

ADAS

ADAS systems which rely heavily on image and sensor data, transport that information across sensor bridges to a controller via PCIe® and then rely on UFS storage systems for 3D Mapping. Teledyne LeCroy Protocol Solutions Group is the market leader in computing protocol expertise for a wide range of communication busses used in the connected car. Our tools provide users with an ability to debug, validate, and performance tune infotainment and ADAS systems with ease.

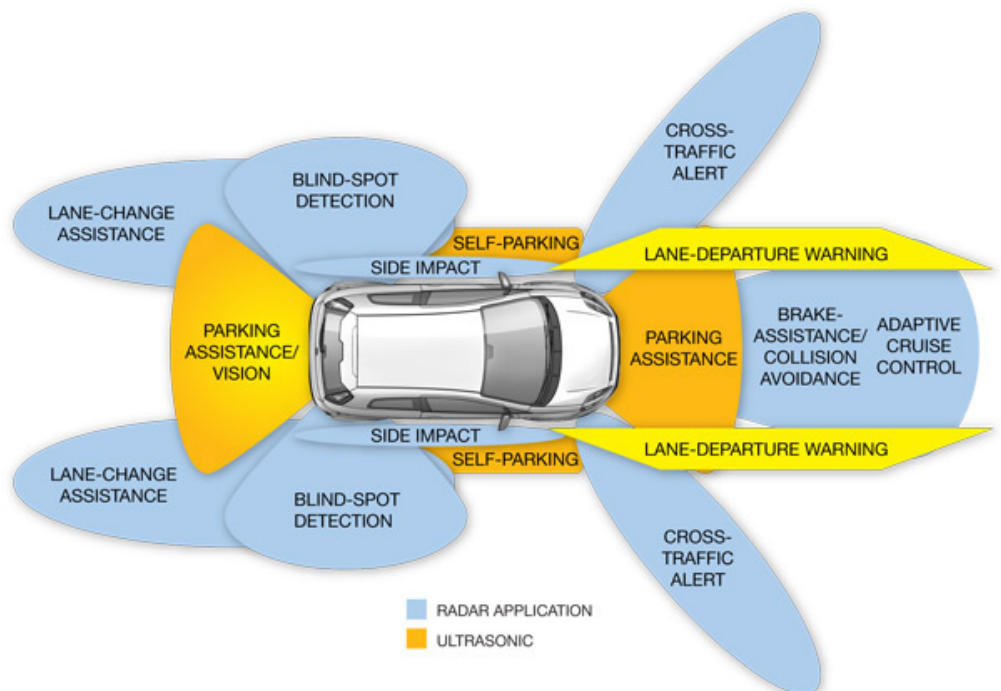
Sensors

- Camera
- Radar
- Lidar
- Ultrasonic
- Infrared
- Sensor Fusion

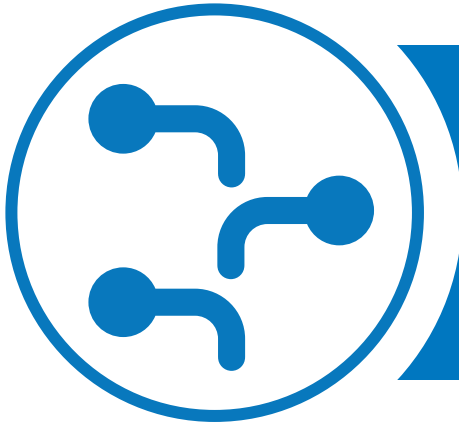
Processors

- ECUs
- MCUs

Actuators



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Control Busses

CAN remains the most used vehicle serial data bus. Many vehicle bus software architectures are very message dense, and data for a single message is spread across multiple data bytes.

On-Board Diagnostics II (OBDII)

Standardized series of diagnostic trouble codes (DTCs), via fast digital communications ports

Control Area Network (CAN)

In-vehicle networks controlling window/seat operation, engine management, brake control, etc.

CAN-FD

In-vehicle networks using flexible data (FD) rates

FlexRay

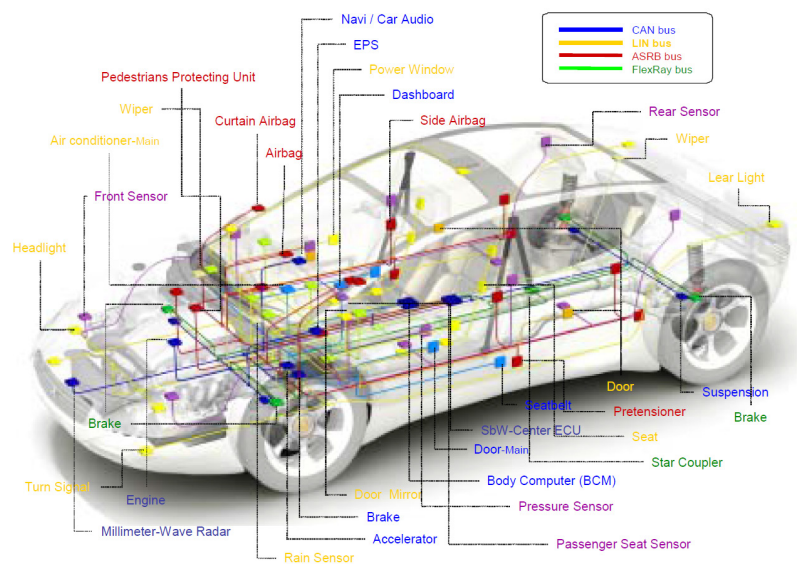
High-speed serial communications – steer-by-wire, brake-by-wire, etc.

