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Generic Technologies for Nano/Pico Platforms (6B)

Author: Prof. Sabrina Corpino  
Politecnico di Torino, Italy

Mr. Giorgio Ammirante  
Politecnico di Torino, Italy

Dr. Fabrizio Stesina  
Politecnico di Torino, Italy

Mr. Guglielmo Daddi  
Politecnico di Torino, Italy

Mr. Filippo Corradino  
Tyvak International SRL, Italy

Prof. Alessandro Francesconi  
University of Padova - DII/CISAS, Italy

Dr. Francesco Branz  
University of Padova - DII, Italy

Dr. Jeroen Van den Eynde  
ESTEC, European Space Agency, The Netherlands

SPACE RIDER OBSERVER CUBE – SROC: A CUBESAT MISSION FOR PROXIMITY OPERATIONS  
DEMONSTRATION

**Abstract**

The Space Rider Observer Cube (SROC) mission aims at demonstrating critical capabilities and technologies required for successfully executing a rendezvous and docking mission in a safety-sensitive context. The SROC multipurpose space system is constituted by a nanosatellite and a deployment/retrieval system. The system will perform a mission featuring Proximity Operations in the vicinity of the Space Rider (SR) vehicle before docking and re-entering Earth with the mothership. The SROC project aims at developing and testing in space novel key technologies in the area of proximity operations, such as: Propulsion systems (cold gas), Guidance Navigation and Control (hardware and software), Electro-optical systems (spectral imager/visual camera), Mechanisms (docking, deployment and retrieval), and at improving Autonomous Operations also using Artificial Intelligence algorithms. All these technologies are of interest for a broad set of mission goals involving proximity operations. This in-orbit demonstration has the potential of opening a wide spectrum of novel applications for nanosatellites. The development of the advanced technologies needed for the SROC mission will have a positive impact also for pursuing other mission objectives, especially in the domains of in-orbit servicing, space exploration and debris mitigation. In the current baseline, the 12U CubeSat will be launched with Vega C as payload of Space Rider and released from the Multi-Purpose Cargo Bay (MPCB) once in orbit. Target launch is the Space Rider Maiden Flight, currently planned Q2 2024. Once deployed and commissioned, SROC will fly in formation with Space Rider taking observation of the vehicle from close distance. At a certain point in time, SROC will rendezvous and dock with its Multi Purpose CubeSat Dispenser hosted in the Space Rider MPCB. The paper describes the concept of operations, and the mission and systems architectures as of end of Phase B1, highlighting the main challenges and the proposed solutions to be further developed in next project phases. The study is conducted under ESA contract no. 4000136625/21/NL/MG in the GSTP framework

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