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AUTONOMOUS VISUAL GUIDANCE AND NAVIGATION CAMERA USING COTS TECHNOLOGIES

Abstract

In order to realize space debris mitigation, it is indispensable to access to the target debris reliably and efficiently. Because the target debris is so called uncooperative target that is not control its situation nor notice is its precise position, it is essentially important highly intelligent visual guidance navigation system that autonomously identify the target debris and control rendezvous maneuver to the target debris. Simultaneously the space debris mitigation system is forced to be low cost because of its subsidiary function. Therefore we need to solve quite difficult problem in very low cost. We have been developed highly intelligent camera system combining autonomous control software technologies and COTS devices. Using high resolution COTS imager and FPGA system high-resolution image and very fast image processing is achieved very low cost. In addition to the hardware improvement, utilization of free software scheme, we improved software performance and reliability sharing software resources among university satellite development communities. We have successfully utilized intelligent camera system in various missions such as IKAROS, Hayabusa-2, Hodo-yoshi satellites and so on. Now we plan to utilize the intelligent camera system for the visual guidance and navigation of space debris mitigation combining with orbit estimation and autonomous rendezvous and homing control technologies. In this paper, we are going to introduce the outline and performance of the visual guidance and navigation system for the space debris mitigation.