

智能操作系统的变革与挑战

Evolution & Challenges of Intelligent Operating System

2018.6.28

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- ❖ About Us
- ❖ OS Evolution
- ❖ OS Modulization
- ❖ 4 Cases
- ❖ OS Challenges & Future

About ThunderSoft

Who is ThunderSoft?

Smart System Service & Technology Provider



中科創達



AI & Vision



Smart IoT

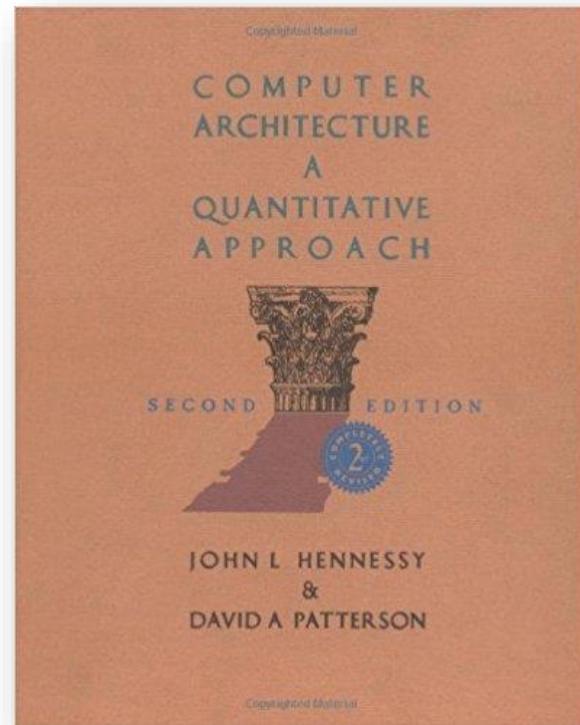
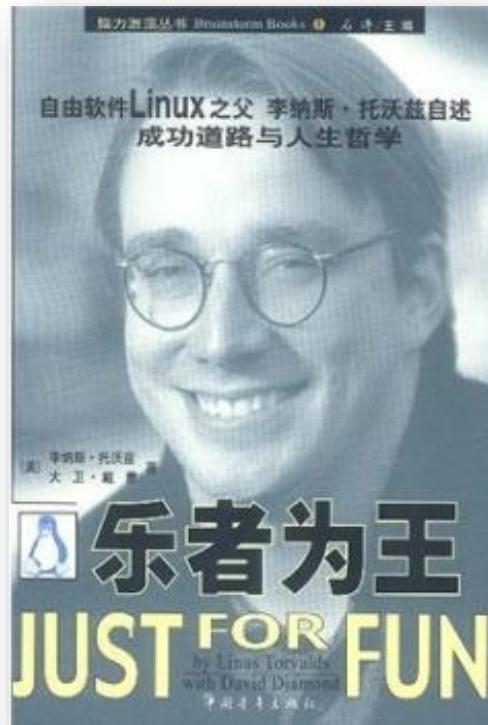
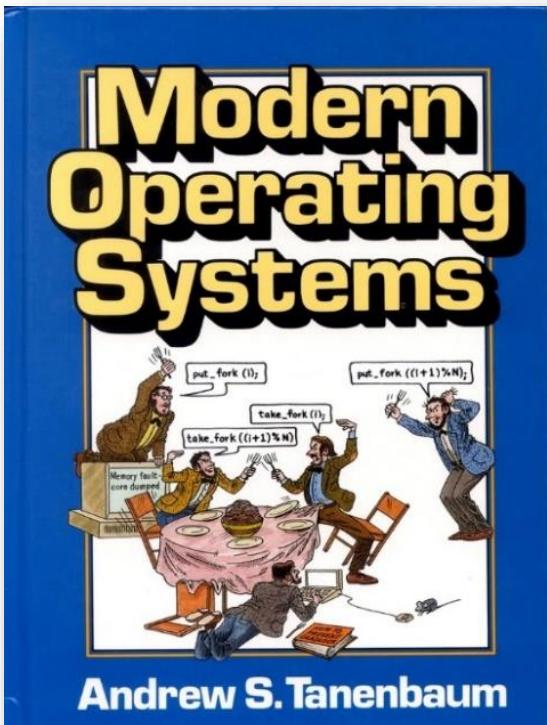


