Minority University Research and Education Project (MUREP)

Institution: California State University-Northridge

City/State: Northridge, CA

Award Name: MUREP Partnership Learning Annual Notification (MPLAN)

Award Number: N/A

Title: Repurposing Lander Parts into Geodesic Assemblies/ STTR: T12.09 Thermoplastic Composites for Repurposable Aerospace Applications

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Summary:

Repurposing lander parts into geodesic assemblies is proposed as an innovative approach to sustainable lunar/Martian habitat construction. Crucial to this approach are energy-efficient disassembly/assembly techniques and the re-processability/reconfigurability of materials used in lander construction. Thermoplastic composites serve as the enabling materials, fashioned into original lander components such as stiffening elements. These components incorporate lightweight, minimally invasive Joule heating elements integrated between joint interfaces. Portable, low-power supplies can be used to locally re-melt the interfaces for dis-/re-assembly. As a demonstrator, a thermoplastic double-skin/C-channel stiffener composite assembly will showcase on-demand disassembly and reconfiguration through Joule heating. Experimental studies and simulations will investigate the parameters necessary for successful repurposing of these elements in terms of heat transfer and required (electric) power input.