



Explore the Car



FIND
TARGET





Safety

The end stop for Safety is zero accidents and zero fatalities. To achieve that goal, cars need to use more safety systems, which are increasingly being carried out by electronics. The electronic systems need to be safe, so that they protect the driver, other cars and pedestrians in the event of a malfunction.

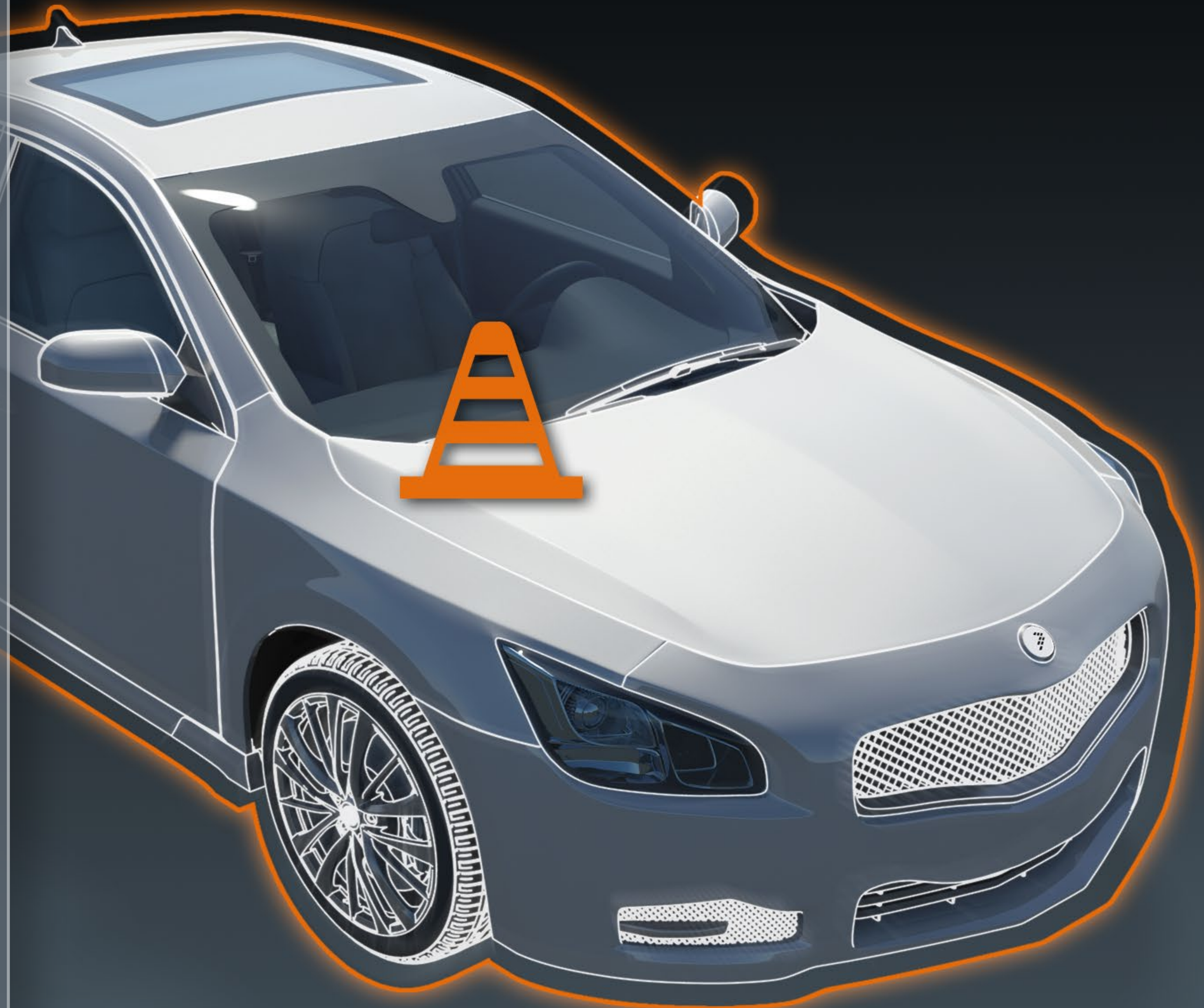
The Internet of Tomorrow View:

Having these safe electronic systems in the car enables the transition to fully autonomous cars and mobile spaces.

