智能操作系统的变革与挑战

Evolution & Challenges of Intelligent Operating System

2018.6.28

Content

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

About ThunderSoft

Who is ThunderSoft?

Smart System Service & Technology Provider

ThunderSoft 中科創達

AI & Vision

Smart IoT

Smart Vehicle

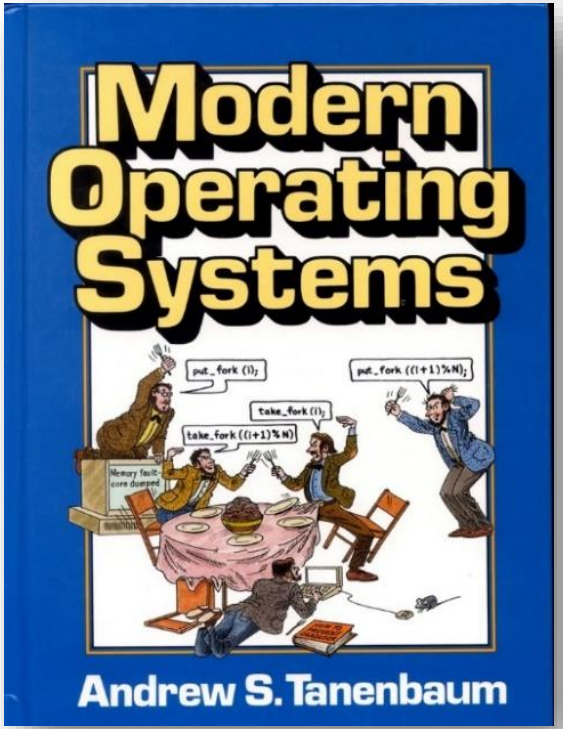
Smart System

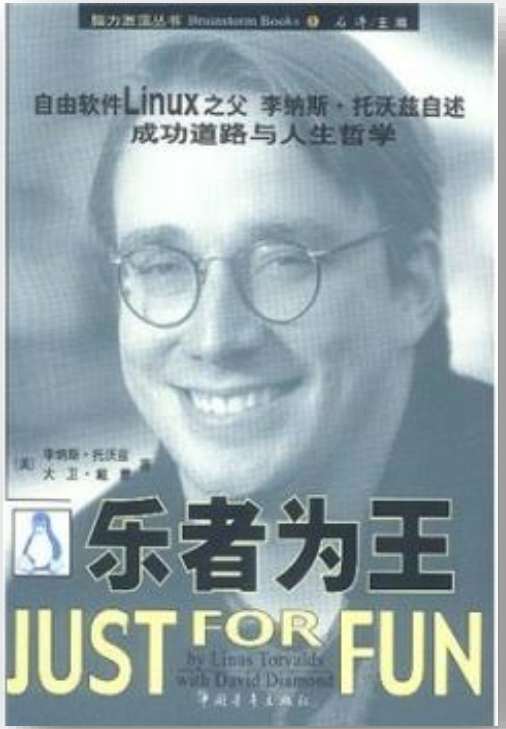
Global Carrier

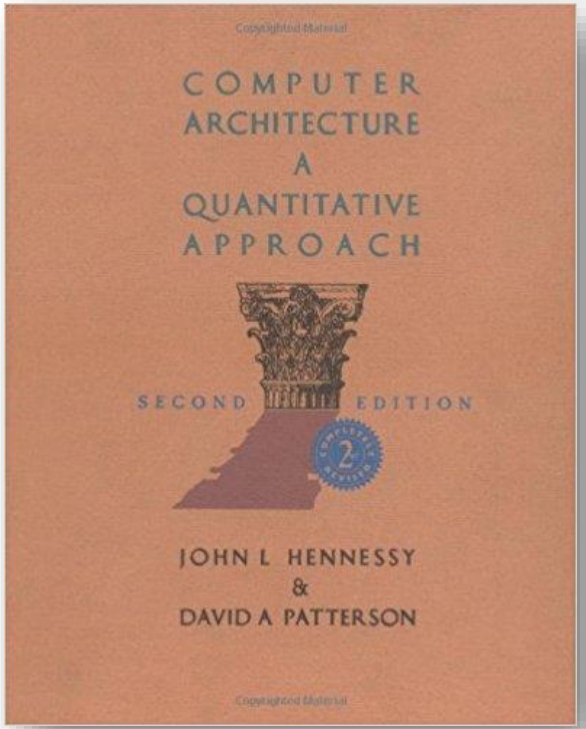
Start-up	Fast Growing	Expanding	Core Technology

