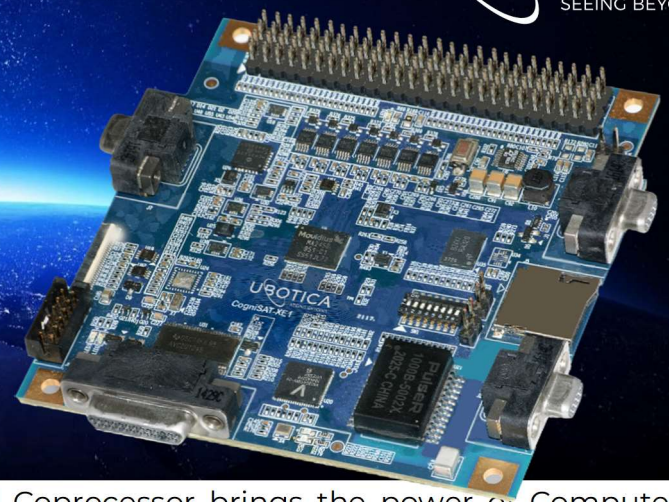


UBOTICA
CogniSAT
XE1



Edge Compute AI Payload Processor

The Ubotica CogniSAT-XE1 On-Board AI Payload Coprocessor brings the power of 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™ 2 CV and AI COTS Vision Processing Unit (VPU) whose 12 vector cores provide high-performance parallel and hardware accelerated compute within a low power envelope.



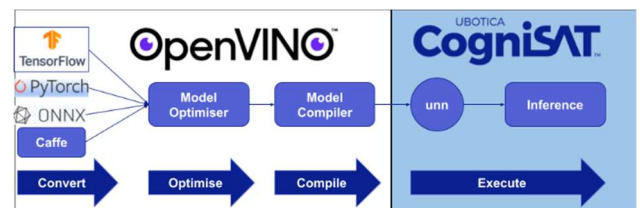
Widely Adaptable for AI and Computer Vision Deployments

Flexible and Integration Ready

CogniSAT-XE1 combines the power efficient compute of the Myriad 2 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 2 device using Intel®'s OpenVINO™ toolkit. Workflows contained within the CogniSAT-TK package guide this process to reduce error. CogniSAT-XE1 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-XE1 board using the Host Control Software (HCS) which is supplied as part of the package.



A host loads NN models to the CogniSAT-XE1 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-XE1 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-XE1 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

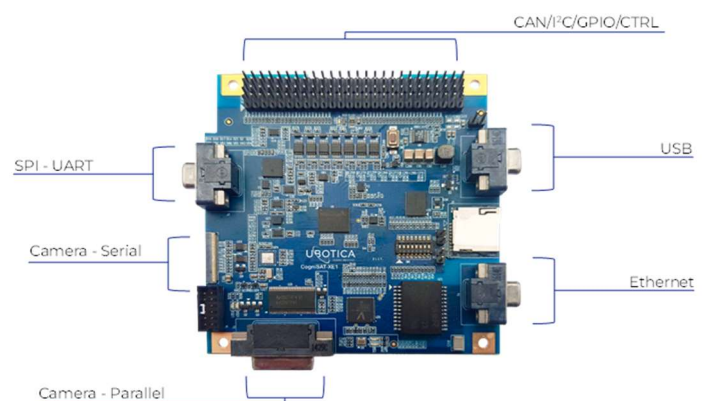


The CogniSAT-XE1 board has the following features:

- Part of the CogniSAT™ platform
- 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
- Serial NOR boot flash
- External power-down control
- Parallel and MIPI camera interfaces for direct sensor connection
- Fully compatible with the Ubotica CogniSAT Software, for complete control over AI processing
- microSD card for non-volatile data storage
- Additional on-board peripherals
 - Floating Gate Dosimeter
 - IMU (3D accelerometer and gyroscope)
- Operates from single 5W power supply
- Stackable 2x dual row board-edge headers for power delivery and low-level control

	Min	Typ	Max	Units	Notes
Physical Characteristics					
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	
Electrical Characteristics					
Supply Voltage		5		V	
Power		2.2		W	Assuming a typical network with Enet connectivity
Environmental					
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 ⁻⁵ mbar				

Interfaces	
Ethernet	10/100/1000BaseT
USB	2.0/3.0
CAN	Supporting CSP
SPI	Master/slave, 3.3V logic
I ² C	3.3V logic
UART	3.3V logic
GPIO	x5, 3.3V logic
JTAG	Debug
MIPI	4-lane CSI-2 camera I/F ^(Note 1)
CIF	16-lane parallel camera I/F ^(Note 1)



Note 1: Use of these interfaces is not supported by the standard firmware supplied with the CogniSAT-XE1. Contact Ubotica to find out how to utilise these interfaces.

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