Smart EV & V2X Embedded Solutions

Frankwell Lin
CEO
Andes Technology Corporation

2021 Computex Cyberworld Forum
EV Will Dominate

Global annual passenger vehicle sales by drivetrain

Source: BNEF. Note: Electric share of annual sales includes battery electric and plug-in hybrid.
31% of Vehicles on the Road Will be EV in 2040

In 2040...

- **Bus**: 31%
- **Moto**: 67%
- **Commercial**: 47%

**Source**: 工業技術與資訊
Driving Forces of EV Market Growth

**User Altitude**
- Driving range
- Charging utility
- Cost/incentive

**Manufacturers Strategy**
- More fashion alternatives
- More competitive price
- More promotion programs

**Policy/Regulation**
- CO₂ emission standard
- Carbon neutrality Commitment
- Tax & finance incentive

**Enterprise Role**
- Support to EV
- Image
- Responsibility to Earth
- Cost down
- Employees satisfaction

Source: 工業技術與資訊
What is V2X (Vehicle-to-Everything)?

- Vehicle-to-Everything (V2X) communication
- Revolutionary technology
- A wireless technology that enables communication between the vehicles, infrastructure, and other devices in the vicinity, grid, home, and network
- This technology helps the vehicle to receive warnings regarding real-time traffic and alerts related to accidents or other hurdles
- V2X-capable vehicles can assist in better traffic management leading to greener vehicles and lower fuel costs

Source: 智享汽車圈
V2X: Pioneer for Fully Autonomous Driving

- V2X is also helping pave the way for fully autonomous driving through its unique non line-of-sight (NLoS) sensing capability
  - which allows vehicles to detect potential hazards, traffic, and road conditions
  - From longer distances and sooner than other in-vehicle sensors such as cameras, radar, and LiDAR (Light Detection and Ranging)

Better Autonomous Driving Experience
Global spending on V2X:

- Expected to grow at a CAGR of > 170% between 2019 and 2022
- More than 11.2 million light vehicles equipped with some form of V2X system will be produced globally and compound annual growth rate (CAGR) of 277.5% in 2024
Major Technologies

- **Dedicated Short Range Communication (DSRC)**
  - Key technology: IEEE 802.11p-2010
    - IEEE 802.11bd/NGV (Next-Generation V2X)
  - USA WAVE/DSRC standard
    - Integrated IEEE 802.11p & IEEE 1609
  - Europe: European Telecom Standard Institute (ETSI)
    - ITS-G5 regulation version based on IEEE 802.11p protocol
    - Announced 《the Delegated Act on C-ITS》 in 2019/March, lean toward DSRC(IEEE 802.11p)

- **Cellular Connectivity (C-V2X)**
  - Key technology: 5G/3GPP Release 14/15/16
  - China aggressively promote it
    - 629,000 light vehicles produced in the region equipped with C-V2X technology in 2020
  - USA: Industry supports of the 5G Automotive Association’s waiver request seeking permission to deploy Cellular Vehicle-to-Everything (C-V2X) technology in a portion of the 5.9 GHz band
V2X Supply Chain

Source: 拓璞 TRi
Taiwan’s Move in ICT/Semiconductor Industries

- Personal Computer
- Smartphone
- Smart EV

EV Open Platform
Foxconn Initiative
Partner Funnel

Alliance of partners

Key solutions & modularity

Go to market!
Open Platform Accelerating Innovation of EV

Autonomous Driving System

Vehicle Motion Control

- Deceleration
  - Pressure control
  - Valve control
  - Brake

- Steering torque/Steering angle
  - Torque control
  - Steering

- Motor Torque
  - Torque control
  - VCU
**Function Safety Requirements**

- **ISO26262 or ASIL for current products are not necessary now in V2X**
  - Most of market available SoCs are **not** dedicated for V2X (for mobile phone or networking)
  - However, in the future
    - RSU (Road Side Unit)
      - ASIL-B: may be required
    - OBU (On-board Unit)
      - ASIL-B: minimum
      - ASIL-C/D: required for Unman-drive purpose
- **For EV, not limited in V2X, but also for Motion Control and ADAS**
  - ASIL-B is required
What Andes Can Provide for EV & V2X?

• **Non ASIL requirement:**
  - EV requirement
    - ADAS and Vehicle Motion Control requirement can be satisfied by V5 cores
      - V5 27/45-series can be dual issue, multi-core unit like ADAS and/or Motion Control Unit
  
• **V2X CPU requirement**
  - Major SoCs CPU requirement can be satisfied
    - V5 45-series can be multi-function unit like OBU
    - V5 25/27-series can be good for cost-down devices like RSU

• **Security requirement:**
  - Possible partners solution, AndeSentry platform: Secure-iC, Silex Insight, Hex-Five, IAR, etc.

• **ASIL requirement:** **ASIL-B certified CPU IP on the way**
Concluding Remarks

• EV, Smart EV will dominate market
• Smart EV requires V2X communication
• In Taiwan there are supply chains for Smart EV, V2X platforms
• MIH Open Platform is a good example
• Andes is MIH member, will provide solutions for CPU IP required in EV & V2X
• Yet there are more for you to dig out in Taiwan
• Computex provides you platform for digging out ideal suppliers
Thank You!