

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Innovative Systems toward Future Architectures (1)

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EUROPEAN ROBOTICS FOR SPACE ECOSYSTEM - EU-RISE

Abstract

The emerging space ecosystem is expected to grow significantly, with more than 40,000 satellites and 100 lunar missions envisioned to be launched over the next decade. This extensive infrastructure will subsequently drive the demand for capabilities to transport, assemble in-orbit and maintain this infrastructure for future use.

The European Robotics for Space Ecosystem (EU-RISE) project aims to advance the robotic and autonomous technologies required for in-orbit manufacturing, assembly and servicing (e.g. refueling, payload exchange) up to the Technology Readiness Level (TRL) 5. To achieve this, the project has two interrelated sub-goals: the definition of the future space ecosystem and the development of an end-to-end, laboratory demonstrator integrating all the enabling technologies. This paper focuses on detailing the approach and results of the first sub-goal with a first description of the architecture of the envisaged demonstrator, including hardware and software aspects.

Market and economic analysis was used to identify new market opportunities for a future space ecosystem. The required services and associated capabilities were then defined, leading to the definition of

market and mission requirements. A system concept definition was then carried out, leading to a realistic concept of a laboratory demonstrator for a specific reference use case of the previously identified in-space manufacturing and assembly mission.

To address the different markets and missions identified, a modular approach in terms of robotic capabilities, transportation and interface seems mandatory. To this end, the main functions required to address future on-orbit service missions have been identified and arranged in a modular concept. This concept is based on building blocks that are arranged differently depending on the mission to be addressed, resulting in a trade-off between versatility and specific needs.

This project aims to establish a European capacity for on-orbit services and in-space manufacturing to promote industrialisation and business in space, while supporting low-cost missions and a sustainable, circular economy in space. It will develop new technologies and concepts for space systems and services, enabling in-orbit demonstration/validation and mature key technologies up to TRL 5. This will contribute to Europe's independence in space technology development.