Smart Vehicle

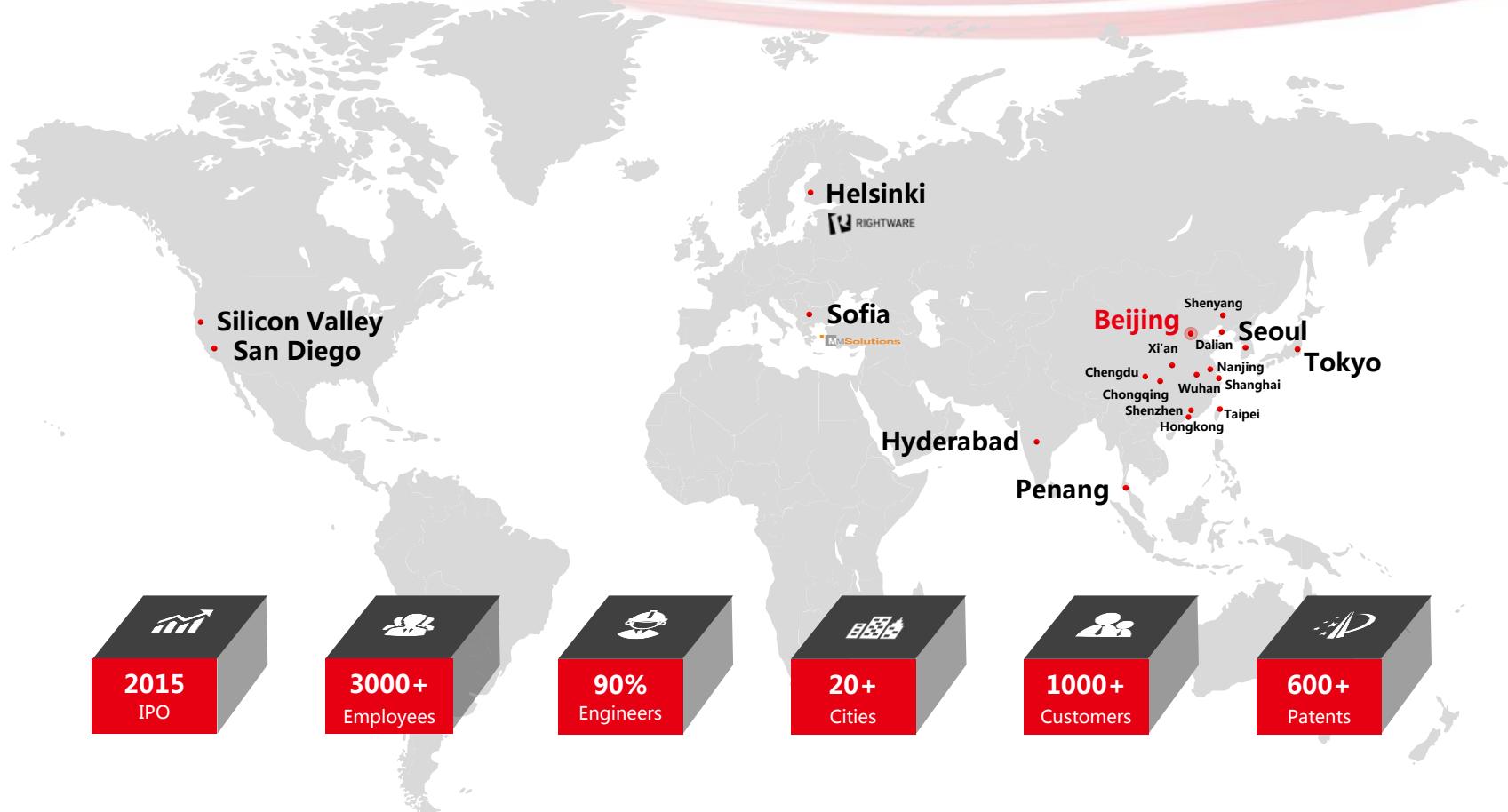
Smart System

Start-up		Fast Growing			Expanding			Core Technology	
2008	2009	2010	2011	2013	2014	2015	2016	2017	2018
founded	Japan branch	Qualcomm Smartbook	Qualcomm Joint Lab	Intel/MS Joint Lab	JV with Intel	JV with ARM	JV with Qualcomm	TurboX SoM & OS	Iot Scaling AI Dev Kit

What does ThunderSoft read?

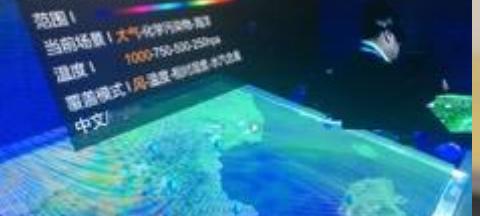


Where is ThunderSoft?



What does ThunderSoft do?





OS Evolution

Evolution of Operating System



1960s
大型计算机

操作系统: UNIX
交互: 键盘



1990s
个人计算机 (互联网)

操作系统: Windows / Mac OS
交互: 键盘+鼠标



2010s
手机/平板 (移动互联网)

操作系统: Android / iOS
交互: 触摸屏



2020s
物联网/人工智能/机器人

操作系统: ???
交互: ???

操作系统的演进伴随着计算平台发展

the Mass Program of IoT

- ❖ Thousands customers
- ❖ Inexperienced on QCT platform
- ❖ Small volume
- ❖ Highly Fragmentation
- ❖ Prefer Open Source
- ❖ Can't afford high development cost
- ❖ More access for help



Gaps of IoT Operating System

- ❖ IoT customers ask for different features => need **IoT specific feature sets**
- ❖ IoT customers needs more and longer support => need **well-maintained SW**
- ❖ IoT customers asks for more choices => need support **more SW/HW modules**
- ❖ IoT customers are facing more choices => need **accessible docs and portals**
- ❖ IoT customers are less technical => need cleaner & more **solid software**
- ❖ Many Projects, Smaller Projects => need **complete software solution**