Freescale Technology:

- Freescale is a leading supplier of safety solutions for MCUs, Analog and Power Management ICs, Sensors and SW
- ISO 26262 developed products
- Freescale's SafeAssure program helps customers find better suited products for safety critical applications
- Key applications targeted: powertrain, body, chassis, radar, vision and sensor fusion

Freescale recommends: SafeAssure program





Security

There is no safety without security. Designers must anticipate every form of attack to prevent access to embedded systems and data.

The Internet of Tomorrow View:

Trusted data must be at the heart of every node that connects to the IoT. Users must have control over their data, along with assurances of data privacy.

Freescale Technology:

Freescale secures more types of end equipment than virtually any other semiconductor company. Freescale MCU, MPU, and DSP product lines utilise the following capabilities:

- Cryptographic Technology
- Trust and Platform Assurance Technology, authenticating and encrypting information
- Expertise in security inherited from high-end networking industry

Freescale recommends: Security Technology, i.MX, QorIQ, S32





Automotive Quality

Rebooting your phone or game console if the application crashes is common place. That is not an option for your car.

The Internet of Tomorrow View:

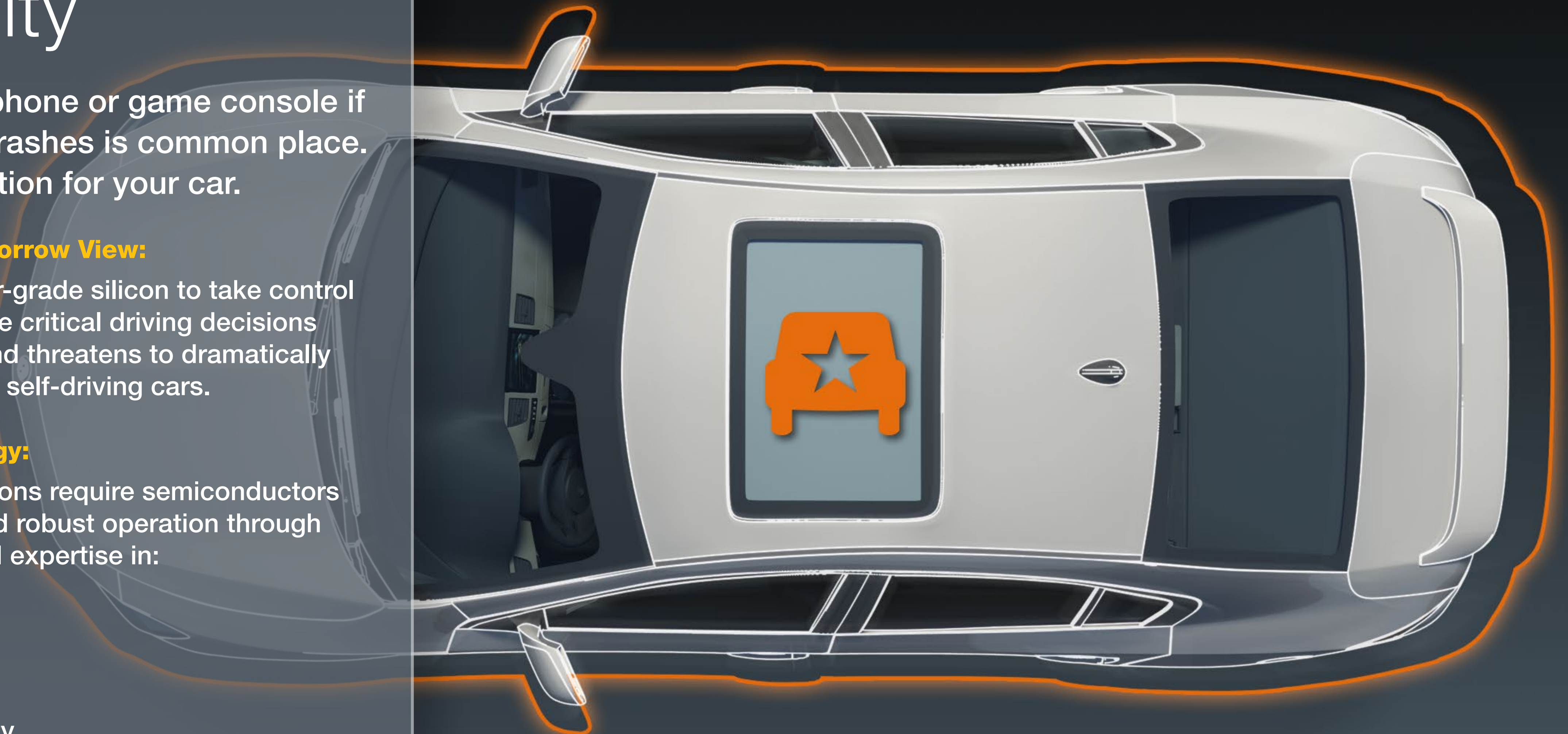
Relying on consumer-grade silicon to take control of a vehicle and make critical driving decisions endangers drivers and threatens to dramatically slow the evolution of self-driving cars.

