



Integrated Mission Planning for Distributed Robot Systems



Several robots of the type Pioneer P3-AT will be used for exploration and for the localization of the lunar modules which will be collected by Amparo.



The mobile robot Amparo will be used for the collection of lunar modules.



The robot Amparo and a Scout robot during a coordinated mission, where modules have to be located and transported.

Within the research project IMPERA strategies for distributed mission and task planning for lunar missions are investigated. One example for such a mission is the exploration of an unknown environment using a team of mobile robots. This task can be executed on multiple robots, each robot using a different sensing modality.

The planning system envisaged will be usable for a team of heterogeneous, distributed robots and will allow planning on a mission level.

The main goal of the project is the development of a modular planning software architecture which runs on several robots in a distributed manner. The software architecture will be augmented with a variety of task planners which will be verified on physical robot platforms. The research on different acting strategies will be performed on real systems as well as in simulated environments.

The verification and implementation of the project is done in the context of extraterrestrial exploration while using a team of heterogeneous mobile robots. In order to show the robustness of the envisaged planning architecture following planning problems are tackled:

- Dynamic sensor coverage and dynamic communication coverage in the context of lunar exploration.
- Planning with limited resources e.g. energy and memory.

- Distributed exploration with heterogeneous systems.
- Inspection and maintenance of lunar infrastructure.

For each of the aforementioned planning problems is one specific planning module envisaged which will be integrated into the IMPERA planning architecture. All use-cases are verified within a lunar environment using a team of heterogeneous robots.

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