16th IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)
Novel Concepts and Technologies to Enable Future Building Blocks in Space Exploration and Development (3)

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# STEREO, HIGH-RESOLUTION AND THERMAL CAMERA DESIGN FOR INTEGRATION INTO THE I3DS SENSOR SUITE FOR FUTURE ROBOTICS MISSIONS

**Abstract**

I3DS is an Integrated 3D Sensors suite with the goal of becoming a reusable infrastructure component by providing future robotic missions with a standardised suite of sensors. I3DS is comprised of multiple building blocks that can be customised for a particular use case, all the while presenting a standardised interface to the platform by utilising smart sensors and providing integrated pre-processing of sensor data. The orbital use-case investigates the autonomous rendezvous and capture of a spacecraft, either for on-orbit servicing with a cooperative satellite or for debris removal with a non-cooperative object. The planetary use-case focuses on the ground exploration of celestial bodies such as Mars or the Moon.

To this end, cosine Measurement Systems BV is supplying three vision-based sensor systems for the I3DS suite: a stereo camera system in the VNIR range, itself comprised of two camera heads; a high-resolution VNIR camera; and a thermal infrared camera in the 8 $\mu$m to 14 $\mu$m range. The stereo camera is capable of providing detailed 3D imagery, disparity mapping and point clouds. The high-resolution camera can be coupled with pattern projection to provide depth information of the target. The thermal camara can be utilised for both GNC and science use cases. The information from all three camera systems is integrated in a customised data fusion algorithm running on the I3DS Instrument Control Unit.

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