Visteon At A Glance

Leading supplier of cockpit electronics and autonomous driving systems to carmakers across the world

$3.15B annual sales
10,000 employees
18 countries

20 manufacturing locations
18 technical centers

Leading the transition of the cockpit to a smart, learning, digital assistant
The Transformation of Visteon

2012 Sum of Parts
- Exit non-core business to focus on cockpit electronics

2015 Cockpit Electronics Pure Play
- Acquired JCI auto electronics
- Streamlined cockpit electronics products and technologies

2018 Smart Digital Mobile Assistant
- Launched cockpit domain controller
- Introduced autonomous driving controller
Industry-Leading Cockpit Electronics Product Portfolio

Rapidly growing in infotainment and domain controller solutions

Visteon Market Position

Top 5
Connected car Tier 1 supplier

#1
Digital clusters

#2
Center stack displays

Source: Rankings from 2016 ABI Research and IHS Markit.
Visteon Technology Portfolio

Cockpit Domain Controllers

Leading cockpit domain controller solution in industry with two launches in 2018

Connected Infotainment

Innovative HTML5 and Android connected infotainment solution

Autonomous Domain Controllers

Scalable open autonomous driving solution for Level 2-5 systems

Next-Gen Cockpit Displays

Advanced curved displays with integrated sensor technology

Artificial Intelligence for Cockpit

Automotive voice smart assistant and driver monitoring based on Artificial Intelligence
Autonomous driving technology requires centralized processing of sensor data.
Visteon’s DriveCore™

Visteon’s Autonomous Driving Platform

• DriveCore™ Compute: Modular and Scalable Design with SoC Flexibility

• DriveCore™ Runtime: Safe Communication and Easy Integration in Vehicle

• DriveCore™ Studio: OPEN for Common end to end Development
DriveCore™ Compute
DriveCore™ Compute — Scalable Concept

Key Architectural Differentiators

- Modular design with full HW scalability on system level
- Scalable by using different SoC/VIP from same family
- Scalable in every direction: performance, safety, ability...
- Flexible standardized mechanical designs for car thermal environment
- Highly dynamical workload and data sharing concept
- Ultra low latency (μs level) for communication among SoCs and VIP(s)
- Failsafe (L2-L3), fault tolerant (L4-L5), ASIL compliant
- Straightforward productized adaptation for cost-down in serial production
DriveCore™ — Scalable Concept for Flexible Development

Fail safe and fault tolerant Base Boards: Power supply redundancy, CAN redundancy, Central PCIe
Computing and safety carriers: Daughter boards with integration of different SoCs vendors
Flexible development combined with straightforward productized adaptation

DriveCore™ — Productized Adaptation

Modular computing carrier #1

Base board with customer specific form factor

Modular computing carrier #2

A-Sample Unit

B-Sample Unit
DriveCore™ Compute – SoCs partners

- DriveCore™ Compute enables flexibility in SoC selection and cohabitation
- Facilitate up-integration, SoC evaluation and performance comparison
- SoC selection based on Customer and Projects needs
- Visteon SoC partners:
DriveCore™ Runtime
DriveCore™ Runtime – Overview

**Framework:**
- Sandboxing Algorithms
- Environment Model
- Sensor Agnostic

**OPEN APIs:**
- Interfaces to sensor data, localization, vehicle data
- Common API - compatible with ROS2
- C, C++ & Python

**Communication Layer:**
- Real Time Pub Sub (RTPS) based protocol
- Multitude of transport interfaces - Network, IPC, Shared Memory
- Optimized for central processing
- Cyber secured

Optimized with IPC based transport and zero copy interfaces

Enhanced for multi-core multi-processor architectures

Maximize performance by leveraging native accelerators

Time synchronized execution pipeline

Secure communication & sensor network
DriveCore™ Studio
DriveCore™ Studio: Supporting the full Development Process

End-to-End Data Processing and Development
DriveCore™ Studio

Enables fast and distributed development of AV algorithms

Configure visualizations
- Plots, Logs, Rviz.

Log perf. data
- Record & play

Analyze logged perf. data

Compare alg. perf. & accuracy

Real-time data profiling
- CPU, MEM, Latency, Accuracy...

Real-time alg. profiling

Simulated sensor data
- Carla

Sensor Data management
- Download/Upload

Middleware abstraction

Online Help

DriveCore™ Perspective(s)

DriveCore™ Runtime config.

Algorithm Profiling

Real-time sensor data
DriveCore™ Studio Cloud provides online access to the DriveCore Studio functions from a public cloud environment

- Web based portal
- Provides REST API for pushing DriveCore Studio artefacts to the cloud
- Public (Microsoft Azure, Amazon AWS) and Private (OEM) cloud support
- Activity and cost analysis dashboard for cost transparency for the usage of resources
- Automation of developer’s current workflow in the cloud
- Automating the Quality Assurance process for Algorithms validation and regression testing
- Analytics on executions to benchmark algorithm performance and results
- Performance metrics – CPU, Memory, GPU, Latency, Accuracy
- Record the virtual execution in an Output Rosbag
- Engineering Workstation integration
- Cloud repository for Launch files, Rosbags and Algorithms
- Validation of the uploaded content
- Hardware in line for real world testing
- User access management
ADAS Platform // Feature Roadmap

<table>
<thead>
<tr>
<th>Comfort</th>
<th>Safety</th>
<th>Parking</th>
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</thead>
<tbody>
<tr>
<td>Q1 2019</td>
<td>Warning Functionality FCW, LDW, Cross Traffic Assist</td>
<td>Automated Valet Parking (AVP) to pre-defined spot</td>
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<tr>
<td>Q2 2019</td>
<td>Proving Ground Testing</td>
<td>Dynamic re-routing</td>
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<tr>
<td>Q3 2019</td>
<td>Field Test Feedback</td>
<td>Map download</td>
</tr>
<tr>
<td>Q4 2019</td>
<td>Field Test Feedback</td>
<td>AVP indoor</td>
</tr>
</tbody>
</table>

- ACC + LCC
- Intelligent Speed Control
- Stop & Go in Traffic Jams
- Driver Initiated Lane Change
- Automate Lane Change
- Highway Pilot
- Field Test Feedback
- Construction Zone Assist
- Merging on Highways
- Driver Monitoring
- Safe Stop
- Take Over Management
- Validation
- Maturing
- Field Test Feedback

- Active Steering (LKA)
- Active Braking (AEB)
- Functional Safety Validation
- Evasive Steering Assist (ESA) for Pedestrian Detection
- Interaction AEB and ESA
- ESA for High-Speed Object Avoidance

- Automated Valet Parking (AVP) to pre-defined spot
- Dynamic re-routing
- Map download
- AVP indoor
- Create Local Map Online
- Follow Pre-Trained Path
- Field Test
- Find Parking Spot
- Remote Control and HMI
- Usage of ISO-Standard Interfaces for Parking Garages
Visteon addressing L3 Highway Pilot

Visteon L3 Highway Pilot
L3 Highway Pilot Environment Model

Environmental Model consisting of fused moving objects and fused lanes