

Small Payloads and Advanced Concepts for Exploration (SPACE) Early Mission Design Tool. R. Leiter^{1,2}, Z. Himwich¹, A. Natarajan¹, J. Rosenthal¹, P.E. Clark^{1,3}, ¹IACS, Catholic University of America, Washington, D.C. 20064, ²NASA/GSFC Summer Student Interns Program, NASA/GSFC, Greenbelt Road, Greenbelt, MD 20771, and ³University of Virginia, 472-4 Lambeth Field, Charlottesville, VA 22904. Contact Emails: rml3yb@virginia.edu and clarkp@cua.edu

Rationale: As interest in the development of cubesats for deep space applications grows, and as the first opportunities for lunar cubesat missions are becoming available, more commercial off-the-shelf components for CubeSats, nanosatellites with standard bus, components, and interfaces, are becoming available.

Tool: Our project at NASA Goddard was to create a program and user interface that facilitates the design of deep space CubeSat missions, based on the nature of the science investigation, in the early stages of mission design. The SPACE tool separates the design process of a CubeSat mission into selection of an instrument or payload and selection of various subsystems. In addition to the SPACE program, we created a database of commercially available satellite components designed for CubeSats, which the SPACE tool is able to search and select from. After subsystems are selected, the tool allows the user to tweak their mission concept or subsystem selections. Ultimately, the user will be able to access 3D models of the CubeSat parts and bus that can be printed individually or as a complete CubeSat layout assembled in a CAD program.

Result: This tool allows scientists and engineers in early phases of mission development to select an compact instrument for a science application, to determine the state-of-the-art technological capability of CubeSats for that application, and find initial estimates mass, power, volume, and bandwidth for a specific nanosatellite mission. Our hope for the future of this tool is that it will be made available online for public use, and as more scientists, engineers, and manufacturers use the tool, they will contribute to the CubeSat database, increasing the functionality of our tool.