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Author: Mr. Ibrahim Alharthi
Mohammed Bin Rashid Space Centre (MBRSC), United Arab Emirates

THREE NATIONS COLLABORATE TO BUILD MARS SPACECRAFT FLIGHT SOFTWARE

Abstract

Developing a robust, reliable, state of the art spacecraft Flight Software (FSW) subsystem is an important component of space mission success. To design and implement the software was one challenge; but to manage the development to satisfy the project's schedule and requirements in terms of managing resources and build deliveries was an even bigger challenge. Engineers from 3 nations, the United Arab Emirates, the United States of America, and Canada, joined forces to create the Emirates Mars Mission (EMM) Spacecraft FSW. The team encountered many obstacles and limitations on the journey, but by using experienced engineers, a software development strategy, collaborative management and development tools, and open source products, the team accomplished the task. Despite working in 3 different time zones, the EMM engineers managed to build and deliver spacecraft FSW within 5 years of the announcement of this mission.

In 2015, Shiekh Mohammed Bin Rashid Almaktoum, the Vice President and Prime Minister of United Arab Emirates, and ruler of Dubai, announced the EMM Mission. This is the first Emirati planetary mission, and will bring UAE into the space exploration society. The UAE, with its counterparts, are sending a probe known as Al-Amal (Hope Probe). Launching in July 2020, it will reach Mars by 2021, to coincide with UAE's 50th anniversary. The aim of the EMM mission is to contribute to the Space Science Community. The Hope Probe observatory includes three instruments to study and observe the Martian atmosphere. The Emirates Mars Ultraviolet Spectrometer (EMUS) focuses on measuring the global characteristics of hydrogen and oxygen coronae; the Emirates Mars InfraRed Spectrometer (EMIRS) measures the abundance of water ice and vapor and global thermal structure; and the Emirates eXploration Imager (EXI) uses a visible imager to measure the abundance of ozone and water ice and dust aerosols. The FSW supports the science instruments, all spacecraft subsystems, and provides for fault protection and autonomous operation. Such a complex observatory requires a highly coordinated FSW team. This paper describes the tools and methodology used to accomplish the goal.