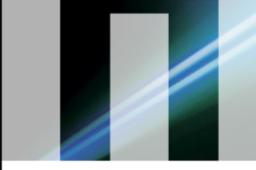
SAE INTERNATIONAL

STANDARDS IN A RAPIDLY CHANGING MOBILITY LANDSCAPE

ITU WORKSHOP ON VEHICLE COMMUNICATIONS AND AUTOMATED DRIVING Beijing, China 28-29 July, 2015

SAE International Gary Schkade



SAE portfolio. Reaching Over 145,000 individuals in over 110 Countries Over 20,000 Volunteers from 51 countries participate on our Standards Committees



The big picture...



SAE Standards Development http://www.sae.org/standardsdev/groundvehicle/gvorgchart.pdf

Roll mouse over a committee name to view its scope

f +1248.273.2455 · CustomerService@sae.org

Click on a committee name to view its fact sheet.

MOTOR VEHICLE COUNCIL RUCK AND BUS COUNCIL MATERIALS, PROCESSES AND PARTS COUNCIL Track and Bus Natural Gas Task Force
Truck and Bus Brake and Stability Control Steering Automotive Corrosion and Prevention Committee SERVICE DEVELOPMENT /EHICLE SAFETY SYSTEMS IGHTING SYSTEMS RID-EV STEERING COMMITTEE STEERING COMMITTEE Safety and Human Factors Standards Steering Committee Lighting Systems Steering Committee
 Lighting Committee Editorial Advisory Group
 Heavy Duty Lighting Standards Committee
 Lighting Standard Practices Committee · Fael Cell Standards Committee Service Committee
 Towability Committee
 Collision Repair Committee Acoustical Materials Committee
 Committee on Automotive Rubber Specs
 Surface Enhancement Committee
 Fatigue Design and Eval Executive Advisory Group VEPTIXXX PORCE 3328891 J2831 In-Vehicle TextMessaging Task Force Visual Behavior and Methics Committee Hybrid - EV Committee ntee is Charging J2954 Task Force plogy J175 Task Force Jg 206 Definitions measures related to DV behavior TF J2802 Blind Spot Monitorian Data Components Committee • Truck and Bus Hydraulic Brake Committee Lighting Materials Standards Committee Hybrid Terminology J1715 Task Force Hybrid and EV First and Second Responder Task Graphics Based Service Information Task Foro Lighting Discussion Forum Hybrid Connector J1772 Task Form and East Witheel Committee J2830 Process for testing of in-vehicle icons Read Humination Devices Standards Committee Truck and Bus Advanced and Hybrid Powertrait Fasteners Committee
 Ground Vehicle Reliability Committee task force 17395 JTS In-Vahirla Massana Priority Task Force Steering Committee ALITOMOTIVE QUALITY AN etrid Safety Committee PROCESS IMPROVEMENT COMMITTEE ices Task Force -Keeping Assistance Systems Subcommittee Power Quelity J2894 Task Force Unmanned Ground Vehicle Reliability Task Foro J2886 DBREN Task Force Truck and Bus Body and Occupant Environmen sted Lighting System Tark Force Steering Committee • Ready-Mix Concrete Truck Safety Committee • Truck and Bus Human Factors Committee Non-Hydraulic Hose Committee Signaling and Marking Devices Stds Committee Not-Hydrautic Hook Committee
 Uphtweight Volice Dezign Materials and Asy Technology Committee
 Heals Technical Executive Steering Committee
 Carbon and Aley Steels Committee
 Shed and Step Steels Committee
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 DVI Tel Evaluation Approaches, Prioritization and Mitigation
 DVI Tesk Force 5 - Automated Webdes Test Methods and Equipment Stds Committee Emissions Standards Committee Brake Emings Standards Committee Engine Power Test Code Committee Filter Test Methods Standards Committee · Elev Temp Prop of Ferrous Metals Committee ISTS Thermal Test (Underhood) Task Force
 EPLLA CAD AND PostProduction Testing working Nanagement System Garolina Sual Injaction Gandards Committe Plattics Committee groups IT USO Photometry Guidelines Task Force Truck and Bus Tire Committee Platics Committee
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 Vibration Control Committee
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 Automotive Addresses and Sealurits Committee
 Fluid Conductors and Connectors Tech Steering
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 Stel Systems Standards Committee
 Drivetrain Standards Committee
 Beit Drive (Automotive) Systems Committee Driving Performance Operational Definitions (DRIPCID) J29.44 Brake Fluids Standards Committee Automotive Brake and Steering Hose Standards Truck and Bus Electrical " Electronic Steering Emergency Warning Lights and Devices Standard: Hydraulic Brake Components Standards and Bus Event Data Recorder Committee Driver Wsion Standards Committee Automatic Transmission Transaste Committe ines for Emergency Warning Devices Track and bus Event Cata Necorder Committee Track and Bus Electrical Systems Committee Track and Bus Low Speed Communication Networ Automatic Transmission Friction Standard Committee Vehicle Performance Steering Committee mmillee Methods Tube Diffices Connection International Lighting Standards Advisory Group Highway The Committee
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 Wheel Standards Committee
