March 12, 2014

Software Group of the Open Orbiter Project

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The software development effort for the OpenOrbiter project consists of four teams: operating software development, payload software development, ground station software development and testing. The teams are designing and developing the software needed to create and operate a small spacecraft. The goal is to design a satellite that can be produced for under USD $5,000 by students, faculty and others around the world. The students are gaining valuable real-world experience in areas of indicated interest, through the process of designing and developing the spacecraft. Each team is headed by a team lead that is responsible for conducting weekly meetings and organizing the activities of the team. During the Fall, 2013 semester, team leads were aided by students in the CSCI 297—Software Project Management Through Experiential Learning class. The team members also collaborate through the GitHub source code management system, in addition to via in-person interactions.

While the spacecraft is out of range of the ground station the operating software is responsible for the autonomous operation of the spacecraft. When in range it is responsible for communications. It will be responsible for controlling and commanding the subsystems and turning them on/off at the appropriate time in addition to monitoring the general health and status of the satellite and taking appropriate corrective actions as required.

The payload software is responsible for processing the images captured by the camera. It will perform super-resolution and mosaicking to maximize quality (via enhancement of multiple images) and minimize data (via the removal of unneeded and overlapping areas) that has to be transmitted to the ground. It will also be responsible for breaking high-level tasks up into smaller jobs that can easily be executed by the operating software.

The ground station software provides the user interface used by the mission operators to monitor and command the spacecraft. Commands can be entered while the spacecraft is out of range and transmitted at the appropriate times. It will also control the ground station antenna and point it in the direction of the spacecraft to maximize signal strength.

The testing team is developing validation standards against which all of the software components will be measured and developing applicable tests at numerous levels (i.e., unit, integration, system and usability) to validate the performance of the system. Testing team members actively participate in the other three teams in addition to their testing team duties.

References: