DRISI
Caltrans Division of Research, Innovation and System Information

Research Notes

Connected Vehicle - Pooled Fund Study- TPF-5(389)

A research program to support the research, development, and deployment of connected vehicles

Advanced Research

FEBRUARY 2023

Project Title:
Connected and Automated Vehicle (CAV) Application Development

Task Number: 3614

Start Date: January 1, 2019

Completion Date: December 31, 2024

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WHAT IS THE NEED?

The Connected Vehicle (CV) Pooled Fund Study (PFS) is a research and development program to support state and local transportation infrastructure owner operators (IOOs) in preparing for the effective deployment and operation of connected vehicle systems infrastructure and applications. The purpose of CV PFS is to establish a multi-phase program to facilitate research, field demonstration, deployment and evaluation of connected vehicle infrastructure, vehicles and applications, in order to aid transportation agencies and Original Equipment Manufacturers (OEMs) in justifying and promoting the large scale use of connected vehicle environments and applications through modeling, development, engineering, and planning activities. Members of the CV PFS are representatives from federal, state, local, and international transportation agencies that contribute funding to the study. Each member has the decisionmaking authority for the Pooled Fund Study activities, and they are primary stakeholders.

WHAT ARE WE DOING?

In this project the focus is on:

- Research, development, and evaluation of connected vehicle applications;
- Improved technology transfer to state and local agencies through:
  - Documenting and sharing deployment best practices and guidelines;
  - Providing input into emerging standards;
  - Identifying additional requirements within the Connected Vehicle Program to connected vehicle technology by transportation agencies and OEMs
  - Coordinating with OEMs on infrastructure and vehicle tests, application development, and standards development.

The specific program of projects to be conducted will be developed by participating states in the pooled fund study.

WHAT IS OUR GOAL?

To provide technology transfer to state, local, and international transportation agencies as well as vehicle Original Equipment Manufacturers (OEMs) in preparing for the deployment of connected vehicle infrastructure and to provide input to the AASHTO Connected and Automated Vehicle working group, USDOT Connected Vehicle Program, and other national initiatives.

To establish a multi-phase program to facilitate research, field demonstration, evaluation, and technology transfer of connected vehicle infrastructure, vehicles, and applications.

To aid transportation agencies and OEMs in justifying and promoting the large scale use of connected vehicle environment and applications through modeling, development, engineering, and planning activities.

WHAT IS THE BENEFIT?

Connected Vehicle research can enable driver, pedestrians, transit riders, and even cyclist to reach a destination quickly, safely, and in a cost-efficient manner. Research will investigate communication with the traffic signals, road infrastructure, communication methods, etc. There is potential for reduction in congestion, safety improvements, and improved traveler services.

WHAT IS THE PROGRESS TO DATE?

This project is multi-dimensional and a multi-phase program to facilitate the field demonstration, and deployment of Connected Transportation Systems infrastructure applications.

There are four active and on-going projects:

1. Creation of a Guidance Document for MAP Preparation Phase II https://engineering.virginia.edu/cv-pfs-projects-and-research#accordion620712
2. Connected Intersections Program https://engineering.virginia.edu/cv-pfs-projects-and-research#accordion620710
3. Connected Intersections Message Monitoring System (CIMMS) Requirement and Prototype Development https://engineering.virginia.edu/cv-pfs-projects-and-research#accordion620711
4. Connected Vehicle (CV) Data Architecture https://engineering.virginia.edu/cv-pfs-projects-and-research#accordion620713

A total of 17 projects were completed with the support from the pooled fund study. (Note that, IntelliDrive, the previous name of Connected Vehicle, appears in the early stage projects.)