 Aftermarket Wheel TestCertification International Conneration Committee Committee Truck Bus Control and Communications Network Natalkr Tubing Committee VEHICLE SAFETY SYSTEMS Spline Committee -892 Spring Steering Commit VEHICLE SAFETY SYSTEMS > Occupant Protection and Biomechanics Steering Committee - Sear Beit Systems Committee - Onidaen Sketsunt Systems Committee - Initiable-Restants Committee - Initiable-Robert Te HICLE BATTERY STANDARDS Finishing Lab Testing Task Free Vehicle FF System Diagnostics Stearing Committe » Elaxed Wheel Hub Fabrace Lab Test Task Battery Safety Standards Committee Tarson Rat Spring contribute
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 J1962 OBDIT Diagnostic Connector TF
 J1979 Review Table Force
 J1979-2 OED II Related SAE Specification Children _ Sm Adults Innect and Rollown Text Proced Stds Committee Battery Terminology Committee Battery Materials Testing Committee Secondary Battery Use Committee Start-Stop Battery Committee Foel and Lubricants TC2Industrial Lubricants
 Fuels and Lubricants TC 3 Driveline and Chassi ELIPTE ENGINEEDING SVETENS Road Vehicle Aerodynamics Ferum Committee
 Interior Climate Control Steering Committee + J1978 OED II Scan Tool Task Force Lubrication • AxleEfficiency Task Force Capacitive Energy Storage Committee 13005 Guidence for Remote OED Tark Every > Child SideImpect Dummy TF
 > Pedestrian Dummy TF
 > Dummy Testing and Equipment Standards Battery Field Discharge and Disconnect Committee Interior Climate Control Mar Surplier Committe Diagnostics Task Force 12012 Diagnostic Trouble Code Task Force Rattery Systems Connectors Committee Tark Frene for J306 Battery Standards Testing Committee Battery Standards Testing Committee Battery Thermail Nanagement Committee Battery Standards Labeling Committee Battery Transportation Committee Fuels and Lubricarts TC 7 Fuels Committee Interior Climate Control Vehicle CEM Committee Fuel and Lube TC7 Biodiesel Fuel and Elends Task Electrical Distribution Steering Committee Glazing Materials Standards Committee
 Connected Vehicles Steering Committee Lumbar Flaxon Hill S0th Task Force Calibration and Linearization methods for Potentiormeters
 Hybrid III Dummy Family TF
 Dummy Abdomen-Pelvis Round Ratin Cable Standards Committee Battery Size Sta dardization Comm **Battery Standards Starter Battery Committe Cooling Systems Standards Committee** Functional Safety Committee
 * Erakes, Trailer Brake, and Part Brake TF
 * Steering and Suzparision Task Force
 * Propulsion and Driveline Task Force Battery Standards Truck and Bus Battery Committe Battery Standards Electronic Fuel Gauge Committee Battery Standards Advanced Battery Concepts J1726-TF - Crg Air Coster Informal Clean, Leak Driver Assistance Systems Steering Committee BUDY - Test Nethod for Heavaing Perfor Fig. Electronic Design Automation Steering Committee CRAV Sataty Taction T COOPERATIVE RESEARCH PROJECTS JIS42 TF - Lab Test Veh Ind Heat Ex Therm Cro CRAY Detriftons TF
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 Volumente REEN TECHNOLOGY STEERING Ind Loading Ergonomics Steering Committee · Green Racing Committe » Active Safety Systems Sensors Task Force Communication Transceivers Qualification Requirements TF ide Electric Power Supply Systems Standards H2 Feel Cell Station Breakaways, Hoses, Fittings and Controls and Distribute Standards Committae Crash Data Collection and Analysis Steering Nozzles High Strain Rate Plastics mailtee Data Collection & Archiving Standards Cor Committee
 Embed ded Software Standards Committe
 Automotive Electronic Systems Reliability Healted Seals Standards Committee
 Light Duty Vehicle Performance and Economy
 Measure Committee
 Optamical Modeling and Simulation Committee
 Odometer and Speedometer Standards ITS Deplact Stational Station (Commission Standards Committee) CARCAD Motor Vehicle Fire Investigation Task Force CAESAR Ergonomics Federal Highway (FHWY) Dedicated Short Range Communications (DSRC) Otologic Trauma Vehicute Fitt Piles Organy Standards
 Electromagnetic Compatibility (EHC) Standards
 Electromagnetic Immunity (EM) Task Fox
 Electromagnetic Immunity (EM) Task Fox Light Vehicle Exterior Sound Level Standards STANDARDS DERIVATIVE PROGRAMS Horsepower Certification
 Horsepower Certification
 J2746 Software Assessment Repr
 Thisseoffics Database Vehicle Electrical System Security Committee Tow Vehicle Trailer Rating Committee
 Volatile Organic Compounds
 Wiper Standards Committee
 VIN - WMI Technical Committee Rechargeable Energy Storage Systems (RESS) Safet EVIE/EV Internershilts Development TF Vehicle Electrical Hardware Security Task Force MAC Equipment Conformance
 H-Point Machines Truck Cab Anthropometric Study Emergency Vehicle Lighting Vehicle Sound Level for Peder WMI/VIN WMC/PIN Plastics Suitable for use with H2

