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Ergonomic constraints for astronauts: Challenges and opportunities

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Since mankind took the first step to enter space in 1961, over 560 people have travelled into space spending from as little as 15 minutes to 437 days 18 hours on the Mir space station in 1995. The deleterious effects of living and working in microgravity (G) on astronaut physiology and psychology are well documented and the ergonomic challenges posed are at present insurmountable to support near or deep space missions leading ultimately to planetary colonisation. Space agencies around the globe have recognised that a collaborative effort to mitigate the effects of G by developing artificial gravity in situ are urgently required for manned space exploration. This presentation will describe the physiological and psychological ergonomic constraints placed up by astronauts living and working in space and present current

counter measures and mitigation strategies as may be deployed on the Orion spacecraft. We will consider an evaluation of future looking technologies which comprise strategies for human life extension in space, the prospect of multigenerational space voyages and the potential for faster-than-light travel. Based upon published research, we will finally consider the prospect for development of an e-crew, comprising human avatars on board nano space craft. This presentation considers current state of scientific fact and projects a forward looking vision which draws together multi-disciplinary fields including machine based learning artificial intelligence and attempts to explore the ergonomic boundaries placed upon astronauts undergoing space travel today.

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