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
NEC 红旗 Linux		Investment from Qualcomm, ARM, Spreadtrum, NL	Spreadtrum Joint lab	Camera Turn-key	H5OS Security	IPO **300496**	Rightware Acquisition	MM Solution Acquisition	India/Malaysia Branch

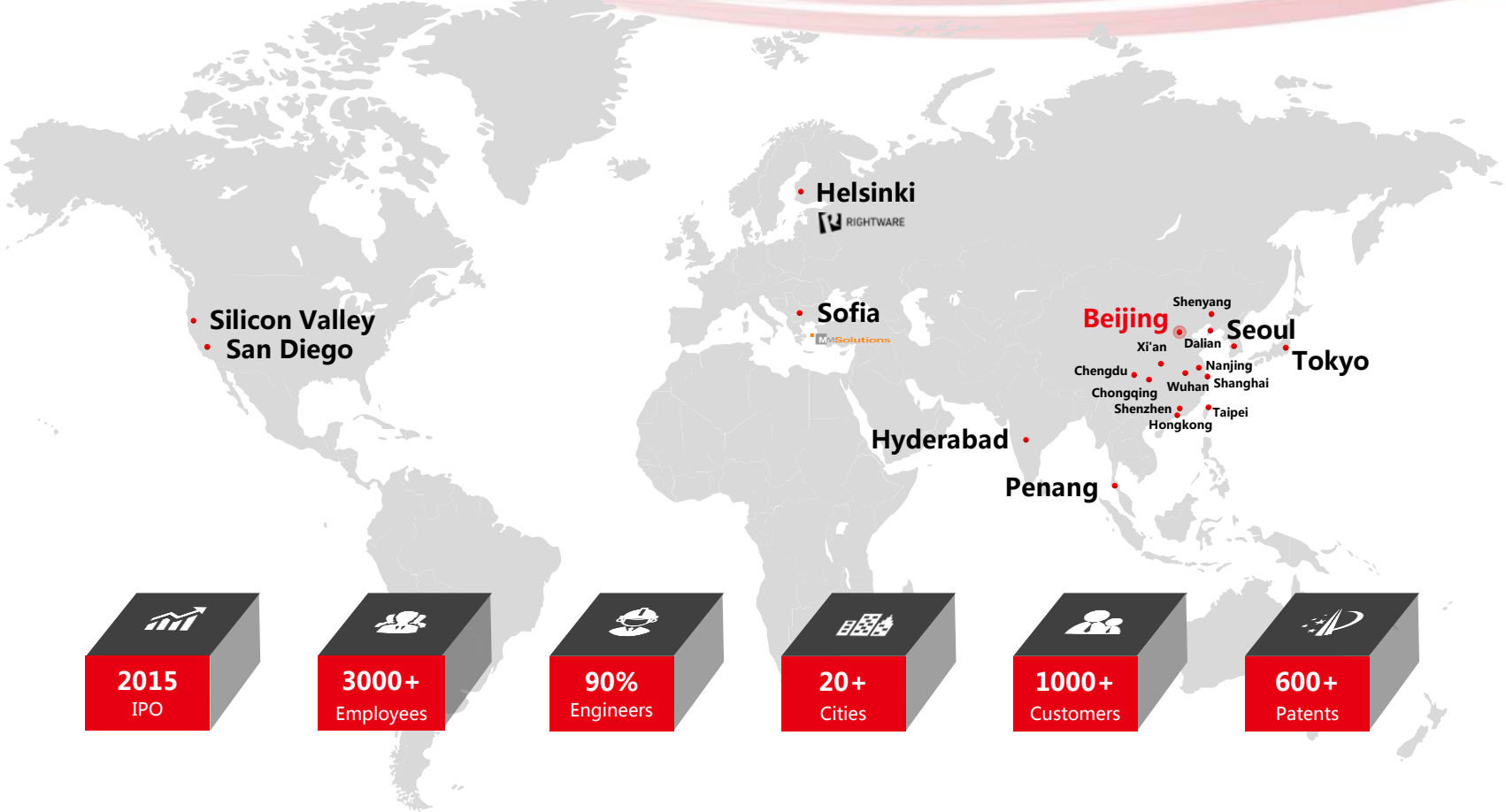
What does ThunderSoft read?