Media Oriented Systems Transport (MOST)

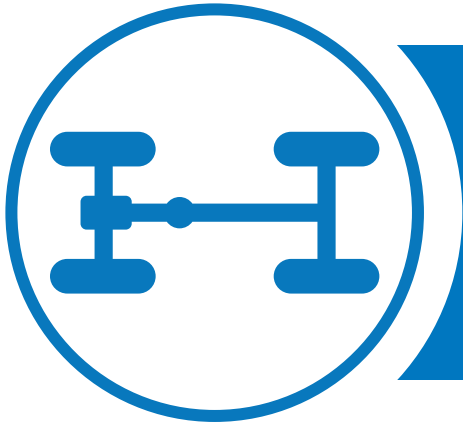
Fiber optic network – optical solution for car infotainment (radios, CD, DVD, and GPS) systems

Automotive Ethernet

High speed, Ethernet technology for delivery of subsystem data



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Powertrain

Teledyne LeCroy Test Services specializes in precision torque measurement and calibration solutions for automotive powertrain development testing. Our custom-engineered torque sensors deliver high-frequency data from engines, motors, transmissions and other rotating drivetrain components. These products utilize robust non-contact, wireless data-transmitting telemetry technology.

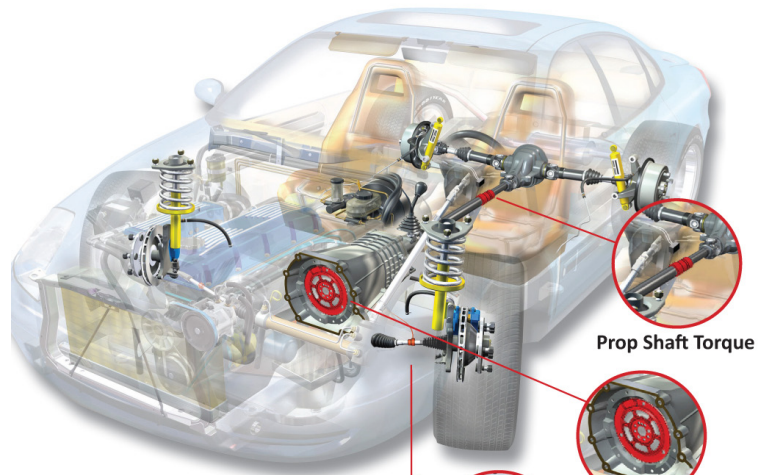
Engine Torque

- Engine Mapping
- Transmission Development
- Hybrid Powertrain Development
- Torsional Analysis
- Racing Vehicles
- Fleet and Customer Use Testing

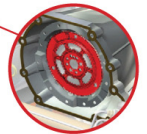


Prop and CV Shaft Torque

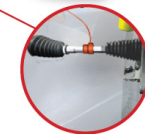
- Transmission Development
- Engine Development
- Powertrain Torque Monitoring
- Traction Control
- Fleet and Customer Use Testing
- Racing Vehicles



Prop Shaft Torque



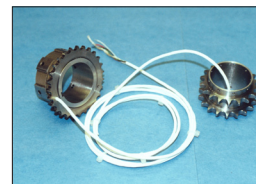
Engine Torque



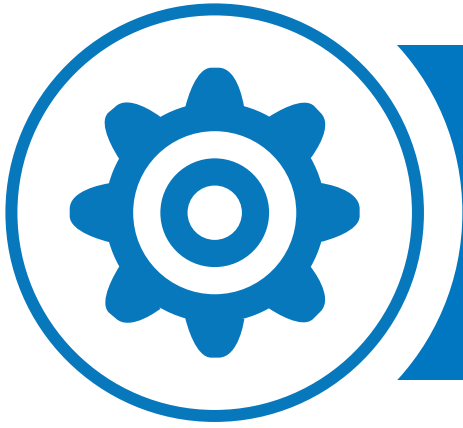
CV Shaft Torque

Other Torque Sensing Applications

- Engine Crankshaft
- Camshaft
- U-Joint and Driveshaft Yoke
- Timing Chain Tension
- Internal Gaging of Solid Axles



