An Overview of Alaska DOT&PF and FHWA project on Self-assessment and Readiness for CAV Deployment in Alaska

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About me

- Associate Professor of Civil Engineering at UAA
- Served as Associate Professor at the Indian Institute of Technology Kanpur (IIT Kanpur)
- Program Manager/Associate Research Engineer at UNLV-TRC/UTC (2004-2010)
- Areas of interest:
- *CAV, LiDAR, Traffic safety, Crash analysis, Biking, Pedestrians, Traffic calming, Use of technology in transportation, Transport economics, Highway financing, and GIS applications*

Presentation Overview

- Introduction
- Connections of CAV
- Challenges
- Objective of the study
- USDOT guidelines
- Proposed work
- Anticipated benefits

Introduction

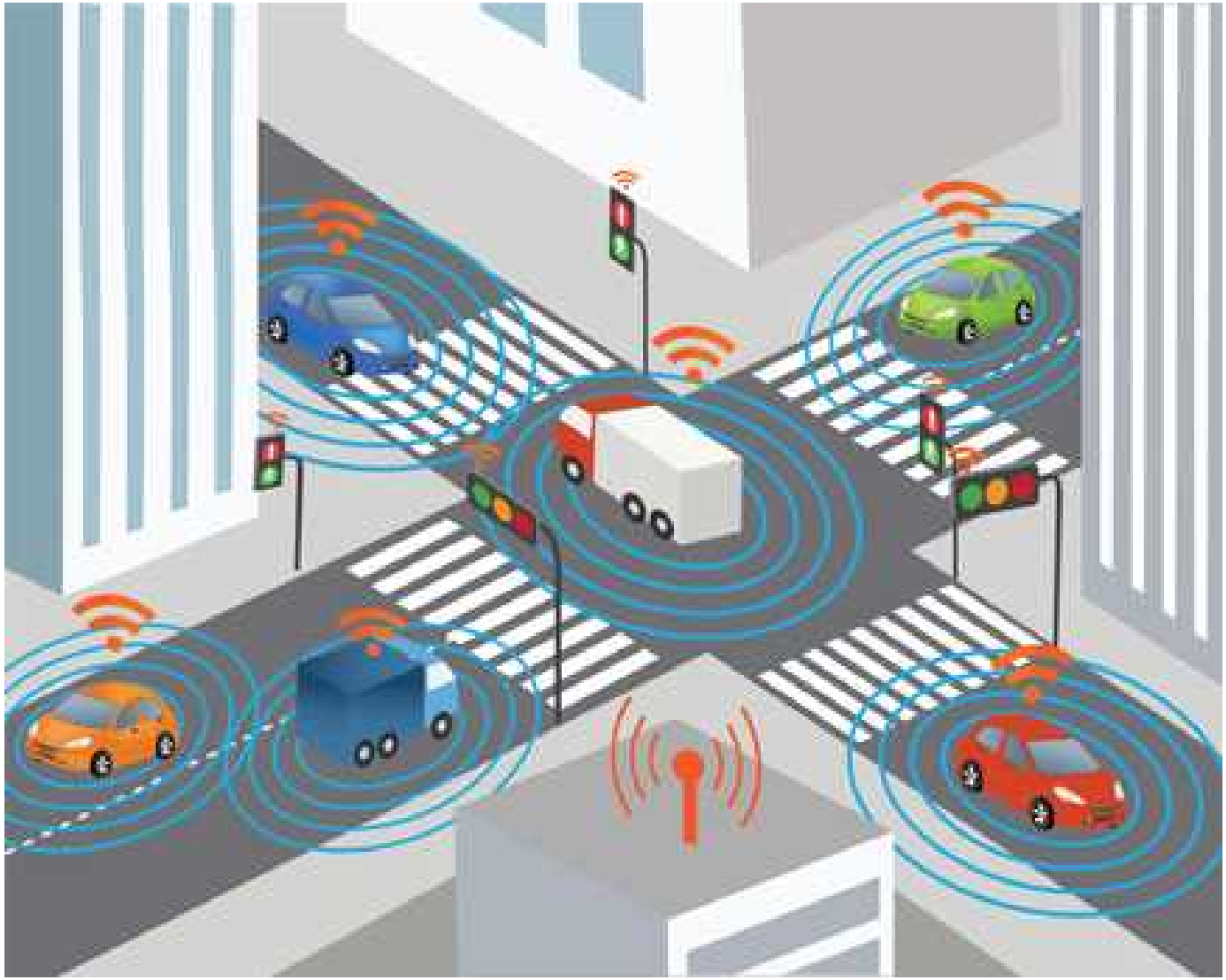

Image source: https://cts.umn.edu

Introduction

- Connected and Autonomous Vehicles (CAV) presents a huge potential
  - Enhanced safety, improved mobility, efficient traveler services, lower emissions, ….
- USDOT promotes CAV deployment
- Several states (Florida, California, Minnesota, Arizona, Alabama, Nevada, …) have invested support for CAV implementation
- Several issues need to be sorted out prior to the nation-wide implementation

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“Connections”

- One of the major challenges in CAV deployment is the “connectivity” of all elements (V2X or X2V)
  - Vehicle-to-vehicle (V2V)
  - Vehicle-to-Infrastructure (V2I)
  - Infrastructure-to-Vehicle (I2V)
  - Vehicle-to-Internet (V2N)
  - …….

