Sense the Wonder

Scale AI Vision Solutions on the Edge
Sony AITRIOS – The Ultimate Platform for Developers and Partners

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Sony Semiconductors Solutions America
What are the key challenges with Vision AI for developers, partners and integrators?
Industry Challenges to Current Methods of Visual AI

- Large Scale of Streaming Cameras or Smart Cameras
- Heavy requirements for network, CPU/GPU, backhaul/cloud
- Complexity of Deployment
- Increase in power requirements
- Issues with Latency
- Privacy concerns streaming and storing video
- Visual AI solutions challenge business folks to consider at scale realities

Customer w/2000 Locations Est.

x 2000 Cameras per location $250/ea
x Install $50 ea Camera+(Cat5/6)
x NW Upgrades $20,000 per location

Total Installation Cost = $1.24B
Sony’s AITRIOS
Our Approach to Visual AI
Increase Image Sensor Possibilities with Stacked Structure

Sony develop a real-time intelligent image sensor

AI

Embed Recognition in Logic Layer

Pixels

Logic
**Sony Intelligent Vision Sensor – Worlds First**

**Specification Overview**

<table>
<thead>
<tr>
<th></th>
<th>IMX500 (Bare-Die)</th>
<th>IMX501 (Package)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pixels</td>
<td>4056(H) × 3040(V) 12.3Mpix</td>
<td></td>
</tr>
<tr>
<td>Image Size</td>
<td>1/2.3’ (Diagonal 7.857mm)</td>
<td></td>
</tr>
<tr>
<td>Cell Size</td>
<td>1.55μm(H) × 1.55μm(V)</td>
<td></td>
</tr>
<tr>
<td>Functions</td>
<td>AI Processing, ISP, HDR</td>
<td></td>
</tr>
<tr>
<td>Output Format</td>
<td>MetaData, Bayer RAW, ISP Out (YUV/RGB), ROI</td>
<td></td>
</tr>
<tr>
<td>Package</td>
<td>—</td>
<td>Ceramic LGA 12.5mm(H) × 15.0mm(V)</td>
</tr>
</tbody>
</table>

**IMX500 (Left) / IMX501 (Right)**
Paradigm Shift
– Extreme Visual AI at the Edge

• Integration of sensor & AI engine into a single piece of silicon – Sony IMX500

• Camera designs: Wi-Fi or POE, small size, low power, no fans (No SOC req.)

• Inference on Sensor – Only Meta JSON, BB/ROI coordinates transmitted

• As an industry we can reduce the cost and complexity of Vision AI by factors of 1/3-2/3.

• Sony AITRIOS Platform & Microsoft Azure
Sony’s AITRIIOS
Our Approach to Visual AI
Advantage of the intelligent vision sensor IMX500

Raw data travels just $\mu$m between layers, Low Latency, Low bandwidth NW needs & performs edge AI with no discrete power hungry SOCs
## Significant Performance

### Processing Time w/MobileNet V1

<table>
<thead>
<tr>
<th>Processor</th>
<th>[msec]</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMX500/501</td>
<td>3.1</td>
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<tr>
<td>Processor A</td>
<td>4.9</td>
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<tr>
<td>Processor B</td>
<td>135</td>
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<tr>
<td>Processor C</td>
<td>6.5</td>
</tr>
</tbody>
</table>

Inferred result will be output at the tail of the frame (33msec)

Inference Result in each frame up to 30fps
Car Detection Model - Performance Example

Sony AITRIOS Camera

SOC Enabled Streaming Smart Camera
QR Code Shipping Logistics Example - Performance Example

Sony AITRIOS Camera

SOC Enabled Streaming Smart Camera
Advantage of the intelligent vision sensor IMX500

Raw data travels just μm between layers, Low Latency, Low bandwidth NW needs & performs edge AI with no discrete power hungry SOCs
Advantage of the intelligent vision sensor IMX500

Raw data travels just $\mu$m between layers, Low Latency, Low bandwidth NW needs & performs edge AI with no discrete power hungry SOCs
Keep tracking slot cars with bounding box rendering on the background video. Visualize the latency comparison, and display the critical data comparison, e.g., inference time, ISP processing time, data size, power consumption, etc.
AITRIOS – The platform to enable practical execution of AI solutions
Introducing Sony AITRIOS Enterprise & Developer Edition

- Enterprise Now Available on Azure Marketplace
- Enabling AITRIOS to run on a customers hosted tenant of Microsoft Azure
- Developer Addition Now available – No Azure Tenant Required
- Providing control and management of AITRIOS Compatible Devices through APIs
Deliverables of AITRIOS

**Cloud Service**
- Console: Various cloud services for efficient implementation of solutions
  - Enroll cameras
  - Manage cameras
  - Deploy cameras
  - Create model
  - Train model
  - Check data
  - AI Converter For IMX500
  - Market Place

**SDKs and tools for efficient development**
- Device SDK
- AI App SDK
- Cloud SDK

**Partners & Users to buy/sell AI models and Applications**

Microsoft Azure
Sony and Microsoft Co-Innovation Lab and Connected Store PoC
Dev kit evaluation program - AI developers
Available at our Table in Exhibit Hall

- Hardware
  - An AITRIOS Type 2a camera module
  - GPIO extension board
  - Raspberry Pi 4B 8GB memory

- Software
  - Firmware of Raspberry Pi (sc_t2r)
  - TensorFlow Lite - AITRIOS Converter

- Cloud
  - AITRIOS Packager on cloud
How To Learn More About AITRIOS

Co-Innovation Lab
Microsoft  SONY

Apply to Participate with Sony & Microsoft’s Co-Innovation Labs
https://aiotlabs.microsoft.com/en/500

General AITRIOS information
https://www.aitrios.sony-semicon.com/en#top

AITRIOS Device information
Thank you

Q&A
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