Freescale Technology:

Automotive applications require semiconductors with zero defects and robust operation through deep investment and expertise in:

- Silicon technology
- Test conditions
- Silicon reliability
- Packaging reliability
- Functional Safety
- Security
- Support and Logistics

Freescale recommends: Freescale Quality, S32





Vehicle to Vehicle/ Infrastructure (V2X)

V2X (Vehicle to Vehicle, Infrastructure or Person) is a wireless technology that allows cars to communicate with nearby cars, roadside objects or people to share information in the IoT.

The Internet of Tomorrow View:

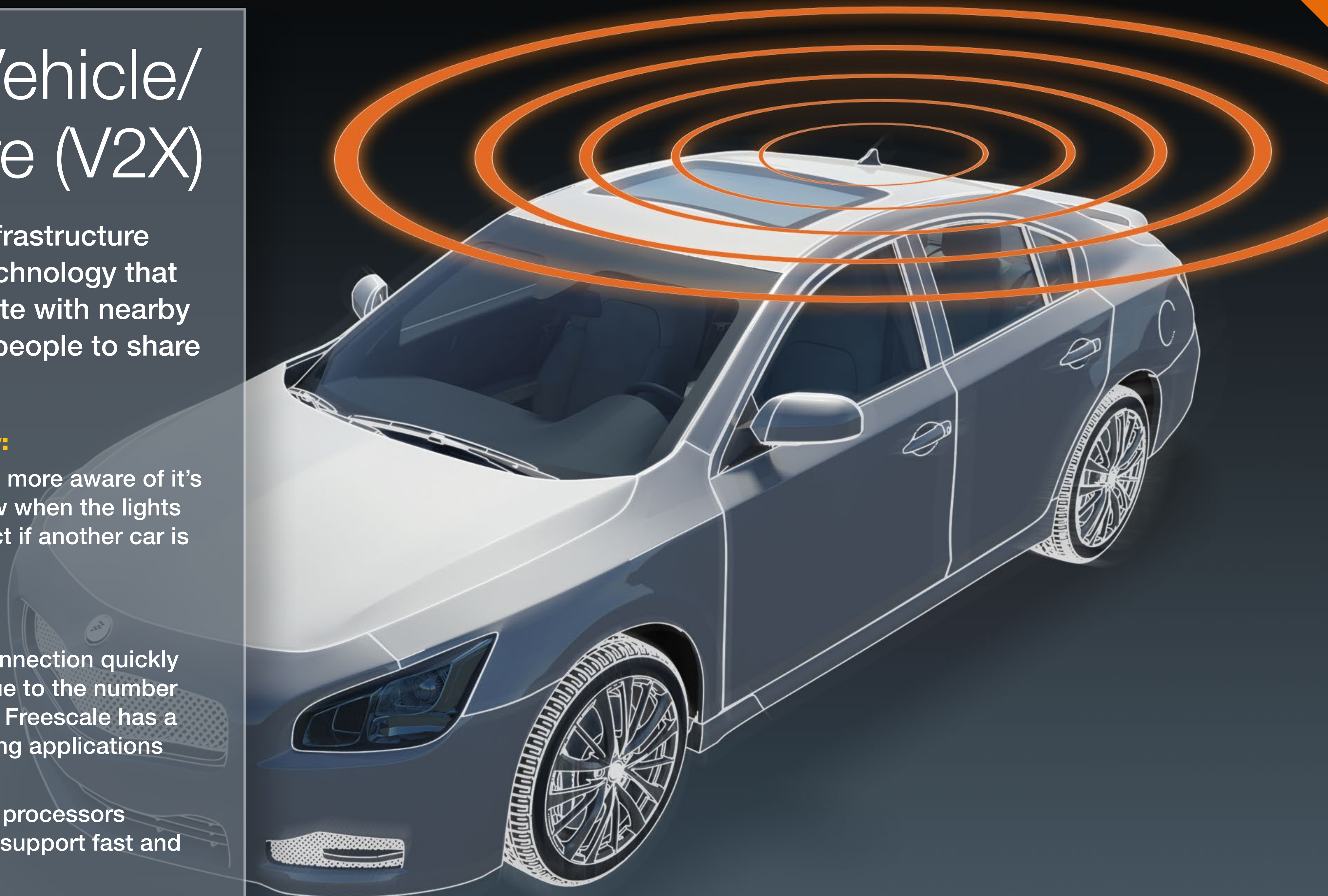
This will result in each car being more aware of its environment, being able to know when the lights are about to change or to predict if another car is on a collision course.

