

# Edge Compute AI Payload Processor



The Ubotica CogniSAT-XE2 On-Board AI Payload Processor brings the power of Myriad X's Computer Vision (CV) and Artificial Intelligence (AI) compute acceleration to a PC/104 form-factor for SmallSat and CubeSat missions. It is built around the Intel® Movidius™ Myriad™ X CV and AI COTS Vision Processing Unit (VPU) whose 16 vector cores and application-specific hard blocks provide high-performance parallel and hardware accelerated compute within a low power envelope.



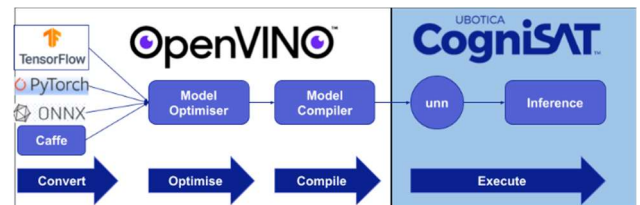
## Widely Adaptable for AI and Computer Vision Deployments

### Flexible and Integration Ready

CogniSAT-XE2 combines the power efficient compute of the Myriad-X VPU with a wide range of interfaces and peripherals, providing broad flexibility for integration into satellite platforms. Either Gigabit Ethernet or USB2.0/3.0 can be used as the primary control and data interface to the board, enabling data rates sufficient to handle many CV and AI applications at near-streaming throughput.

### Efficient Neural Network Inference

Common Neural Network (NN) frameworks (e.g., TensorFlow, PyTorch, Caffe) can be used for NN model development and training, with the model subsequently compiled to target the Myriad-X device using Intel's OpenVINO™ toolkit. Workflows contained within the CogniSAT-TK package guide this process to reduce error. CogniSAT-XE2 leverages the broad range of pre-qualified models and layers available within OpenVINO™. Pre-trained OpenVINO™ models can be used with transfer learning, or can be deployed directly on the CogniSAT-XE2 board using the Host Control Software (HCS) which is supplied as part of the package.



A host loads NN models to the CogniSAT-XE2 board, subsequently sending image frames and receiving processing results. The host can dynamically update the CogniSAT application over the primary interface, enabling flexible runtime solutions.

### Enabling an Ecosystem of Features

Ubotica supplies the CogniSAT-TK utility package which, combined with the CogniSAT-HCS software, allows the CogniSAT-XE2 to operate seamlessly with most sensors currently on the market. Ubotica and our ecosystem partners are constantly expanding the set of utilities as new sensors and functions are identified. Deployment to CogniSAT-XE2 involves the transfer of only a single configuration file, and runtime updates enable the updating of pipelines without requiring re-compiles or system reboots.



## Key Features

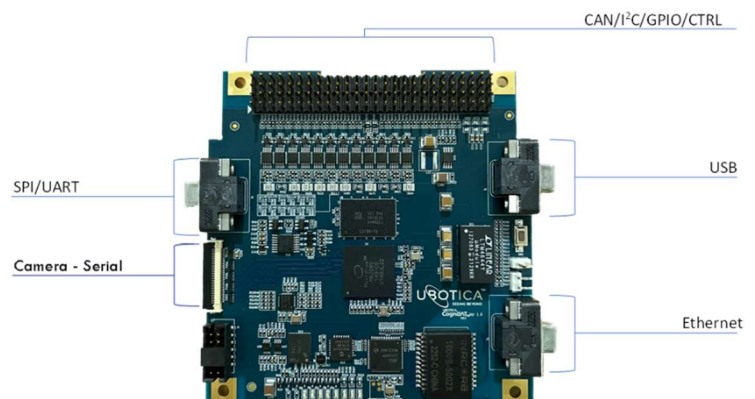
The CogniSAT-XE2 board has the following features\*:

- Part of the CogniSAT™ platform family
- PC/104 form factor
- On-board integrated latch-up protection, with auto-restart and trip signal
- Single 5V power supply
- CAN interface for C&C
- CV & AI engine operating as a slave over USB 2.0/3.0 or Ethernet
- eMMC for non-volatile data storage
- External power-down control
- MIPI camera interface for direct sensor connection
- Fully compatible with the Ubotica CogniSAT HCS Software, for complete control over AI processing
- Operates from single 5W power supply
- Stackable 2x dual row board-edge headers for power delivery and low-level control

\* Subject to change

	Min	Typ	Max	Units	Notes
<b>Physical Characteristics</b>					
Length		94.0	98.0	mm	PC/104 form factor (Max includes Connectors)
Width		90.0	99.0	mm	PC/104 form factor (Max includes Connectors)
Height		15.0	18.5	mm	(Max includes Connectors)
Mass		80.0		g	
<b>Electrical Characteristics</b>					
Supply Voltage		5		V	
Power		2.5		W	Assuming a typical network with Enet connectivity
<b>Environmental</b>					
Operating Temperature	-40		85	°C	
Storage Temperature	-55		85	°C	
Shock			1,269	g	3-axes, SRS, 5g @ 30Hz / 1,269g @ 1kHz to 10kHz
Vibration (Sine)			15	g	3-axes, 3g @ 5Hz - 125Hz, max g @ 20Hz - 40Hz, 2 Oct/min
Vibration (Random)			14.2	grms	3-axes, 20Hz - 2,000Hz, max g 50Hz - 800Hz 2min/axis
Thermal-Vacuum	Operation from -40°C to +65°C at 1x10 <sup>-5</sup> mbar				

<b>Interfaces</b>	
Ethernet	10/100/1000BaseT
USB	2.0/3.0
CAN	Supporting CSP
SPI	Master, 3.3V logic
I <sup>2</sup> C	3.3V logic
UART	3.3V logic
MIPI	4-lane CSI-2 camera I/F <sup>(Note 1)</sup>



Note 1: Use of this interface is not supported by the standard firmware supplied with the CogniSAT-XE2. Contact Ubotica to find out how to utilise this interface

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