



CEVA TECHNOLOGY
SYMPOSIUM SERIES

Edge AI SoC : The Enabler of New Retail Innovation

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▲ The Era of AIoT



Application Scenario of New Retail



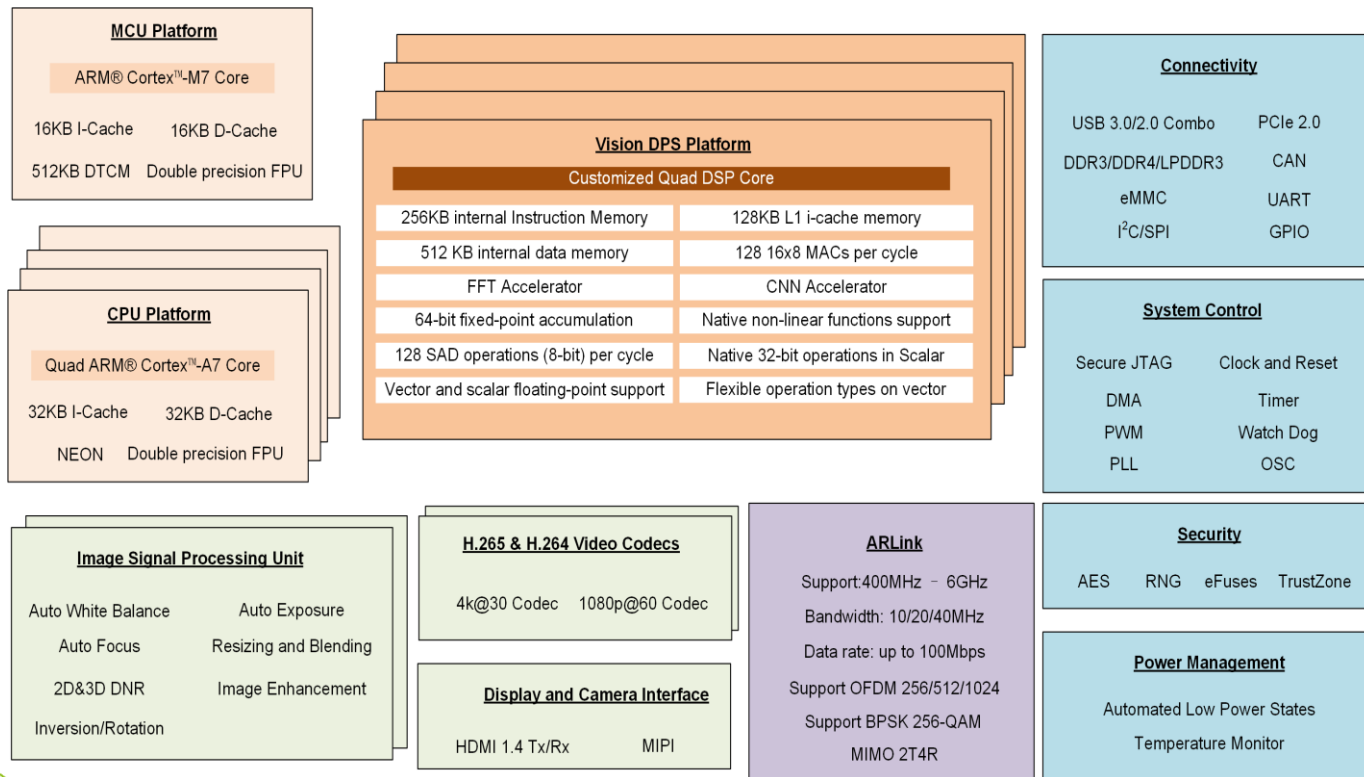
Key technologies

- Robust image and video capture
- Object detection and recognition
- Face detection and recognition

Key challenges

- Low illumination/Back lighting
- CNN inference performance
- Precision of CNN inference
- Power consumption

Artosyn Edge AI SoC AR9201



Key Features of AR9201

- High performance ISP
 - 2D/3D noise reduction
 - HDR
- High performance Vision DSP (CEVA-XM4)
 - CNN inference
 - CV algorithm
- Robust wireless connection

HDR



欠曝图像

+



过曝图像

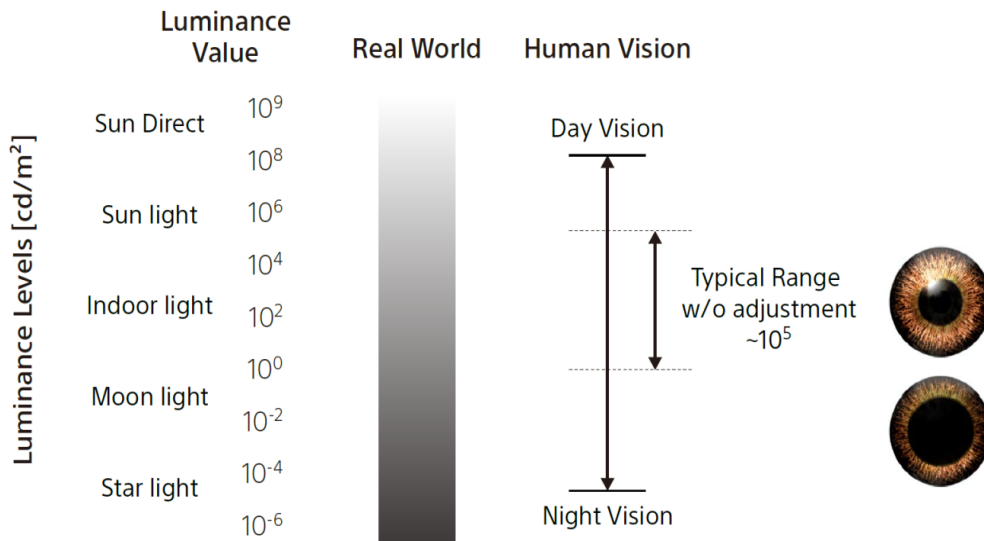
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HDR合成图像

Why HDR

- The dynamic range of human eye is ~100dB, normal CMOS sensor is only around 60dB.



