

A scalable vision processor for automotive applications

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Industry trend – embedding cameras in phones



iPhone 1
2007
Front cam
1 camera



iPhone 4
2010
+Selfie cam
2 cameras



iPhone 5s
2013
+Touch ID
3 cameras



iPhone 7+
2016
+Dual cam
4 cameras



iPhone X
2017
+Face ID
4 cameras

Industry trend – embedding cameras in cars



Roadster
2008
Rear
1 camera



Model S
2012
Rear
1 camera



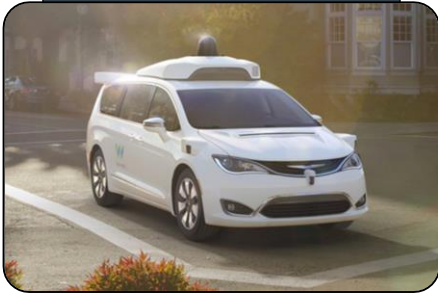
Model S
2014
+Front
2 cameras



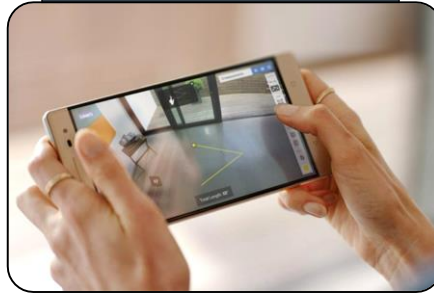
Model S
2016
3F, 4S, 1R
8 cameras

Industry trend – intelligent cameras everywhere

Automotive



Mobile



Drones



Gaming



Cloud



Surveillance



AR/VR

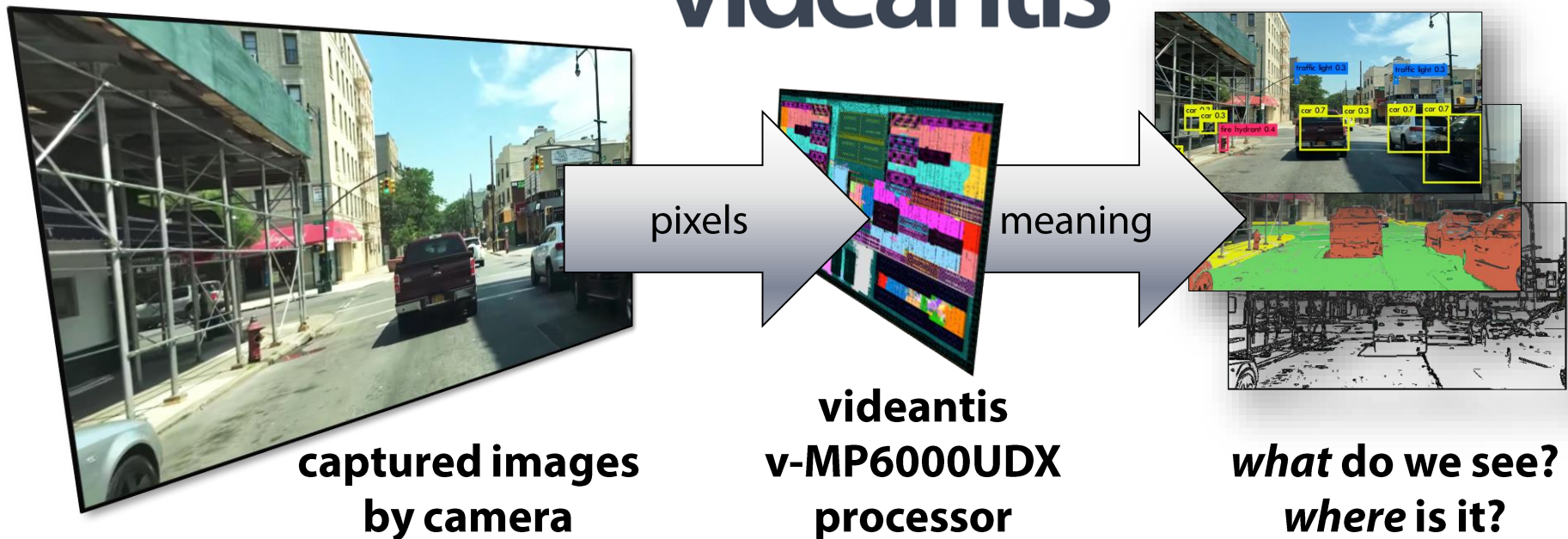


IOT



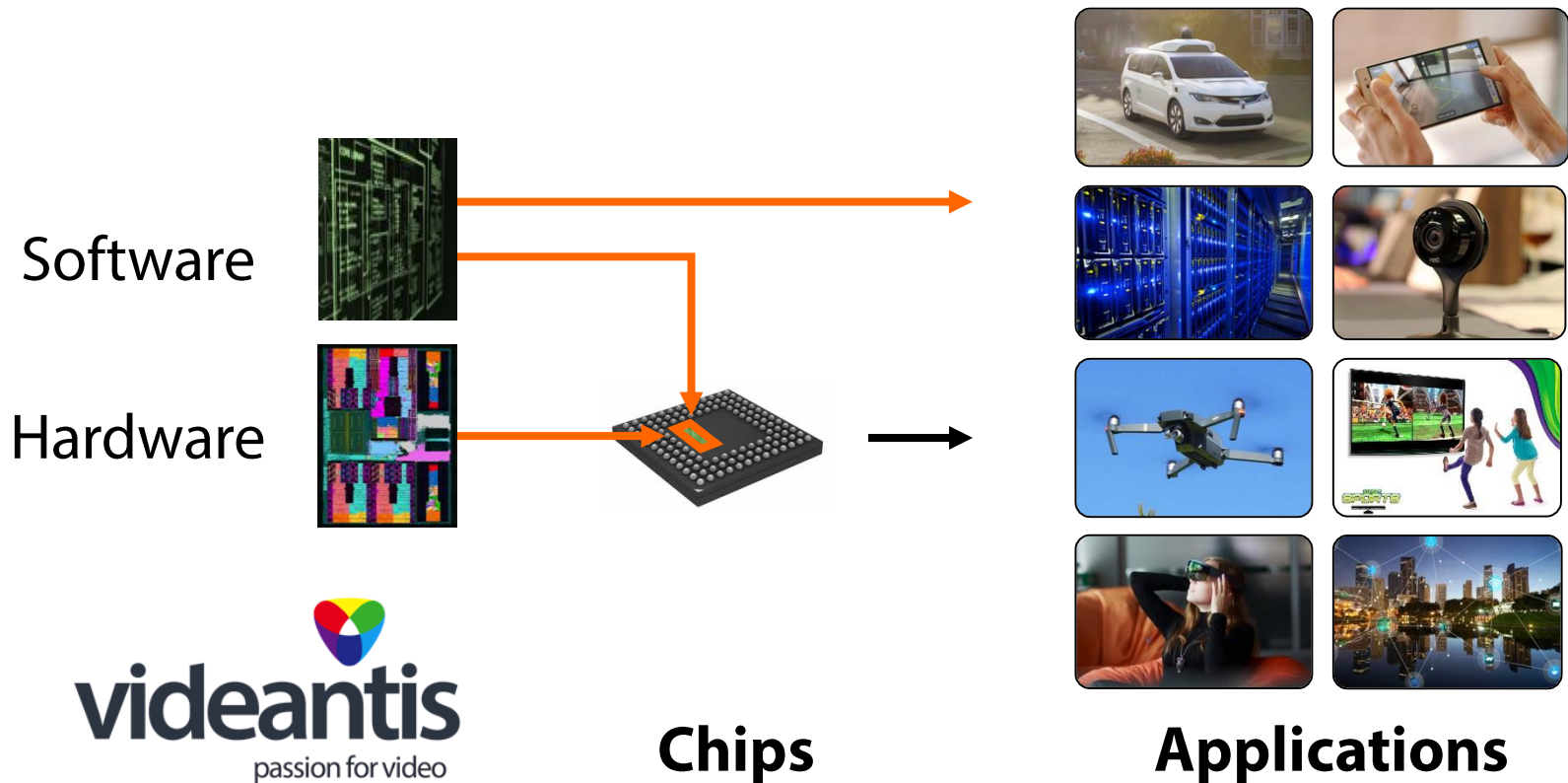
Smart sensing is a key technology to many new applications

