Paper ID: 68419
student

IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Interactive Presentations - IAF HUMAN SPACEFLIGHT SYMPOSIUM (IP)

Author: Mr. Naman Kumar Shetty
R V College of Engineering, Bengaluru, India

Mr. Shryas Bhurat
R V College of Engineering, Bengaluru, India
Mr. Aashish Yadav
R.V.College of Engineering, India

3D WELDING ADDITIVE MANUFACTURING HUMANOID FOR SPACECRAFT

Abstract

Space exploration is truly the most adventurous journey in the history of mankind. Satellites, space flights, and stations are deeper into the infinite expanse of the universe, and these are susceptible to impact by orbital debris and meteoroids. In order to protect these machines from failures of their components and build new parts in space, we need an effective method to build 3D durable components in space. This paper discusses the usage of a LEMUR Robot for Additive Manufacturing using 3D Laser Welding. 3D laser welding uses a high concentration of energy to fuse the metal wires into a precise part that can withstand harsh conditions in the space environment. It offers high geometrical accuracy and material strengths. 3D welding uses laser metal fusion to build products layer by layer using the robotic arm attached to the Limbed Excursion Mechanical Utility Robot (LEMUR) which was originally designed to do repairs on the ISS. LEMUR has four limbs which helps it to translate and rotate around various axes of the spacecraft. The 3D laser welding machine with one arm is attached to the body of the LEMUR, helping it to move on the rails outside the space stations. This paper concludes with the operation of the given system in order to obtain additive manufacturing at the desired damaged sites without direct human interaction in space. The different applications encompass growing complicated elements for the spacecraft, helping habitats in terrestrial areas, and the potential of the LEMUR robot to work in compact areas on the earth.