Doctoral School of Information and Biomedical Technologies
Polish Academy of Sciences (TIB PAN)

SUBJECT: Artificial intelligence applied to autonomous space systems

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DESCRIPTION: The proposed PhD will address a significant operational challenge in space exploration: the communication latency between edge devices (e.g., satellites or rovers) and Earth. The lack of system autonomy necessitates the continuous transmission of vast volumes of raw data to ground stations and prevents real-time operations (such as visual inspections, rover navigation, and Earth imaging). To address this issue, during the work on doctoral thesis the candidate will develop AI algorithms for edge processing designed to provide space systems with autonomy. Given the memory and computational constraints of such devices, the AI systems must be hardware-optimized, comprehensively validated, and interpretable.
The central research hypothesis posits that developing 1) AI system optimization techniques and 2) methods for training AI models on hybrid datasets (including synthetic data) will enable the deployment of energy-efficient, fault-tolerant, and explainable models on space-grade hardware. The intended outcome of the doctoral project is the development of a specialized AI software module designed primarily to enhance the decision-making and operational autonomy of space vehicles (e.g., satellites, planetary rovers).

REQUIREMENTS:

- Holding an MSc degree in Computer Sciences, Mathematics or related areas
- Solid background in programming
- Knowledge of AI algorithms and autonomous systems
- Ability to design, execute, and evaluate research experiments
- Excellent collaboration skills as well as the ability to work independently
- Highly capable of communicating scientific results in English, both orally and in writing

ADDITIONAL INFORMATION:

This is a PhD funded as a part of “application PhD” programme, executed in cooperation with KP Labs Sp. z o.o.