Modeling In-Vehicle Reaches Perturbed by Ride Motion

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Aside the capital investment and without the ability to otherwise simulate, motion capture  
is the preferred conduit by which to model human movements in a digital environment.  
However, these capture sessions are almost universally conducted in stationary  
environments. While this may be adequate for modeling many industrial applications of  
digital modeling, many other jobs require operators to perform tasks while being exposed  
to a moving environment (e.g. postal drivers, flight attendants, and numerous military and  
transportation operations). The Ride Motion Simulator (RMS) at the US Army – Tank  
Automotive and armaments Command (TACOM) simulated single-axis sinusoids and  
6DOF ride motion, in which twelve participants were asked to perform extended reaches  
to eight push-button targets. In order to better ascertain the effects of dynamic ride  
motion on in-vehicle reaching tasks, we used a twelve-camera VICON motion capture  
system to record and EDS Jack to analyze the associated reach motions. Recent studies  
have presented methodologies and results from motion capture studies of human reach  
performance under ride motion perturbation (Rider et al. 2003a, Rider et al. 2003b).  
Additional studies are underway to augment the development of regression models  
predicting movement time and the required target size based on task and ride conditions.  
Results of the reach data reveal the critical nature of the design and layout of controls,  
with respect to torso-included motions, ellipsoid-shaped buttons, and the inherent  
increase in movement time required to successfully complete an in-vehicle task under  
ride motion.