

Deep Learning AI in Cloud, every IOT and Smartphone

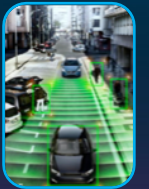
DRONES
\$ 2 Billion market



SMARTPHONES
Phones



ADAS



1.2Billion cars worldwide



PERSONAL HEALTH
Healthcare Analytics
\$ 12 B mkt



CAMERAS
245 millions
surveillance cameras
installed worldwide

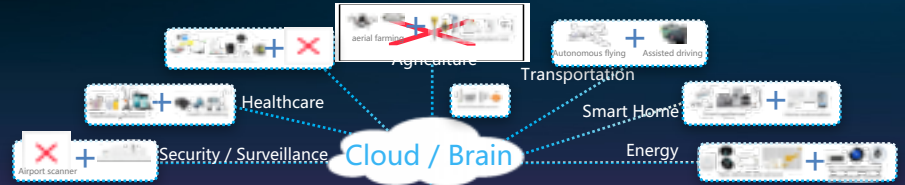


IOT
13.4Billion devices



ROBOTS

Cloud “+” is for “Local intelligence”



AI Everywhere:

- Connected to the “Deep Learning Brain” in the cloud
- Millions/billions of nodes learning and self-adapting – working in concert to make our lives easier

AI in both Cloud and Device

Cloud Assist –
Poor Response Time



Local Intelligence



Neural Processor Unit (NPU)

39 CNN Layer Implementation

(Similar to  AlphaGo)



28 nm – 0.3w – 100x GPU

1ST Deep Learning IoT Chip

NPU vs GPU

KDP 3100 Client chip

	NPU (Kneron)	GPU (NVIDIA Jetson)	CPU (Intel Xeon E5)
Optimized for Deep Learning	YES	NO	NO
Energy Efficiency (GFLOPs/W)	200 (1428 times better)	14.71 (105x)	0.14 (1x)
Power Consumption(W)	0.3 (1x)	10.2 (consumes 30x more energy)	95 (consumes 320x more energy)

KDP 3200 Server Chip

	FPGA (Kneron)	GPU (NVIDIA M40)	CPU (Intel Xeon 2.2G)
Adaptive Configuration For Deep Learning	YES	NO	NO
Power Consumption(W)	20 (1x)	200 (consumes 10x more energy)	95 (consumes 5x more energy)

	FPGA (Kneron)	GPU (NVIDIA M40)	CPU (Intel Xeon 2.2G)
Detection Speed*	17x faster	4x	1x
Training Speed**	4.3ms (shortest training time)	17.2ms	68.8ms

* Object Recognition
 ** Average time to train 5 layer CNN estimated on ImageNet for 99.9% accuracy



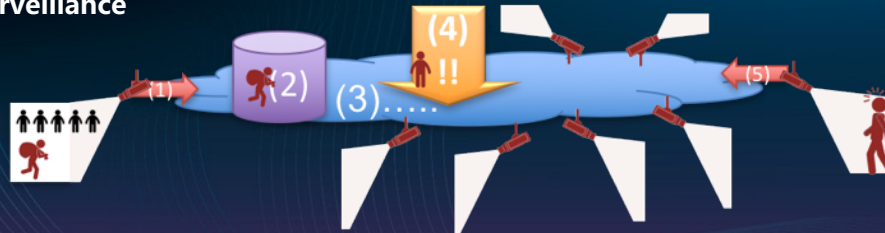
SOFTWARE – Deep Learning Modules

- Emotion Recognition
- Smart Surveillance
- Activity Recognition
- Smart Navigation

HARDWARE

- Reconfigurable Neural Networking Processor (NPU)
- IOT chip for deep learning
(Client side solution)
- Scalable deep learning engine - FPGA
(Server side solution)
-

Smart Surveillance



- ① Local surveillance
- ② Detection data consolidated
- ③ Possible threat identified
- ④ Updated threat pattern to all devices
- ⑤ Threat confirmed



Distributed AI * Collaborative Learning – Cloud + Device

1. Deep Learn enabled IoT - always learning



2. Learning shared within enterprise



3. All learning consolidated centrally



4. All edge devices gets smarter together





THANK YOU !