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ACCELERATION ON BOARD THE ISS: 24-7 PHYSICAL ACTIVITY MONITOR FOR ASTRONAUTS

Abstract

The measurement of body acceleration has been used as a low cost and power electronic sensor in clinical and home enviroment to monitor physical. In clinical, an accelerometer is used to study people suffering from back-pain, Parkin-son's disease, sleep order, etc. As a home enviroment monitoring, it is used for the elderly person's fall detection and prevention. In space, it is used to understand severe disorientation, space motion sickness (SMS), due to microgravity environment. It is experienced by 60 percent or more of astronauts during the first few days of exposure to the microgravity environment of space. It affects on crew performance and has the potential to interfere with scheduling of extravehicular activities and to jeopardize the safety of space shuttle landings. Despite of many researches over decades, the precise cause of space motion sickness is not fully understood. In addition to the early detection of incipient sickness symptoms, an accelerometer can monitor human physical activities 24-7 to ensure the safety of astronauts. This experiment focuses on quantifing the normal pattern of acceleration of the astronaut's head and body in orbit. Two XLR8R accelerometers were used to evaluate the range of acceleration experienced during normal daily life. Fourteen healthy subjects (5 female students, 5 male students, 2 female staffs and 2 male staffs from 9 different countries) at International Space University (ISU) wore the accelerometers on their heads and hips for 12 hours. The measurements were repeated to see the consistency of their physical activities. Frequencies, locomotor/nonlocomoter activities were found at different sample size (5, 10 and 20 hz). The results of this experiment are needed to provide recommendations for the specifications of the flight hardware. In addition, design recommendations for the space use are described.