

## How do you add more intelligence to a two-wheeler without adding more complexity?



The modern two-wheeler is evolving into a connected, intelligent mobility platform. Riders now expect digital cockpits, smartphone connectivity, keyless access, battery intelligence, navigation, and over-the-air (OTA) updates—not just reliable transportation. At the same time, manufacturers are challenged to deliver these innovations while optimizing cost, weight, packaging, and power efficiency.

This transformation is accelerating alongside the rapid growth of electric two-wheelers. McKinsey estimates that the global two-wheeler market will reach **US\$218 billion by 2029**, with **30% of all two-wheelers sold globally expected to be electric by 2030**. As vehicles become increasingly software-driven, the underlying electronic architecture must evolve to support this next generation of features.

### What is ECU Consolidation?

Traditionally, new vehicle features have been enabled by adding dedicated Electronic Control Units (ECUs), with each controller managing a specific function such as the Vehicle Control Unit (VCU), instrument cluster, smart key, or telematics. While this distributed architecture has supported feature expansion, it has also increased hardware complexity, wiring, software integration effort, and system cost.

ECU consolidation reimagines this approach by integrating multiple vehicle functions into a common hardware and software platform. Instead of each function having its own

dedicated ECU, a single high-performance microcontroller or processor handles multiple domains such as:

- Vehicle Control (VCU functions)
- Instrument Cluster / Display
- Smart Key / Vehicle Access
- Body Control Functions
- Telematics and Connectivity

This is typically enabled by advancements in processing power, communication protocols, and embedded software architectures. The result is an architecture that is easier to integrate, validate, and scale.

## Why ECU Consolidation Matters

ECU consolidation is more than an engineering optimization. It creates tangible benefits across the vehicle lifecycle.

- **Reduced system complexity:** Integrating multiple functions into a common platform reduces the number of ECUs, connectors, and wiring harnesses, making vehicle architecture simpler and easier to integrate.
- **Lower cost:** Fewer hardware components, including PCBs, housings, power supplies, and connectors, translate into lower material costs, streamlined manufacturing, and simplified assembly.
- **Weight and space optimization:** Consolidating controllers frees up valuable packaging space and reduces overall vehicle weight.
- **Improved power management:** A centralized controller can better coordinate sleep modes and manage quiescent current, helping improve battery efficiency and extend vehicle range.
- **Simplified software development:** A unified software architecture reduces CAN traffic, streamlines diagnostics and validation, and enables faster deployment of over-the-air (OTA) software updates.
- **Future-ready architecture:** A consolidated platform provides the computing foundation needed to support connected services, intelligent diagnostics, and future software-driven features without adding new hardware.

## Challenges to Consider

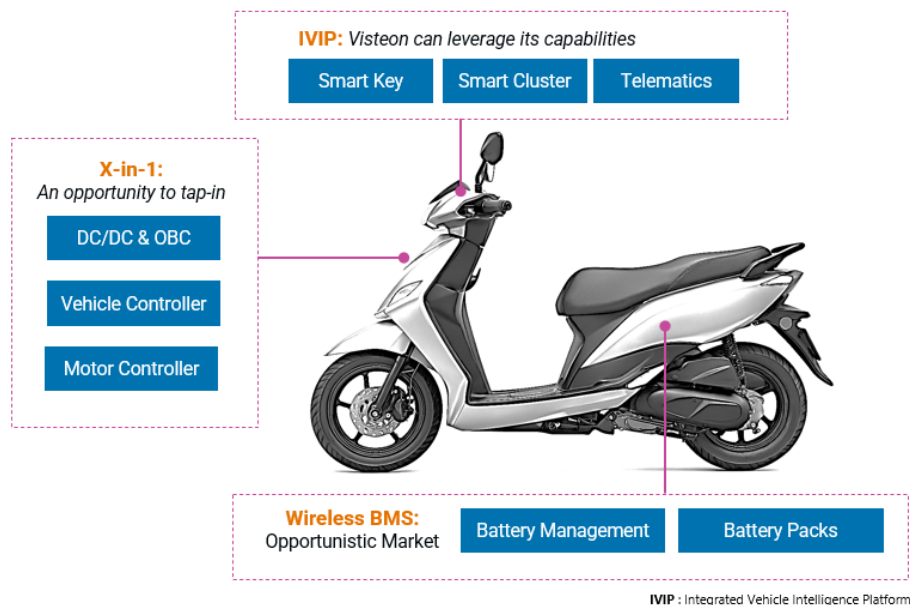
While ECU consolidation offers many benefits, it also introduces certain challenges:

- Increased software complexity requiring robust architecture and validation
- Higher dependency on a single ECU, requiring fail-safe and redundancy mechanisms
- Need for more powerful processors and advanced thermal management

## Visteon's Vision for Integrated Vehicle Intelligence

As two-wheelers continue to adopt advanced digital and connected features, ECU consolidation is becoming a key enabler of product innovation.

Visteon's **Integrated Vehicle Intelligence Platform (IVIP)** brings together multiple vehicle domains into scalable **X-in-1** solutions, integrating functions such as the vehicle controller, instrument cluster, smart key, telematics, battery management, and charging systems onto a common platform. This integrated architecture helps OEMs reduce electronic complexity while accelerating software development, improving power management, and creating a scalable foundation for future feature enhancements.



*Visteon's Integrated Vehicle Intelligence Platform (IVIP) enables scalable X-in-1 architectures for next-generation two-wheelers.*

Rather than viewing ECU consolidation as a hardware optimization alone, IVIP enables OEMs to rethink how vehicle intelligence is designed and delivered—creating a platform that can continuously evolve with changing rider expectations.

## The Way Forward

As the next generation of two-wheelers evolves toward connected, software-driven mobility, electronic architecture will become a key differentiator. ECU consolidation enables OEMs to simplify hardware while creating scalable platforms that can continuously evolve through software. With integrated solutions like Visteon's IVIP, manufacturers can accelerate innovation and deliver smarter, future-ready vehicles without adding complexity.