Where is ThunderSoft?



What does ThunderSoft do?

Smart IoT

Smart Vehicle

Smart System

Services

- Full-stack Engineering
- SoC Enabling
- Turn-key Solution
- Embedded OS
- System Maintainance

Cloud	FOTA	DM	Security	
Middleware	AI	UI	Connect	Camera	Security
OS				RTOS
Hardware				

Technology

- Optimization
- Security
- Vision
- Graphics
- AI


长风联盟
Changfeng Alliance
IT大咖说
知识共享平台
Where are we going?
Build the colorful intelligent World!

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

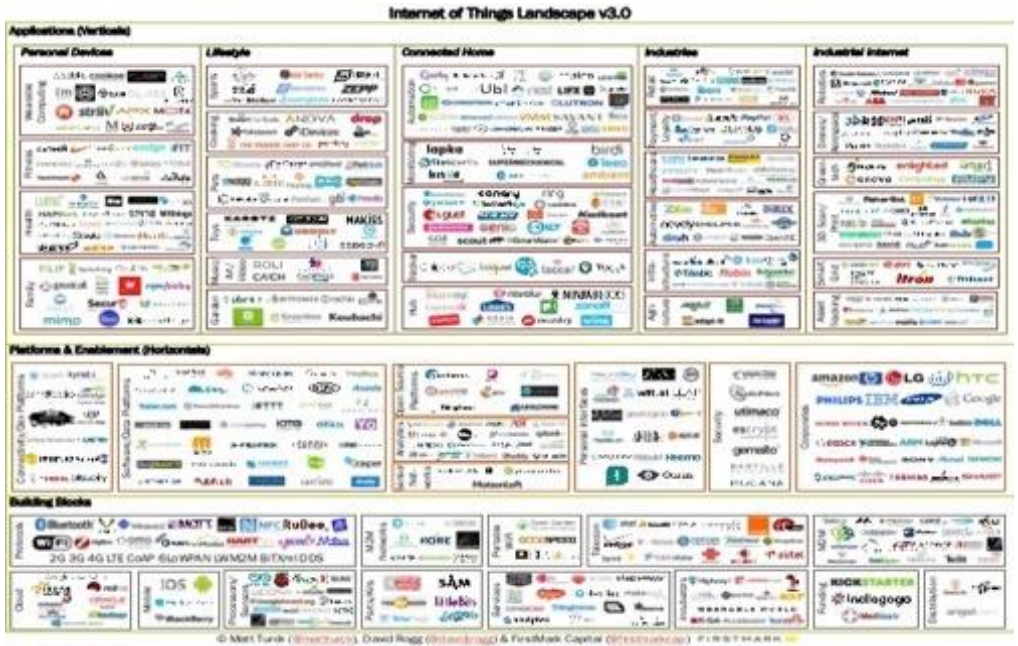
2020s
物联网/人工智能/机器人

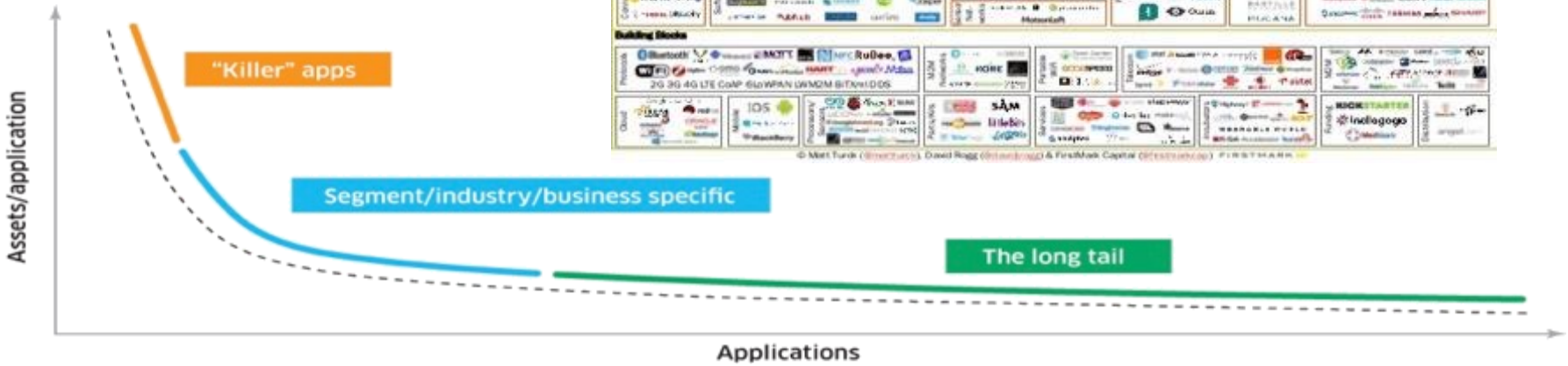
操作系统: ？？？
交互: ？？？

