



OG5: Modular Interfaces for Robotic Handling of Payloads (SIROM)

H2020 SRC Space Robotics Technologies

SIROM GOALS

- To develop a set of **interfaces** (mechanical, data, electrical, thermal) that allow coupling of payload to robot manipulators and payload to other payload (or to a platform).
- **Scope:** manipulation of payload by robots in orbital and planetary environment, assembly of structures out of elemental blocks, spacecraft deployment aid.
- **Impact:** The **standard interfaces** will allow on one hand to develop the SRC end goals (such as FLEXSAT) but also the experimentation on deployment of very large structures (e.g. antenna reflectors and active telescope mirrors).

SIROM Objectives

- Exploitation potential (Terrestrial and Space)
 - The future of planetary robotic exploration will be calling upon a range of robotic assets including lander and rovers. Increasingly, these systems will need to interact between themselves and with additional payload elements to perform a range of tasks to fulfill the mission objectives:
Martian Long Range Autonomous Scientist
 - Space robotics is considered one of the most promising approaches for on-orbit servicing (OOS) missions such as docking, berthing, re-fuelling, re-pairing, up-grading, transporting, rescuing and orbital debris removal:
ModSatServicing,
 - Distributed data handling/processing by the plugged APMs and the system bus via standard interfaces
 - Rendezvous and capturing of cooperative/uncooperative target spacecraft

Consortium

MAIN WPs	Leader
Task 0: Technical management	SENER
Task 1: Technology Review, System Requirements	DFKI/Strathclyde
Technology review	DFKI/Strathclyde
System Requirements	ADS
System Engineering	SENER
Interface Engineering to other OGS	SENER
Task 2: Preliminary Design and Modelling	FNM
Task 3: Detailed design of Reference implementation and related test setu	SAS
Task 4: Manufacturing, Assembly and Integration of reference implementa	SENER
Task 5: Execution of test, demonstration and correlation of test results	ADS-D/UK
Task 6: Dissemination and Exploitation	Strathclyde
Technologies	Leader
Mechanical Interface	SENER
Data Interface	ADS/UK + TELETEL
Electrical interface	FINMECCANICA
Thermal Interface	TAS-I & MAGSOAR
User oriented view	Leader
Scenario definition	ADS
System Requirements	ADS
System Engineering	SENER
APM Orbital	SENER
APM Planetary	SAS
End Effector	FNM
Demonstration Orbital	ADS-D
Demonstration Planetary	ADS-UK
Dissemination and Exploitation	Strathclyde

SIROM innovation and target applications

SIROM will apply novel approach to meet unique design requirements:

- *IF standardization and modularization of the different components (mechanical, thermal, electrical, data connections).*
- *Allow creation of large clusters of modules based on the Standard IF.*
- *APMs are considered for demonstration, validation and verification, connected via standard IF to other modules and satellite bus.*
- *An end-effector for a robotic manipulator will be designed*

SIROM will contribute to enable the following robotic application for:

Orbital scenario

- Planned orbit raising
- Deployment/assembly aid
- Planned maintenance
- Additional payload
- Lifetime extension
- Planetary surface exploration
- Landmark tracking

Planetary Surface scenario

- Inspection
- Replacement of ORU
- Performance enhancement
- Mission evolution
- Re/Deorbiting
- Autonomous navigation
- Rendezvous between 2 planetary assets

SIROM coordination with other OGs

- The main coordination effort of the OGs is
 - in attending **common workshops** in which interface specifications are agreed and verified
 - in maintaining/harmonising the agreed interface specifications along the development of the OGs in a **common repository**
 - in demonstrating the OG results in **common test platforms** (provided by OG6)
- The interaction among OGs will be based on:
 - Cross delivery of interface specifications
 - Cross delivery of preliminary/final outputs
 - Integration and demonstration of the final outputs of OGs in common test platforms
- Interface management: Common work logic will be established between the six (6) OGs where the different OGs will interact in terms of timing and coordination efforts.
- A “SIROM interface engineer” to be nominated in order to coordinate establishment and maintenance of IF specifications with other OGs.

SIROM coordination with other OGs

Project coordination with other OGs

- Verification and validation strategy
 - WP5 will perform verification and validation tests on test platforms provided by OG 6 to validate the Hardware / Software components developed and manufactured within the scope of OG 5 and to show their performance within the two demonstration scenarios: Orbital (Module Satellite Servicing) and Planetary.
 - Perform co-location activities on OG 6 test site by Airbus Defence and Space Limited & Airbus DS GmbH:
 - Airbus DS GmbH will coordinate as leader partner the integration of APM'S and Interfaces within the test platform (orbital track) provided by OG 6.
 - Airbus Defence and Space Limited will coordinate as leader partner the integration of APM'S and Interfaces within the test platform (planetary track) provided by OG 6.

SIROM coordination with other OGs

Project coordination with other Ogs (cont´d)

- Interface of SIROM controller to ESROCOS and ERGO (OG1 and OG2) in terms of operational modes and functions
- Interfaces of SIROM with InFUSE (OG3) in terms of TM
- Interfaces of SIROM with I3DS (OG4) in terms of sensing tools for operational scenarios and complementary elements (targets, SIROM sensors...)
- Interfaces of SIROM with FACILITATORS (OG6) in terms of test verification together with other Ogs

Wire Cutters | Sploid Short Film Festival · Official Selection

<https://www.youtube.com/watch?v=W9J15fDAFxc>

Thank you

For your attention

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