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MICRO-SAT BASED DEXTEROUS ROBOTIC SATELLITE SERVICING: A CASE FOR  
MINIATURIZATION**Abstract**

Small satellites provide a unique path for doing much with little in terms of resources and capital. In this vein, the Space Systems Lab at the University of Maryland has been investigating the use of micro-satellites to perform satellite servicing missions to extend the lifetime of impaired systems that would otherwise be unfeasible to fix. In this process we have learned that small is excellent, but smaller can be even better.

In the pursuit of small satellite dexterous robotic servicing, the Space Systems Lab has developed two separate systems, Exo-SPHERES and DYMAFLEX. Each of the two systems continues to investigate different aspects of an end-to-end servicing mission. From this investigation lessons have been learned about what components are and are not needed for a successful mission. One of the most important of these components is the dexterous manipulator of the spacecraft. The design of the manipulator is highlighted, as well as a case study for further miniaturization from an approximately 75 Kg micro-sat to a 12U cubesat. Additionally, a discussion is included about what works well on the vehicles, what needs improvement, and more notably, what can be miniaturized for future spacecraft.