Next Generation of IVI Systems: Android Automotive

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Current Infotainment Systems











Company Identity

MBUX:





Android Auto



Apple CarPlay



Platform: Handy/Smartphones





Alcatel



Blackberry



AEG





Sony Ericsson

Nokia



Nokia



Siemens



Microsoft

Samsung



Today











Challenges

- The HMI has to reflect the identity of the OEM
- The Software must be updated continuously over the lifetime
- The lifecycle of cars is different to the consumer world
- New trends popping up
- Number of variants (different cars, country variants)
- Personalization / Skinning
- Integration of Services (WeChat, fleet management, ...)
- Autonomous driving vs manual driving (different UI rules)
- Speech assistant are heavily under development in the consumer world









What will be Offered by Android Automotive?

- One EcoSystem for the Automotive world like Android/iOS for the mobile world
- One Apps Store with Apps well known by the customers
- One EcoSystem for all OEMs: the pre-condition that 3rd party developer will start by themselves
 - Alternatively the OEM has to know that the market needs and request the development
- Inherit the development of the mobile world
 - All new features will added at first in the mobile world; standards are enabled in the mobile world
- Adapted solutions for different markets (country specific)
- Android Automotive will be the platform for Servies (China)
- Major Player will offer their products on the platform
 - E.g. Google will over the "Google Automotive Services" (GAS)
 - Tight integration of the mobile world/Services into the car



Service Expectations in China

- Andoid is the most popular mobile OS, but no Google Servies are avilable
- The user expects Android (Dealer change the IVI to an Android System before selling the Car)
- The user expects all mobile Services in the Car
- Android is only the enabler for the Services
 - Services will change over the time as well as the Apps which are used





Audi Tablet

E2E HW/SW Concept- and Series Development

- HMI Concept and Specification
- Development (Mechanics, Antenna, Electronics, Thermal, EMC, ESD, Battery, Crash)
- Industrialization (Support Supplier Selection, Consulting Manufacturing Supplier, Production Planning and Test/ Test Systems, Certification, Qualification)
- Software (PoC, Android/AOSP, Android Apps, Integration)





Smart Remote Control for Audi A8



HMI Concept and Specification





Google I/O (2017)

- HMI concept
- Graphics (all screens)
- App development (MMI part)





Google I/O (2017)











Google I/O (2017)















Common Android Automotive Framework

- Full stack Android SW development and integration into the car
 - HAL adaptation to the Linux Kernel/Hypervisor and car systems
 - Application development
 - Integration of the Android SW stack (AOSP) and the Google Automotive/Mobile Services
 - Extension of the Android Stack by customer needs
 - Component protection, diagnosis, ...
 - Execution of all Google relevant test suites (CTS, VTS, GTS, CDD, etc.) for full Google certificaton (at nominated 3PL)
- Integration of services
 - Google Automotive Services
 - Local Services for the chinese market
- User Experience (UX) design to enforce a consistence brand experience across all displays and devices
 - Description of use-cases, personas and deduction in form of wireframes
 - Graphics (assets) design



Android Automotive Systems

- Entry System
 - Cost driven
 - the IVI supports base services
 - Complex and "expensive" applications running on the smartphone
 - Lifetime problem is moved to the smartphone
 - Not certified
- Mid range System
 - IVI stand alone
 - Bare metal
 - Support of GAS Services (if needed and available in target market)







Android Automotive Systems

- High range system
 - Cluster, IVI and passenger Systems
 - Hyper Visor Version
 - Support of GAS Services



Beyond Vanilla Android: 3 Android Instances on One SoC

- The Multi-Seat IVI: 3 independent Android instances are running on one single SoC.
- The solution is based on KVM (Kernel Based Virtual Machine) together with QEMU (Quick Emulator).
- Demo Case:
 - 3D benchmark with 60 fps
 - Google Maps with demo route
 - Full HD Video
- The benefits compared to an Hypervisor are:
 - that is uses less resources
 - we can re-use Android images provided by Google
 - fast boot times



Next Steps

- Run same setup on SoC like QC 855
- Check if all sensor / connectivity related use cases are supported in Android Emulator
- Check (with Google) if Android certification (GAS) can be passed with an Android Emulator
- Verify and improve Emulator stability and performance to reach production quality



Next IVI System:



Get in touch!



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