Human Vision to Machine Vision

ON BOARD

Since 1997, Nextchip has dedicated its time to develop better vision technologies for over 2 decades. Nextchip can deliver the overall technology for processing from Human Vision to Machine Vision within the vehicle itself.
**NEXTCHIP HIGHLIGHTS**

**GLOBAL SALES NETWORK**

#8
EU/US/CN/JP

**PATENTS LOCAL & OVERSEAS**

#100
IN ISP & AHD™

**AUTOMOTIVE CERTIFICATION**

#7

CMMI-DEV V2.0 Lv.3
ISO9001/14001
ISO26262
AEC-Q100 Gr.2
A-SPICE Lv2&3
Continuously Updated MP Records & On-going Projects

24 years Know-how
- Proprietary Image Processing Algorithms
- Tuning Know-how at Various Scenario
- System friendly design
- Specialized in Customer Support

Strong relation
- Close communication with OEMs and Tiers
- Technology Marketing Know-how based on Broad Experience in automotive market

Record Proven Strategy
- Develop and Release New Products Based on Market Requirements
  - Application Bonding Products
- Targeting Affordable Car line-up
  - Securing Sales Volume
RECORD PROVEN

~ 2019 | 20.1Q | 20.2Q | 20.3Q | 20.4Q | 2021~

X7 | RX5 / RX5MAX | AVANTE (Elantra) | SANTA FE | B13(New) | CARNIVAL | GENESIS | G90

EU5 | CE16 | AVANTE (Elantra) Hybrid | | | | |

J6P | JETOUR | | | | |

星越 | IX25 | | | | |

More to be Updated
FROM IMAGE PROCESSOR TO ADAS PROCESSOR

Using experience and established ecosystem in automotive market, have expanded market to sensing (ADAS)
WHERE IN ADAS MARKET

FOCUSED ON WHERE VOLUME IS

The Highest ADAS level adopted in the vehicles on the road is LV2+/3, and level 3 only applies to luxury vehicles. There will be lots of obstacles to produce cars accompanied by ADAS Level 4, 5 in the volume market due to regulatory issues or instability of tech’s performances, and high cost of the whole system. Many researchers and market players assume it will take a long time for fully autonomous vehicles to be mass-produced.

ADAS Lv

4, 5

The vehicle is capable of performing all driving functions under certain/all conditions.

3

The driver must be present but is not required to monitor the environment all the time. However, the driver must be ready to take control of the vehicle at all times with notice.

2

Driver must remain engaged with the driving task and monitor the environment at all times. But Vehicle has combined automated functions, like acceleration and steering.
HOW TO FIT IN ADAS MARKET

Image Edge Processor
Processing capable in the sensor itself

AI Powered Camera

- Maximizing Computing Power
- Size & Power Consumption
  suitable to put in camera module

APACHE4
Triple core ARM Cortex-R5F & CEVA XM4

APACHE5
Quad core ARM Cortex-A53 & Aiware(NPU)

FIT Domain Controller
Purpose Fit-in Processor
High computer power applicable in the ECU

- Utilization Rate, Cost Effectiveness
- System Complexity, Power Consumption

APACHE6
ARM Cortex-A8 Quad Core 64 bit
GPU(>85GFLOPS), NPU(8TOPS) embedded
WHAT
EDGE PROCESSORS DO

NEXTCHIP EDGE PROCESSOR
Real-time Processing

IMAGE SENSOR
IMAGE SIGNAL PROCESSING
FEATURE EXTRACTION
CLASSIFICATION
ECU
AlexNet Perf. (1000 classes, 227x227)

- MC/Image: 23
- BW/Image (MB): 18
- ROI/SEC @600MHz: 26

Tiny YOLO (448x448)

- MC/Image: 75
- BW/Image (MB): 425
- ROI/SEC @600MHz: 8

Sourced by CEVA
USECASE RearAEB

PD in High Illumination

PD in Mid Illumination
USECASE
FRONT SENSING

LD+VD+MVD+Tracking

+Clustering(SW processing)
RIGHT NPU FOR EDGE PROCESSOR

APACHE5

APACHE5 Brief Block Diagram

- **ARM Cortex-A53 (Quad core)**
- **Image Signal Processor**

**NPU (1.6TOPS@800MHz)**

aiWare

The low-latency NN accelerator
Hardware IP designed for automotive
AI inference.