Open Standard · Maintainability · Controllability · Modularity

AI · Audio · Camera · Tools · Security · Performance

OS Modulization

IoT Hardware Modulization



TurboX 835



TurboX 845



TurboX 801



TurboX 821



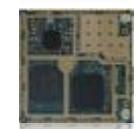
TurboX 410



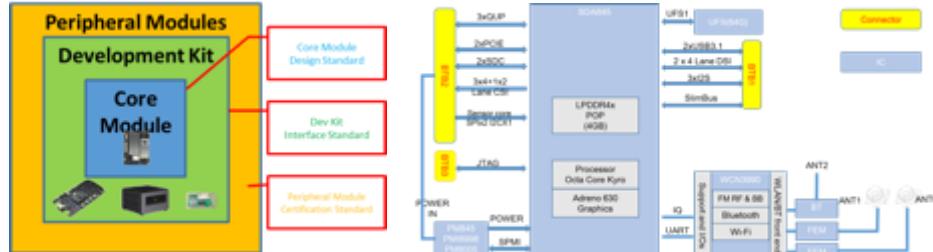
TurboX 625



TurboX 9206



TurboX 210



HW Spec

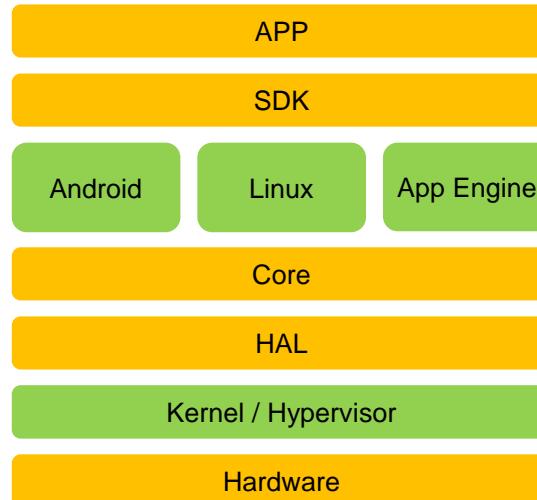
Hardware

- Computing: 820/845, CPU, GPU, SNPE, DSP
- Changeable Camera: Single-Cam, Dual-Cam, Depth-Cam
- Memory: 4/8GB RAM, 16GB ROM
- Wired & Wireless Charging: Wi-Fi, HDMI

SW Spec

SW Module	Description
Apps	Face/Object/Food/Scene Recognition, Video Analysis
Services	Data Annotation, Data Training, SNPE/HVX training & support, Optimization, Algorithm Store.
Tools	Data Mgmt Tool, Annotation Tool, Training Tool, Tuning Tool
SDK	SNPE, AI algorithm plug-in, security, AI task scheduler, etc.
OS	Android & Linux. AI Acceleration Lib, SNPE integrated AI

IoT Software Modulization



Better Ingredients.
Better Pizza.IoT.

4 Cases

Case #1 – Dual Screen



志新手机



Yota Phone



Flex Phone



Cast II 投影手表



魅族Pro 7



三星
Feature Phone



中兴天机Axon M



三星W2018

Dual Screen Support

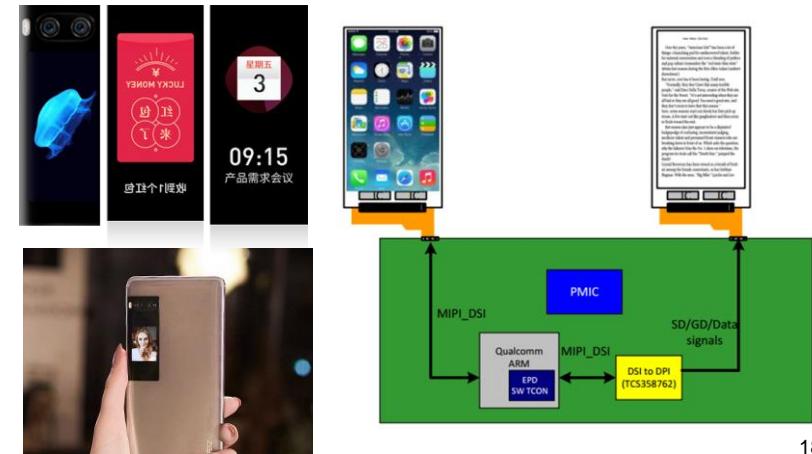
Before Android 8

- ❖ New Viewport Conception
- ❖ Enhanced Window Manager
- ❖ Enhanced Activity Manager
- ❖ Input Manager Service & IME
- ❖ Multi-Window Launcher



After Android 8

- ❖ Input support of 2nd screen
- ❖ HDMI enabling
- ❖ Power Management
- ❖ Qualcomm composition mechanism
- ❖ DisplayPort Alternate Mode
- ❖ Application on 2nd screen



Case Study #2 - Smart AR/VR

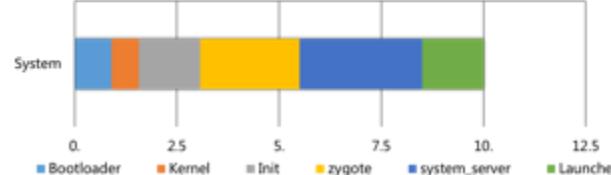
- ❖ AR/VR Resource & Solution
- ❖ Full Stack Engineering Services
 - ▶ HW, SW, Camera, Audio, UI, AI, ...
- ❖ AR/VR SoMs
 - ▶ 8009, 626, 820, 835, 845, etc.
- ❖ Core Technology
 - ▶ SoM
 - ▶ SoC Leveraging
 - ▶ Fast Boot
 - ▶ Low Latency
 - ▶ On-device AI
 - ▶ End to End Security
 - ▶ Circle Display
 - ▶ ...