GLOBAL GROUND VEHICLE STANDARDS CONSTRUCTION AGRICULTURAL AND OFF ROAD MACHINERY COUNCIL Agricultural Tractor Standards Committee (ATSC Con-An Council Chairs Vice Chairs Subcommittee Common Tests Technical Steering Committee Human Factors Technical Advisory Group HETC2, Machine Displays and Symbols HETC4, Operator Stating and Ride He FCs, Operator Accommodation Machine Technical Steering Committee MTCI, Loaders, Crawlers, Sinapers and Mountee fTC2, Sweeper, Deaner, and Machinan MEC4 Forestry and Logging Equipment MECC5, Excavators MTC7 Roadbuilding Machinery Technical MICP isoaccusting machinery sectrical Subcommittee MICP, Tire and Rim MICP, Trenching and Horizontal Earthboring Machines • Operator Protection Technical Advisory Group OPTC2, Braking OPTC3, Lighting and Sound Committee OPTC4, Protective Structures Cranes and Lifting Devices Committee SPECIALIZED VEHICLE AND EQUIPMENT COUNCIL Motorcycle Technical Steering Committee Marine Technical Steering Committee · Personal Waterratt Committee Snowmobile Technical Committee Snail Engine and Powered Equipme Special Purpose Vehicle Committee ment Committee

Ship Fluid Systems Committee

GROUND VEHICLE STAFF

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stance Loeffler - I

Ship Systems - Fasteners Committee Trailer Committee

Trailer Dynamics Task Force Crimentional Towing System up to 20,000 lbs

530 committees 8,957 members 2,898 companies 1,496 meetings/yr.

Committee meetings are open to all interested parties, but only committee members vote on draft documents. Individuals participate on committees as technical experts and not as representatives of their organizations

Wheel Conformance

SAE International Global Relationships



SAE GROUND VEHICLE STANDARDS

COOPERATIVE RESEARCH PROJECT WORK

Examples: Cooperative Research Projects and Connected Vehicles

- Standards and Test Procedures for Plug-in Electric Vehicle safety and Interoperability with Electric Vehicle Supply Equipment
- Wireless Charging: J2954: Industry/gov't collaborative effort for the development of minimum performance, interoperability and safety criteria for wireless charging of EVs/PHEVs.
- Federal Highway funded project on Dedicated Short Range Communication and performance requirements for V2V communications related to expected NHTSA rulemaking in V2V space.

