

# UTILIZATION OF ARTIFICIAL INTELLIGENCE-BASED TOOLS TO SUPPORT AUTONOMOUS MEDICAL OPERATIONS

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**INTRODUCTION:** This panel summarizes recent activities that the Exploration Medical Capability (ExMC) Element of NASA’s Human Research Program (HRP) is utilizing to leverage the power and efficiency of artificial intelligence (AI) tools to reduce human system risk in space medicine operations.

**TOPIC:** The first presentation describes the adaptation and fine-tuning of an open-source large language model (LLM) based on the OpenBIO 8 billion parameter LLM. This “Doc-in-a-Box” (DIB) LLM features multi-modal capability (interactive voice and image acquisition) and following containerization was deployed on an IoT core in collaboration with the Lunar Command and Control Interoperability (LuCCI) Project.

The second presentation in this panel outlines the novel approach to development and utilization of the Objective Structured Clinical Examination (OSCE) for evaluating the performance of DIB. Features of the OSCE and performance of the model as scored by physicians trained in Aerospace Medicine will be discussed.

The third presentation describes the use of AI-based tools to collect and summarize vast amounts of information necessary to create Clinical Finding Forms (CliFFs) as part of an Evidence Library for use by the IMPACT probabilistic risk assessment tool. Utilizing AI-tools to streamline the labor-intensive process of CliFF development could substantially reduce the amount of physician labor necessary to complete such tasks in the future.

The fourth presentation in this AI Panel explores the breadth and depth of AI-related activities currently ongoing or in planning stages within ExMC and HRP. Topics include LLM use at the edge, directed acyclic graph analysis, synthetic clinical data generation.

The final presentation presents the possibilities of incorporating Agentic AI to automate tasks and facilitate in the movement of data using integrated data systems platforms. Following a Federated model, an Agent can control the flow of information to maximize the overall performance using AI tools via distribution of computing capacity over multiple APIs.

**APPLICATION:** Taken together, the presentations in this panel summarize the challenges to be overcome and potential solution spaces to be explored and matured to progressively enable autonomous medical operations using AI-based tools.