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Human Exploration of the Moon and Cislunar Space (1)

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AARAMBH V2, THE FUTURISTIC LUNAR SURFACE VEHICLE

**Abstract**

The human dream to colonize the Moon might be a reality soon. Colonization demands an effective and reliable transport vehicle. AARAMBH v2 is the proposed rover that is intended to enhance the capability of our previous design AARAMBH. AARAMBH was able to provide a viable solution for most of the challenges faced by the conventional rover such as slow movement, wearing heavy and stiff spacesuits while operating. Lack of Radiation Shielding, Communication & Navigation Systems are some of the drawbacks of the earlier design. This paper elaborates on various improvements in the existing conceptual design of the rover along with a viable solution for major problems like Radiation Shielding and Communication & Navigation systems.

Humans are subjected to higher levels of radiation on the lunar surface due to the absence of sufficient atmospheric and magnetic shielding similar to the Earth's surface. Ionizing Radiations such as Galactic Cosmic Rays and Solar Particle Events are not only life-threatening but can also damage the equipment onboard the rover. These issues motivated the authors to build a multi-functional thermal radiation shielding mechanism for the rover which consists of CFRP(Carbon Fiber Reinforced Polymer) and Ammonia. CFRP is used due to its radiation shielding ability, which is nearly twice that of Aluminium and also it has comparable mechanical properties to that of Aluminium. Ammonia will be used in passive thermal controls due to its superior thermodynamics properties in the lunar surface temperature range. In the previous design, the lunar rover was having less endurance due to its less battery life. Carbon Nanotubes based energy system will charge the batteries of the rover in a lesser amount of time while ensuring better endurance.

A radio waves-based communication system is proposed which has a central communication center that will store the system id of the rover and will monitor it with the help of the satellites orbiting the moon. The dataset obtained from the different cameras and sensors of the rover will be sent to the communication center from where the navigation and communication are coordinated. Robotic arms are also proposed on the outer surface of the rover to reduce extravehicular activities significantly. The new

design of AARAMBH v2 aims to eliminate the design flaws or limitations possessed in the previous design that will help the future colony to travel on the Lunar surface with ease.