SAE GLOBAL GROUND VEHICLE STANDARDS BUSINESS UNIT

STANDARDS ACTIVITIES IN AUTOMATED VEHICLES/CONNECTED VEHICLES/INTELLIGENT TRANSPORTATION SYSTEMS

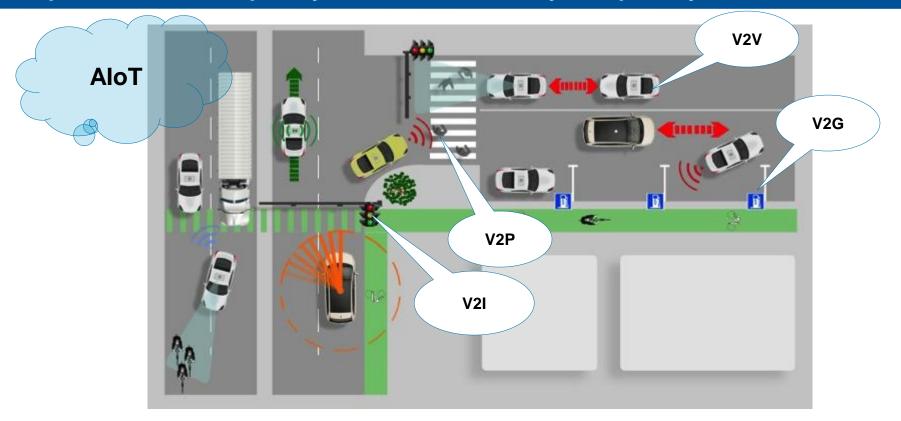
Fundamental Question: Why Connect or Automate? A few anticipated benefits

- Reduced fatalities and fewer accidents
- Greater fuel economy and lower emissions
- Reduced traffic congestion, increase existing road capacity
- Improved and new mobility options for aging population and disabled
- Productive time in vehicle

OEM's predict semi autonomous vehicles by mid-decade and fully autonomous vehicles by 2020

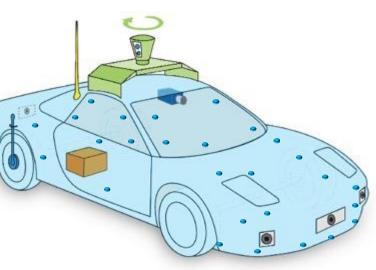


From Connected Vehicles: Multiple connections increase system and performance complexity, and create security and privacy issues.



and advanced safety and advanced driver assistance systems ...

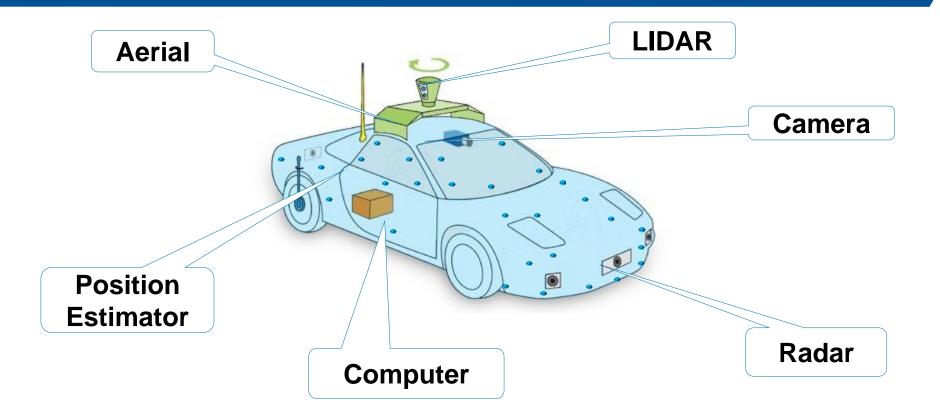
Road condition sensor Magnetic sensor Vehicle distance sensor Forward obstacle sensor Blind spot monitoring camer Drive recorder Side obstacle sensor Air pressure sensor Inside door lock/unlock



Airbag Rear view camera Water repelling windshield Seatbelt pretensioner Driver monitoring sensor Fire detection sensor Vehicle speed, acceleration sensor Collision detection sensor Pedestrian collision injury reduction structure Electronic control system Message display system Hands-free system Rear obstacle sensor

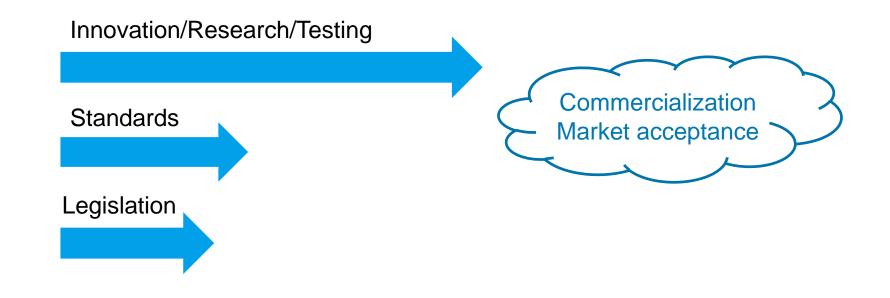
Head-up display Steering angle sensor Electronic control throttle Electronic control brake GPS sensor