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

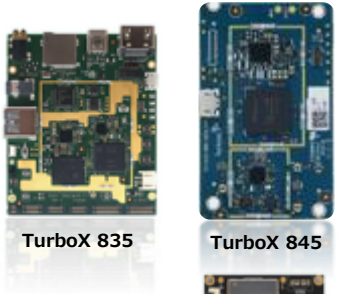
- IoT customers askes for different features => need **IoT specific feature sets**
- IoT customers needs more and longer support => need **well-maintained** SW
- IoT customers asks for more choices => need support **more SW/HW modules**
- IoT customers are facing more choices => need **accessible docs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

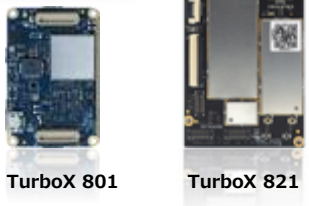
Open Standard · Maintainability · Controllability · Modularity

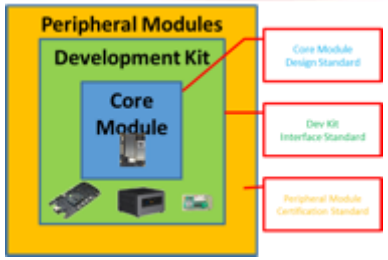
AI · Audio · Camera · Tools · Security · Performance

