

24th IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (A5)
Human Exploration of Mars (2)

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MOBILE RESEARCH STATION FOR MARS EXPLORATION: A CONCEPTUAL DESIGN AND
DEVELOPMENT OF MARTIAN HABITAT USING 21ST CENTURY TECHNOLOGIES**Abstract**

The use of satellites and planetary exploration robots in Mars has provided with plenty of information and knowledge to the scientific community for future human settlement. It has filled the gap in understanding the Martian geology and climate. However, the research is still ongoing with more Mars exploration missions which is also targeted to understanding the planet better and study for its habitability and human settlement. The aim for the first human crew to Mars will be to extend the area of search and validate the existing information we have gathered so far while collecting more accurate and in-situ data to catalog them. Colonization is a step by step process involving various contributions and detailed scientific knowledge not limited to sustainable designing of Martian settlements. To meet the need for complete survey of the planet that cannot be fulfilled by conventional basecamps on surface or underground limiting the mobility and mode of operation from one place to another that are distant from one another. A mobile research station for Mars exploration would be a challenging task given the harsh conditions on Mars. It is designed to meet all the technological and infrastructural needs for a crewed mission for a limited time. Its highly advanced mobility capability using the shape memory alloy wheels is included along with the research lab for state of the art research activities especially for life sciences is described. After reviewing several Martian habitat designs, a survey of widely used systems and major instruments and tools are given. It will consist of all the required life support systems and crew friendly operational modules within the mobile habitat unit that also support EVAs. The use of deployable solar panels for additional power supply generation and mini inflatable habitat for backup purpose will make this mobile platform a novel engineering design with all the 21st century technologies including the development of RTGs and Artificial Intelligence. This work presents the conceptual design and development of mobile research station for Mars exploration to perform scientific activities while securing the crew activities and ensuring the safety of the crew as well as the mission. The mobile habitat vehicle will be designed to sustain extreme temperatures, dust storms, anomalous radiations and other critical events.