Freescale Technology:

Securing and analyzing each connection quickly is essential in urban settings, due to the number of vehicles, objects and people. Freescale has a strong heritage in high performing applications processors providing this.

- High performance application processors running complex analytics, to support fast and safe decisions
- Secure and trusted architecture, authenticating and encrypting information

Freescale recommends: i.MX 6 Series





Sensor Fusion

Fusing internal and external car sensor inputs provides better data that assists in the prevention of accidents, as it decreases driver and system response times and improves data accuracy.

The Internet of Tomorrow View:

A fusing of sensor inputs e.g. from wheel, vision, stability control and V2X inputs, can establish with a very high level of certainty the road conditions in real time (e.g. icy or not). The data becomes trusted. Correct and safe decisions are made.

Freescale Technology:

Sensor fusion requires;

- MCUs designed to meet the stringent levels of automotive reliability
- MCUs with functional safety built-in from the ground up
- MCUs that have security
- The S32 Vision and Sensor Fusion ADAS processor uniquely delivers all three of these must-have sensor fusion requirements.

Freescale recommends: S32V234





Radar

Radar technology supports systems like collision warning. In a collision warning system, the radar chipset can; detect and track objects, adjust the vehicle's speed in response to the traffic ahead, trigger a driver warning and can initiate emergency braking intervention.

The Internet of Tomorrow View:

Radar performs its role, even in poor weather and light conditions, and when fused with other sensor inputs provides the high level of safety required to enable the goal of zero fatalities and self-driving cars.

Freescale Technology:

- Freescale offers a complete and optimised radar solution that supports the roll out of this technology for all mainstream cars
- Freescale's complete solution is the high-performance multicore MPC577xK MCU combined with freescale's 77 GHz radar transceiver chipset

Freescale recommends: MPC577xK, MR2001, and S32





Vision

Having multiple cameras around the vehicle acting as virtual eyes for the driver, extends the field of view considerably, improving the driver and vehicle's ability to identify danger sooner and respond accordingly.

The Internet of Tomorrow View:

Seeing is believing. Real time images from cars can be shared with the IoT, and be used for many purposes such as traffic management and emergency response.

Freescale Technology:

ADAS camera systems can analyze the video content for systems like; lane departure warning, automatic lane keeping assist, headlight control, traffic sign recognition and object detection and classification.

Freescale's MCU and MPU families provide the functional safety, security, computing performance, graphics and video processing, memory size scalability and communication interfaces required for all camera applications within the vehicle.

Freescale recommends: S32V, i.MX 6 Series, MMPF0100





External Connectivity

The vehicle's connectivity to the outside world is provided by the telematics unit, enabling it as a key node on the IoT.

