Vision Image Processor (VIP)

May 2017
VeriSilicon Global Operations

- Founded in 2001, currently 650+ employees
- 70% dedicated to R&D
IP-centric, Platform-Based, End-to-End Turnkey Service
Vivante Vision Processor Product Line

Vision & Image Processor VIP Series

OpenVX
OpenCL

VIP 8000

Automotive
ADAS, In-Car Vision

Drones

VIP Nano

Medical

IoT

Surveillance

1 Core
2 Cores
4 Cores
8 Cores
16 Cores
Vision Processor Architecture Comparisons

Best Programmability

- CPU
- GPU
  - VeriSilicon
  - ARM
  - Imagination
- DSP
  - VeriSilicon
  - CEVA
  - Videantis
  - Cadence
  - Synopsys

VIP – Better SPPPA
(Scalability, Programmability, Performance, Power, Area)

- OpenCL
- OpenVX
- OpenCV

Best Performance, Power

Custom RTL
Vivante VIP8000 Architecture

Programmable, Scalable, Extendable, REAL TIME & Low Power
Target Applications (1) – Automotive

▲ Infotainment System, Instrument Cluster
  ▶ Surround view, back camera
  ▶ Wide dynamic range, defogging
  ▶ Obstacle detection, reverse braking system

▲ ADAS, Driverless Vehicle
  ▶ Pedestrian/vehicle/traffic sign detection
  ▶ Lane departure warning
  ▶ Pixel labeling for scene understanding, road boundary estimation

▲ Driver Monitoring System
  ▶ Head position/orientation estimate for non-attentive or fatigue alarm
  ▶ Driver identification, face/Iris recognition
Target Applications (2) – Surveillance/Action Camera

▲ Image Stabilization
   ► High frequency vibration environment

▲ ROI Detection & Recognition
   ► Face, body parts, vehicle, license plate...

▲ Anomaly Detection
   ► Theft, fall, fire

▲ Crowd/Border/Gate Control
   ► People counting
   ► Border cross detection
   ► Face recognition

▲ Content-Based Compression
   ► Attention map
VIP8000 Product Lineup

▲ Highly Configurable Processor Family
▲ PPU: 32/8 ~ 256/64 GFLOPS (16b/32b)
▲ NN: 384/64 ~ 3072/512 GMAC/s (INT8/Float16)

VIP8000 ▲ VIP8000L ▲ VIP8000UL ▲ VIP Nano
VIP8000-S ▲ VIP8000L-S ▲ VIP8000UL-S ▲ VIP Nano-S
VIP8000-D ▲ VIP8000L-D ▲ VIP8000UL-D ▲ VIP Nano-D
VIP8000-Q ▲ VIP8000L-Q ▲ VIP8000UL-Q ▲ VIP Nano-Q
VIP8000-O ▲ VIP8000L-O ▲ VIP8000UL-O ▲ VIP Nano-O

VIP NN-S ▲ VIP NN-D ▲ VIP NN-Q ▲ VIP NN-O

0 PPU ▲ 1 PPU ▲ 2 PPUs ▲ 4 PPUs ▲ 8 PPUs

Company Proprietary and Confidential
Faster RCNN

VIP Nano-D

- 768 MACS / cycle
- 30 fps @ 800 MHz (800x600)
Vivante Vision SDK – ACUITY™

ACUITY: Computer Vision and Deep Learning IDE

- Eclipse-based OpenVX Programming UI
  ![Eclipse-based OpenVX Programming UI](image)

- End-to-End NN Design and Training
  ![End-to-End NN Design and Training](image)

- Interactive Vision Processing and NN Inference
  ![Interactive Vision Processing and NN Inference](image)
ACUITY IDE

Development with smart editing and project management

Simulation with both source code and assembly code support

Seamless debugging on both VIP code and host application

VIP side profiling which supplies global view and per node view
“One-Button” CNN Mapping

ACUITY Tools

- NN Graph Editor
- NN Compressor
- Data Curator

Conversion: NNEF to OVX

FP32 or FP16 ➔ FP16 or INT8

Convertors from Khronos