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국문 강연제목: 선택적 능동/수동 구동이 가능한 하이브리드 의족 개발

영문 강연제목: Development of selective passive/active switchable knee prosthesis based on multifunctional hydraulic cylinder for lower limb amputees

Abstract

Significant advances have been made in prostheses with the aim of enhancing the quality of life for transfemoral amputees. While commercially available transfemoral prostheses mainly focus on the developing passive prostheses that act only as dampers, academic research is centered round powered prostheses that can provide net-positive knee torque. Although recent active-powered prostheses have made excellent progress in terms of weight and battery life, it remains unclear if these prostheses can be effectively used in everyday life. This study presents a rotary hybrid prosthesis based on the combination of a multifunctional rotary hydraulic cylinder that is designed to operate as a brake, clutch, and damper with a 100 W active motor system. This prosthesis enables long-term level ground walking while supplying active power as needed. The passive and active components of this hybrid prosthesis are designed such that they can be decoupled when operated independently, allowing for quick switching between passive and active modes in 50-100 ms. The study outlines the aims and procedures for the design of rotary hybrid prostheses, as well as the feasibility tests for each module and the amputee's clinical test on the developed knee prosthesis.

Brief Biosketch

Hyunjun Shin received the B.S. degree from the University of Hanyang, Seoul, Republic of Korea, in 2003, and Ph.D. degree from KAIST(Korea Advanced Institute of Science and Technology), Deajeon, Republic of Korea, in 2014, both in mechanical engineering. He is currently a senior researcher in the Advanced Prosthesis R&D Team, Korea Orthopedics & Rehabilitation Engineering Center. His current research interests include the design, control, and testing of lower extremity prostheses and wearable robots.