Title	Proposal of faults detection isolation and recovery design process for bus system of microsatellite
Sub Title	
Author	Pham, Anh Minh(Shirasaka, Seiko) 白坂, 成功
Publisher	慶應義塾大学大学院システムデザイン・マネジメント研究科
Publication year	2017
Jtitle	
JaLC DOI	
Abstract	
Notes	修士学位論文. 2017年度システムエンジニアリング学 第257号
Genre	Thesis or Dissertation
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=K040002001-00002017-0019

Master's Dissertation 2017

Proposal of Faults Detection Isolation and Recovery Design Process for BUS System of Microsatellite

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September 2017

Graduate School of System Design and Management,

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Major in System Design and Management

SUMMARY OF MASTER'S DISSERTATION

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Title

Proposal of Fault Detection, Isolation and Recovery Design Process for the Bus System of Microsatellite

Abstract

Microsatellite developments are going to be the trend of the space industry, many companies (TerraBella, OneWeb) and universities are developing the micro satellites for various purposes such as Earth observation, navigation, communications and so on. Safety design of bus systems is a critical part to guarantee the success of the mission and project. Faults Detection, Isolation, and Recovery (FDIR) algorithm are one of the vital functions which are implemented in flight software to support the satellite maintaining the safe spacecraft operation automatically even when the faults occur. It has an influence on safety, reliability, and independence of the satellite system in operation. In contrast, FDIR design is difficult because the generic process is too abstract and complicated. On the other hand, design FDIR is started in the late phase of satellite development process; therefore the risks of development will increase.The research proposes a standardizing the FDIR design process which will be useful to reduce risks of development and minimize the complexity of the process. An FDIR design process contains design guidelines in each phase and the set of template table to design FDIR for bus subsystem of microsatellite class. The FDIR process is integrated into the satellite development process, and the design is repeatedly revived during the process. Several analyses have been done to design the process including stakeholder analysis, use case analysis, requirement analysis and the architecture of the process was designed to meet all requirements of the design process. Applying the process to the MicroDragon project and interview satellite experts are used to evaluate the standardized FDIR design process. The proposed process not only focus on solving the problems of design FDIR, but also supporting FDIR implementation during the integration phase.

Key Word: Faults Detection Isolation and Recovery, Design Process, Micro-Satellite