Tech Modules in IoT

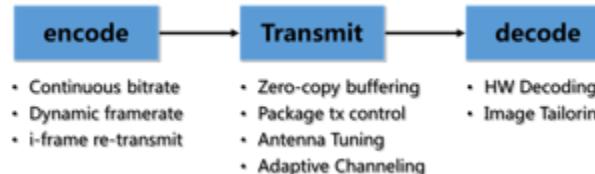
Fast Boot

- Android <10s
- Linux < 5s
- Camera < 400ms
- Wi-Fi < 10s



Low Latency

- VR Latency < 17ms
- Streaming < 150ms



SoC Leveraging

- CPU
- GPU
- DSP
- VPU



On-Device AI

- AI Algorithms
- Tuning & Optimization
- Multi-cam & Depth Cam
- Voice UI



Case Study #3 – Smart Car

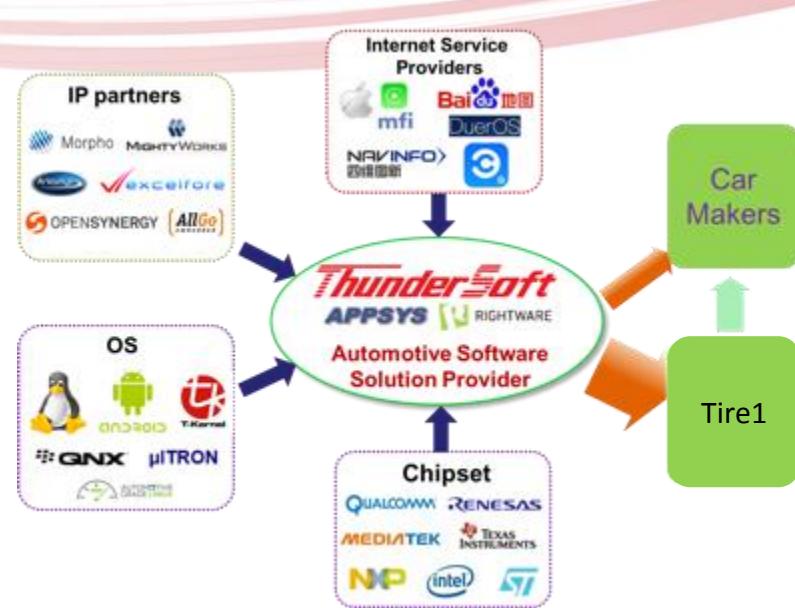
❖ Positioning:

- ▶ Provide smart cockpit and IVI turn key software solution for Tier1 and OEM.

❖ Product Line:

- ▶ OS for Automotive, Android, Linux & RTOS
- ▶ IVI software solution and service
- ▶ Digital cluster software turn key solution and service
- ▶ ADAS solution and Algorithm
- ▶ UI/UE: Rightware Kanzi UI engine and tools

❖ China Factor: Baidu, Ali, ShangQi, Chongqing...