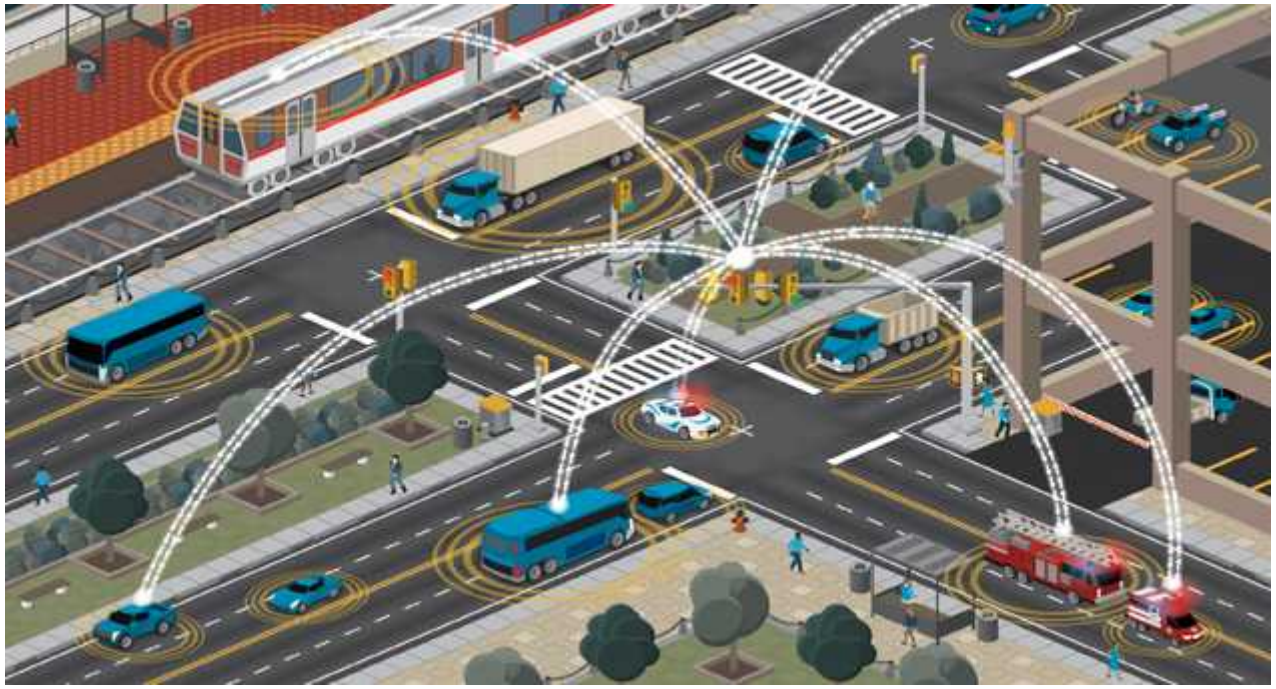

Image source: its.dot.gov

Agency Role

- DOTs and local agencies are the Infrastructure Owner-Operators (IOO)
- IOOs are directly responsible for the V2I and I2V connections, mainly on the “I” side

Image source: digitaltrends.com

Challenges

- Agencies currently use a lot of sensors for operation and ITS applications
  - Loop detectors
  - Video sensors
  - Infrared sensors
  - Radars
  - …
- They work well in the existing system
- Most of them may not be effective in the CAV era
  - For efficient CAV applications, more details, ideally, vehicle-by-vehicle trajectories are required

Objective of the Study

- Carry out an assessment of the AKDOT&PF's readiness for CAV implemetation
- FHWA, USDOT, has developed guidelines for the assessment
- The first step for Alaska to evaluate future infrastructure and maintenance investments necessary for V2I connections
- Provide a road map related to CAV planning and research activities for AKDOT&PF and local agencies

USDOT Guidelines

- Guidelines for Applying Capability Maturity Model Analysis to CAV Deployment (2017)
  - Illustrated potential applications of CAV
  - Sensor/infrastructure requirements for each of these applications are also listed
  - Road-side units (RSUs) and dedicated short-range communication (DSRC) requirements vary across applications
- USDOT does not mandate all IOOs to implement CAV infrastructure
- Self assessment on CAV capabilities is required

USDOT Guidelines

- Lists six dimensions of Traffic Systems Mgmt and Operations (TSMO) Capacity Maturity Model (CMM)
- Three process-oriented
  - Business process
  - Systems & technology
  - Performance measurement
- Three institutional
  - Culture
  - Organization & staffing
  - Collaboration

USDOT Guidelines

- Define four different levels for each of these dimensions
  - Level 1: *Performed* (Basic level)
  - Level 2: *Managed*
  - Level 3: *Integrated*
  - Level 4: *Optimized* (Advanced level)
- Need to determine where IOO stands for each of the six dimensions mentioned
- What steps are required to move from the current stage to the higher stages

Proposed Work

- Literature review
  - Check the status of similar states
- Carryout self assessment by using data collected from AKDOT&PF
- Data includes:
  - Readily available data
    - Roster of employees with their relevant qualification/experience
    - List of equipment and its capabilities
    - List of vendors and their service domain
    - List of contractors and their relevant expertise
    - List of partners and their expertise
    - ……

Proposed Work (Cont.)

- Data includes:
  - Collected using questionnaire surveys collected from:
    - Traffic engineers
    - ITS engineers
    - Planners
    - IT staff
    - Traffic operation managers and operators
    - Administrators
    - Technical/maintenance staff
    - Contractors
    - Vendors
    - Partner agencies
    - Partner organizations (local ITS/ITE representatives)

Proposed Work (Cont.)

- Collect and analyze quantitate data
- Collect and analyze qualitative data
- Conduct the six-dimension USDOT assessment
- Prepare final report

Image source: https://twitter.com/f_bartoloni/status/690259698520592385

Anticipated Benefits

- Self assessment of AKDOT &PF on the CAV readiness
- Understand ongoing/planned activities of IOOs in the CAV area
- Recommendations for future activities which will enable AKDOT&PF to achieve higher goals on each dimension
- Provides an insight on local challenges on CAV deployment

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Questions/Discussion

Thank you!

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