The Quickstand: A Portable Device to Facilitate Standing Up

Ewout Arkenbout and Just Herder
Delft University of Technology

Most current sit-to-stand devices are electrically powered. These devices, typically chairs, are for home use and are not portable. Yet there is a great need for a device that can be used anywhere. This paper proposes a novel portable device, named the QuickStand. Its working principle is based on a spring which provides partial support. When sitting down, this spring stores energy, which becomes available in getting up. A lock avoids undesired release of spring energy. The device is adjustable to subjects and chairs, making it very versatile. A prototype was manufactured. Technical evaluation showed the ability to provide around 150 N of support force over the whole range of motion. The device was successfully tested on a subject with a full body muscle disorder.

Keywords: sit-to-stand aid, static balance, home rehabilitation

Human-Device Interface in Catheter Based Interventions

MaryBeth Privitera, Micheal Wirtz, Todd Abruzzo, Andrew Ringer, and Stephen Nelson
University of Cincinnati

Systematic methods for descriptive analysis of physician hand movements during surgical or catheter based interventions have not been previously reported. Although such data would provide critical guidance in the design of surgical instruments, there is currently little to no information about the chronological and spatial integration of operator movements and user conditions during catheter based interventions. The essential function of the hand is to provide physical coupling between the cognitive process and the environment, translating intention to action. The ideal surgical instrument is a contiguous extension of the haptic unit that enables an expanded range of effector actions and environmental effects. In reality, however, there is an interface between the hand and the surgical instrument creating a barrier that can introduce variable levels of interference and impedance between the cognitive process and the intended task. The objective of this project is to analyze surgical effector outputs as a function of operator psychomotor inputs using synchronized multimodal image data recorded during clinical cases of transcatheter neurological intervention. Research methodology consisted of observations and digital recording (video and/or still photography) of 24 diagnostic cerebral angiograms. These were analyzed to synchronously document physician hand movement, surgical effector output (as represented by the fluoroscopic image monitor), spatial orientation feedback (as represented by rotational movements of the fluoroscopic imaging plane with respect to patient anatomical axes), and to identify user specific conditions. The results are presented in a defined procedure map and user behaviors based upon physician experience (e.g., fellow/trainee versus attending physician). As stated in the Association for the Advancement of Medical Instrumentation HE 75 human factors standards for medical device design, there is a clear need to develop human factors standards for endovascular devices. This research will serve as a guide to this effort. The models and multimodal image database generated by this project will also be used in the development of interactive educational tools to train physicians to perform these advanced applications.