HDR feature

Multi-mode support

**DOL HDR /
stagger HDR**

Sony : IMX290
IMX307

OV : OV4689

SC : SC2310

**Zig-Zag
HDR**

OV:OV13870

2 frame HDR :

88dB

3 frame HDR :

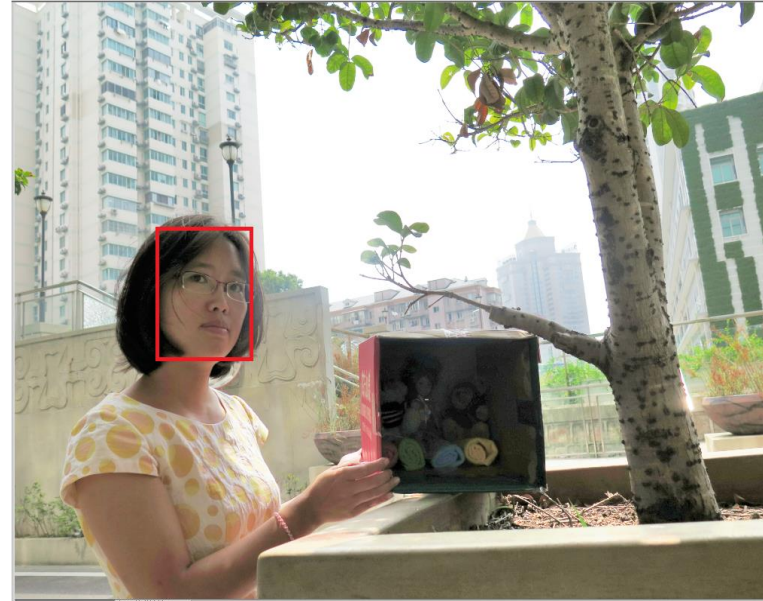
120dB

HDR demo

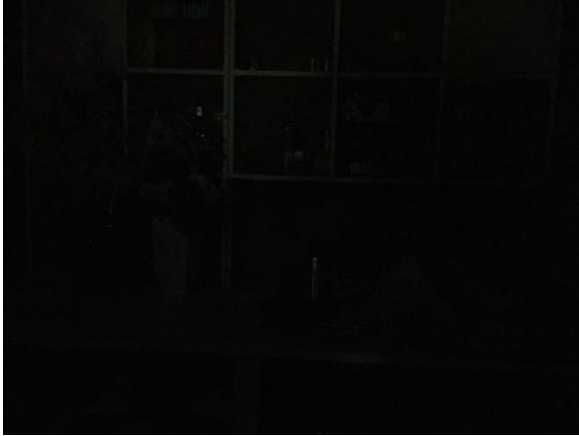
HDR OFF



HDR ON



Low illumination : $<0.01\text{lux}$



iphone



High performance sensor + ISP

3D Noise reduction



3DNR OFF



3DNR ON

CNN inference

- Typical CNN network
 - Mobilenet SSD/Mobilenet
 - Resnet50/Resnet101
 - MTCNN
 - ...
- Performance requirements
 - >10-20 fps
- Tools
 - CNN generator

CNN inference performance

	Jetson TX1 (FP32/691MHZ) ¹	Jetson TX1 (FP16/691MHZ) ²	Jetson TK1 (FP32/691MHZ) ²	AP (FP32/A72@1.8G,A5 3@1.5G)	AR9201 (INT16/700M)	AR9201 (INT8/700M)
VGG16	6.4fps ¹	9.6fps ¹	/	0.2437fps ⁴	7.0347fps	11.5520fps
AlexNet	45.7fps ¹	65.1fps ¹	/	2.8732fps ³	134.1778fps	200.2668fps
GoogLeNet	34.2fps ¹	42.1fps ¹	5.0761fps ²	1.7298fps ³	59.6025fps	87.4038fps
resnet50	11.2360fps ²	/	4.9261fps ²	/	23.1695fps	36.7542fps
mobilenet	29.5858fps ²	/	2.9762fps ²	5.751fps ³	70.5032fps	102.9646fps
YoloV2	3.5fps ⁵	/	/	/	5.0343fps	7.1052fps
Tiny Yolo	12fps ⁶	/	/	/	28.5715fps	44.5715fps ₁₅

Summary

- New retail related business is booming
- Edge AI SoC is the enabler of new retail
- Higher performance/Lower power SoC is coming soon

Thank you

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The CEVA logo features the word "CEVA" in a bold, white, sans-serif font. A small yellow triangle is positioned above the letter "V". A registered trademark symbol (®) is located to the upper right of the "A".

The artosyn logo consists of the word "artosyn" in a lowercase, black, sans-serif font. To the right of the "o" and "s" are three small green dots of varying sizes. Below the English text, the Chinese characters "酷芯微电子" are written in a green, sans-serif font.

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