

Evolution of AI Integration in Vehicles

Phase 1: Connect

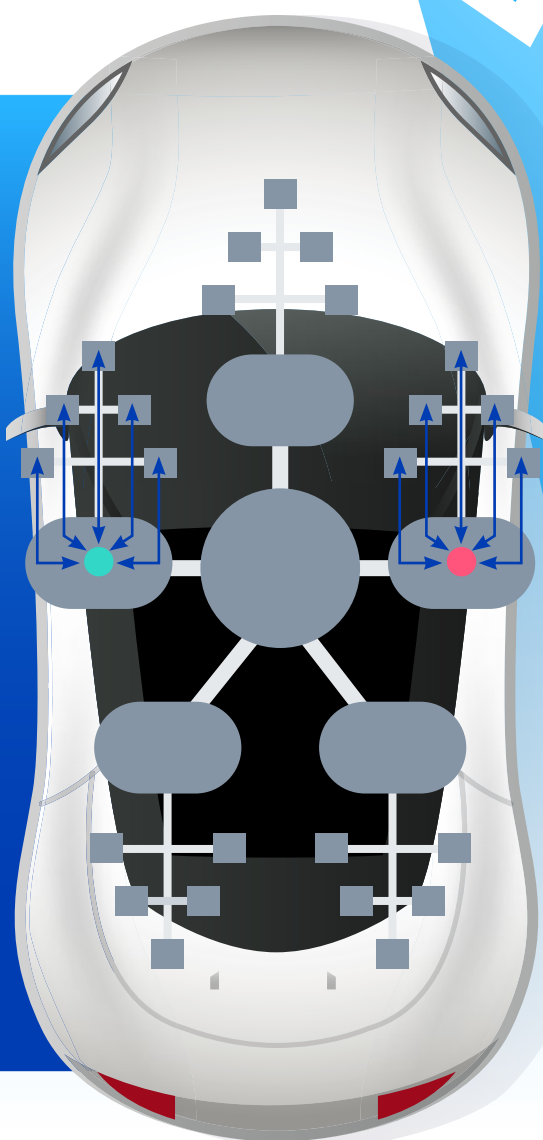
Function-Specific AI



- E/E Architecture: Distributed
- Computing Resources: Highly constrained (small ECUs)
- Key Characteristic: Isolated AI systems scattered throughout vehicle systems
- Example: Separate modules for parking, lane detection
- Impact: High redundancy, severely limited AI capabilities

Phase 2: Augment

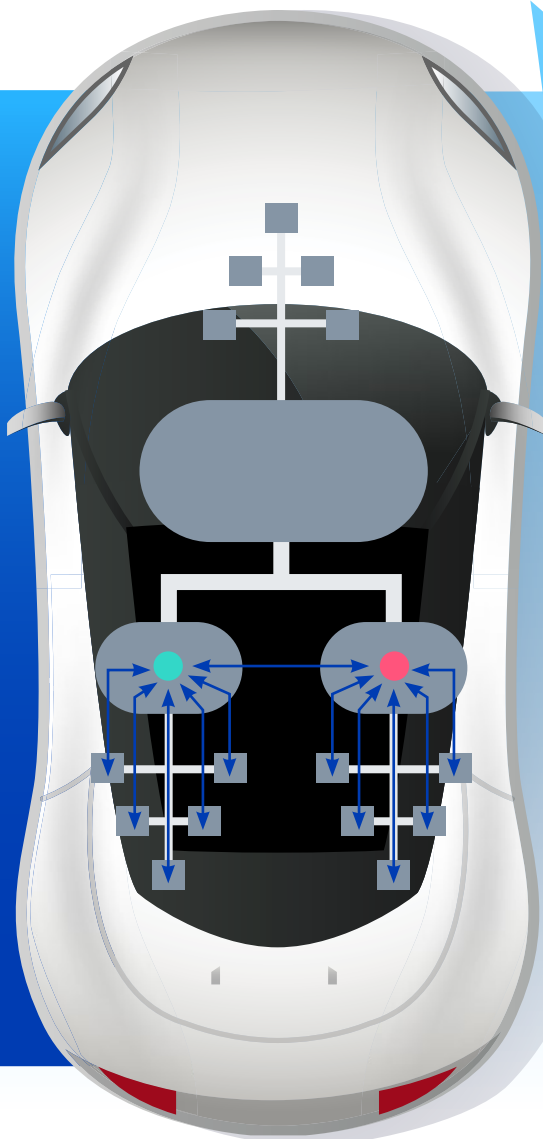
Domain-Consolidated AI



- E/E Architecture: beginning of domain controller centralization
- Computing Resources: Domain-specific
- Key Characteristic: Unified within domains
- Example: Single AI managing all ADAS functions
- Impact: Reduced redundancy, domain-optimized capabilities

