A unified visual computing platform

September 24th, 2019 | www.videantis.com
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
- **iPhone 11 Pro 2019**
  - +Triple cam 5 cameras
Industry trend – embedding cameras in cars

Roadster 2008
   Rear
   1 camera

Model S 2012
   Rear
   1 camera

Model S 2014
   +Front
   2 cameras

NVIDIA GPU 2016
   3F, 4S, 1R
   8 cameras

Tesla FSD SOC 2019
   260mm²
   72 TOPS
Our mission: giving machines the power of sight

Use case: computer vision and deep learning in self-driving cars
Intelligent vehicles – a tale of two roads

**Future**
- Proof of concept
- Cost no issue
- Zero accidents
- Research

**Goal:**
- L5 / Robotaxi
- Cost no issue

**Today**
- 100 million cars per year
- Consumer price points
- 1.3M deaths (WHO)
- Business

**Goal:**
- Increase safety & comfort
- Must be low cost

videantis focuses on high volume market
Semiconductor BOM budget

Need cost scalable and modular solutions
Processing capabilities are power limited

Inside camera: <1W
Behind mirror: 5-10W
Inside box: 10-100W

Need low power and scalable solutions
About videantis – place in the value chain

Software

Hardware

Chips

Applications

videantis provides key processing technology for all embedded vision markets
v-MP6000UDX: Integrated product offering for deep learning and visual computing

- **v-MP6000UDX architecture**
- **CNN libraries of optimized kernels**
- **v-CNNDesigner mapping tool**

**Deep learning**
- Computer vision
- Image processing
- Video coding

**Processor**
- 1-256 cores

**Software**
- 16384 MACs per cycle

**Tools**
- Backward compatible
v-CNNDesigner push-button code generation

Train & define CNN network

Caffe/Caffe2, Tensorflow, PyTorch, etc

CNN Algorithm Topology (Layers & Parameters)
High-Level Network Definition

Supports all key networks:
AlexNet, GoogLeNet, ResNet, VGG-X, YOLO, Mobilenet, etc

Images Labeling Developer

Map

CNN mapping

Data type analysis
Data type optimization
Low power optimization
Optimal distributed memory allocation
Memory & bandwidth minimization
Multicore partitioning & mapping

Run

v-CNNDesigner

v-CNN application
Optimized v-CNNLib kernel library
v-MP6000UDX processor

Runs and optimizes your CNNs in minutes
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

**Unified architecture with software compatibility reduces development cost**
Smart automotive backup camera at <1W

System on Chip

videantis v-MP6000UDX
1-2 v-SP, 8/16 v-MP cores at 1 - 2.5 TOPS

Lowest power intelligent rear/surround view SOC
Automotive front camera at <5-10W

Front camera System on Chip

- videantis v-MP6000UDX
- 4 v-SP, 16/32/128 v-MP cores at 2.5 / 5 / 20 TOPS
- CNN detection
- CNN segmentation
- CNN classification
- Classic CV
- Top view generation
- E mirror generation
- Driver monitoring
- 8Ch dec + 2Ch enc for Ethernet
- CAN
- IO
- Flash i/f
- ETC
- 100Mbps 1GBbps 10Gbps Ethernet
- Domain controller
- Dashcam recorder
- Vehicle control
- SD Card
- Surround view cameras
- Smart rear view camera
- Electronic mirror cameras
- Driver monitoring
- Surround view & Emirror displays

Lowest power deep learning automotive front view SOC
Developed for Automotive Safety

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Key requirements for production-ready automotive solutions

ASIL QM
ASIL A
ASIL B
ASIL C
ASIL D
Summary

v-MP6000UDX visual processor family

- Single unified architecture runs all visual processing tasks, saving power, area, time-to-market, extending product life
- Scalable from ultra low cost to extreme performance
- v-CNNDesigner tool for easy porting of neural nets
- Seamless upgrade path from large installed base of devices
- Production-grade automotive quality and functional safety

Cost-scalable low-power solution for high volume markets

Giving electronics the power of sight
passion for video

Thank you!