Sensor-Fusion
InfoADAS system



High Performance
3D UI Engine



Connected Infotainment
System



Cutting Edge
Digital Cluster

Challenges of E-Cockpit

- ❖ 奥迪A3、A4、A7、Q7、A8L
- ❖ 奥迪虚拟化智能驾驶舱风格
- ❖ 应用于全液晶仪表盘、中控液晶屏和中控台下方的触摸液晶屏
- ❖ 营造强烈的科技感
- ❖ 用户更流畅、个性化地使用导航、音乐、车辆操控等核心功能。



Multi Screen



Connected



Prettier



Customized



Faster



Integrated



Smarter



User Friendly

UI Modularization

Traditional



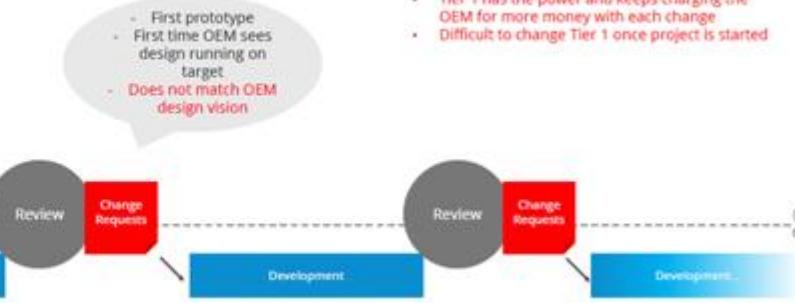
OEM

Tier 1

Kanzi Way 1

OEM

Tier 1



Kanzi Studio

RESULT:

- OEM has the power and can make changes to design at **no cost**
- Design and integration independent of each other
- No disruptions -> very short development time
- Can switch Tier 1 in the middle of project
- > **Faster development at significantly reduced cost**

