
eVPU - Embedded Vision Processing Unit
Powerful computing platform for image processing and analysis
UP TO 32x 4K CAMERAS
750Top/s - 100Gb/s data stream - 100w
NEXVISION
OPTRONIC DESIGN
www.nexvision.fr

# A POWERFUL EMBEDDED CALCULATOR FOR SITUATIONAL AWARENESS

Tank/train/bus/trucks/UGV
Unmanned Ground Vehicle

Autonomous tractor
Smart Farming

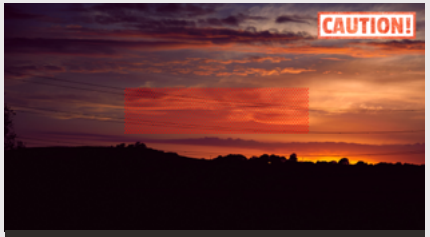
RPAS/UAV
Unmanned Aerial Vehicle

AUV
Autonomous Underwater Vehicle

USV
Unmanned Surface Vessel

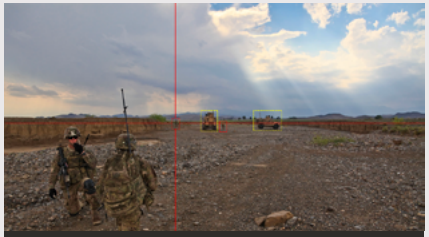
Aircraft/VTOL
Vertical Take off & Landing

## EVS/EFVS (Enhanced Vision System/ Enhanced Flight Vision System)
## For vehicle, autonomous or not, in extreme conditions [#DVE - Degraded Visual Environment]

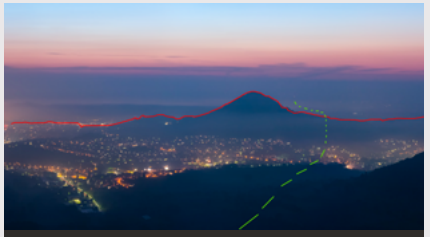



CABLE DETECTION

DETECTION & TRACKING



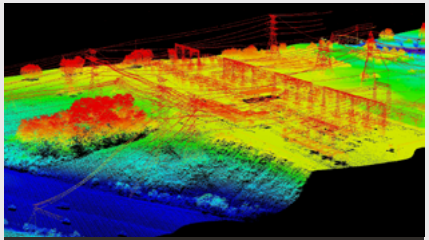
THREAT IDENTIFICATION



PATH PLANNING

SEARCH & RESCUE


INFORMATION PROJECTION



3D RECONSTRUCTION [LIDAR]

