UBOTICA CogniSAT™ NEI

AI-Enabled Non-Earth Imaging Camera System

The CogniSAT-NEI platform has been specifically designed to provide image capture and processing for a number of different in-orbit Non-Earth Imaging applications. Its processing architecture allows the efficient application of AI analysis on images captured in real time in order to provide programmable situational awareness and autonomous navigation capabilities to space vehicles. Ubotica's range of pre-designed applications allow satellite developers to integrate leading-edge autonomous capabilities to their satellites without the need to develop the underlying machine learning skills in-house thereby reducing development cost and time to market.

The CogniSAT-NEI consists of a 2.3 Megapixel RGB sensor, which can operate in full High Definition at 60 frames per second, coupled with an AI processing block built around the Intel® Movidius™ Myriad™ X VPU. The CogniSAT-NEI operates as a self-contained image processing subsystem which can be configured to perform many different situational awareness and video streaming functions. The use of Gbit Ethernet as the control and data interface minimises the complexity of integrating multiple cameras within the system architecture and also allows easy modification of runtime parameters.

Application Examples

Live Streaming

The Live Streaming application allows the CogniSAT-NEI platform to deliver real time video directly to the user in a form which minimises data overhead while maximising image resolution. The Live Streaming application provides in-line H.265 compression of High Definition colour video at 60 frames per second directly to the central control unit over ethernet. The systems architects can easily integrate this functionality into the satellite or launch vehicle to fulfil many real time monitoring functions

Docking Assistance

The Docking Assistance application provides alignment parameters to the Navigation Computer on the service vehicle to allow it to autonomously align the vehicle with the docking structure of the target satellite. The real-time nature of the feedback from the camera allows more accurate docking than one reliant on non-visual cues. The implementation of this processing within the camera subsystem means that the navigation solution can take the input from multiple cameras without any significant increase in the processing load on the navigation

computer subsystem. As the models running on the CogniSAT-NEI can be updated on an ongoing basis, the specific characteristics of the target satellite can be updated during the mission thereby allowing the service vehicle to address a far greater number of docking scenarios than would be possible with a pre-programmed solution.

Satellite Failure Avoidance

The accumulation of undetected damage to parts of the satellite (for example the solar panels) can result in sudden catastrophic failure. Ubotica's Failure Avoidance application provides the ability to use AI to identify issues with specific areas of the satellite and to alert the On Board Computer of the need for preventive maintenance before the operation of the satellite is compromised. This allows the required maintenance of the asset to be scheduled for a time which does not interfere with its operation requirements thereby increasing its operational uptime. Additionally, such monitoring has the ability to extend the operational lifespan of the satellite by addressing minor issues before they accumulate to cause operational impacts thereby increasing the ROI which can be achieved.

Technical Specifications

	Min	Typ	Max	Units	Notes
Physical Characteristics					
Length		136.0		mm	
Width		66		mm	
Height		53		mm	
Mass		350		g	
Electrical Characteristics					
Supply Voltage		5		V	
		28		V	
Power		7	10	W	Dependant on application
Environmental					
Operating Temperature	-40		+85	ºC	
Storage Temperature	-55		+85	ºC	
Shock			1,269	g	3-axes, SRS, 5g @ 30Hz / 1,269g @ 1kHz to 10kHz
Vibration (Sine)			15.0	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 -40ºC to +65ºC at 1×10^{-5} mbar				

Ordering Information

Part Number	Description
CogniSAT-NEI EM	CogniSAT-CAM-VMC Hardware Platform Engineering Model
CogniSAT-NEI FM	CogniSAT-CAM-VMC Hardware Platform Flight Model
CogniSAT-NEI-CS	Deployment License for the operating firmware
- Option 1	Live Streaming Application
- Option 2	Docking Assistant Application
- Option 3	Fault Detection Application

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