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Author: Mr. Alexander Kleinschrodt
University of Würzburg, Germany

Mr. Andreas Freimann
University Wuerzburg, Germany
Prof. Marco Schmidt
Bochum University of Applied Sciences, Germany
Prof. Klaus Schilling
University Wuerzburg, Germany

LESSONS LEARNED FROM IN ORBIT OPERATIONS OF THE UWE-3 PICO-SATELLITE

Abstract

Pico-satellite missions are challenging activities, since the full functionality has to be fitted into a satellite without exceeding a total mass of around 1kg. Beside the development of the satellite itself, the construction and operation of the ground segment is a sophisticated challenge as well. Due to the growing interest in small satellite missions, this contribution presents a short overview of the ground station system and summarizes the lessons learned from the UWE-3 mission, which is successfully operated since November 2013. The scientific objective of the mission was to investigate advanced attitude determination and control capabilities for pico-satellites in orbit. As part of the mission, a new ground station design has been implemented to increase autonomy, reliability and remote operation capabilities. With this automated system the necessary amount of manpower as well as the operational costs have been reduced. At the same time the stations uptime was significantly increased. By applying the end-to-end principle to the ground station, the operation of the whole sta-tion was significantly improved and simplified. Hereby progress with respect to ground station networks was achieved. During LEOP the fully automated ground station concept interfered with the need for op-timization of the communication link, due to inaccurate orbit parameters. Related practical issues to handle such conflicts during operation are outlined and solutions to increase the situational awareness of the operator are presented. The benefits and drawbacks of the autonomy concept will be discussed. The paper concludes with several suggestions for improvements in future missions