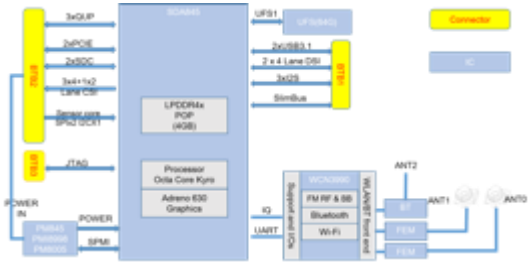
OS Modulization

IoT Hardware Modulization









HW Spec

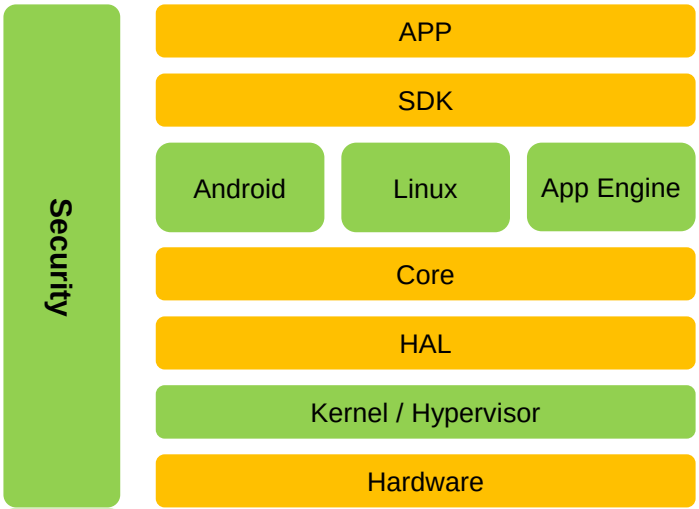
Hardware

- 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



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

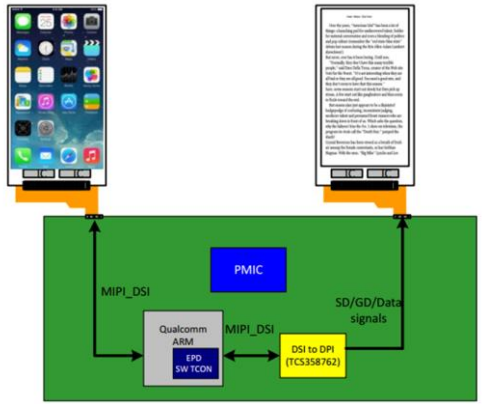
Dual Screen Support

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



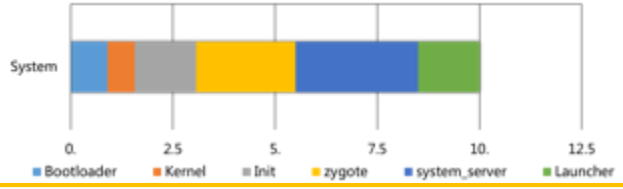
Case Study #2 - Smart AR/VR

- 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

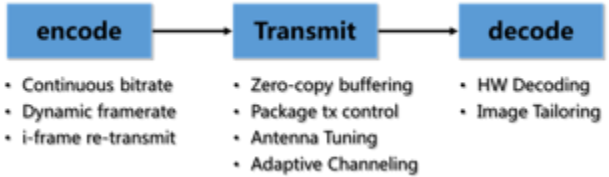
Fast Boot

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



Low Latency

- VR Latency < 17ms
- Streaming < 150ms



SoC Leveraging

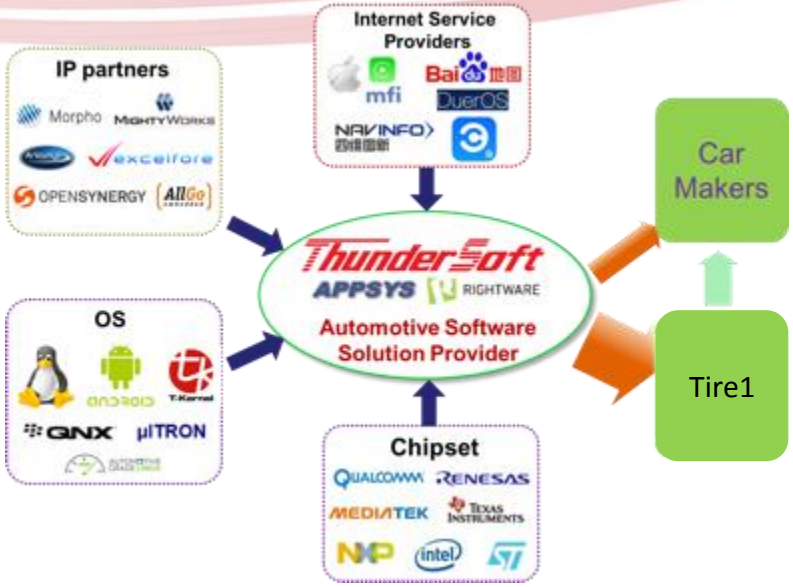
- CPU
- GPU
- DSP
- VPU

