ASTRODYNAMICS SYMPOSIUM (C1)
Guidance, Navigation and Control - Part 2 (8)

Author: Dr. Clemens Kaiser
OHB System AG - Munich, Germany, *(email is not specified)*

Mr. Peter Rank
OHB System AG - Munich, Germany, peter.rank@kayser-threde.com
Mr. Klaus Landzettel
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, klaus.landzettel@dlr.de
Dr. T. Boge
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, toralf.boge@dlr.de
Mr. Michael Turk
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, michael.turk@dlr.de

VISION BASED NAVIGATION FOR FUTURE ON-ORBIT SERVICING MISSIONS

Abstract

On-Orbit Servicing missions are dependent on a robust relative navigation system allowing to approach safely to the client and to perform the respective servicing mission. There are different physical sensor principles possible; one of it is using an optical vision system which can be combined for both sensing and inspection. The VIBANASS project (VIsion-BAsed NAvigation Sensor System) comprises development, construction and verification of a versatile optical Rendezvous and Docking (RVD)-camera system including an illumination subsystem. The technical requirements for VIBANASS have mainly been derived from LEO and GEO missions. A qualification model representative with regard to the flight hardware will be built for execution of a space qualification programme. Functional performance verification will be supported using the new EPOS (European Proximity Operation Simulation) facility and dedicated image processing ground software which applies (adaptable) target specific distance estimation algorithms. The compressed or raw camera data serve as input for an RVD control algorithm. VIBANASS can be configured for mono and for stereo image acquisition, the latter one being mostly used for short distances. The far range camera images will be used for initial target identification starting from a few kilometres distance (depending on the true size) and for subsequent tracking until the mid range camera images become superior in image quality. Light conditions during the final approach and the docking phase (if applicable) can be improved by activation and control of a laser-based illumination system, whose wavelength will be in accordance with the close range camera, thus improving the image quality for distance determination. VIBANASS is a Kayser-Threde development programme under cofunding by DLR, the German Space Agency (Förderkennzeichen 50 RA 1001). Cooperation partners in the development programme are DLR-RM (DLR Institute for Mechatronics and Robotics) and DLR-RB (EPOS).