

Digital twin modeling and artificial intelligence



Topic: DIGES - DIGital twin di sistemi di ESplorazione lunare (DIGES)

TITLE: Machine learning-based surrogate modelling of a lunar rover Digital Twin for real-time operations

RESEARCH BACKGROUND:

Surface exploration of planets and satellites with rovers is the trending topic of space exploration. Rovers' complexity and costs require high reliability since anomalies or component degradation may compromise the mission. In this framework, it is possible to develop a Digital Twin (DT) of the rover to simulate its behaviour and its subsystems.

A continuous and real-time comparison between the DT model and the real system will allow a more efficient operational management of the space system, coupling the models with artificial intelligence algorithms. The DT must be characterized by a relatively low computational weight, allowing its real-time usability. This can be achieved by exploiting the potential of surrogate models.

RESEARCH ACTIVITIES:

1. Bibliographic analysis of state-of-art of rovers, DT and surrogate modelling
2. System modelling on Simulink-Simscape
3. Choice and optimization of Machine Learning algorithms for surrogate modelling
4. Development of a simplified scenarios to test the developed framework



DURATION: 7-9 months

METHODOLOGY: Numerical – Experimental

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POSSIBLE COLLABORATIONS:

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