Our mission: giving machines the power of sight



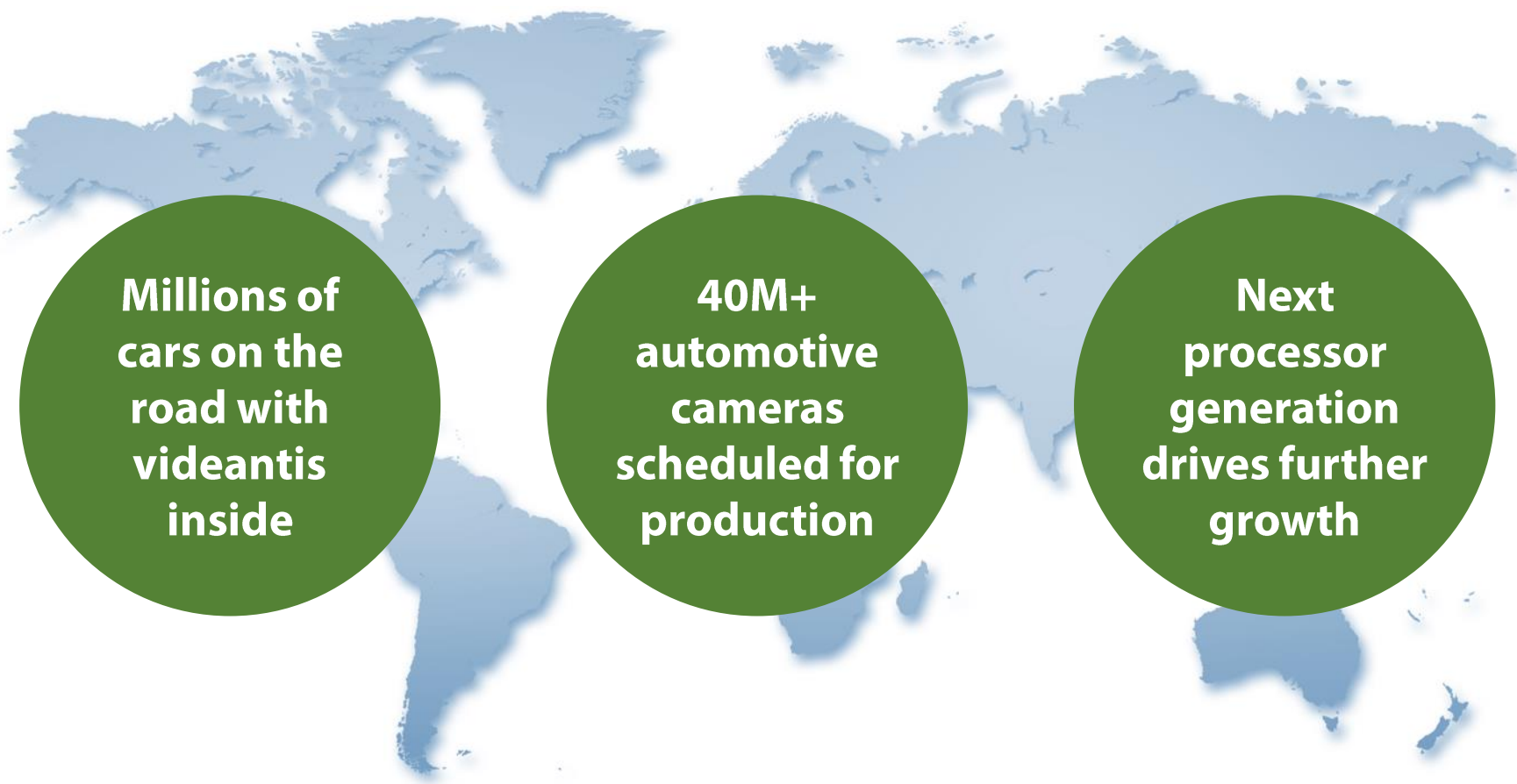
Use case: computer vision and deep learning in self-driving cars