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Motor Drive

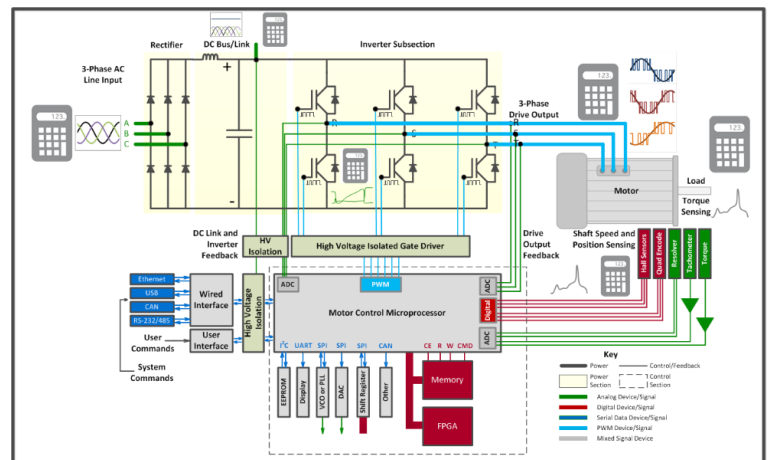
Motors are everywhere in our world, and nowhere more so than in our vehicles. For example, when's the last time you had to crank a car window up and down to pay a highway toll? Or, for that matter, when did you last manually adjust the seat position or rear-view mirror angles? These aspects of vehicles are all typically motorized these days.

Complete Drive System Debug

- 8 analog input channels
- Three-phase power analyzer

Dynamic Drive Response Analysis

- Three-phase power system values
 - Real power
 - Apparent power
 - Reactive power
 - Power Factor
 - Phase Angle
 - Efficiencies
 - Various voltages
 - Current and mechanical parameters



Comprehensive Motor Mechanical Integration

- Brushless DC (BLDC) hall sensors
- Quadrature Encoder Interface (QEI)
- Resolvers
- MSO Digital Inputs
- Analog Torque load cells
- Analog /digital tachometers



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Cyber Security

Security for complex security systems is a collaborative effort, requiring a holistic approach, with the involvement and contribution of the supply chain and the broader ecosystem. Unlike traditional computer systems, initiation and consequences in both the cyberworld and the physical world are possible over vehicle attack surfaces, making it more challenging to protect the vehicle's systems.

Smart Phone integration

Bluetooth®, Wi-Fi, USB, NFC

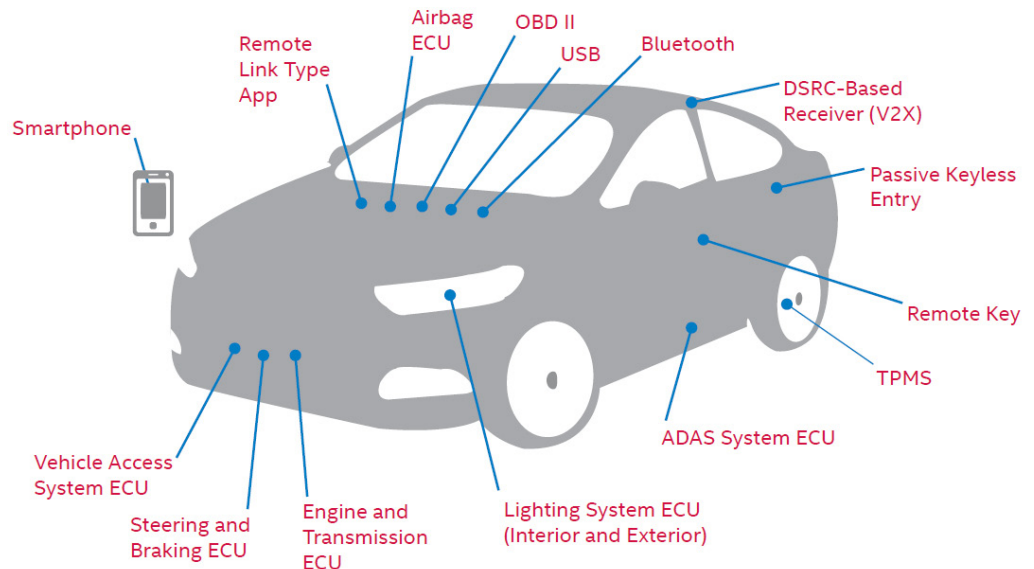
Engine Control Units (ECUs)

Vehicle Access System, Steering and Braking, Engine and Transmission, Lighting System (interior / exterior), ADAS System, Airbag

Onboard Diagnostic Systems (OBD II)

Remote Links

Dedicated Short Range Communications (DSRC)



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Infotainment

Today's connected car relies on many standard protocols and specifications. Infotainment systems are essentially a tablet or laptop motherboard customized for automobile entertainment and information delivery. These head unit / DCU motherboards support PCI Express®, USB, SATA, UFS, Bluetooth®, Wi-Fi as well as HDMI and DisplayPort.

Entertainment

- Bluetooth
- Wi-Fi
- HDMI

Communication

- Bluetooth
- Wi-Fi

Connectivity

- Bluetooth
- Wi-Fi
- USB
- HDMI
- NFC
- PCI Express

Storage

- DDR
- SAS / SATA
- USB
- UFS

