

Modelling of extended de-weight fuzzy control for an upper-limb exoskeleton

ABSTRACT

Performing heavy physical tasks, overhead work and long working hours are some examples of activities that can lead to musculoskeletal problems in humans. To overcome this issue, automated robots such as the upper-limb exoskeleton is used to assist humans while performing tasks. However, several concerns in developing the exoskeleton have been raised such as the control strategies used. In this study, a control strategy known as the extended de-weight fuzz was proposed to ensure that the exoskeleton could be maneuvered to the desired position with the least number of errors and minimum torque requirement. The extended de-weight fuzzy is a combination of the fuzzy-based PD and fuzzy-based de-weight controller systems. The extended de-weight fuzzy was then compared with the fuzzy-based PD and PID controllers, and the performances of these controllers were compared in terms of their deviations and required torques to perform tasks. The findings show that the proposed control strategy performs better than the fuzzy-based PD and PID controller systems.

Keyword: Upper-limb exoskeleton; Fuzzy-based de-weight; Extended fuzzy-based de-weight; Fatigue upper arm