



## NASA SBIR 2016 Phase I Solicitation

### S3.05 Guidance, Navigation and Control

Lead Center: GSFC

Participating Center(s): ARC, JPL

NASA seeks innovative, ground breaking, and high impact developments in spacecraft guidance, navigation, and control technologies in support of future science and exploration mission requirements. This subtopic covers the technologies enabling significant performance improvements over the state of the art in the areas of spacecraft attitude determination and control, spacecraft absolute and relative orbit and attitude navigation, pointing control, and SmallSat/CubeSat technologies.

Component technology developments are sought for the range of flight sensors, actuators, and associated algorithms and software required to provide these improved capabilities. Technologies that apply to all spacecraft platform sizes will be considered. Special considerations will be given to emerging technologies applicable to SmallSat/CubeSat class spacecraft if they are technology leaps and mission enabling.

Advances in the following areas are sought:

- *Spacecraft Attitude Determination and Control Systems* - Sensors and actuators that enable milli-arcsecond class pointing capabilities for large space telescopes, with improvements in size, weight, and power requirements.
- *Absolute and Relative Navigation Systems* - Autonomous onboard flight navigation sensors and algorithms incorporating both spaceborne and ground-based absolute and relative measurements. For relative navigation, machine vision technologies apply. Special considerations will be given to relative navigation sensors enabling precision formation flying, astrometric alignment of a formation of vehicles, robotic servicing and sample return capabilities, and other GN&C techniques for enabling the collection of distributed science measurements.
- *Pointing Control Systems* - Mechanisms that enable milli-arcsecond class pointing performance on any spaceborne pointing platforms. Active and passive vibration isolation systems, innovative actuation feedback, or any such technologies that can be used to enable other areas within this subtopic apply.
- *SmallSat/CubeSat Technologies* - Lightweight, low power, compact sensors and actuators that push the state-of-the-art for SmallSat/CubeSat attitude and orbit controls capabilities. Arcsecond-level pointing performance, non-propulsive orbit control, and radiation hardening technologies apply. NASA would like to utilize SmallSat/CubeSat technologies on missions beyond LEO therefore special considerations would be given to proposals addressing those needs.

Phase I research should be conducted to demonstrate technical feasibility as well as show a plan towards Phase II integration and component/prototype testing in a relevant environment. Phase II technology development efforts shall deliver component/prototype at the TRL 5-6 level consistent with NASA SBIR/STTR Technology Readiness Level (TRL) Descriptions. Delivery of final documentation, test plans, and test results are required. Delivery of a hardware component/prototype under the Phase II contract is preferred.

---

Proposals should show an understanding of one or more relevant science or exploration needs and present a feasible plan to fully develop a technology and infuse it into a NASA program.