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SPACECRAFT DOCKING PILOTING PERFORMANCE ASSESSMENT BY MEANS OF VIRTUAL REALITY AND EYE-TRACKING A THE SIRIUS-21 SPACE ANALOG

Abstract

The SIMSKILL-VR experiment presents an innovative approach to understanding astronaut piloting performance in spacecraft docking procedures, employing a cutting-edge flight simulator equipped with the latest in virtual reality, eye-tracking, and cognitive load measurement technologies. Conducted during the SIRIUS-21 space analog mission at the IMBP facilities in Moscow, this research extended over an 8-month period, meticulously recording crewmember performance across various flight scenarios. This study not only introduces the technologies and methodologies developed for performance assessment but also offers an in-depth analysis of the results obtained from both flight telemetry and a comprehensive suite of human behavior metrics. Our findings reveal the nuanced impact of prolonged isolation and confinement on piloting performance, underlining a degradation in skills despite high levels of crew autonomy. Importantly, this work highlights the critical role of situational awareness as a latent factor influencing pilot reliability and performance. By shedding light on these dynamics, the SIMSKILL-VR experiment contributes valuable insights towards optimizing astronaut training and mission planning for future space exploration endeavors.