Future Vehicle Safety: Connected, Cooperative, or Autonomous?

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TexITE Meeting
August 30, 2012
Presentation Outline

- Connected Vehicle Program
- Connected Vehicle Development
- Other Smart Vehicle Efforts
- What Does the Future Hold?
Connected Vehicle Program
Eliminate Crashes

- Top Down – “Big Bang” Approach
- Bottom up – “Evolutionary” Approach
IntelliDrive has the potential to address 82% of the vehicle crash scenarios involving unimpaired drivers.
Benefits of Connected Vehicles

Safety Benefits
- Increase Driver Situational Awareness
- Reduce or Eliminate Crashes
  - Driver Advisories
  - Driver Warnings
  - Vehicle Safety Controls

Mobility Benefits
- V2I, I2V Interactivity (SPAT)
- Data-Rich Environment
  - Operations Efficiency
    - Traffic, Transit, Parking
    - Weather
  - Performance Management

Environmental Benefits
- Reduce Emissions
- Save Fuel
Connected Vehicle Key Issues

• NHTSA Requirement for DSRC
• Earliest Deployment 2020 vehicle fleet (late 2019)
• Policy Issues
  – Governance, privacy, security, liability
• Availability of 5.9 GHz DSRC Licenses in Texas
• Migration of Commercial Vehicle Applications to 5.9 GHz DSRC
• Early Infrastructure Deployment
Connected Vehicle Development
Michigan Test Bed

- 50 roadside equipment units (RSEs)
- 9 equipped vehicles with on-board equipment units (OBE)
- 3rd Party Testing On-going
Safety Pilot Project

SAFETY PILOT MODEL DEPLOYMENT SITE PLAN: ANN ARBOR, MICH.

- Primary Model Deployment Routes
- University of Michigan Campus/Medical Center (Primary Driver Recruitment Area)
- Proposed Curve Warning Locations
- UMTRI Facilities (Showcase, Facilities, Equipment and Data Storage)
- Roadside Equipment Co-located with Freeway ITS Installation
- Roadside Equipment Co-located with Actuated Traffic Signal
- Roadside Equipment/SPaT-Enabled Traffic Signal
- Prototype Solar/Cellular Roadside Equipment Installation

The Safety Pilot Model Deployment includes more than 73 lane-miles of instrumented roadways.
Safety Pilot

• More than 2,800 vehicles
  – Cars, commercial trucks, transit
  – Integrated Safety Systems, Vehicle Awareness Devices, and Aftermarket Safety Devices

• 73 lane-miles of roadway instrumented with 29 roadside-equipment installations

• 1 year of data collection
Safety Pilot

Photos Courtesy of E. Seymour, TTI
FHWA Turner-Fairbanks Test Bed

- Signal, Phase, and Timing (SPaT)
- I2V applications
- VehicleWarnings
- Eco-driving
- Emergency priority
Connected Vehicle Test Beds

- Arizona – Emergency Vehicle Test Bed
- California – SafeTrip21, VII California Test Bed, Vehicle Infrastructure Technology Affiliates Laboratory
- Florida – ITS World Congress, Orlando
- Minnesota – Automated Snow Plows, Stop Sign Warning Systems
- New York– Commercial Vehicles – I-495
Connected Vehicles for State and Local DOTs

- **AASHTO Deployment Guide**
  - Enhance Safety
    - Reduce primary and secondary crashes
  - Enhance Mobility
    - More accurate traveler info, efficient use of capacity
  - Reduce Environmental Impacts
  - Facilitate Electronic Payment
  - Improve Agency Operational Performance
    - Reduce infrastructure, resources for system maintenance
    - Improve asset condition monitoring, performance measures

- **ITE Connected Vehicle Task Force**
Autonomous Vehicles
DARPA Challenge

- 2007 DARP Urban Challenge
- 11 teams, 6 completed course
- 60 mile course
- Traffic control, obstacles, other traffic

Photo: www.tartanracing.org/
Google Car

- A dozen on the road at any one time
- Logged over 300,000 miles
- No crashes while under computer control
- Still challenges with weather, temporary work zones, unique conditions

Photo: www.techhive.com
Autonomous Vehicle Legislative Approval

• Nevada approves autonomous vehicles in February 2012
• Nevada DMV approves Google’s license application
• California SB 1298 was approved by the State Assembly on Aug. 28 with a vote of 66-2
Cooperative Systems

