Professor Kim, Seung-Jae:

Bio:

Dr. Seung-Jae Kim is currently a professor of Bioengineering at California Baptist University. He received his B.S. and M.S degrees in Mechanical engineering from Han-Yang University and Pohang University Science & Technology. He then received his Ph.D. degrees in Bioengineering from the University of Utah. From 2006-2011, he worked as a post-doctoral research fellow conducting multiple research projects in the fields of biomechanics and neural engineering at the Massachusetts Institute of Technology and Arizona State University.
Dr. Kim has extensive experience in the field of biomedical research, especially in the areas of neural prostheses, biomechanics, and rehabilitation research. His recent research focuses on developing better forms of rehabilitative gait training by employing perturbations such as visual feedback distortion and electrical stimulation technique. For more details on Dr. Kim's research topic, visit this website (https://sites.google.com/view/biokimlab/home).

Seminar Title: 보행의 시각적 운동적응: 보행재활훈련을 위한 '시각 피드백 왜곡' 의 역할과 가능성 (Visuomotor adaptation in human walking: The role and potential of visual feedback distortion paradigm in improving gait rehabilitation)

Abstract:
걸음의 비대칭은 보행 장애에 흔하게 나타나며 보행 속도와 효율의 감소, 균형감각 감소 등을 수반한다. 운동 학습은 새로운 운동 형태를 충족시키기 위해 움직임을 조정하는 운동 적응 과정이며, 반복적인 적응 훈련은 보다 영구적인 운동 패턴을 학습하게 해준다. 걸음의 비대칭성 (gait asymmetry) 을 향상하기 위한 가능한 재활훈련방법으로서, 분할 벨트 같은 기계 장치만이 유일한 방법은 아니다. 이러한 목적은 보행 중 사람에게 제공하는 보행 변수에 대한 시각 피드백을 조정함으로도 달성될 수 있다. 왜냐하면 시각 피드백은 보행 중 다리의 움직임을 제어하는데 중요한 영향을 주기 때문이다. 따라서 이 세미나는 시각적 피드백 왜곡 (VFD) 패러다임을 통해, 걸음 대칭에 대한 시각적 운동 적응 (visuomotor adaptation) 과정에 대해 소개할 것이다. 발표자는 적응된 운동 학습 패턴의 기억 효과에 있어서, VFD 패러다임을 이용한 암묵적 학습 과정의 장점에 대한 실험결과들도 보여줄 것이다. 또한 보행대칭성 운동적응에 전기자극을 이용하는 최근 연구도 함께 소개할 것이다. 보행 대칭성을 향상시키려면 보행 적응에 대한 이해를 높이고 보행 패턴의 변화를 주도할 수 있는 다양한 적응 방법을 사용하여 보다 효과적인 훈련 접근법을 탐구하는 것이 필수적이다.

Gait asymmetries are most common and challenge many orthopedic and neurologic populations in several areas, including reductions in gait speed and efficiency of walking, and reductions in stability of balance. Motor adaptation is the error-driven motor calibration process of adjusting movement to meet new demands, and repeated adaptation can lead to learning a more permanent motor pattern. As a possible intervention to correct interlimb asymmetry, mechanical device such as split-belt is not the only way to drive the adaptation of gait asymmetry. This purpose can also be achieved by altering the visual-motor representation of walking patterns because visual input provides critical information for modifying or adapting walking movements. Therefore, the seminar talks about the process involved in visually-driven locomotor adaptation (visuomotor adaptation) of gait symmetry through a visual feedback distortion (VFD) paradigm. The presenter will also demonstrate the potential benefits of implicit learning processes accompanied by the VFD adaptation in retention (saving) of adapted motor patterns. The seminar will also introduce a recent study using electrical stimulation for gait symmetric motor adaptation. In the hope of improving gait symmetry, it is essential to enhance understanding of locomotor adaptations and explore more effective training approaches using various adaptation methods that can drive changes in gait patterns.