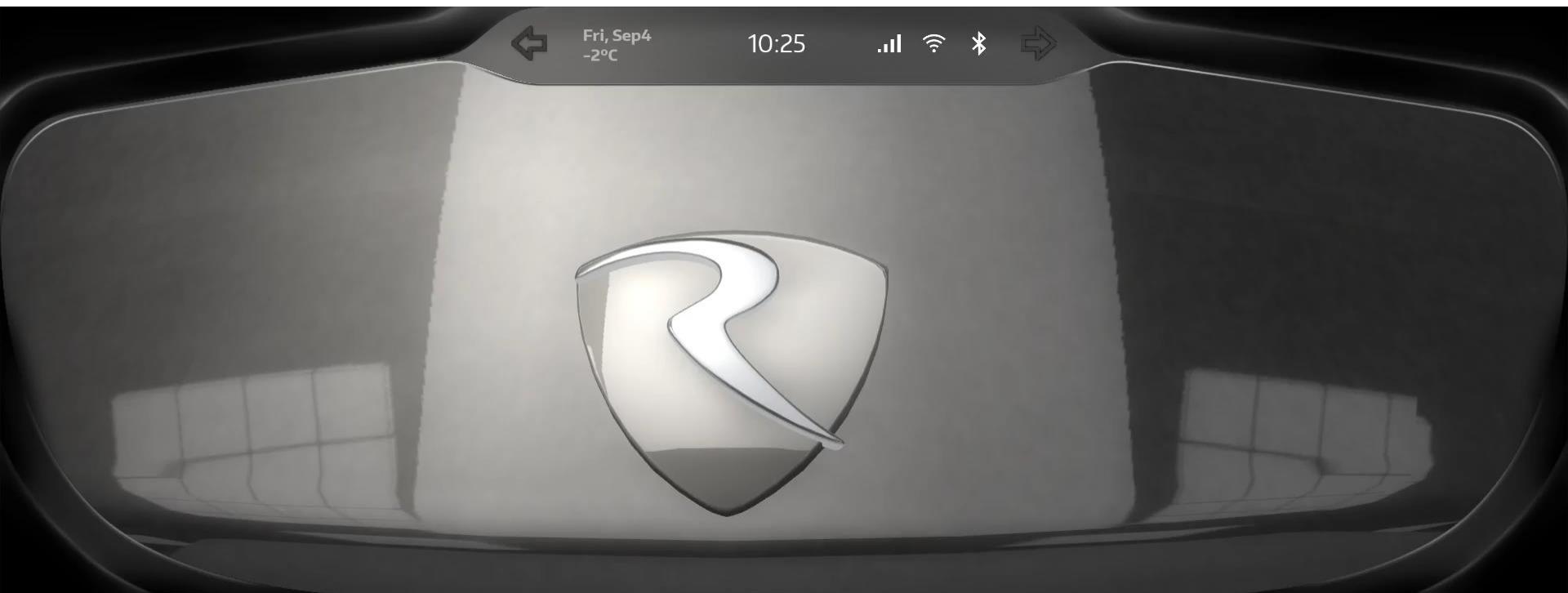
SOP

Integration (C++ API and plug-ins)

Prettier – T-UI



Prettier – T-UI

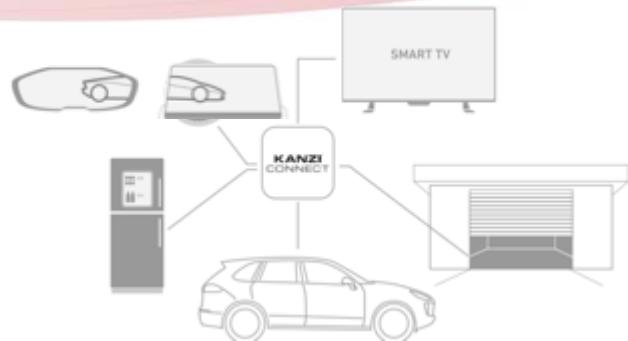


Device – Device Connection

- ❖ Unified content and service sharing
- ❖ Cross OS, hardware platform and network media
- ❖ Support UI platform for Kanzi, HTML5, Android and more
- ❖ WYSIWYG UI design tool - Kanzi Studio
- ❖ Existing functionality sharing



