Paper ID: 42702
student

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Medical Care for Humans in Space (3)

Author: Ms. Eloise Matheson
Imperial College London, United Kingdom, eloisematheson@gmail.com

SHARED CONTROL ARCHITECTURE FOR TELEOPERATED MEDICAL SURGICAL PROCEDURES

Abstract

In the context of human spaceflight, exploration and habitation, surgical procedures will need to be undertaken in response to both emergency and planned medical interventions. Until there is a critical mass of infrastructure and expertise present in the space environment to respond to all medical requirements, it is likely a small group of people will not have the skill sets required to respond to every eventuality. In this case, tele- and autonomous surgery can augment or replace a skilled medic in space. On Earth, telesurgeries are commonly performed using robotic systems where the surgeon is located from meters to thousands of kilometers away from the patient. Such systems have been approved for their clinical use, however are limited in their capability due to lack of haptic feedback. Haptic feedback is commonly identified by doctors as a limitation of available commercial robotic systems, however this modality of feedback is much more sensitive to lag and loss in communication channels – a challenge to be overcome in the case of space to ground links. This paper presents a framework of shared control for a robotic system, where the surgeon can adapt their level of control authority (from manual control to full autonomy) in order to best suit their skill level and environmental situation. In such a way, haptic feedback can be rendered when the communications channel is of high enough quality to guarantee stability.