...to automated vehicles

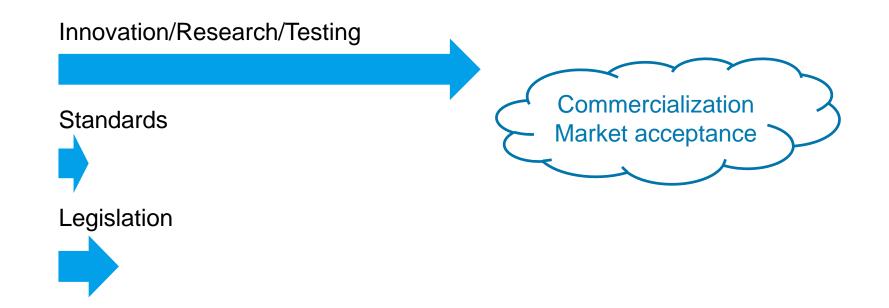


Sensors accuracy and reliability Data Positioning Systems accuracy and reliability Security **Driver Distraction Electronic system reliability** Privacy Future vehicle vs existing fleets HMI **Entire vehicle system interoperability** Powertrain system interoperability

Automated/Connected Vehicles - Optimal Standard Development path (US)



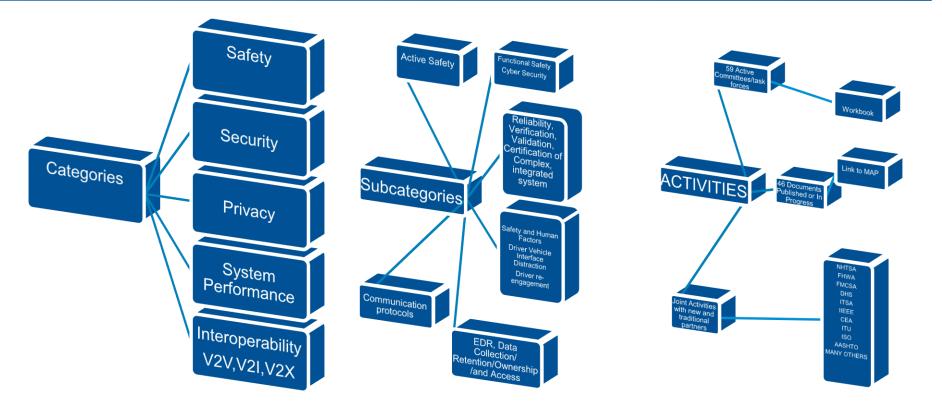
Automated/Connected Vehicles - Current Standards Development path (US)



SAE and Connected/Automated Vehicle Technology Intelligent Transportation Systems: Ancillary Activities

- Mapping all SAE Connected/Automated/ITS Vehicle standards activities across all SAE sectors:
 - Expected portal launch date: August 2015
- Expanding alliances with non-traditional Standards Partners:
 - Federal Highway International Standards harmonization project
 - American Association of State Highway and Transportation Officials (AASHTO)-Infrastructure
 - Transportation Research Board (2014 / 5 Autonomous Vehicle Symposium- Ann Arbor)
 - State and Local DOTs (automated vehicle testing on public roads)
 - Consumer Electronics Association (CEA). MEMA, SEMA: EMC and consumer device interference
 - Technology Maintenance Council (TMC) commercial vehicle and fleet maintenance/Platooning new TMC committee on fleet platooning (CACC incorporating DSRC)
 - International Telecommunications Union (ITU)
 - Geospatial Transportation Mapping Association (GTMA): Digital Asset Management and base maps

RESULTING SAE CROSS COUNCIL CONNECTED MOBILITY STANDARDS MATRIX Categories, Subcategories And Activities



STANDARDS COMMITTEES:

- Dedicated Short Range Communication
- Vehicle Active Safety
- Truck and Bus Active Safety
- Functional Safety
- Truck and Bus Functional Safety
- On Road Automated Vehicles
- Truck and Bus Automated Commercial Vehicle
- Vehicle Electrical System Security (CyberSecurity)
- Truck and Bus CyberSecurity

STANDARDS COMMITTEES:

- Automotive Electronic Systems Reliability
- Vehicle Architecture For Data Communications
- Vehicle Event Data Recorder
- Truck and Bus Event Data Recorder
- Safety and Human Factors incorporating Driver Vehicle Interface in Automated/Connected/ITS Vehicles.
- Adaptive Beam Lighting
- Truck and Bus Driver Distraction

