Capitol Graduate Research Summit

Cubesat Platform for Research, Education and Business in Kansas

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A CubeSat is a miniaturized satellite weighing 1–10 kg, has a short lifecycle, uses commercial-off-the-shelf components, and is carried as a secondary payload. CubeSats provide low-cost access to space for scientific studies, technology demonstrations, and communication purposes. CubeSats also provide tremendous educational value because students can learn about spacecraft subsystems and integration of those components while still in school. Our research particularly focuses on propulsion and control technologies for CubeSats. We propose a hybrid propulsion system that can be used for high and low thrust maneuvers by CubeSats. In addition, an experimental setup has been designed for determining the specific impulse of a CubeSat propulsion system. Furthermore, an adaptive control algorithm, already demonstrated to work for larger satellites, is being studied for CubeSats. We provide an overview of these efforts and demonstrate their impact on Kansas. Specifically, CubeSats present new business opportunities that can leverage the existing aeronautical infrastructure in Kansas. MicroSats (10–100 kg) have used technologies for precision agriculture by obtaining near-real-time information about photosynthesis levels, evapo-transpiration, surface soil properties, nitrogen content, crop yield, extent of weed and vegetation cover; it is likely that some of these technologies will be integrated into CubeSats in the future.