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VALIDATION AND VERIFICATION APPROACH FOR THE ABSOLUTE AND RELATIVE VISION BASED NAVIGATION SYSTEMS IN THE LUNAR LANDING SCENARIO

Abstract

Development of autonomous GNC algorithms that include Vision Based Navigation requires an effort in validation and verification, which has been underestimated in recent development programs. In many development programs Vision based Navigation has been limited or discarded, even if promising, because the complete validation was not possible. GMV in recent years has been involved in the development, validation and verification techniques of Navigation system that requires an HW/SW co-design in order to reach the system requirements either in terms of desired frequency of operation and mission accuracy. In this paper the example of the Vision Based Navigation, including the Absolute and Relative visual navigation, developed in the frame of the Lunar Landing activities is used to address the development validation and verification steps performed. Final validation step presented is performed over an avionics prototype of the system based on space representative HW consisting of PowerPC processor and FPGA breadboard. Furthermore, the validation roadmaps needed for reaching the TRL 8 will be presented. In this paper, not only the validation and verification steps needed for developing the HW/SW optimized co-design will be addressed, but special emphasis will be placed in the necessity of well-defined requirements, the data and the analysis needed for validating the algorithm, the problems met when using real data from past missions and how these problems have been overcome so far.