MAPPING

### Low SWaP-C

Size : 317.5x228x112 mm
weight : 6.8kg

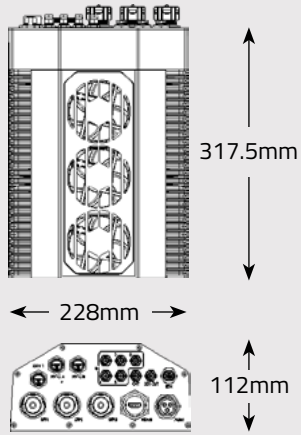


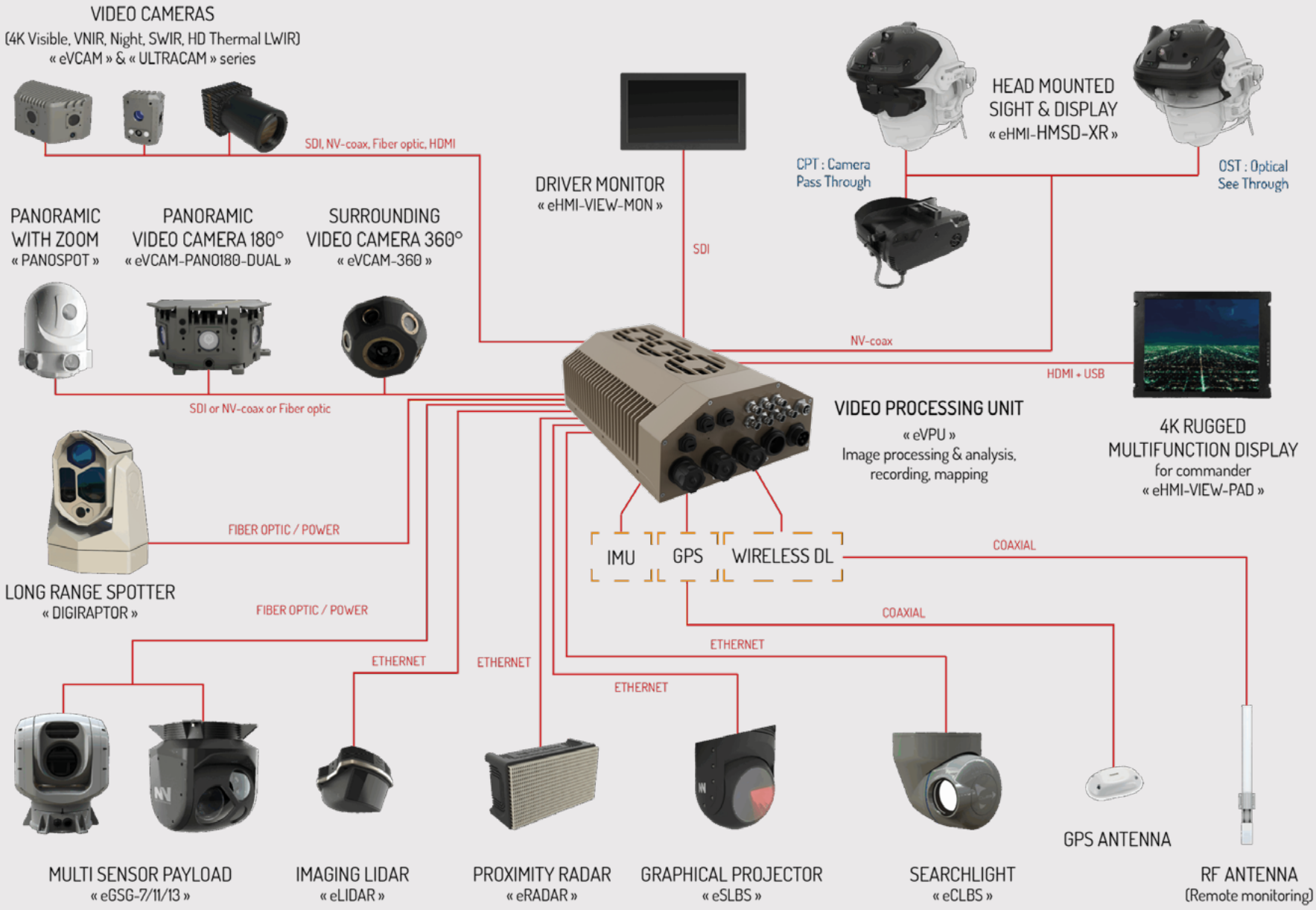

Image analysis through embedded GPU + Neuronal network (object detection & tracking, deep learning)

NVIDIA Jetson AGX Orin™ · XILINX Ultrascale+ FPGA · ARM POWERED · samtec · PCI EXPRESS · H.265 HEVC · HDMI™ · HI-SPEED USB CERTIFIED

# COMPATIBLE WITH ALL NEXVISION' SENSORS & ALL DEVICES OF THE MARKET :

*Video camera in Visible, Infrared night vision (VNIR, SWIR, thermal MWIR/LWIR) or Active 3D LiDaR/RaDaR*

## *Perfect for data fusion, image processing and analysis (detection, tracking...)*




NVIDIA.

pyxalis
Your Image Sensor Solution

LYNRED

## VIDEO PROCESSING PERFORMANCE

**Front-End Image Co-processor (FPGA)**

- 650k logic elements
- 22 Mb SRAM
- 3x 1GB DDR4 @2666 Mb/s (42.66Gb/s)
- 512 Mb NOR Data Flash