The Internet of Tomorrow View:

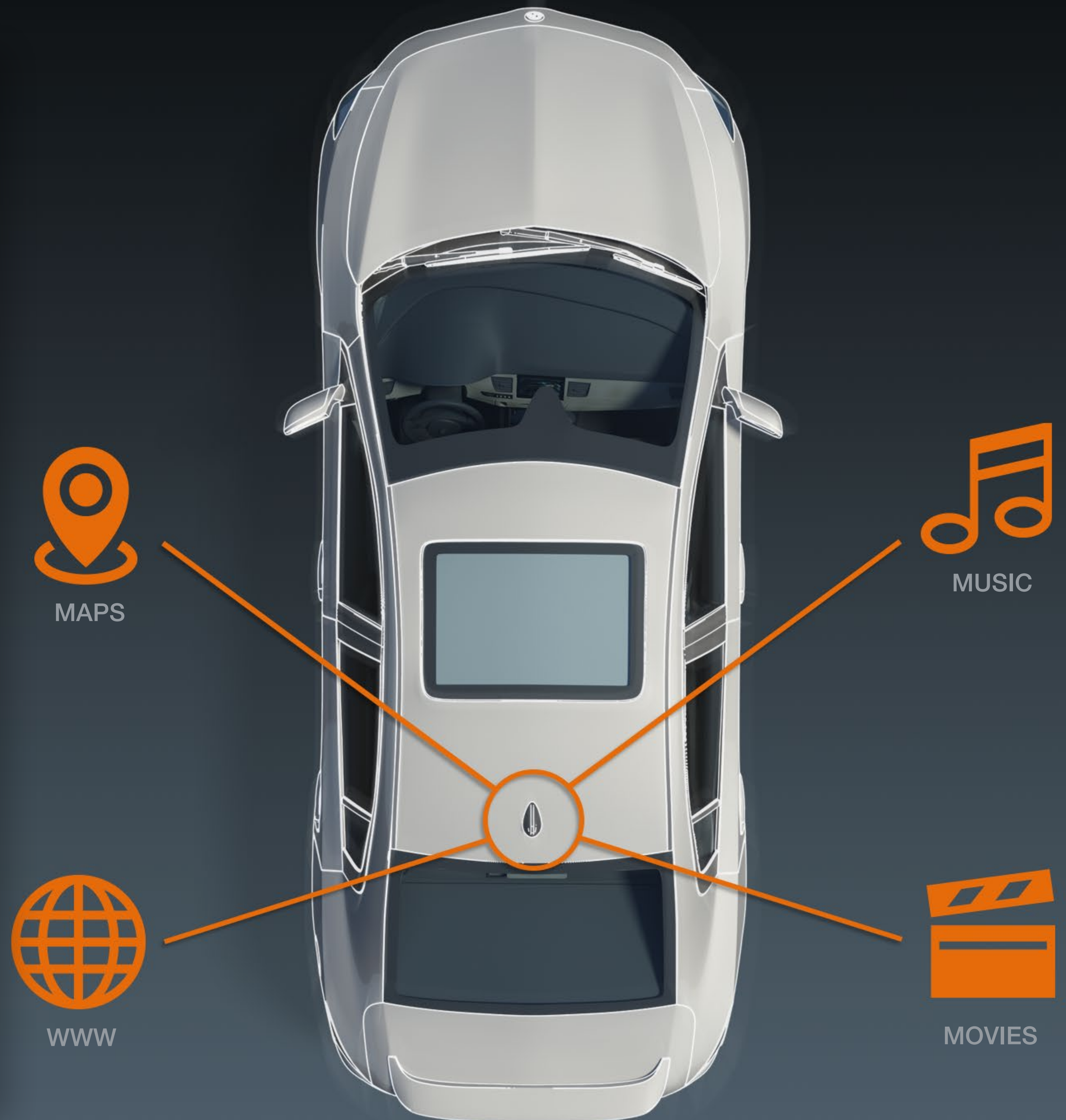
Sharing the information that the vehicle gathers is pivotal to enable the Internet of Tomorrow. Secure and seamless external connectivity will open up the doors for this information sharing.

