

COST Action CA16116 on Wearable Robots for Augmentation, Assistance, or Substitution of Human Motor Functions

Short Term Scientific Mission (STSM):

Hip muscle responses following trunk perturbation using a gyroscopic backpack - A pilot study

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Home institution: Technische Universität Darmstadt, Germany

Host institution: Technische Universiteit Delft, The Netherlands

Postural balance is a necessary requirement for safe and efficient human locomotion. During walking, balancing the trunk is important for upright gait. However, the capacity for trunk balance can be impaired resulting in higher risk of falls and reduced mobility, e.g., by pathologies or for elderly people. Wearable robotics (WRs) provide a great potential to assist and compensate human insufficiencies by inducing external forces and torques.

The purpose of the STSM was to investigate how human balance strategies are controlled in a human-robot-interaction scenario. For this, an assistive device – the *Gyroscopic Backpack (GBP)* – developed by Host, the Delft Biorobotics Lab (DBL, Head: Heike Vallery) was used to conduct experiments in a pilot-study with the aim of exploring specific mechanical perturbation profiles that are suited for deeper investigations. Specific variables such like timing, duration, strength and orientation of the induced perturbation torque were altered and resulting muscle activation of hip joint muscles was analysed.

Based on the initialized work, my research on this topic will continue at DBL. I'm very thankful for receiving this opportunity to gather new insights and experiences. I would like to thank my supervisors Prof. Dr. phil. André Seyfarth, Prof. Dr.-Ing. Heike Vallery as well as Dr. Jan Veneman and Dr. Je Hyung Jung.