**System on Chip GPU modules**

Up to 3x onboard parallel NVIDIA® Jetson AGX ORIN™ Module.
Each SoC has the following performance :

| | |
|---|---|
| **CPU** | 12 Cortex®-A78A CPU |
| **GPU** | Ampere architecture-class — up to 254 INT8 TOPS, including a Deep Learning Accelerator (DLA) with 87 INT8 TOPS \| 5.2 FP32 TOPS |
| **Programmable Vision accelerator** | Up to 2048 INT8 GMACS \| 512 INT16 GMACS |
| **Image Signal Processor (ISP)** | 1.85 Gigapixels/s |
| **Video capabilities** | **Video Encoder**<br>Up to 1.0 Gigapixels/s (H.265)<br><br>**Video Decoder**<br>Up to 1.9 Gigapixels/s |
| **Memory band-width (256-bit LPDDR5)** | Up to 200 GB/s |
| **UFS** | 256 GB/s |
| **Cameras** | 90 Gb/s over 16x GMSL(R) ports |
| **Ethernet** | Up to 30 Gb/s for data transmission (including for lidar/radar) |
| **Vehicle IO** | 6 CAN interfaces |

## I/O

### VIDEO INPUTS

**9x Digital (mix of the following type of links)**

- **3x Optical fiber** (proprietary fiber optic protocol) > 10 Gb/s per lane
- **1x SDI** 6G
- **5x NV-COAX** input 8Gbps downlink + 20Mbps uplink + 20W power over cable

### VIDEO OUTPUTS

**Digital**

- **3x Optical fiber** 10Gbps
- **1x SDI** 6G/3G
- **1x HDMI** 4096x2160 at 60 Hz
- **1x NvCoax** ouput

### DATA LINK

**USB**

- **USB 3.1** type C connector

**Ethernet**

- **1x 1 Gigabit Ethernet**

### STORAGE

**SSD**

- **2x SSD NVMe** up to 10 TB

**EEPROM**

- 1x 2Mb EEPROM per SoC
- 1x 2Mb EEPROM for FPGA

## ENVIRONMENT

- Operating temperature Range : -20°C to 70°C
- Humidity : 10-90% non condensing

## POWER SUPPLY

| Voltage range | 9-36 $V_{DC}$ |
|---|---|
| Power consumption<br>▪ Light process<br>> 1 SoC (40% Load)<br>> Ambient temp : 25°C | 35W |
| ▪ Typical application<br>> 2 SoC (70% Load)<br>> Ambient temp : 55°C | 75W |
| ▪ Peak process<br>> 3 SoC (100% Load)<br>> Ambient temp : 70°C | 120W |

## IMAGE PROCESSING & ANALYSIS : NEXIP™

**FPGA (Image Pre-Processing)**

- Video enhancement and advanced video processing : Temporal noise filtering and contrast enhancement
- Multiple exposure blending provides realtime HDR for high details retention in low and over exposed area
- Multispectral band image sensor fusion (Visible, SWIR, Thermal IR)
- Feature point extraction, image stabilization, denoising

**GPU (Image analysis and codec)**

- Object detection, recognition, tracking
- Machine learning / AI / Pattern matching
- 3D perception / SLAM / 360° vision (stitching)
- Full framerate, 4K high quality video encoding

## SOFTWARE DEVELOPMENT

**Dedicated Embedded Linux BSP based on Buildroot, including:**

- U-boot bootloader
- Custom Linux kernel based on NVIDIA sources
- Integration of NVidia Tegra specific frameworks: CUDA®, OpenCV, OpenGL  TensorRT™, cuDNN, NVIDIA DIGITS™ Workflow, NVIDIA VisionWorks™, Camera Imaging, Video CODEC.
- Customizable failsafe update system (FPGA, Software)
- Embedded debugging and profiling tools: quadd, nvprof, cuda-gdb, gdb, LTTng

**External debugging and profiling tools:**

- Tegra system profiler, NVIDIA NSight

**Specific drivers:**

- FPGA: PCIe based, video acquisition, video display, Xilinx IPs (UART, SPI, I2C, XADC, ...), High Speed Inter SoCs communication channel, generic data transfer to/from SoC modules

**Nexvision's Middleware:**

- Video Analysis Framework
- Embedded Video Recording: H264, H265, MP4, MKV, AAC
- Video streaming: RTSP/RTCP/RTP, H264, H265, AAC

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