Aalto-1, a Finnish Hyperspectral Remote Sensing Nanosatellite: a Status Update

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Aalto University launched a student satellite project Aalto - 1 in 2010. The project joins the effort of several Finnish research institutes and universities to build a first Finnish Remote Sensing satellite. Aalto - 1 is a 4 kg, three - cube nanosatellite based on CubeSat standards, carrying three different payloads, and with a planned mission lifetime of more than two years. The satellite is designed for a sun synchronous orbit. The main payload of the satellite is a Earth Observation instrument, a novel tiny Fabry-Perot imaging spectrometer, developed by VTT Technical Research Centre of Finland, Finland. The main scientific goal of the mission is to demonstrate the feasibility of Fabry-Perot spectrometers for spaceborne Earth Observation applications. A miniature radiation detector RADMON, developed by the University of Helsinki and University of Turku, will be a secondary payload, and has the goal to demonstrate its technology in space as well as to map the LEO radiation environment. In addition, the satellite will carry an electrostatic plasma brake developed by Finnish Meteorological Institute, with which in a separate part of the science phase, the force caused by LEO plasma on the brake will be measured, and eventually the satellite will be slowed down enough to re-enter the atmosphere instead of remaining as space debris. The ground segment for the Aalto - 1 satellite will consist of a UHF/VHF transceiver for comman and telemetry and a S - band receiver for data download. As of the summer of 2011 the UHF/VHF section of ground station has been built and is functional.

During the last year, the satellite team has completed the Preliminary Design - phase for the satellite platform and evaluated the design in a international Preliminary Design Review (PDR) panel. The preliminary design of the payloads is also nearly finished and the PDR is to be arranged soon by Aalto University.

Currently the emphasis is put on the science mission design and development of a functioning electrical model of the satellite while finishing the Detailed Design - phase. The detailed design is expected to be ready by autumn 2012. Also the ground station S-band receiving capability is planned to be ready by that time. Building of the protoflight model of the satellite can be started according to the current schedule in late 2012. At the moment the project has kept its schedule and is heading towards a launch in late 2013.

The satellite project is coordinated by Aalto University School of Electrical Engineering Department of Radio Science and Engineering and supported by Space Technology teaching. In the project participating also Department of Applied Mechanics and additionally Department of Physics of University of Helsinki, Department of Physics and Astronomy of University of Turku, VTT Technical Research Centre of Finland, Finnish Meteorological Institute, Aboa Space Research Oy, Oxford Instruments Analytical Oy, Space Systems Finland and other Finnish companies.