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BUY VS. MAKE TRADEOFFS FOR EDUCATIONAL CUBESATS

Abstract

CubeSats have enjoyed immense growth in profile, popularity, and functionality over the past decade, rapidly moving from paper designs to over one hundred flown spacecraft. Accompanying this growth has been a transition from garage project and research lab status to a full-fledged industry segment with high performance demands for these tiny spacecraft. This industry provides many "off-the-shelf" CubeSats and CubeSat components that were unavailable even five years ago. The recent availability of these components make it timely to revisit the buy verses make tradeoffs for CubeSats.

The decision to buy or make a CubeSat is typically framed as a basic schedule verses cost tradeoff. This approach is appropriate for rough order of magnatude discussions, but glosses over the nuances of the decision. For instance, the cost of custom software to interface the various comercial components can dwarf the cost of a custom component designed to simplify software integration.

In this paper we discuss various aspects to the buy verses make decision as it applies to the CubeSat research lab at Cal Poly. Some of the outcomes, such as our slight preference for make, are driven by our objective to provide a valuable educational experience for our students. However, most of the decisions are a result of the experiences over ten flight missions and are applicable in other situations.