Aalto-1
Finnish nanosatellite for hyperspectral remote sensing

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Modern miniature sensor technology allows to build smaller satellites for earth observation. Smaller size reduces significantly launch cost and development time. Modern nanosatellites use also interchangeable subsystems which reduces development costs.

Aalto University has launched a student satellite project called Aalto-1. The satellite will be built mainly by students in project assignments and thesis work. The satellite project is coordinated by Department of Radio Science and Engineering and supported by Space Technology teaching. In the project participate also Aalto University Department of Automation and Systems Technology, Department of Communications and Networking, Department of Applied Mechanics and additionally Department of Physics of University of Helsinki (HY), Department of Physics and Astronomy of University of Turku (UTU), VTT, Finnish Meteorological Institute, Aboa Space Research Oy, Oxford Instruments Analytical Oy and other Finnish companies. The consortium will expand in the future.

The feasibility study and the preliminary design of the satellite have been made by Aalto University students during the spring semester 2010. The 3 kg satellite will be based on CubeSat standards and launched to sun synchronous mid-day orbit. The main payload of the satellite is a novel tiny Fabry-Perot imaging spectrometer, developed by VTT, Finland. The main scientific goal of the mission is to demonstrate the feasibility of MEMS Fabry-Perot spectrometers for space applications. This miniature technology can be used in nanosatellites for large a variety of remote sensing applications in the future.Measured high spectral resolution images are tested in water quality monitoring and land use classification.

Aalto-1 will also carry several secondary payloads, including: Soft Radiation Detector, Electrostatic Plasma Brake, accelerometer system, lightning detector and two digital cameras. Payloads dictate several restrictions for the mission. Satellite needs to be 3-axis stabilized, it has to have large downlink bandwith and and it has to be able to power several secondary payloads besides the spectrometer and satellite bus subsystems. This makes designing and building Aalto-1 a very interesting and complex engineering challenge for mostly student based team. This work will present preliminary studies made for the project and plans for the next steps towards succesfull mission.