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

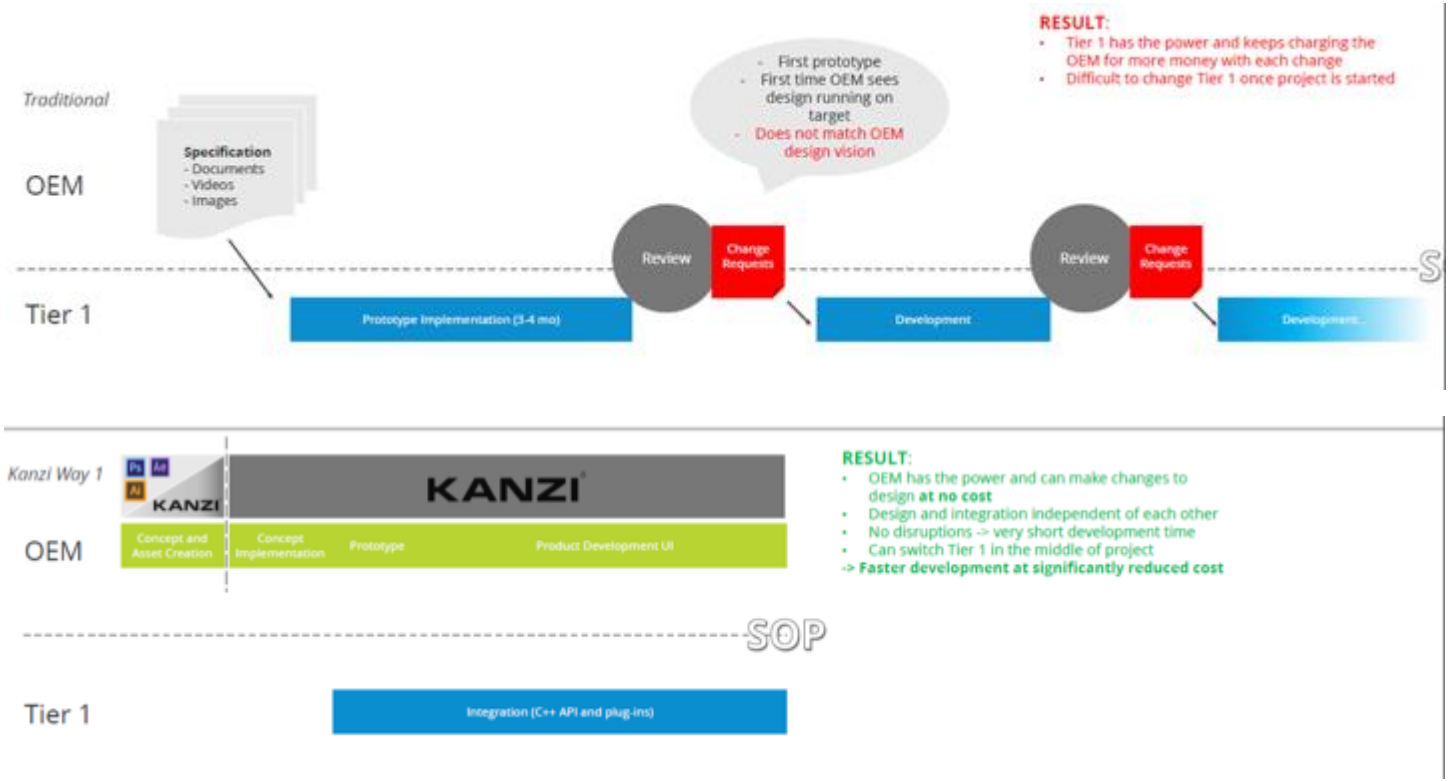
Faster

Integrated

Smarter

User Friendly

UI Modulization



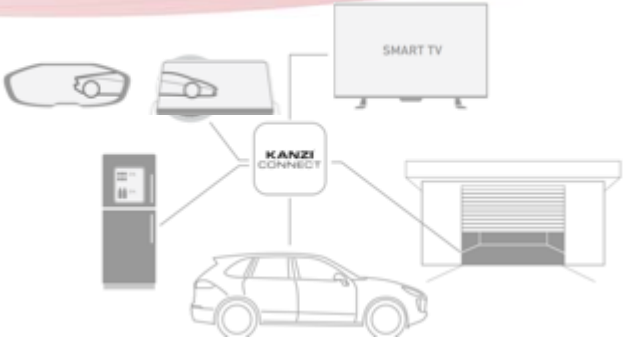
Kanzi Studio

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



Single API for multi-displays & Multi-device

Personalization

AUDI Q8 Sport Concept @ Google I/O 2017

Case Study #4 – the Messy World of A...

Vendor 1
Vendor 2
Vendor n
CPU
Many-core
DSP
FPGA
GPU
ASIC/ASIP
TPU
Caffe
libDNN-clBLAS
VGG
CLBlast
SNPE
SSD
clBLAS
Theano
AlexNet
cuDNN (NVIDIA)
cuBLAS (BVLC)
YOLO
cuDNN (BVLC)
GoogleNet
cuBLAS fp16 (NVIDIA)
ResNet
cuDNN fp16 (NVIDIA)
Torch
pyTorch
TensorFlow
Fast RCNN
libDNN-CLBlast
libDNN-viennaCL
TensorRT fp16
SqueezeNet
viennaCL
