The M3S-based electric wheelchair for the people with disabilities

陳適卿

WEOI-LUEN CHEN;SHIH-CHING CHEN;YU-LUEN CHEN;SHOW-HO CHEN;JUNG-CHAI HSIEH;JIN-SHIN LAI;TE-SON KUO

摘要
Abstract

PURPOSE: This study aims to establish an electronic wheelchair system in Taiwan that conforms to multiple master-multiple slave (M3S) standards. The proposed system could enhance the safety and convenience of people with disabilities. MATERIAL AND METHOD: The M3S-based head-controlled electric wheelchair consists of three parts: (A) the input device, (B) the output device, and (C) the safety device. Head movement can be used as the input control to cause the tilting device to produce a corresponding level of analog voltage (backward & forward/left & right) which is then transmitted to the analogy/digital conversion module to control the output device (wheelchair's motor). Ten subjects with C5 incompleted spinal cord injury were recruited in the clinical assessment. They were randomly assigned into groups A and B. In the group A, the subjects were assigned to operate the head-controlled wheelchair system with M3S standard before operating the head-controlled wheelchair system without M3S standard. In the group B, the subjects were assigned to operate the head-controlled wheelchair system without M3S standard before operating the head-controlled wheelchair system with M3S standard. Two subjects in the group B drop off due to their personal reasons.RESULTS: The time cost for group A in completing tasks 1, 2, and 3 with the M3S and without the M3S were insignificant (p>0.05). The time cost for completing in group B was insignificant (p>0.05). Thus, the wheelchair operating time is depended on the proficiency of the subjects, not the M3S standard added. DISCUSSIONS AND CONCLUSIONS: The time cost for subjects to operate the wheelchair was determined by their proficiency, not the M3S standard control added to the system. However, the M3S-based system did realize the safety mechanism and complex auxiliary tools with and without the plug-in and play function.