Phase 3: Automate

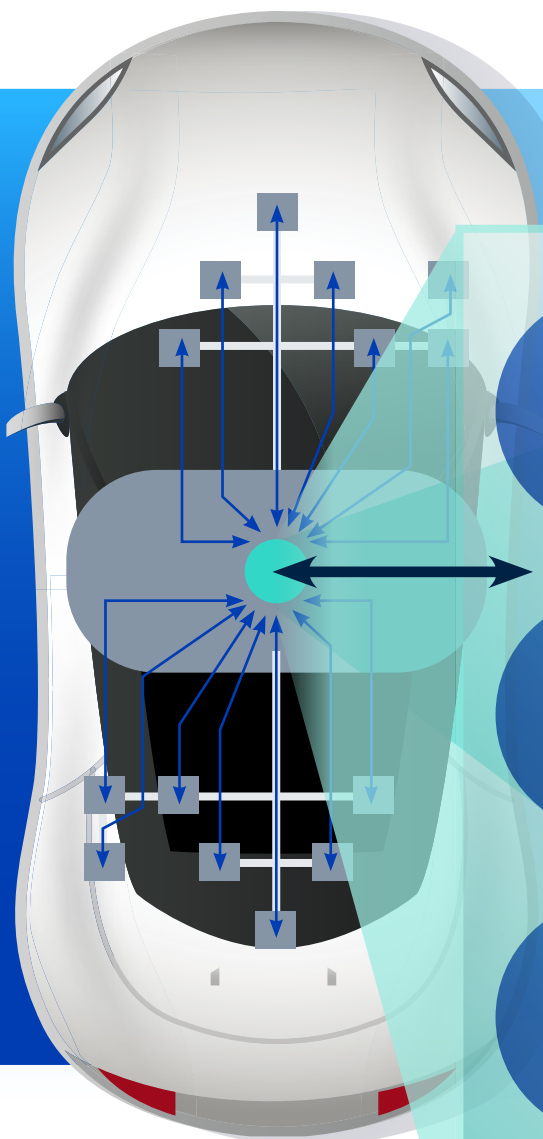
Cross-Domain AI Framework



- E/E Architecture: beginning of zonal implementation/hybrid zonal
- Computing Resources: Shared across connected domains
- Key Characteristic: Multi-domain integration
- Example: Connected cockpit and ADAS systems capabilities, cross-domain diagnostics and performance monitoring
- Impact: Enhanced insights, resource sharing across domains

Phase 4: Integrate

Unified AI Platform



AI Vehicle-Level Integration: AI connects internal vehicle systems (bi-directional communication)

Developer-Level Integration: Unified and standardised AI platform enables cross-domain development and deployment of AI agents and AI applications.

Industry-Level Integration: AI agents interface with broader ecosystems (other vehicles (V2X) and IoT, smart cities, robotics devices)

The Three-Dimensional Integration Model within SDV Phase 4 (Integrate)

- Architecture: Full zonal architecture/Centralized Computing
- Resources: Dynamically allocated across entire vehicle or even the cloud
- Key Characteristic: AI-Led Software Architecture that has AI as the central orchestrator of vehicle functionality rather than a component
- Example: AI agents with full sensor/actuator access plus cloud and external device integration
- Impact: Maximum efficiency, maximum and flexible insight collection, flexible resource allocation, ecosystem integration, exponential innovation through developer ecosystem

SDV Maturity Phase

Evolution Benefits:

- ➡ Increasing available computing power ➡ Growing computational flexibility ➡ Expanding AI capabilities ➡ Optimizing resource utilization ➡ Enhancing vehicle intelligence ➡ Enabling ecosystem connectivity