- Traffic Signal Data Integration
  - SPaT data
- Real-time Traveler Information
- Tolling and pricing applications
- Special use and managed lane systems
- Roadway and Pavement Marking
- Construction Work Zone Warning
What Does the Future Hold?
Questions Still to be Answered

• Are Applications Available and are Benefits Validated?
• What is the Minimal Infrastructure Needed for Maximum Benefit? How Much, Where, What Type?
• Degree of Market Penetration Required for Effectiveness?
• Is Technology Stable, Reliable, Secure, and Interoperable?
• Are Policies/Governance/Funding Sufficient for Sustainability?
• Acceptability by the Public?
Observations

• 2010-2019
  – Decade of Connectivity
  – Decade of Electrification

Photo: www.nissan-zeroemission.com
Vehicle Connectivity

Apple Battles With Android-Centric MirrorLink For Control Of Connected Car

Summary: There are two cross-vendor efforts to defragment the car computer space and put it in the hands of your automobile. With the outcome uncertain, developers remain in limbo.

Android often gets criticized for fragmentation. But the connected car market has it beat by a mile, with literally dozens of competing telematics platforms, each with its own code and ecosystem for developers to wrestle with.

At the Charged Vehicle Symposium Silicon Valley held last week on SAP's Palo Alto campus, I learned a few things which left me unoptimistic that things are changing any time soon.

The good news: carmakers are eager to garner more apps. You have Nissan, which is in the 8th generation of its NissanConnect system that includes integration with Google local and Pandora music or BMW, which is working with developers on 100 apps today for its computing platform, according to Andreas Winkler, a senior advanced technology engineer at BMW Group's Silicon Valley office. And there's even this juicy rumor about Tesla Motors and the telematics system in its Model S Sedan that I heard from a source at a rival electric car maker.

Apple Mobile

By Eric Lai for UberMobile | August 27, 2012 -- 21:35 GMT (14:35 PDT)

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Agero Vehicle Connectivity Innovation Featured in HondaLink EV for 2013 Honda Fit EV

Agero Extends Honda Relationship Beyond the Dashboard to Ensure Positive EV Customer Experience

DALLAS, August 27, 2012 — Agero, a leader in vehicle connectivity innovation for global automobile manufacturers, announced today the successful launch of a new connectedvehicle program with American Honda Motor Co. Inc.'s remote interface systems, specifically designed to enhance the electric vehicle (EV) ownership experience.

HondaLinkTM EV, recently launched along with the all-new 2013 Honda Fit EV, leverages Agero's technologies through multiple interfaces including a smart phone/tablet application and a personalized web portal designed to assist the owner with wirelessly managing vehicle charging, monitoring fuel availability, driving range and setting their interior cabin temperature remotely. Additionally, Agero helps manage the customer relationship between Honda and Fit EV owners, with call center support and roadside assistance.

"The breadth of integration that the Agero technology provides is key to the seamless Honda Fit EV customer experience," said Charles Koch, Manager of the HondaLink program for American Honda. "From ongoing roadside assistance support to initiatives that help provide useful digital tools, Agero helps keep our network tightly integrated and extends our vision for new cloud-based customer support."

"We’re facing a lot of potential unknowns in terms of customer acceptance of a new technology, so we need to provide multiple interfaces to ensure we’re delivering a high level of knowledge and comfort to Fit EV owners," said Charlie Caroline, president, Agero Connected Vehicle Services. "Likewise, it’s a platform that also must quickly provide vehicle manufacturers with immediate feedback from owners so that next-generation systems can be quickly adapted."

Caroline is optimistic the channels Agero provides to EV owners today will evolve into one of the key benefits of EV ownership — providing an instant link to information that educates vehicle owners regarding their vehicle’s real-time performance as well as, in the near future, guiding them through the potential post-sensor complexities in using EVs before they even happen to manage their
Observations (cont.)

- **2020-2029**
  - Decade of Smart Vehicles
  - NHTSA Decision 2013
  - 2019 Vehicle Fleet

Photo: www.sae.org/mags/aei/8727
Observations (cont.)

• Implications of Smart Vehicles
  – Lawrence Burns, former head of R&D at GM
    • No crashes
    • Lighter vehicles
    • Changed infrastructure
    • Related impacts
      – Emergency rooms
      – Insurance industry
      – Personal injury law
What is the Future in Texas?
Questions & Contacts

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