1. Vehicle-to-Infrastructure Queue Advisory/ Warning
2. Multi-Modal Intelligent Traffic Signal System (MMITSS)– Phase III: Deployment Readiness Enhancements
3. Creation of a Guidance Document for MAP Preparation
4. Using Third Parties to Deliver Infrastructure-to-Vehicle
5. Connected Traffic Control System: Research Planning and Concept
6. Basic Infrastructure Message Development and Standards Support
7. Multi-Modal Intelligent Traffic Signal System – Phase I: Development of Concept of Operations, System Requirements, System Design and a Test Plan
8. Multi-Modal Intelligent Traffic Signal System – Phase II: System Development, Deployment and Field Test
9. 5.9 GHz Dedicated Short-Range Communication Vehicle-Based Road and Weather Condition Application: Phase I
10. 5.9 GHz Dedicated Short-Range Communication Vehicle-Based Road and Weather Condition Application: Phase II

11. Best Practices for Surveying/Mapping Roadways and Intersections for Connected Vehicle Applications
12. Traffic Management Centers in a Connected Vehicle Environment
13. Aftermarket On-Board Equipment for Cooperative Transportation Systems: Enabling Accelerated Installation of Aftermarket On-Board Equipment for Cooperative Transportation Systems
14. Certification Program for Cooperative Transportation Systems: Preparing to Develop a Standards Compliance and Interoperability Certification Program for Cooperative Transportation Systems Hardware and Software
15. IntelliDrive Traffic Signal Control Algorithms
16. Investigation of Pavement Maintenance Support Applications of IntelliDrive
17. Investigating the Potential Benefits of Broadcasted Signal Phase and Timing (SPAT) Data under IntelliDrive

The website provides more detail to the projects listed above.
https://engineering.virginia.edu/cv-pfs

LEARN MORE

Check out the reports in the links provided:
https://www.pooledfund.org/Details/Study/642

Connected Vehicle Pooled Fund Study Website
https://engineering.virginia.edu/cv-pfs

IMAGES

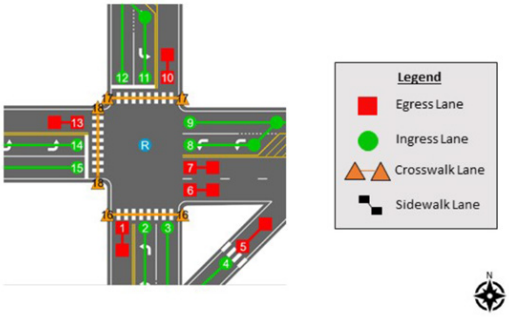

Image 1: Illustration of example lane ID numbering approach from the "Guidance Document for MAP Preparation"

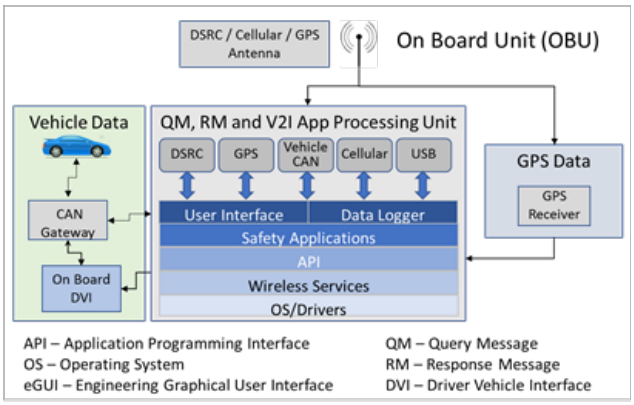

Image 2: Event-Driven Configurable Messaging (EDCM)-Enabled Vehicle System (Source: CAMP)

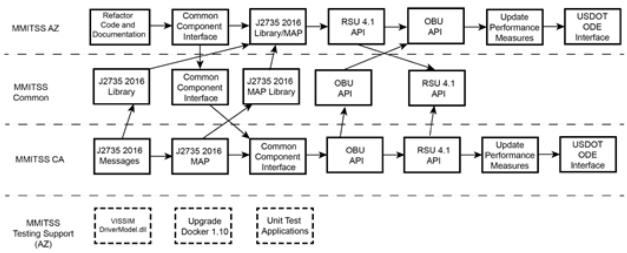

Image 3: MMITSS Development Plan