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DIY SATELLITES: APPLICATIONS FOR CITIZEN SPACE

Abstract

Newly developed picosatellites, weighing less than a kilogram and deployable in large clusters, are emerging as the cheapest and easiest option for students and amateur space scientists to get a payload into orbit. Citizen space participants are now able to access commercial picosatellite hardware do-it-yourself (DIY) kits and associated services and expertise to customize their missions and place their payload into orbit. Companies like Virginia Space, Interorbital Systems, and ThumbSat, Inc. have designed STEM education and citizen science programs that provide the ability to custom design a payload with all of the other necessary space mission services, from telemetry streaming to launch vehicle selection to spacecraft testing—-at very low costs. Although the satellite technology is not necessarily breakthrough, these types of accessible, user-centered space programs are unprecedented. Commercial picosatellite leaders are opening the door for a whole new demographic to participate in space. The expected success of these picosatellite programs is game-changing, as successful "citizen space" applications can have a variety of technological, demographic, and regulatory implications across all space sectors.

This paper focuses on two notable case studies–ThinSats and ThumbSats. In addition, the paper explores key market drivers for citizen science, key enabling elements of DIY picosatellites, technology and market growth triggers, and possible implications of these new satellites. This paper is a new release of the Game Changer Series from The Aerospace Corporation's Center for Space Policy and Strategy.