Designing Conversational AI Devices in a Day

Saleel Awsare – VP & GM, Audio & Imaging
Voice AI is Everywhere
Evolution of the Human Interface

- Punch Card
- Keyboard
- Mouse
- Touch
- Voice
The State of Voice as an Interface

Voice Assistants: This Is What The Future Of Technology Looks Like

“[…] advances in AI mean that the possibilities of a voice-activated world are finally becoming a reality”

Voice is about to fix our love-hate relationship with machines

“More intelligent services will not only learn to talk with us, but also recognise emotion so they can truly engage with our lives”

The Future of Secure Authentication Is Your Voice

“Software […] can now pick up microsignatures in a voice that reveal telling details about the speaker.”

CES 2018: What the Gadget Fest Looks Like in ‘the Year of A.I.’

“Amazon dominated the arena by the sheer volume of products that worked with the Alexa voice assistant […]”
Massive Leap in Device Intelligence Through Voice

User learns fixed device

User struggles with multiple devices

Smart devices adapt to user
What is Required for a Successful Voice AI Device?

**DEVICE**
- Acoustic Design
- Hardware
- Firmware
- Voice Algorithm
- Software
- Wake Word

**CLOUD**
- Cloud ASR
- Natural Language Processing
- Services

Cloud providers include:
- Google
- Amazon
- Microsoft
- Baidu
- NTT Docomo
- SK Telecom
- Samsung
- NAVER
- Kakao
- Tencent
Voice AI Enablement

Smart Product

Voice Enablement

Voice Enabled Smart Product

72°
Building a Voice AI Device **The Old Way**

**36 Weeks**

1. **Select far-field pre-processing chipset / evaluation board**
2. **Select microphone provider**
3. **Select codec chipset / board to drive external speakers**
4. **Select external speakers for far-field voice application**
5. **Select host processor board with wireless connectivity**

**6 Weeks**

- **Connect microphone / pre-processing / host processor / wireless / codec / speaker system and ensure compatibility and good electrical performance**
- **Develop, integrate and test software running on host processor**
- **Contact third party keyword detection provider and integrate their keyword detection technology into DSP or host processor**
- **Build and verify reproducible test setup to perform far field performance testing**
- **Verify the system (hardware and software) performance meets expectations**

* If it does not meet expectations, start process from beginning
Building a Voice AI Device *The Smart Way* with AVS

1. Purchase audio front-end dev kit
2. Connect to host processor or Raspberry Pi
3. Load AVS SDK onto host processor
4. Performance is pre-validated
5. Build prototypes to validate product concepts

1 Day
What Makes a Good Voice AI Device?

SUBJECTIVE

USE CASE

Typical Home

CRITERIA

Device should overcome common household acoustic challenges

Running Faucet  Pets  Television  Babies  Appliances  Music
What Makes a Good Voice AI Device?

**RAR**
(Response Accuracy Rate)
75% or better

**FAR**
(False Acceptance Rate)
Less than 4 in 24 hours

**FRR**
(False Rejection Rate)
Less than 20%

**SER**
(Speech to Echo Ratio)
-20dB
Synaptics has the most robust process to take prototypes to product stage.
An Impressive End Result
What has Synaptics Done?

- Synaptics Expands Collaboration with Amazon to Bring Alexa to More Third-Party Devices
- Baidu Collaborates with Synaptics to Bring Conversation-based AI Devices to Market
- Synaptics and HARMAN Collaborate to Advance Far-Field Capabilities for Voice-Enabled Devices
- Synaptics Broadens Voice-Enabled Ecosystem for Microsoft Cortana Integration
- Arrow Electronics, Synaptics and NXP Team to Accelerate the Development of Amazon Alexa-Enabled Smart Home Products
- Synaptics Selected by Naver to Develop AI Products Based on AudioSmart Far-Field Voice
Voice AI Devices Announced at CES 2018

- Kohler Verdera Smart Mirror
- ASUS Lyra Voice Wi-Fi system
- Onelink Safe & Sound Smoke + CM Detector
- Harman/Kardon Allure Portable Speaker
- Polk Command Soundbar
- Anker Roav Viva Car Charger

+100s MORE
ADVANCING THE HUMAN INTERFACE

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