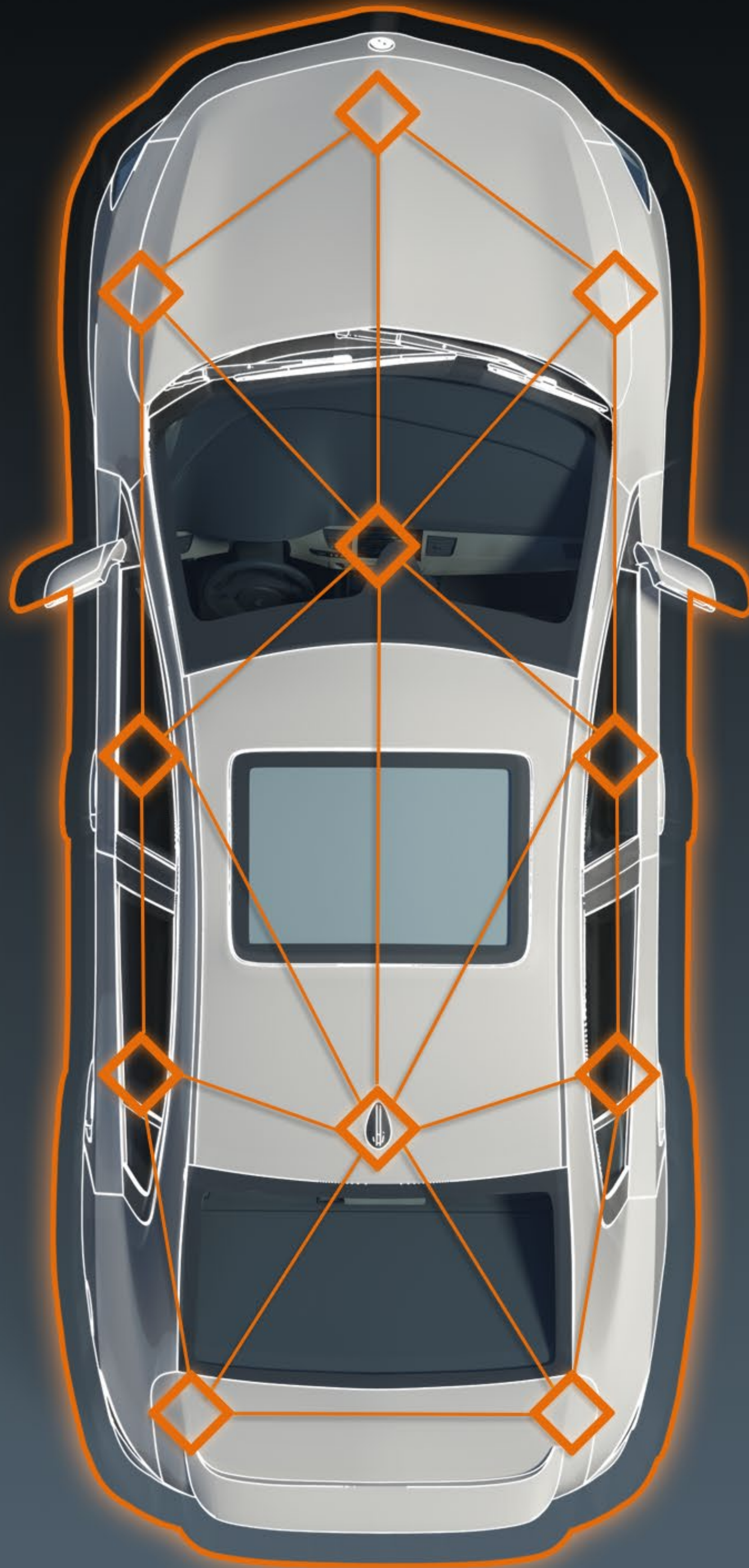
Freescale Technology:

Freescale's legacy of networking expertise has transcended to the vehicle, providing software and hardware solutions for each step in the connection — from the vehicle, through the network, to the OEM and beyond.

- Packet Processing Acceleration
- Enabling seamlessly WiFi and Cellular experiences
- Secure and trusted architecture, authenticating and encrypting each connection

Freescale recommends: LS102x Series, i.MX 6 Series





Internal Connectivity

Internal automotive networks (Ethernet, CAN, LIN) allow the different electronic systems to communicate with each other. The Gateway processor is the bridge between the electronics in the vehicle and the outside world.

The Internet of Tomorrow View:

The Gateway accepts IoT information from the sensor fusion system, and repackages it to be securely shared with the cloud based IoT systems outside the vehicle.

Freescale Technology:

Freescale have been supplying the industry with leading Automotive Gateway microcontrollers for many generations. This technology enables:

- Advanced Automotive Ethernet solutions
- Embedded solutions for Automotive security standards (SHE-High)
- Intelligent energy efficient modes of operation

Freescale recommends: MPC5748G Series





Multimedia

Videos, audio and apps are available through the infotainment unit, bringing the home entertainment experience into the vehicle.