Top Documents

- J2980 Functional Safety: Companion to ISO26262 for Automotive ASIL classifications
- J3018Safe Testing of Highly Automated Vehicles on Public Roads:
- J3016 Terms and Definitions: Levels of Automated Driving Systems: Being globally harmonized and adopted in ISO
- J2735: Dedication Short Range Communication Message Sets: Updated to include message sets needed for Signal Phase and Timing (traffic signaling) SPaT Map.
- J2353: Data Dictionary for Advanced Traveller Information Systems (ATIS)
- J2540/2: ITIS Phrase Lists (International Traveler Information Systems)
- J3061 WIP CyberSecurity in Balloting Stage expected publication 3rd qtr. 2015
- J3101 Requirements for Hardware-Protected Security for Ground Vehicle Applications (WIP)

Top Documents AV/CV/ITS

- J2395 ITS –In-Vehicle Message Priority
- J2808 Road/Lane Departure Warning Systems: Information for the Human Interface (WIP)
- J3083 Reliability Prediction for Automotive Electronics(WIP)
- J2988 Guidelines for Speech Input and Audible Output in a Driver Vehicle Interface (WIP)
- J2944 Operational Definitions of Driving Performance Measures and Statistics
- J3063* Active Safety Terms and Definitions
- J3088 Active Safety System Sensors
- J3087: Automatic Emergency Braking (AEB) underway for Crash Imminent Braking based on CAMP (Collision Avoidance Metrics Partnership) project

Connected Vehicles Communication and Message Standards: Dedicated Short Range Communication (DSRC) Protocol

A system of real time wireless communication (Wi-Fi) using Dedicated Short Range Communication (DSRC) in the 5.9Ghz band between:

- Vehicle to Vehicle (V2V)
- Vehicle to Infrastructure (V2I)





- Messages transmitted 10 times/sec (300m range)
- Basic Safety Message: vehicle position, speed, heading, acceleration, size, brake system status, etc.
- Privacy is protected (vehicle VIN and location is NOT recorded or tracked)

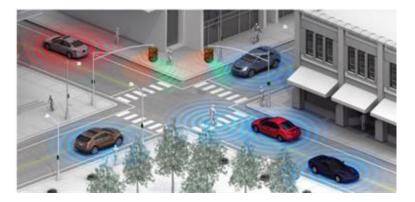
SAE DSRC Standards activities in Connected Vehicle: Supports expected National Highway Traffic Safety Administration expected V2V rulemaking

SAE J2735 – Dedicated Short Range Communications Message Set Dictionary

- Supports interoperability
- Defines standardized message sets
- Defines formats for basic safety message set dictionary
- Incorporates Signal Phase and Timing message sets (SPaT)
- SAE J2945 (WIP) Dedicated Short Range Communications Minimum Performance
 - Specifies minimum communication performance requirements
 - Defines message transmission rate, channel usage, optional data usage in various situations

Examples of In Vehicle Driver Alerts

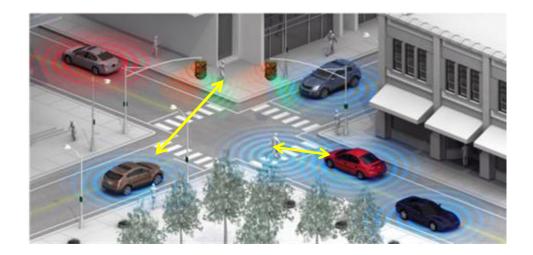
- Forward Collision Warning
- Emergency Electronic Brake Light
- Intersection Movement Assist
- Blind Spot Warning
- Lane Change Warning
- Do Not Pass Warning
- Right Turn in Front
- Signal Phase and Timing
- Curve Speed Warning



New DSRC Work in Progress for Vulnerable Road Users (Pedestrians/Cyclists/Disabled).

SAE J2945-9

To include Pedestrian Safety Messages (PSM) to support interoperability among various types of handheld devices, vehicles, and vehicle-pedestrian applications.



