22nd IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Small Satellite Operations (3)

Author: Mr. Sendhilkumar Alalasundaram
College of Engineering, Pune, India

Mr. Nikhil Sambhus
College of Engineering Pune, India
Mr. Abhishek Joshi
College of Engineering, Pune, India
Ms. Rucha Vaidya
College of Engineering, Pune, India
Mr. Abdulhussain Songerwala
College of Engineering, Pune, India
Mr. Vaibhav Rekhate
College of Engineering Pune, India

AGILE PROCESS FOR EMBEDDED SOFTWARE DEVELOPMENT OF SMALL SATELLITES' ONBOARD COMPUTER

Abstract

The design of a mission based, feature driven, timeboxed and dynamic Onboard Computer (OC) subsystem for small satellites poses several avenues for innovative solutions in system software development, automated testing mechanism and scrupulous maintenance and versioning. With several cross functional systems relying on onboard software for effective operation in space, the frequently changing application requirements of these systems necessitate a flexible, adaptive and aspect oriented software development process for onboard software. "Swayam", a 1-U class pico-satellite soon to be launched in space with a Passive Magnetic Attitude Control System (PMACS) payload hosts an Onboard Computer, providing short messaging services to the HAM community across the globe. The model of process adopted in developing Swayam Satellite Onboard computer software forms the central theme of this paper. The finality of the system software once deployed in space necessitates an iterative development model coupled with immediate integration testing at the end of each iteration to ensure high standards of quality assurance and dependable operation over long duration.The notion of developing a deployable version in a single iteration, as professed by the Waterfall method renders it ineffective for space missions. The application of agile processes for an OC's software development holds great potential. This paper explains the efforts in studying agile methods and processes, while keeping in mind the requirements for an OC software, and establishing a list of practices to adopt and implement during the development phase of an OC. The technique in which SWAYAM's OC subsystem implemented these practices allowed a small team to work effectively and ensure uncomplicated knowledge transfer to the new members. Through these practices, the feasibility, usability and effectiveness of agile processes in research and development of embedded systems is explored. With empirical evidence, this paper seeks to reveal valuable insights in favour of the application of such agile processes in embedded systems.