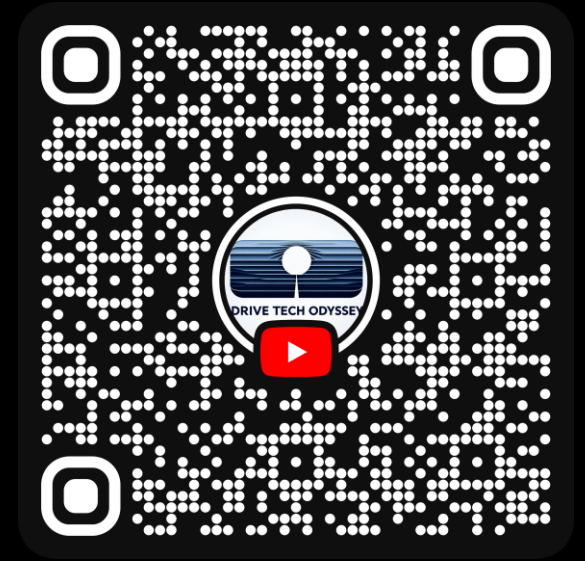


Beyond OTA - The True Essence of SDV



From Silicon Valley to the World: How Vertical Integration Enables Rapid Innovation

Sungjun Maing

Powertrain specialist, ex-Tesla, Contents creator

Sungjun Maing

Powertrain engineer based on the simulation

Experience



Sr. Vehicle Modeling Test Engineer

Tesla

Mar 2022 – Jan 2025

Palo Alto, California, United States



Sr. Project Engineer

Intertek

Oct 2011 – Mar 2022

San Antonio, Texas, United States



Professor

UTSA College of Engineering

Jan 2018 – 2020

San Antonio, Texas, United States

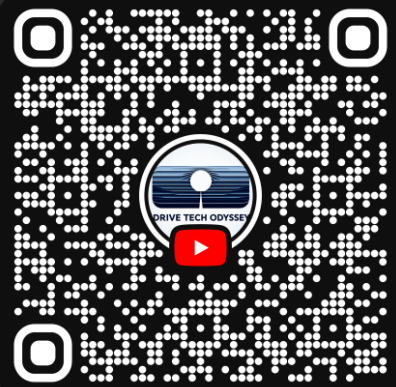


Research Engineer

Doosan

Nov 2007 – Aug 2011

Incheon, South Korea

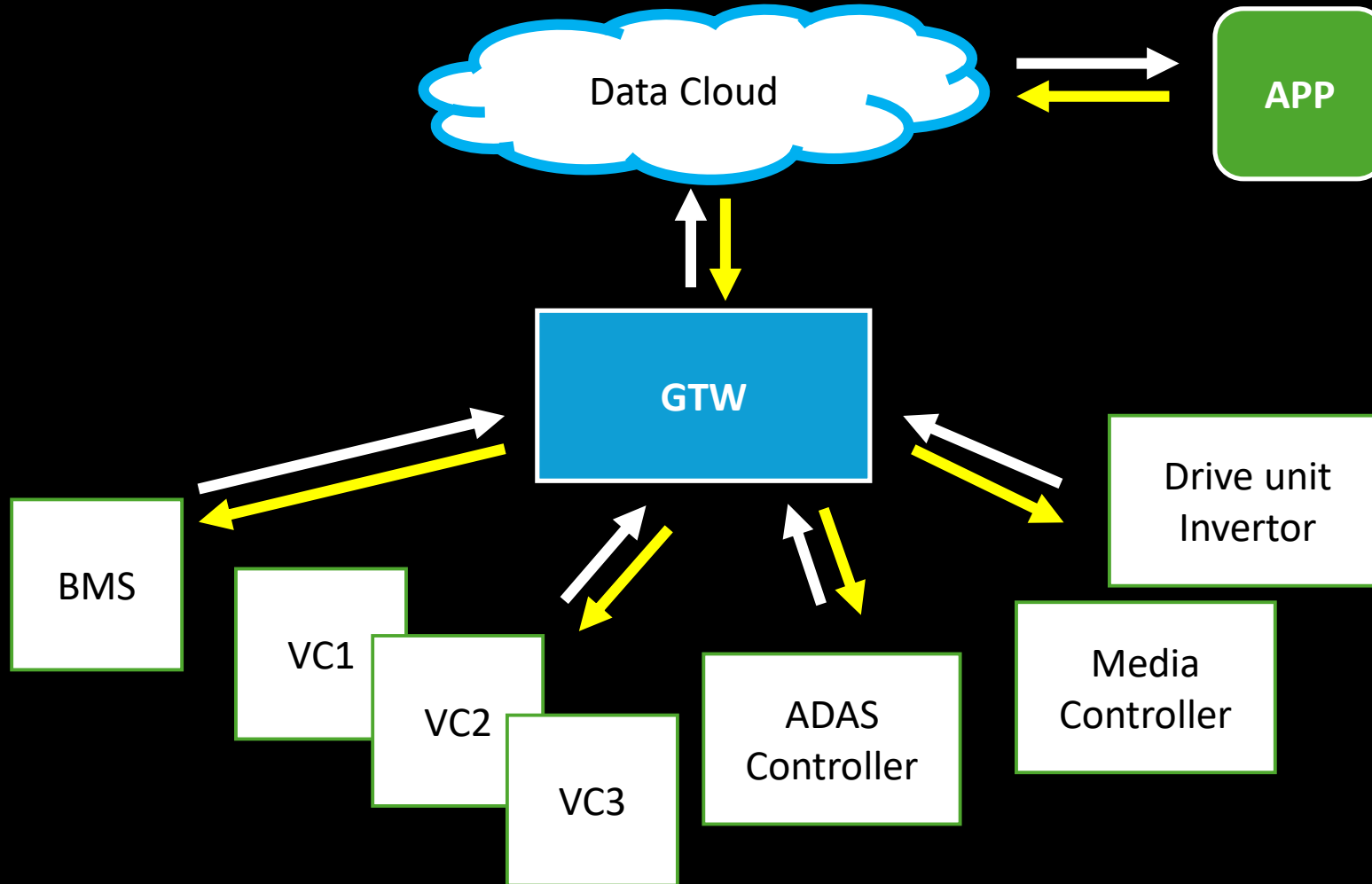


www.youtube.com/@DriveTechOdyssey

SDV = A car with OTA updates

- The term “**Software-Defined Vehicle (SDV)**” mainly comes from the **legacy automotive industry** – it is not a native concept in Tesla or Silicon Valley.
- Often misunderstood as “**a car with OTA updates**”.
 - In reality, **OTA is only a by-product**.
- The foundation is building a **vertically integrated system**:
- All controllers are designed, connected, and unified.
- A central **Gateway (GTW)** links ECUs with the cloud.
- Data collection + firmware deployment are seamless.
- **Key message:** SDV is not about OTA.
 - → It is about creating **one integrated, data-driven architecture**.

SDV System Architecture



Vertical Integration: The Foundation of SDV

- **Legacy OEMs (Horizontal Integration):**
 - Controllers purchased from multiple Tier-1 suppliers
 - Software fragmented and vendor-dependent
 - Full system integration nearly impossible
- **Tesla & Silicon Valley Approach (Vertical Integration):**
 - All controllers **designed in-house**
 - Embedded software also developed internally
 - Complete control over **hardware + software stack**
