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THE TELEMATICS INTERNATIONAL MISSION TIM FOR 3D EARTH OBSERVATION BY PICO-SATELLITES

Abstract

In space technology there is an trend from traditional large multifunctional satellite towards small networked multi-satellite systems. This encourages the cooperation of partners contributing satellites to a formation or constellation to benefit from a larger data base generated. Small and very small satellites are now able to complement the traditional large satellites. In this context with TIM – the Telematics International Mission by 7 international partners a cooperating pico-satellite formation will be realized in order to generate 3D images for Earth observation. The miniature attitude and orbit control system will enable the satellite to orient the instruments of the planned 12 satellites towards target observation areas. Taking advantage of the different viewing directions by photogrammetric methods from these data related 3D-images will be generated, suitable for monitoring of environment pollution, harvesting status, critical infrastructures, and natural desasters (like forest fires, volcano activities, earthquakes).

The scientific challenge behind this evolution is two fold:

- bringing into orbit a formation of networked, cooperating, "smart" small satellites, operating autonomously with minimum ground station interaction;
- developing modular, robust small satellites.

Essential subsystems needed for a formation are: the altitude and orbit determination and control system, the communications system capable of inter-satellite communication and satellite-to-ground communication, as well as electrical propulsion for orbit control and maintaining formation. Precursor missions of the partners in this international team prepared the expertise the relevant areas in satellite research

for this challenging pico-satellite formation flying application. Thus by the international cooperation a challenging and innovative Earth Observation Mission can be realized.