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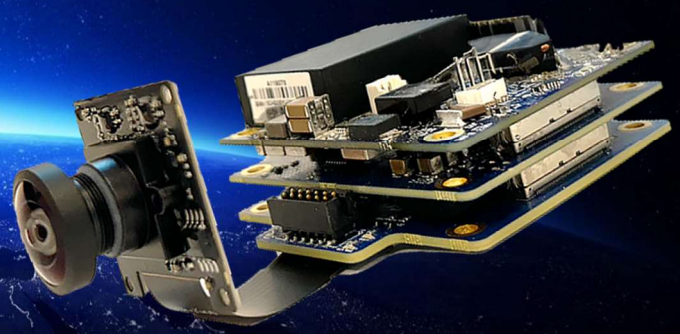
UBOTICA CogniSAT NEI

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 can be coupled with any MIPI sensor to target specific applications, with the default sensor being a 2.3 Megapixel RGB sensor that delivers frames in full High Definition at 60 frames per second. At its core is an AI processing block built around the Intel® Movidius™ Myriad™ X VPU that enables the camera to operate as a self-contained image processing subsystem configurable to perform many different situational awareness and video streaming functions. The use of Gigabit 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 (RTSP). Systems architects can easily integrate this functionality into the satellite or launch vehicle to fulfil many real-time monitoring functions .

Threat Identification

The possibility of satellite operations being compromised by the deliberate actions of other spacecraft in close proximity is becoming more difficult to respond to in a timely fashion using ground-based control as the numbers of satellites grows. The ability to autonomously visually detect the approach of a threat allows the satellite to take evasive action without the

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need for ground intervention, thereby increasing the security of the satellite in orbit.

Satellite Fault Detection

The accumulation of undetected damage to parts of the satellite (for example the solar panels) can result in sudden catastrophic failure. Ubotica's Failure Detection 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.

Rendezvous and Proximity Detection

The Rendezvous and Proximity Detection 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. This real-time feedback allows more accurate docking than one reliant on non-visual cues. The implementation of this processing directly 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. 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.

Custom Solution Development

The CogniSAT-NEI is a programmable platform which can accommodate solutions developed by 3rd parties. Should your project require the deployment of image processing algorithms you have developed, please contact your Ubotica sales contact to discuss how our engineering team can assist you in deploying it to our CogniSAT-NEI platform.

Technical Specifications

	Min	Typ	Max	Units	Notes
Physical Characteristics					
Length		68		mm	Applies to dimensions of 3-board stack. Dimension of overall assembly depends on required position of sensor, choice of lens and enclosure requirements
Width		58		mm	
Height		30		mm	
Mass		98		g	
Electrical Characteristics					
Supply Voltage		5		V	
		28		V	
Power		4		W	
Environmental					
Operating Temperature	-25		+65	°C	
Storage Temperature	-55		+85	°C	
Shock			1269	g	3-axes; 1 per axis; SRS to 10kHz; up to 1269g @ 1400 Hz
Vibration (Random)			14.16	g	3-axes; 2min; 20Hz-2kHz; 14.16g
Thermal-Vacuum	Operation from -25°C to +65°C at 1x10-5 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	Threat Detection Application
- Option 3	Rendezvous Application
- Option 4	Fault Detection Application
- Option X	Custom Application Deployment