Autonomous Vehicles: Direction, Growth, and Challenges

Andrew Wygle
Data I/O Corporation
“Data I/O enables the secure digital world by designing, manufacturing, and selling programming systems to global electronic device manufacturers.”
What We Do

- Semi Supplier
- OEM
- Programming Center
- Final Assembly
- Post Production

Develop
- Circuits to be programmed: Flash Memory, Microcontrollers, Logic devices and more

Manufacture: OEMs, Contract Manufacturers, Programming Centers

Manage

Final Products

In-Line or Offline Data Programming Systems

Automotive
- BOSCH
- CONTINENTAL
- ALPINE
- DESAY SV
- SONY
- SCHNEIDER Electric
- SIEMENS
- DENSO TEN
- Panasonic
- APTIV
- Valeo
- ADAYO
- Tiwi

IoT/Industrial/Consumer
- Amazon
- Honeywell
- WATLOW
- Miele
- Google
- Toshiba
- Apple
- Microsoft
- INSTA
- TRW
- JABIL
- PLEXUS
- PEGATRON

Programming Centers and EMS

8/5/19
Industry Trends Driving Flash Growth:

More Compute: ECU, MPU, GPU

More Storage: MCUs RAM, FLASH >2 TB

More Connectivity: Ethernet, CAN, Wifi, BT, LTE etc.

- ADAS / Autonomous Car 8GB to 512GB
- HD Maps 8GB to 512GB
- Digital Cluster 4GB to 32GB
- Accident Recording 8GB to 64GB
- Rear-seat Entertainment 16GB to 64GB
- Connectivity 4GB to 16GB
- Infotainment 64GB to 512GB
Autonomous Vehicle Growth & Trends

More Compute: ECU, MPU, GPU
More Storage: RAM, FLASH >2 TB
More Connectivity: Ethernet, CAN, Wifi, BT, LTE etc.

- Faster Silicon, Higher Density, Smaller Lithography & TLC
- Larger threat surface for attacks & higher value target
Industry Challenges Impact Design & Manufacturing

**Design Engineering Concerns**

- Transition designs from eMMC to UFS & NVMe
  - Application performance read/write performance
  - Storage capacity
  - Cost

- Security:
  - Protect car operation from intrusions
  - Protect data & communication
  - Recover from a security breach

**Manufacturing Concerns**

- Data retention through reflow & x-ray for 3D and TLC Flash
- Maintain production throughput
- Minimize disruption to existing production processes

- Secure supply chain
- Minimize disruption to existing production processes
Addressing the Challenges

Manufacturing Concerns

• Data retention through reflow & x-ray for 3D & TLC Flash
• Maintain production throughput
• Minimize disruption to existing production processes

Security

• Secure supply chain
• Minimize disruption to existing production processes

Solutions

• Fast, forward compatible programming technology for new Flash
  • Support for hundreds of installed base
  • Partnership across the ecosystem to
    • Align roadmaps
    • Develop best practices

• IC Authentication
• IP Transport Protection
• Automated Security Provisioning during pre-programming
Executive Summary

- Connected and autonomous vehicles will continue to drive innovation in Flash technology to meet speed, data & storage requirements >2TB

- Advancements in Flash technology require forward compatible programming technology

- Data I/O partners with Flash Memory Vendors, OEMs and manufacturers to solve the critical issues facing the design and production
Thank You!

For more information visit: www.dataio.com/automotive
Back-up
To Ensure Data Retention for Managed NAND at X-ray
Filtering is the Most Important Requirement

- All target based X-ray sources produce a spectrum of high and low energy photons, which enable imaging of devices
  - However, for radiation sensitive silicon components, low energy photons <12kV can cause problems
  - This is because they have a >95% probability of being absorbed by the device. This near complete absorption means they play almost no part in the image formation

- The zinc filter layer absorbs these low energy photons, preventing them from reaching the silicon device, but leaving higher energy photons for inspection purposes
  - This reduces the silicon dose typically by a factor of 5x