

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

Author: Mr. Mritunjay Baruah  
National Institute of Design, Ahmedabad, India

Mr. Balaji Rengarajan  
National Institute of Design, Ahmedabad, India

Mr. Sahil Thappa  
India

Mr. Vishal Shukla  
Indian Space Research Organization (ISRO), India

GFAST (GAGANYAAN FATIGUE STUDY TESTBED): A SPACE ANALOG TESTBED TO STUDY  
SPACE STRESSORS INDUCED FATIGUE

**Abstract**

Environment inside a spacecraft during spaceflight is unforgiving and challenging. Fatigue is induced by various space stressors like irregular lighting, noisy environment, microgravity, etc. This in turn leads to degradation of the astronaut's health and affects performance thus compromising with the success of the mission. A space mission is very challenging, demanding huge capital and technology, and even the slightest error from humans or machines can trigger a chain reaction which may be fatal. Hence, it is only obvious to do as many tests on ground, identify the drawbacks and challenges, and develop countermeasures for a successful mission without any casualties. It is true that the space environment cannot be entirely replicated on ground, but some aspects of it can be. Studying these stressors which can be simulated on ground and developing countermeasures for them can help reduce the risks of errors by a huge margin. Countermeasures could be design iterations in the spacecraft or addition of some elements to aid the human factors. In this project, we have proposed the design of an analog testbed that simulates the Gaganyaan mission profile as much as possible, simulating similar confinement, lighting and noisy environment. This testbed is equipped with systems that can sustain human life for up to a period of 3 days and can collect real time data on the changing physiology of the human body with respect to the induced stressors. We have proposed a few solutions which can ease their fatigue and help them enhance their performance. Data gathered from this testbed can help design human factors to aid the mission and astronaut performance as well as develop spinoffs for the people of Earth.