About videantis – place in the value chain



**videantis provides key processing technology
for all embedded vision markets**

Global traction in automotive market



**Millions of
cars on the
road with
videantis
inside**

**40M+
automotive
cameras
scheduled for
production**

**Next
processor
generation
drives further
growth**

v-MP6000UDX: Integrated product offering for deep learning and visual computing

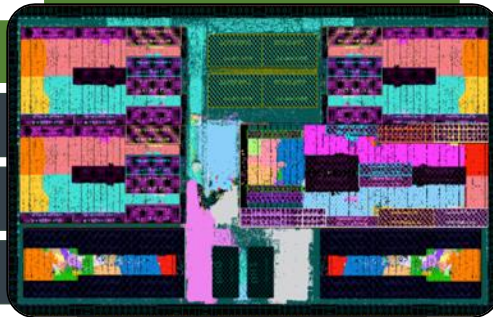
Deep learning

Computer vision

Image processing

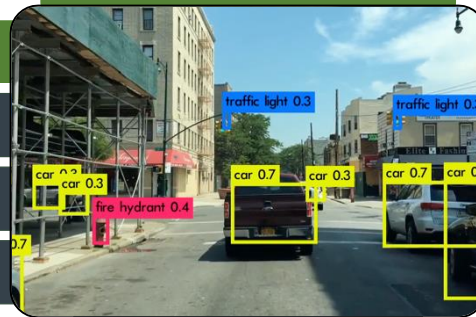
Video coding

v-MP6000UDX
architecture



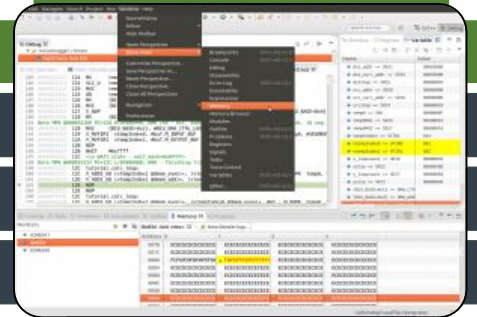
Processor

CNN libraries of
optimized kernels



Software

v-CNNDesigner
mapping tool



Tools

Launched
at CES
2018

16384
MACs per
cycle

1-256
cores

v-MP6000UDX Architecture Overview

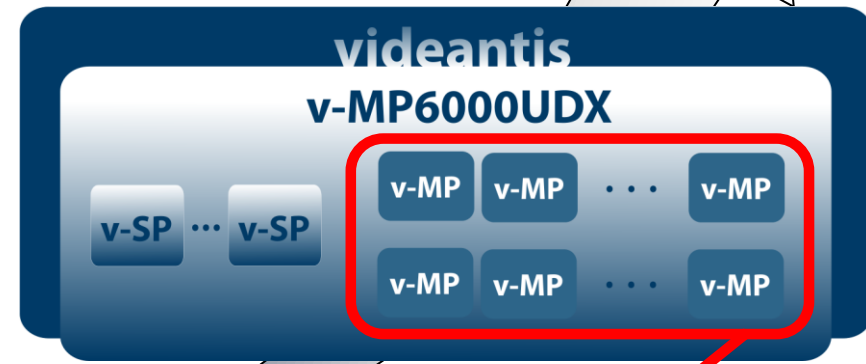
Heterogenous multi-core IP

- Stream processor core v-SP
- Media processor core v-MP

Configuration tailored towards performance requirements

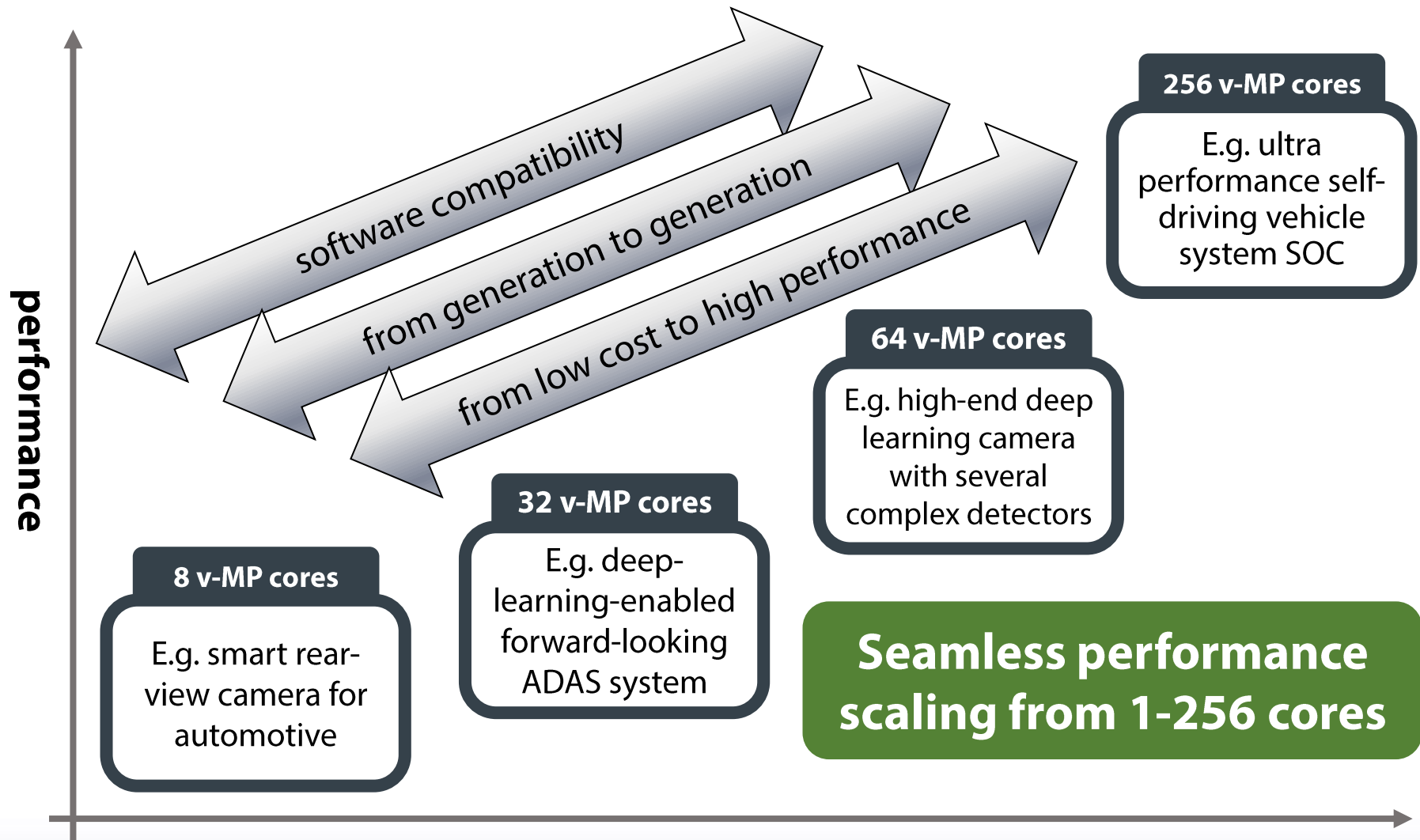
- Array of v-MPs for deep learning, video encoding, decoding, image processing, embedded vision
- v-SPs for bitstream parsing and packing in video encode/decode
- Example v-MP62320UDX
 - 6 - 6000 series processor IP
 - 2x** v-SP cores (dual channel bitstream coding)
 - 32x v-MP cores (deep learning, embedded vision, codecs)

