

# Rascal: A Demonstration of Rendezvous and Proximity Operations within a Small Spacecraft Architecture

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The Rascal mission consists of the demonstration of rendezvous and proximity operations within small spacecraft architecture. Spacecraft RPO missions are defined as those that demonstrate the performance of orbital maneuvers near and around resident space objects (RSO), such as rocket bodies, orbital debris, or other spacecraft, while a small spacecraft architecture is defined as one that utilizes a standard satellite configuration and size that allow for rapid development and launch vehicle integration. In recent years, many RPO missions have been conducted, such as NASA's DART, DARPA's MiTE<sub>x</sub>, and Orbital's Orbital Express, each to varying degrees of success. Regardless of the program, each of these RPO missions consisted of large spacecraft (100 kilograms and up) that were developed with an equally large amount of capital, resources, and effort. Rascal, on the other hand, seeks to demonstrate similar RPO missions within an architecture that can be developed at a university-level while still capable of demonstrating key RPO capabilities, such as stationkeeping (maintaining a set distance between two RSO's), collision avoidance (rapidly increasing the distance between two RSO's), and rendezvous (moving two RSO's within a set distance of each other). Furthermore, these types of demonstrations have been recently highlighted by NASA as key areas of interest in the future development of intelligent spacecraft systems, meaning that the systems developed to make the Rascal mission possible can be easily transitioned to the greater aerospace community as a whole for use in future commercial or academic RPO missions. As such, the Rascal mission is critical to the further refinement and understanding of spacecraft RPO capabilities within the ever-changing small spacecraft landscape.

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