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국문 강연제목: 하지절단 장애인을 위한 첨단 로봇의족 기술 개발

영문 강연제목: Development of Advanced Robotic Prosthesis Technology for Lower-Limb Amputees

Abstract(영문):

Early commercial prosthetic limbs were primarily designed for cosmetic purposes rather than functional performance. However, with advances in linkage mechanisms and microprocessor-based control technologies, robotic prostheses capable of automatically recognizing gait phases and generating adaptive motions (e.g., Ottobock, Össur) have emerged, significantly improving real-world usability.

Robotic prosthetic limbs are generally classified into ankle-type and knee-type systems. The ankle type, though having a limited range of motion, requires a high torque of approximately 150 Nm or more, whereas the knee type must achieve a wide angular range exceeding 130° under relatively low torque conditions. Achieving such performance within human-like constraints of joint size and mass demands high power-density actuators and precise mechanical design, which remain critical technical challenges.

In this seminar, we present a new robotic prosthesis mechanism developed using a lightweight, integrated actuation module that minimizes overall mass while simultaneously providing the required torque and motion range for both the knee and ankle joints. The proposed system enables active joint torque generation, a feature difficult to realize in conventional electronically controlled prostheses, thereby supporting more natural gait not only on flat terrain but also on slopes and stair environments.

Brief Biosketch (간단한 이력, 연구/대외활동 소개, 국문/영문)

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