IAF SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Architectures (2)

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AI-EXPRESS IN-ORBIT SMART SERVICES FOR SMALL SATELLITES

Abstract

Space mission's scenario is rapidly evolving. Several elements are contributing to this evolution, but maybe three can be identified as key points: the lowering of access barriers, the NewSpace approach and the huge, distributed, data availability. This evolving scenario is also raising the need for new operational concepts that have to be able to implement novel technologies, novel approach to missions and that also have to comply with the shortening of the development cycles. AI-express answers to these needs. AI-express is a space system providing services intended to support the following processes: demonstrate AI algorithms, qualify technologies and validate mission concepts where each resource (hosted payloads and cubesat, on board computer, memory, bandwidth and so on) is managed by means of blockchain. It gives access to the actionable information, the NewSpace true value, directly in-orbit and as-a-service. Information can be then transferred back to Earth as notifications and alerts, or directly exploited on-board in autonomous decisions workflows. AI-express provides Artificial Intelligence, on-board, on-demand. The testbed main components are:

- a payload implementing on-board services for other payloads;
- an orbiting platform, such as D-Orbit's ION Carrier, providing hosted payloads and ready-to deploy CubeSats;
- a SW framework infrastructure (implementing services and an abstraction layer towards sensors and on-board resources);
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a catalogue of on-board resources (HW/SW components as well as complete CubeSats in standard configurations);

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a catalogue of processing functions and applications algorithms based on AI;

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on-board service configuration

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CubeSats deployment on-demand;

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support service to custom design needs;

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Ground Segment support services for operations; That, all together, implement the framework identified as In-orbit Smart Services for Small Satellites that allow the investigation of innovative approaches in planning, tasking, data processing and communications.