Wide variety of configurable system interfaces available



**Deep learning &
embedded vision
subsystem**

Multicore scalable architecture

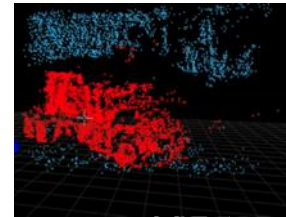
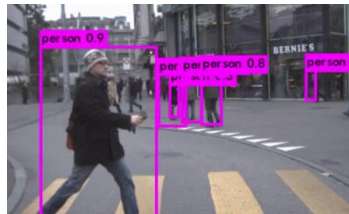


Fulfilling all visual processing needs



Deep learning

- Lowest power
- Supports all CNNs
- Push-button software flow



Computer Vision

- SLAM, SfM
- Optical flow
- Haar/Adaboost
- HOG/SVM
- 3D processing

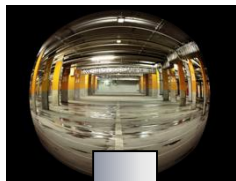
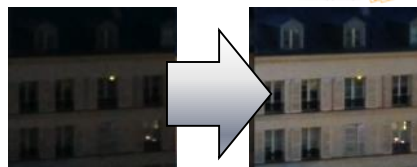


Image processing

- Lens correction
- Image enhancement



Codecs for transmission & storage

- Video compression: 8K60, low delay, 10/12bit, multi-channel, DRAM-less
- Optimized for specialized use cases



Combine CNNs with computer vision, imaging and codecs

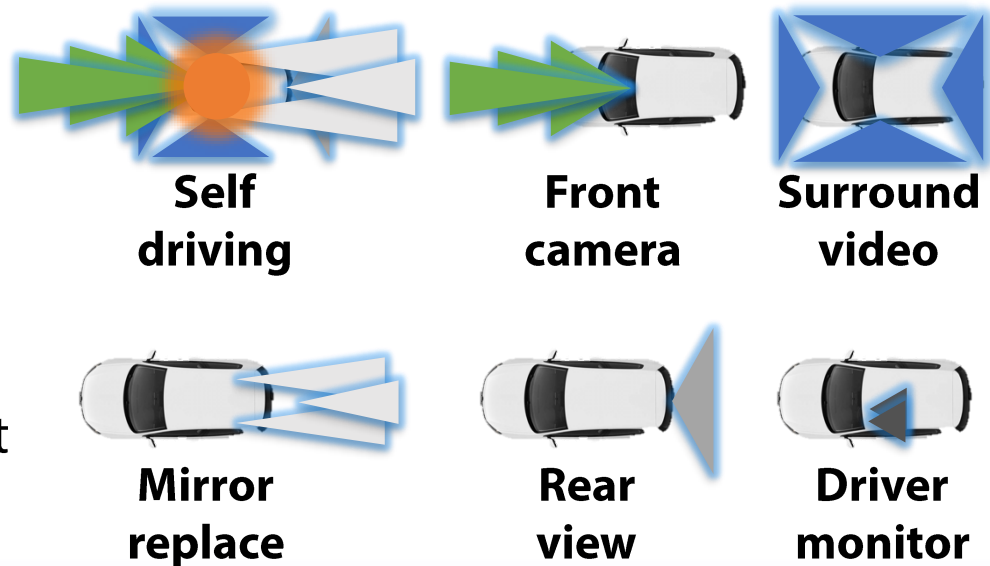
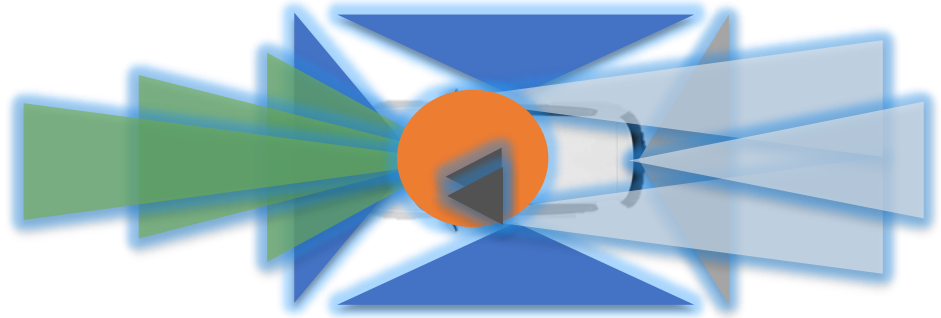
Comprehensive solution supporting autonomous driving and ADAS