**Optimized for Vision NN**
- Designed right for executing deep CNNs
- Appropriate for larger input as high resolution image

**Low Latency & Power Consumption**
- Throughput optimized frame by frame
- On-chip SRAM

**High Level of Autonomy**
- Fully executes all operations for compiled NNs
- No additional support from the host CPU

**Highly Deterministic**
- No caches or Programmable data-paths
- Ideal architecture for ASIL & Safety-related applications
AVP
PURPOSE FIT IN PROCESSOR

APACHE6

WELL PREPARED S/W
Possess quad core technologies enable full-stack solution for AVP

4~6 CAMERA CH IN SINGLE PRODUCT
4~6 CH
High Resolution ISP core

FUSION SENSOR DATA
Interface for USS, Lidar and Radar processed data

Functional Safety
ASIL Compliant Right for Domain Controller
CORE TECHNOLOGY
ISP (IMAGE SIGNAL PROCESSING)

Support Multiple CFA
Color Interpolation of Various CFA
RGB, RCCB, RGBIR, RYYCy, RCCC

Right Tuning for Sensing
Tuning experience in various scenario even for sensing purpose
AE, AWB, Tone Mapping, HDR, LFM and MORE
CORE TECHNOLOGY
ISP (IMAGE SIGNAL PROCESSING)

Perfect in Every Environment
High Dynamic Range up to 120dB
Wide Range LED Flicker Mitigation
(Specific Imager Required)

Special Filters for Better Image Quality
Support Functionality for Each Application/Use Cases
Tuning Capability in Various Scenario

HDR On

Video Link

NR Off

Video Link

LFM On

Video Link(LDC+PGL)

Video Link

Video Link(LDC+PGL)
THE FIRST ANALOG VIDEO TRANSMISSION
AHD™

World's 1st Adopted
Analog HD Transmission Technology
to Mass Produced Vehicle

- TX in ISP ➔ RX on Display

Reliability: EMC Test Approved
High Image Quality
Expandability: Longer Distance
Compatibility: Cable Independency
Cost Leadership

Mass Production Started From Nov.2019!

Indistinguishable to Digital transmission
WHAT’S NEXT

AHD™
SECOND GENERATION

Substitutable LVDS Fully
But added more value on it

Bi-directional Comm.
Support Upstream Communication
for transferring bigger data size
+ Signal/Cable Diagnosis Available

Higher Resolution
Upto 8M@15fps
as Automotive grade chipset

Bayer Transmission
AHD™ TX standalone Chip Available
Transfer raw data from sensor to ECU
<table>
<thead>
<tr>
<th></th>
<th>HD</th>
<th>FHD</th>
<th>QHD</th>
<th>UHD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rear View</strong></td>
<td>NVP2631 : 2M@60fps (RGB)</td>
<td>NVP2632/5 : 2M@60fps (RGB, RCCB)</td>
<td>NVP2633 : 2M@30fps (RGB)</td>
<td>NVP6321 NVP6324</td>
</tr>
<tr>
<td><strong>ISP</strong></td>
<td>NVP2650 : 2M@60fps (RGB, RCCB)</td>
<td>NVP2650D : 2M@30fps (RGB, RCCB), Dual ISP</td>
<td>NVP2670 : 5M@30fps (RGB, RCCB)</td>
<td></td>
</tr>
<tr>
<td><strong>CMS, E-mirror, SVM</strong></td>
<td>APACHE4 : 5M@30fps (RGB, RCCB)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input: MIPI, Parallel / Output: MIPI, Parallel</td>
<td>Hardwired Detection Engine (ex) PD, VD, LD, MVD etc</td>
<td>DSP / ISP Core embedded</td>
<td></td>
</tr>
</tbody>
</table>

※ All AEC-Q100 Gr.2 Qualified

✔ Functional Safety
# PRODUCT ROADMAP

## ALL

<table>
<thead>
<tr>
<th>Year</th>
<th>Quarter</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021</td>
<td>1Q</td>
<td>APACHE_U (8M@30fps, RGB, RCCB, RGBIR, RYCY) Input: MIPI/Output: MIPI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PHOENIX (5M@30fps, RGB, RCCB, RGBIR) Input: MIPI Output: MIPI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AHD TX</td>
</tr>
<tr>
<td></td>
<td>2Q</td>
<td>AHD RX</td>
</tr>
<tr>
<td>2022</td>
<td>1Q</td>
<td>AHD RX</td>
</tr>
<tr>
<td></td>
<td>2Q</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3Q</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4Q</td>
<td></td>
</tr>
<tr>
<td>2023</td>
<td>1Q</td>
<td>AHD RX</td>
</tr>
<tr>
<td></td>
<td>2Q</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3Q</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4Q</td>
<td></td>
</tr>
</tbody>
</table>

### ISP & AHD™

- **AHD™**
  - All AEC-Q100 Gr.2 Qualified
  - Functional Safety

### ADAS SoC

- **APACHE4**
  - Computer Vision Based Edge Processor
  - 5.7M@30fps (RGB, RCCB)
  - Input & Output: MIPI, Parallel Hardwired Detection Engine (ex) PD, VD, LD, MVD etc
  - ISP/DSP embedded

- **APACHE6**
  - AVP Fit-in Processor (Sensor Fusion)
  - 8M@30fps (RGB, RCCB, RGBIR)
  - Input: MIPI
  - Output: MIPI, Ethernet, USB3.0
  - GPU (85GFLOPS), NPU (8TOPS) embedded
  - VSLAM Accelerator

- **APACHE4**
  - CNN Based Edge Processor
  - 5.7M@30fps (RGB)
  - Input: MIPI
  - Output: MIPI, Ethernet
  - 1.6TOPS recognition IP
  - ISP/NPU embedded
Thank You