TensorRT
RCNN
cuBLAS (NVIDIA)
libDNN-cuBLAS
CNTK
Mask RCNN
OpenBLAS

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

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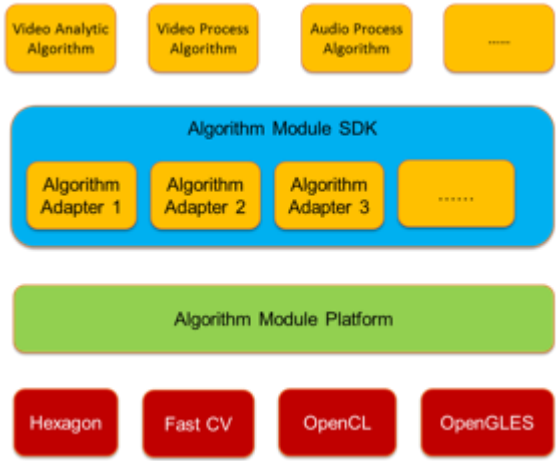
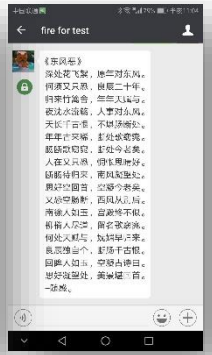
AI Tools	Data Mgmt Tool, Annotation Tool, Training Tool, Tuning Tool
AI SDK	SNPE, AI algorithm plug-in, security protection, AI task scheduler, etc.
OS	Android & Linux with AI Acceleration Lib, SNPE, and integrated AI Frameworks

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

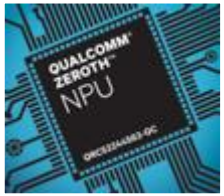
- 交互简单：语音，眼球，脑电
- 开发简单：自动测试
- 优化简单：自动优化

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

ThunderSoft

联合起来，创造丰富多彩的智能世界

Together, Build the Colorful Intelligent World!