SAE Intelligent Transportation Systems (ITS) Standards Development and DSRC

SAE under 5 year contract with FHWA for ITS standards development

 Work performed by SAE contractors working in concert with the SAE DSRC Technical Standards Committee

New Work in Progress: J2945/6 for vehicle platooning using DSRC and Cooperative Adaptive Cruise Control Technology

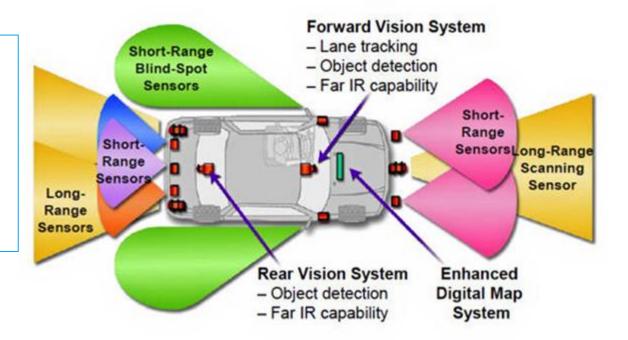
Developing Joint Standards activities with other strategic stakeholders and nontraditional partners:

 New project with Infrastructure on uniform pavement markings for optimizing machine vision systems for active safety technology: Lane Departure Warnings (LDW) and Lane Keeping Assistance Systems (LKA) SAE International's Functional Safety Committee completed a new, recommended practice intended to provide a global, harmonized approach for determining Automotive Safety Integrity Level (ASIL) classifications for vehicle level hazards and is consistent with guidelines provided in ISO 26262.

Reviews factors to be taken into account for determining the exposure, severity and controllability for a given hazard.

Automated Vehicles – Sensing Systems

Sensor quality / reliability & HMI are critical to the successful deployment of automated vehicles - SAE Functional Safety, Safety and Human Factors & Active Safety Committees are focused on these areas



J3018 Safe Testing of Highly Automated Vehicles on Public Roads: SAE's On Road Automated Vehicle Committee (ORAV)

Guidelines for the safe conduct of on-road tests of vehicles equipped with prototype conditional, high, and full (levels 3-5) *automated driving systems* (ADSs), as defined by SAE J3016.

Published May 2015



With the goal of providing common terminology for automated driving, SAE International's new standard J3016 delivers:

- Harmonized classification system and supporting definitions that:
- Identify six levels of driving automation from "no automation" to "full automation".
- Base definitions and levels on functional aspects of technology.
- Describe categorical distinctions for a step-wise progression through the levels.
- Are consistent with current industry practice.
- Eliminate confusion and are useful across numerous disciplines (engineering, legal, media, and public discourse).
- Educate a wider community by clarifying for each level what role (if any) drivers have in performing the dynamic driving task while a driving automation system is engaged.

Summary of SAE International's J3016 Levels of Driving Automation for On-Road Vehicles

SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/ Deceleration	<i>Monitoring</i> of Driving Environment	Fallback Performance of Dynamic Driving Task	System Capability (Driving Modes)
Human driver monitors the driving environment						
0	No Automation	the full-time performance by the <i>human driver</i> of all aspects of the <i>dynamic driving task</i> , even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	Driver Assistance	the <i>driving mode</i> -specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i>	Human driver and system	Human driver	Human driver	Some driving modes
2	Partial Automation	the <i>driving mode</i> -specific execution by one or more driver assistance systems of both steering and acceleration/ deceleration using information about the driving environment and with the expectation that the <i>human</i> <i>driver</i> perform all remaining aspects of the <i>dynamic driving</i> <i>task</i>	System	Human driver	Human driver	Some driving modes
Automated driving system ("system") monitors the driving environment						
3	Conditional Automation	the <i>driving mode</i> -specific performance by an <i>automated</i> <i>driving system</i> of all aspects of the dynamic driving task with the expectation that the <i>human driver</i> will respond appropriately to a <i>request to intervene</i>	System	System	Human driver	Some driving modes
4	High Automation	the <i>driving mode</i> -specific performance by an automated driving system of all aspects of the <i>dynamic driving task</i> , even if a <i>human driver</i> does not respond appropriately to a <i>request to intervene</i>	System	System	System	Some driving modes
5	Full Automation	the full-time performance by an <i>automated driving system</i> of all aspects of the <i>dynamic driving task</i> under all roadway and environmental conditions that can be managed by a <i>human driver</i>	System	System	System	All driving modes

ORAV: New Activities in On Road Autonomous Vehicles Standards Committee

2015 Panel/Committee Session at Transportation Research Board Autonomous Vehicle Symposium July 21-23 2015; UMTRI's New Mobility Transformation Center

Validation and Verification Task Force

Reference Architecture and Interfaces based on TARDEC AMAS (Autonomous Mobility Applique Systems) for fully automated truck platoons and convoys.

