**B. Mellinkoff, M. Spydell, J. Burns University of Colorado Boulder**

**Use of a Telerobotic Simulation System (TSS) for Investigating the Relationship Between Frame Rate and Maximum Rover Speed**

In developing our Telerobotic Simulation System (TSS) and exploring the effects of frame rate on an operator’s ability to explore an unfamiliar environment, we observed a new effect: the combination of frame rate and rover speed on an operator’s ability to explore an unfamiliar environment. A person’s situational awareness degrades as their position changes quickly relative to their ability to see the surroundings. As the frame rate of the video feed decreases, the maximum speed that the rover can traverse must also decrease to account for a lower frame rate. Using the TSS we tested different maximum rover speeds with various frame rates. Our rover roughly operated in an on-off fashion to help us determine the maximum speed for each frame rate that still promoted effective exploration in an unfamiliar environment. This information is very useful for future telerobotic development and human-robotic missions. For example, the Orion crew vehicle is set to orbit above the lunar farside, possibly at the Earth-Moon L2 Lagrange point, and potentially operate rovers on the lunar surface. Orion will have a limited bandwidth to send and receive information so it is imperative to utilize every byte. Understanding the relationship between frame rate and rover speed will allow optimal utilization of bandwidth by continuously varying the rover speed based on available frame rate. Therefore, the maximum speed of the rover can be throttled down to allow for continuous operations even as the network conditions deteriorate for a portion of an orbit. By decreasing the frame rate at slower speeds bandwidth can be utilized for in-depth scientific analysis of the rover’s surroundings. This research was funded, in part, by Lockheed Martin Space Systems Company and is also supported via the SSERVI Network for Exploration and Space Science (NESS) team.