Views on Intelligent and Connected Vehicles

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Contents

• **Trends for Automotive industry**

• Introduction to Huawei ICV Component Solutions

• Policy and Legislation Requirements for ICV
New Trends for Automotive Industry

Vehicle is changing

Connected
Interactions among vehicle, road, cloud, human, environment

Intelligent
Intelligent driving based on AI technology

Shared
New business mode of shared mobility

Electrical
Change of vehicle architecture and power mode

User requirements are changing

Friendly interface
Voice and gesture control

OTA update
Remote update

Connected
Social, entertainment...

Optimal performance
High performance and quality

Intelligent learning
AI

Natural language
Natural language interface

Requirements for ICT

Chipset, Terminal, Network, Cloud, AI, Big data, New power
Automotive Industry is on the Eve of Revolution

Traditional Vehicles → ICV

Transportation → Mobility Service

Self Intelligence → Intelligent

Transportation → Smart City
Global Strategies and Policies to Boost ICV business

USA

Britain
- “The Automated and Electric Vehicles Bill” for insurance and responsibility of ICV

Germany
- Modify “Strassenverkehrsgesetz” for ICV responsibility

China
- Joint 3 administrative departments to release ICV test regulation
- Publish ICV standard framework

France
- “The Future of Manufacturing - France” includes autonomous driving
- Roadmap for autonomous driving

EU
- Release “On the road to automated mobility: An EU strategy for mobility of the future”, full autonomous driving in 2030

UN
- April. 2016, “Vienna Convention for Road Traffic” sets example for the autonomous driving

Japan
- Sep. 2018, release Safety guidance for autonomous driving vehicles
- Initiate law amendment for autonomous driving

South Korea
- Set specific region for autonomous driving test
- Initiate law amendment for autonomous driving
Enabling Technologies for Autonomous Driving

Many technologies are to be studied with consideration for standardization if appropriate.

One outstanding example: An AI driver needs to see as well as an human driver. But how does AI see the outside world? how are senorial signals (camera, infrared ray, LIDAR, millimeter wave) representing the outside real world converted and processed in a format most suitable for machines?

- The answer may be VCM (Video coding for Machines).
- VCM performance of recognition base on machine vision should attain at least the same level as humans.
- VCM is expect to have unique strength in Multi-object detection, Object segmentation, Object (Lane) Tracking, Activity recognition, event prediction, Optical Flow.

Other enabling technologies include: 5G V2X, decision making (reinforcement learning), edge computing, GAN learning, etc.
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Huawei’s Role in Automotive Industry

“Huawei does not manufacture vehicles. Huawei is the incremental component supplier for intelligent and connected vehicles (ICV). We are determined to help vehicle manufacturers to produce high quality and high performance vehicles with advanced information and communication technologies (ICT).”

Eric Xu
Rotating Chairman of Board of Huawei
Huawei Product Portfolio for ICV

- C-V2X Product for intelligent connection

- Octopus for cloud service for autonomous driving simulation and training

- Intelligent Driving
  - MDC (Mobile data center) for intelligent driving
  - Autonomous driving Algorithms
  - Hi-Car for intelligent communication in car
  - Cockpit

- Intelligent Cockpit

- Intelligent Cloud

- Intelligent Energy
  - mPower for intelligent energy management (Electric Driver, BMS etc)
MDC Hardware Platform: Highly Integrated SoC

- High integration: ARM, AI, Image, Storage on a complete SoC
- Open interface: multiple sensors, communication module, infotainment (IVI) and ECU control
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## Requirement for Policies and Laws to Enable ICV

### Steps

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<th>Design</th>
<th>V&amp;V</th>
<th>Commercial</th>
<th>After Sale</th>
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<td>• Adjust vehicle design, e.g., Steering wheel, Display, Brake, etc.</td>
<td>• Allow test in all scenarios, e.g., highway, parking etc.</td>
<td>• Set up certification mechanism, e.g., virtual simulation, certification test and real world test</td>
<td>• Set up insurance, recall, monitoring mechanisms</td>
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**Policies and Laws**

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## Considerations for ICV Certification Framework

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<td>Critical scenario</td>
<td>Closed road test. Verify difficult driving scenarios.</td>
<td>• Closed road test cases and criteria, e.g., highway, urban, parking.</td>
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<td>Edge scenario</td>
<td>Simulation. For all scenarios, especially for the extreme dangerous scenarios.</td>
<td>• Test scenario formats and database.</td>
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<td>Safely and security procedure audit.</td>
<td>• Functional safety • Security safety</td>
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<td>Monitoring Requirements</td>
<td>NA</td>
<td>• OTA monitoring • Vehicle situation monitoring</td>
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Thank you.