The Internet of Tomorrow View:

The infotainment unit establishes the vehicle as the largest connected device you own, securely connecting it your entertainment, home and office content, for a seamless connected experience.

Freescale Technology:

Freescale's application processor portfolio delivers high performance processing, using an industry supported platform, in a secure and trusted architecture that protects your privacy.

- High performance application processors
- Wide partner ecosystem, providing complete solutions
- A strong focus on voice and gesture control to minimize distraction whilst driving
- Seamless integration to cloud services and apps

Freescale recommends: i.MX 6 Series, Vybrid Series, MMPF0200



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Heads Up Display

The heads up display delivers information to the driver through messages projected onto the windscreen, eliminating the need to take the eyes of the road.

The Internet of Tomorrow View:

As autonomous vehicles progress, heads up display will transform how users interact with the vehicle. The information being displayed will migrate from driving based content, towards interactive services and multimedia being projected onto the vehicle's surfaces.

Freescale Technology:

Freescale have a portfolio of automotive-ready display controllers, targeting highly efficient 2D graphics, up to complex, highly responsive 3D graphics.

- Advanced GPUs targeting up to 4K resolution
- Low memory footprint image warping for varying screen surfaces
- Automotive Safety compliance (ISO26262)

**Freescale recommends: MAC57D5xx,
i.MX 6 Series**





Chassis

Chassis controls the movement of the car, whether through brakes, steering, suspension and stability/traction systems and manages the protection of car occupants and pedestrians through airbags and crash sensors.

The Internet of Tomorrow View:

Ensuring the journey of today and tomorrow is safe and comfortable relies on the Chassis system. It will act upon the decisions made by the Sensor fusion system and provide vital car and road conditions to the IoT.

Freescale Technology:

Freescale has created highly innovative integrated systems for advanced chassis and safety systems;

- Dual and Multi core 32-bit controllers for ISO26262 (up to ASIL-D) standard for safety critical automotive applications
- Advanced chipset solutions, with integrated sensor technology, for increasing performance and lowering costs in high volume airbag systems

Freescale recommends: Chassis and Safety, MPC574xP, MC33907, Freescale Sensors





Powertrain

The powertrain system generates the motion of the vehicle, whether through an engine or an electric motor.

The Internet of Tomorrow View:

The powertrain system is able to measure how much pollution a vehicle is creating. Sharing this information with local and national agencies enables a real-time understanding of the environmental impact of vehicles, allowing them to take action (like re-routing traffic) to improve the quality of air we breath.

Freescale Technology:

Freescale have been in powertrain systems since the introduction of electronic control, over 30 years ago. The technologies introduced by Freescale have help achieve more eco-friendly and fuel-efficient driving for the future.

- High performance, real-time processors
- IC Drivers for injectors and motors
- Automotive safety (ISO26262)
- Automotive quality to survive harsh environments

Freescale recommends: MPC57xx Series, MC33905, MC33810





Body

The body electronics are scattered throughout the vehicle controlling a wide variety of the items you see and touch, from the door locks, to the air conditioning, to the lighting.

The Internet of Tomorrow View:

The body electronics leverage a wide variety of information that can help frame the context of the vehicle. Examples would include: passenger occupancy, drowsiness levels, outside light levels and rain detection.

Freescale Technology:

Freescale brings industry leading low power cores into the body electronics market. These enable energy efficient body applications, resulting in more eco-friendly and fuel-efficient mobility for the future.

- Ultra low power operation
- Comprehensive 5V automotive peripheral set
- High integration of microcontroller and analog products
- Automotive quality to survive harsh environments

Freescale recommends: Kinetis EA Series, MagniV Series, Freescale Sensors





IBM Partnership

Trusted partnerships in the Internet of Tomorrow will be paramount. Sharing, securing and transforming information will span different markets and form disruptive partnerships to deliver IoT solutions.

The Internet of Tomorrow View:

Freescale and IBM offer a complementary trusted partnership for the Automotive IoT—providing secure solutions at every stage in the IoT.

IBM technology supporting the Automotive IoT Cloud includes:

- Secure streaming of high volume, mobile data to the cloud
- BlueMix platform for complete IoT development in the cloud
- Predictive and Diagnostic Analytics

For more information, visit
<http://www.ibm.com/Automotive>

