

SMALL SATELLITE MISSIONS SYMPOSIUM (B4)
Design and Technology for Small Satellites - Part 2 (6B)

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SURVEY OF WORLDWIDE NANOSATELLITE PROJECTS AND SUBSYSTEM TECHNOLOGY

Abstract

This paper will provide the results of a global survey of publicly known nanosatellite projects. Nanosatellites are satellites within a mass range of one to ten kilograms, according to the commonly used definition. The standardized form factor of so called CubeSats have initiated the development of nanosatellites by the end of the twentieth century and the total amount of projects have exponentially grown since to a total in the order of a hundred projects worldwide as of 2009. Most of the projects are performed at educational institutes, but activities in this field within space industry and organizations are expanding as well.

Nanosatellites can in general be distinguished from satellites from bigger mass ranges by their relatively short development time, low costs and implementation of the latest technologies. On the other hand, their size is still big enough to allow for the use of commercial off the shelf components and standards, to maintain modularity between the several subsystems and to use slightly adapted but still conventional project approaches. To obtain a better understanding of the current technology level and applications of nanosatellites and to spot trends in the global development and growth of such projects, a survey will be performed including as much nanosatellite projects as possible.

The first section will provide facts and figures on the past and ongoing projects. Statistics will be given on amount of projects, organization types, geographical distribution and progression through time. The second section will classify the projects in terms of their missions and/or onboard experiments, which range from technology demonstration, education, public outreach, science to commercial applications. The third section will provide a technology overview and performance specification of the satellite bus subsystems. In this overview, the subsystems will be classified in commonly known standards if applicable (e.g. data protocols, frequency bands and modulation) and will be expressed in performance specification numbers (e.g. total solar power generated, communication data-rate, etc)

Finally, some estimates for the future for nanosatellites will be made based on extrapolation of the progression trend lines.