Trends

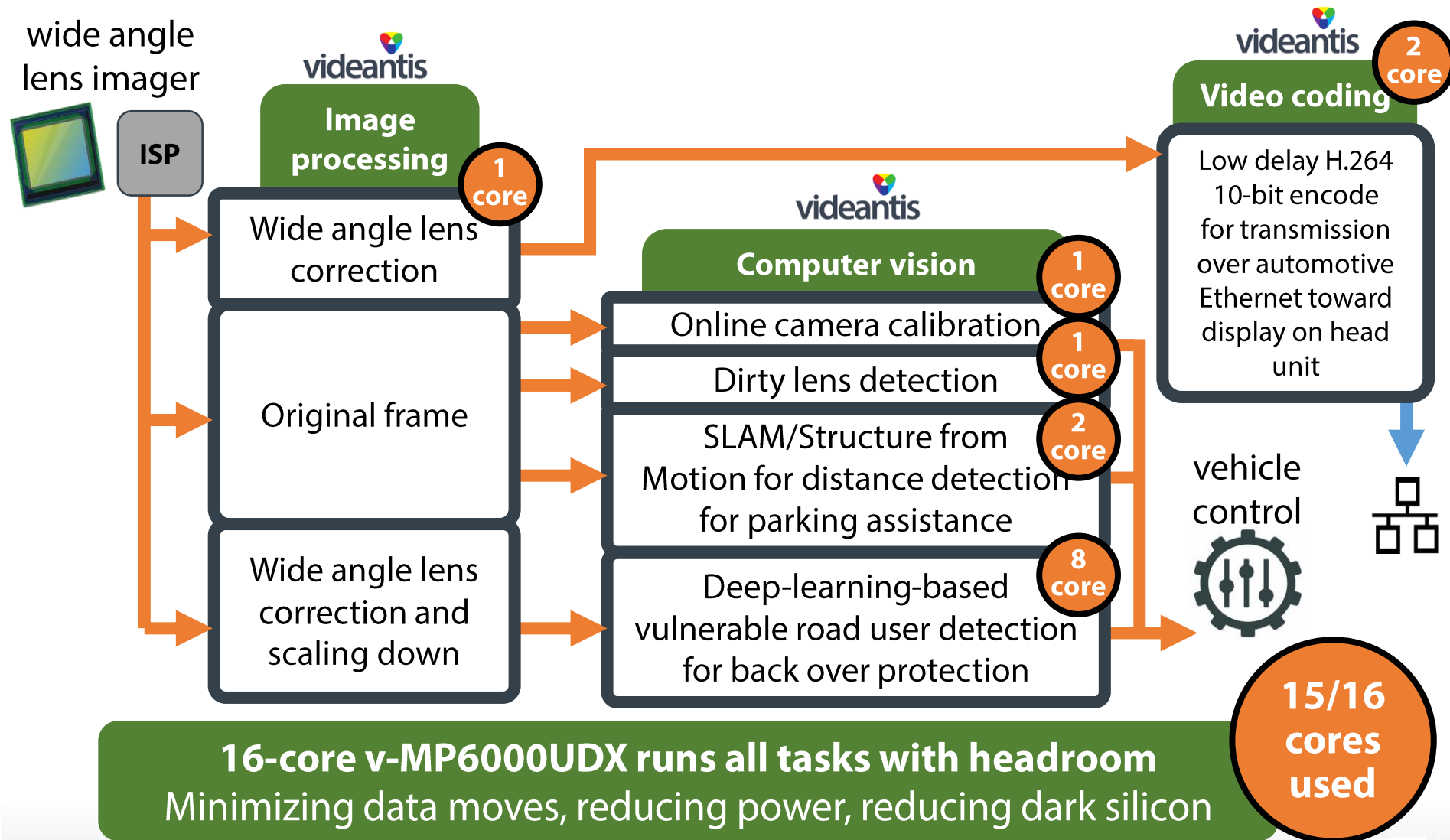
- Processing sensor data crucial to autonomous drive and ADAS
- Industry marching toward 10+ cameras/car, 20+ sensors

