Minority University Research and Education Project (MUREP)

Institution: New Mexico Institute of Mining and Technology

City/State: Socorro, NM

Award Name: MUREP Partnership Learning Annual Notification (MPLAN)

Award Number: N/A

Title: Information-Theoretic Multi-Robot Exploration/ STRG-2: Extreme Access

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Award Fiscal Year: FY2024

Summary:

A multi-robot system will provide unprecedented capacity in accessing, navigating, and exploring previously inaccessible surface or subsurface areas of the Moon or other planets. Due to the obvious advantages of a multi-robot system such as enhanced efficiency and adaptability, NASA has been investigating the use of a multi-robot system in the Moon and other planetary exploration. One such an example is the CADRE (Cooperative Autonomous Distributed Robotic Exploration) project, which is anticipated to result in promising outcomes such as topographical analysis of extreme access areas through simultaneous, distributed scientific measurements using a multi-robot system. One of the main challenges in this type of mission is how to efficiently explore and map partially or even completely unknown areas. To tackle this problem, this proposal aims to investigate a novel information-theoretic multi-robot exploration scheme. This project will provide a multi-robot collaborative exploration framework to efficiently explore and map unknown areas while reflecting physical constraints including measurement uncertainty in sensors, finite battery time, and a limited communication range.