The SAE Vehicle Electrical System Security Committee, formed in 2011, is responsible for developing and maintaining Recommended Practices and Information Reports in the area of vehicle electrical systems' security. The committee's scope is on-board vehicle electrical systems that affect vehicle control or otherwise act contrary to the occupants' interests if the systems are manipulated by an attacker.

The goals of the 56 members committee are:

•To identify and recommend strategies and techniques related to preventing and detecting adversarial breaches, and

•Mitigating undesirable effects if a breach is achieved.

Vehicle Cybersecurity: SAE J3061 Cybersecurity Guidebook for Cyber-Physical Automotive Systems



SAE J3061 – Cybersecurity

SAE J3061 "Cybersecurity Guidebook for Cyber-Physical Automotive Systems"

Estimated publish time:1qtr 2015

J3101 "Requirements for Hardware-Protected Security for Ground Vehicle Applications"

Scope of SAE J3061

- Consistent with Process Framework for ISO 26262 Functional Safety Standard
- Contains automotive cybersecurity framework and processes
- Evaluates Threat Analysis and Risk Assessment (TARA) methods
- Simple approach to allow effective implementation across the automotive industry
- Contains elements of existing industry security standards
- Definitions, Acronyms, and sample templates provided

Scope:

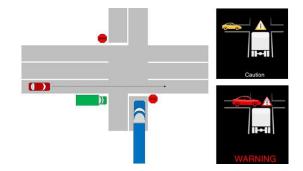
This Recommended Practice establishes a set of high level guiding principles for cyber security as it relates to automotive cyber-physical systems as well as establishes a framework lifecycle process for the incorporation of cyber-security in automotive systems. Additionally, this document provides information on some common tools and methodologies used when designing and validating cyber-physical automotive systems.

EC

Heavy Truck Commercial Vehicle Active Safety Standards Activities

V2V and V2I Applications for Heavy Truck Forward Collision Warning (FCW) Blind Spot/Lane Change Warning (BSW/LCW) Intersection Movement Assist (IMA) Emergency Electronic Brake Lights (EEBL) V2I – Curve Speed Warning (CSW)





Intersection Movement Assist (IMA)



Commercial Vehicles: Truck and Bus Committee Activities in Connected Vehicles: Active Safety.

J3045 Lane Departure Warning Test Procedure

Establishes a uniform, powered vehicle test procedure for lane departure warning systems used in highway commercial vehicles greater than 10,000 lbs.

Human Machines Interface (HMI)/Driver Vehicle Interface (DVI) challenges:

All warning systems (audio, visual and haptic) are being further researched:

• DVI design principles: Interfaces must be effective without increasing distraction

Phase 2: Companion Standard on Performance specifications

J3029 Forward Collision Avoidance and Mitigation (FCAM) System Vehicle Test Procedure

Establishes uniform powered vehicle test procedure for forward collision avoidance and mitigation systems used in highway commercial vehicles and coaches greater that 10,000 lbs.

HMI/DVI considerations similar to J3045

Phase 2: Companion Standard for Performance Specifications

SAE and Connected/Automated Vehicle Technology Intelligent Transportation Systems: On-Going Challenges

- Human Factors: Driver Vehicle Interface: Challenges in automation and automated driving systems
 - Distraction
 - Re-engagement
 - Cognitive overload
- System status: Integrated Vehicle Health Management Systems
- Functional Safety: Electronic Control Systems: Safety, Security. Reliability
- CyberSecurity
- Driver Education and Training
- Public acceptance
- Common Terminology and Taxonomy
- Liability Issues
- Policy Issues
- Funding (Infrastructure needs for Cooperative Intelligent Transportation Systems)

SAE and Connected/Automated Vehicle Technology Intelligent Transportation Systems: Challenges

- Legacy Vehicles and Mixed fleets on common roadways
- Data: Ownership and Privacy Issues
- Data Access: Aftermarket and Right to Repair
- Funding (Infrastructure needs for Cooperative Intelligent Transportation Systems)

SAE and Connected/Automated Vehicle Technology Intelligent Transportation Systems: New Areas in development

- Digital mapping not only for precise positioning of vehicles on the road, but potential for mapping and maintenance of the state and local highway assets
- V2I: Infrastructure approach needs to be sustainable over the long term vs. short term upgrades to existing networks
- Progressive integration using Vehicle Probe Data
- Uniform Roadway markings for machine reading to optimize integrated ADAS systems such as lane keeping assistance, lane departure warnings.

FOR ADDITIONAL INFORMATION ON COMMITTEE ACTIVITIES OR STANDARDS CONTACT:

mdoyle@sae.org

THANK YOU!