videantis automotive targets

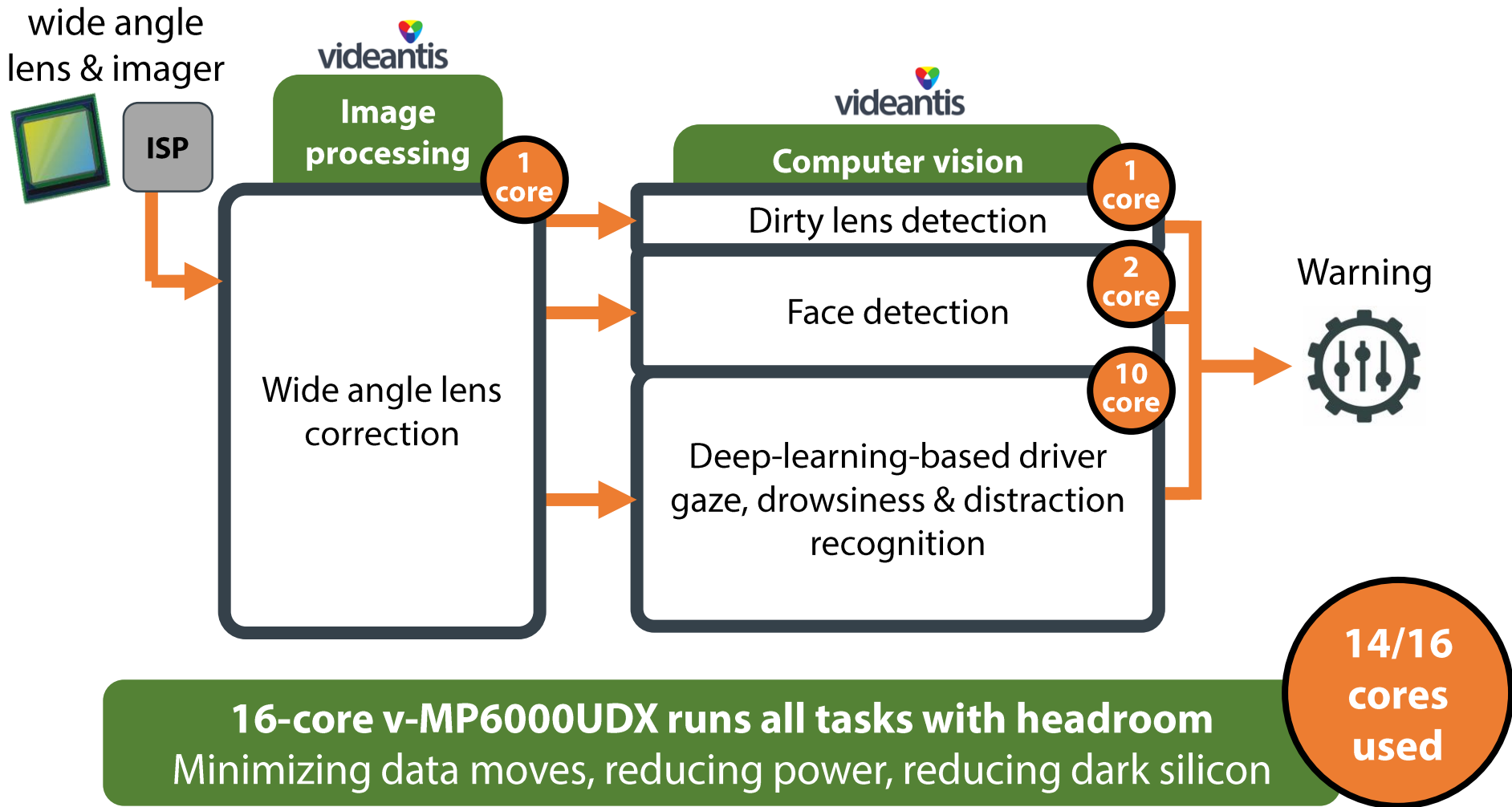
- Deep learning on all sensors
- In-camera, ECU and central processing solutions
- Sensor fusion with radar, Lidar, ultrasound and night vision
- Codecs for automotive Ethernet
- + Infotainment and dashboard