Personalization

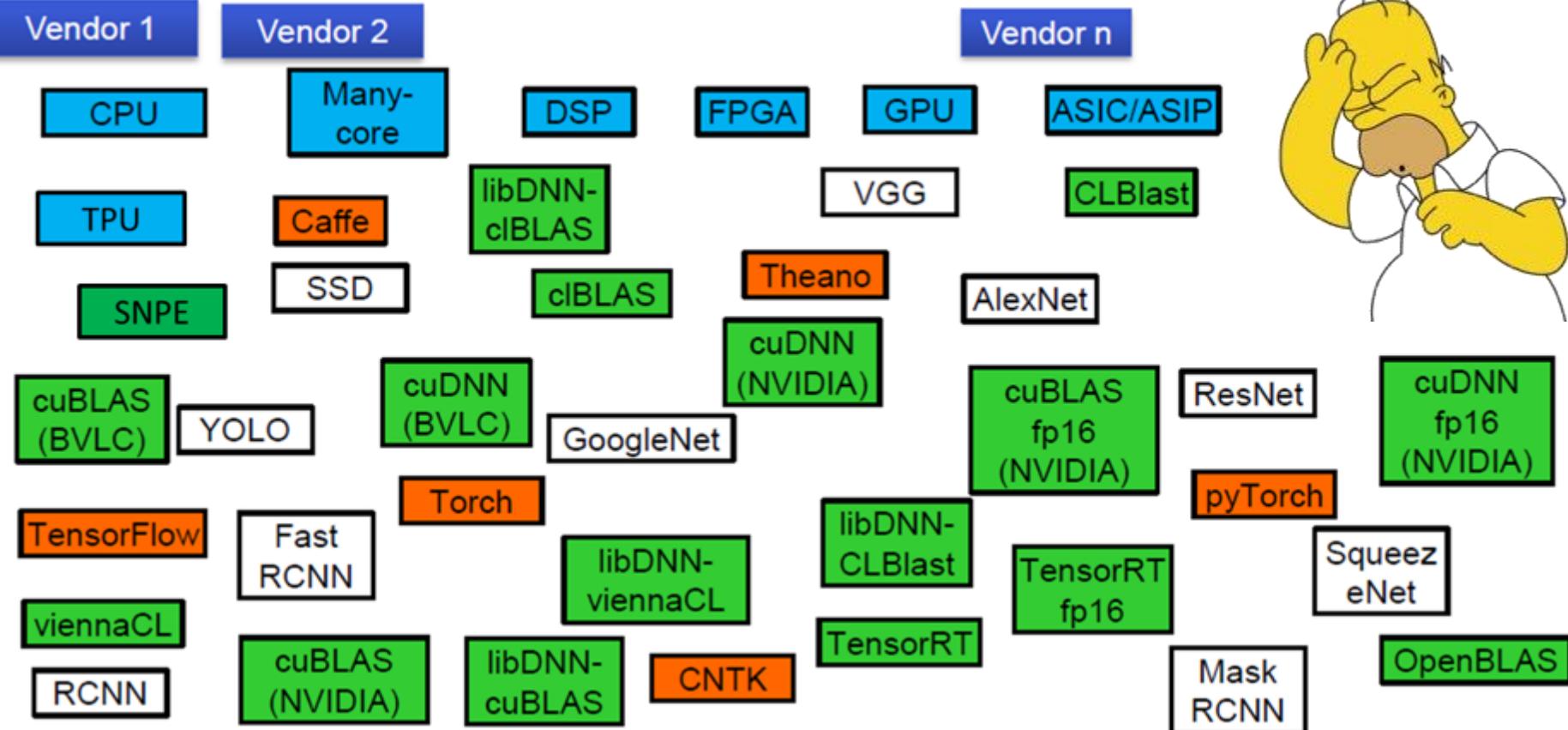


Single API for multi-displays & Multi-device



AUDI Q8 Sport Concept @ Google I/O 2017

Case Study #4 – the Messy World of AI



AI Modulization - AI Dev Kit



OS Support



Powerful On-device AI Performance



Full Camera Stack



Rich AI Tools



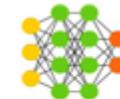
AI Turnkey Solutions



AI Algorithm Store



AI Services Service



DL Training Engine

HW Spec

Hardware

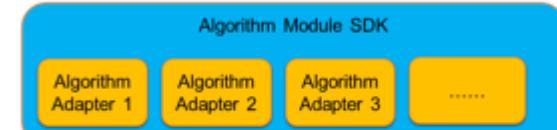
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AI Tools	Data Mgmt Tool, Annotation Tool, Training Tool, Tuning Tool
AI SDK	SNPE, AI algorithm plug-in, security protection, AI task scheduler, etc.
OS	Android & Linux with AI Acceleration Lib, SNPE, and integrated AI Frameworks



AI Dev Kit
Do Intelligent Vision Yourself



More Challenges & Opportunities

- ❖ Freedom
- ❖ Open Standard API
- ❖ UI/AI/Security/Connect/Multimedia
- ❖ Open hypervisor & RTOS
- ❖ Reliable Upgrading
- ❖ Functional Safety
- ❖ New Hardware
- ❖ More Innovations



更小

- 更小硬件：智能传感器
- 更小系统：K级OS
- 更小应用：HTML5应用



更快

- 快速通讯：5G
- 极速启动：<1s
- 快速修复：热补丁



更简单

- 交互简单：语音，眼球，脑电
- 开发简单：自动测试
- 优化简单：自动优化



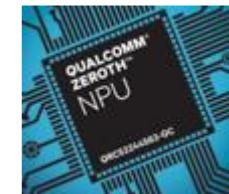
更智能

- 智能汽车
- 情绪理解
- 智能卫星



更安全

- 生物认证
- 防物理攻击
- 安全操作系统



更强大

- 深度学习处理器
- 全面异构计算
- 多层次分布式计算



联合起来，创造丰富多彩的智能世界

Together, Build the Colorful Intelligent World!



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