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DEVELOPMENT OF REMOTELY OPERATED SENSOR BASED GREENHOUSE FOR PLANETARY
HABITAT RESEARCH

Abstract

The Inflatable Lunar/Mars Habitat (ILMH) located at the University of North Dakota is an operational planetary base concept developed to perform simulations of lunar and Mars missions. The ILMH is also equipped with a rover and two NDX-2AT space suits to perform extravehicular operations. The ILMH is used to conduct planetary analog missions for up to four crew members. Four additional modules are being added to the ILMH under a current NASA EPSCoR grant. The additional modules will allow crew members to grow plants, conduct additional extravehicular activities (EVA), perform analysis on geological samples, and maintain human exercise and performance. The Plant Production and EVA modules have already been added to the ILMH in summer of 2017. The additional modules are being developed to mimic feasible extraterrestrial architectures, with the purpose of being tested and optimized on Earth. This paper will describe the engineering challenges of designing a remotely controllable plant sensor system for terrestrial use, from concept to design. The result is a self-sustainable sensor network for the Plant Production module with minimum or no human intervention to be used for extraterrestrial analog simulations. The entire system can be controlled from a remote location. The sensor data can help determine the optimal design of a greenhouse for upcoming missions to settle extraterrestrial bodies.

Keywords: ILMH, Greenhouse, Plant production, Sensor network, Extraterrestrial Analog Simulations