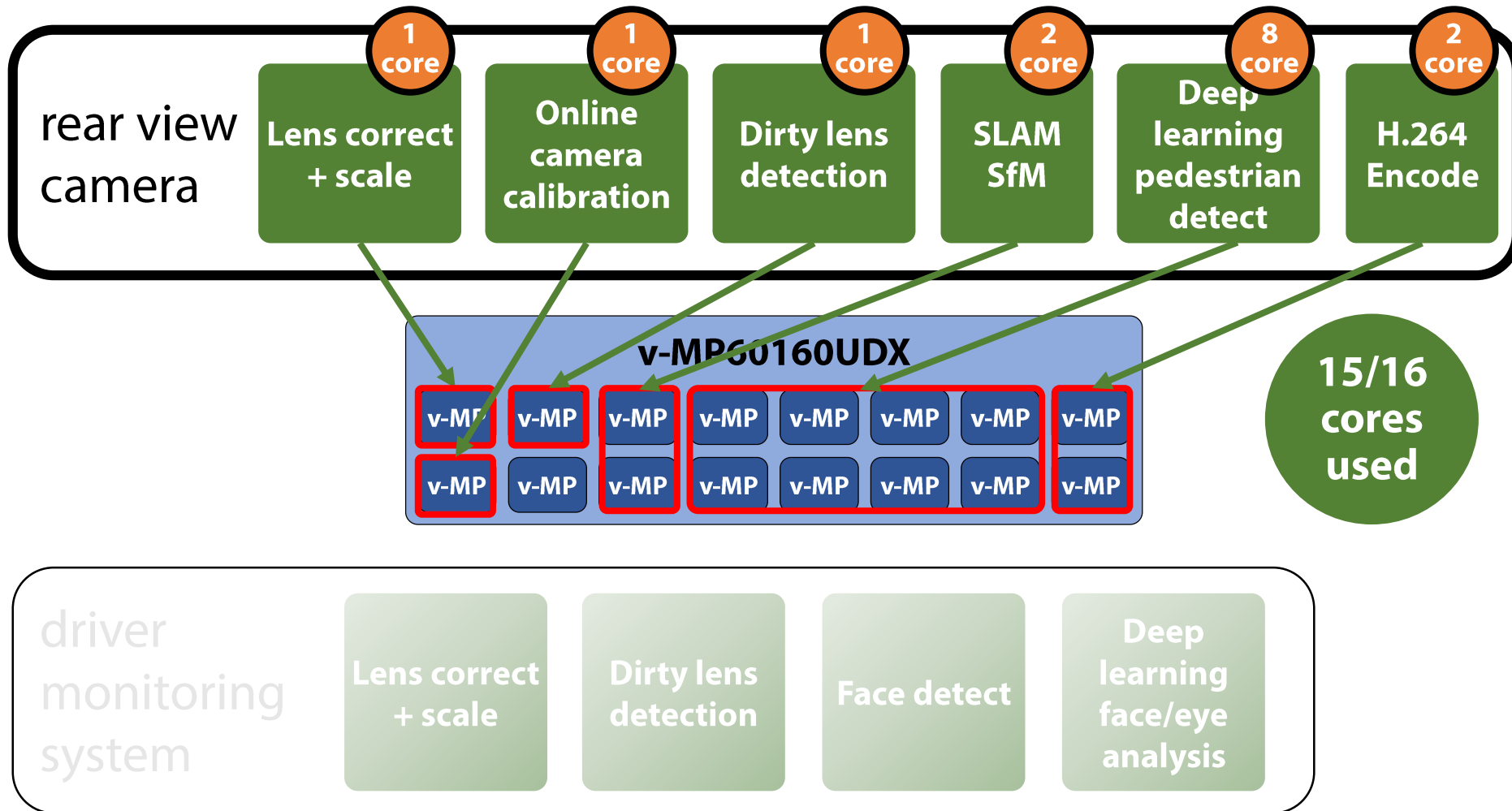
Example 1: smart rear-view automotive camera



Example 2: automotive driver monitoring



Flexible task allocation: smart rear camera



Flexible task allocation: driver monitoring

rear view
camera

Lens correct
+ scale

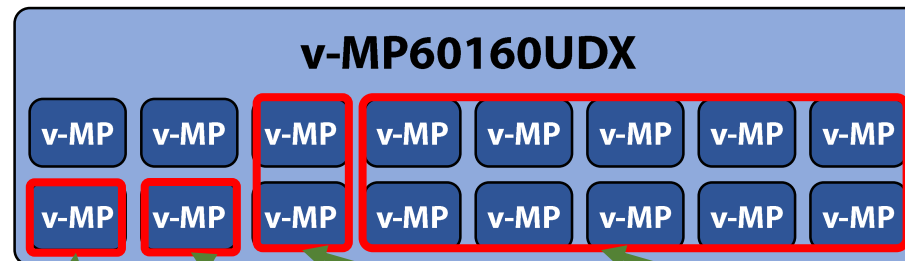
Online
camera
calibration

Dirty lens
detection

SLAM
SfM

Deep
learning
pedestrian
detect

H.264
Encode



14/16
cores
used

driver
monitoring
system

Lens correct
+ scale

Dirty lens
detection

Face detect

Deep-
learning
face/eye
analysis

Summary

v-MP6000UDX visual processor family

- 🌈 Highest performance embedded deep learning solution
- 🌈 New v-CNNDesigner tool for easy porting of neural nets
- 🌈 Seamless upgrade path from industry proven v-MP4000HDX
- 🌈 Single unified architecture runs all visual processing tasks, saving power, area, time-to-market, extending product life
- 🌈 Flexible multi-task allocation dynamically at runtime
- 🌈 Scalable from ultra low cost to extreme performance

Enables self-driving cars, ADAS, smart sensing devices

**Giving electronics the
power of sight**



A blurred rainbow light effect, resembling a lens flare or a soft-focus light source, is positioned on the left side of the image. The colors transition from red at the top, through orange, yellow, green, and blue, fading into the dark blue background. The text 'passion for video' is overlaid on this light effect.

passion for video

Thank you !

w w w . v i d e a n t i s . c o m