecture for scene understanding.



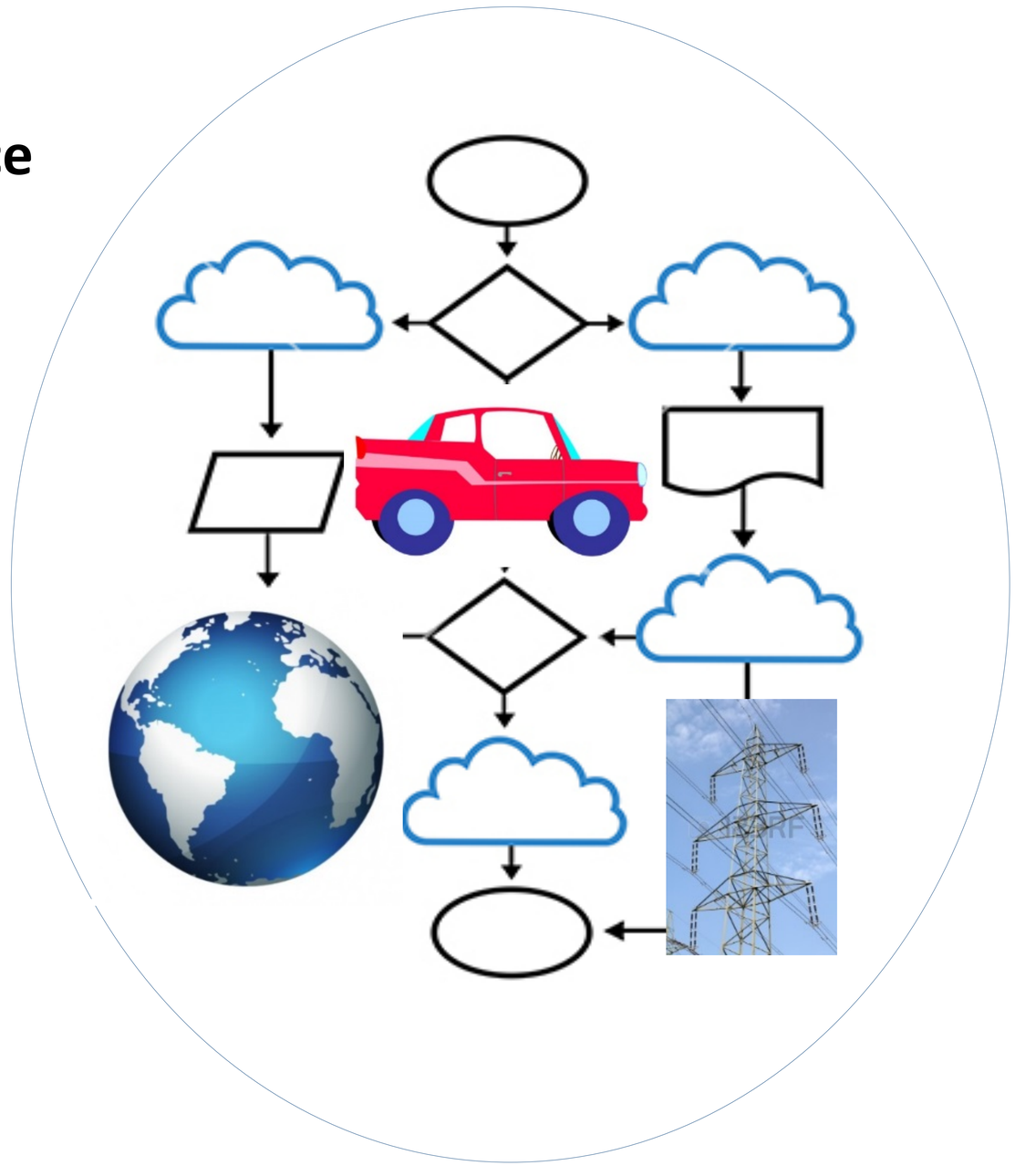
Measuring the size of detected traffic signs.



Estimation of traffic sign retroreflectivity and traffic sign detection.

Award #1446601, 09.09.2014

Graphic(s) on separate slide if space requires.



Graphical representation of your approach and its place within the broader application domain.