 - Enables rapid updates, new features, and seamless integration

Without vertical integration, true SDV cannot exist.

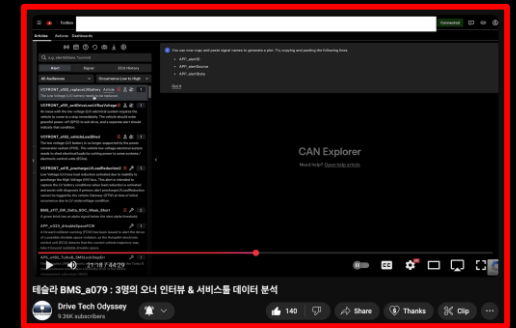
Fleet Data + Cloud: The Engine of SDV

- **Massive fleet data continuously uploaded to the cloud**
 - Driving behavior, component performance, system health
- **Enables rapid development of new firmware and components**
 - Tesla: fleet data used directly for **autonomous driving training**
- **Legacy OEMs:**
 - Cannot easily collect high-resolution vehicle data OTA
 - Limited visibility once cars are sold → slower development cycles
- **SDV Advantage:**
 - Faster iteration in vehicle development
 - Active response to recalls, software bugs, and security issues
 - Continuous improvement across the entire fleet

Fleet data transforms cars into evolving platforms.

Tesla Service Mode: A Practical Example of SDV

- **Subscription-based Service Mode** → vehicle data accessible to anyone with credentials
- Provides **structured tools** for:
 - Data organization
 - Visualization & plotting
- Detailed **error code explanations** available online
- Remote access: simply enter **VIN number** to view data
 - No need to physically connect to the car
 - Diagnostics possible **anywhere, anytime**



SDV makes vehicles transparent, data-rich, and remotely accessible.

The True Essence of SDV

- SDV is **not just OTA updates or UX improvements**
- The foundation is **vertical integration** of hardware + software
- A centralized architecture (GTW + Cloud) enables:
 - Seamless firmware deployment
 - Continuous fleet data collection & analysis
- Fleet data powers **faster iteration**, autonomous learning, and proactive issue resolution
- Tesla's approach shows how cars evolve into **transparent, data-driven platforms**

**SDV = A vertically integrated, evolving mobility platform
— not a car with updates.**