2019 NSF CYBER-PHYSICAL SYSTEMS PRINCIPAL INVESTIGATORS' MEETING

Human-Machine Interaction with Mobility Enhancing Soft Exosuits



Chris Siviy, PhD Student, Harvard University

Conor Walsh^a (PI), Terry Ellis^b (Co-PI), Louis Awad^b (Collaborator) ^aHarvard University, ^bBoston University AWARD #1446464





HARVARD School of Engineering and Applied Sciences





Human-Exosuit CPS System

Developing methods to understand *Cyber Interaction* with human and exosuit

- <u>1. Automatic parameter tuning to</u> <u>maximize delivered augmentation</u> <u>power</u> Lee, S., et al. *JNER*, 15(1), 66, 2018.
- <u>2. Automatic and robust classification of</u> <u>walking and running for adapting</u> <u>assistance profile</u>
 Kim, J. et al. Science, 365(6454), pp.668-672. 2019.





Augmented Walking (7.8%)

Augmented Running (4.8%)

Human-Exosuit CPS System

Development of portable and autonomous system and empirical validation in patients poststroke showing improvements in walking speed and other biomechanical parameters

Bae, J., Siviy, C., et al. ICRA 2018. (Best Medical Robotics Paper) & Sloot et al. (in preparation)



Transition to practice via collaboration with ReWalk

- transfer of knowledge to company
- training opportunities for lab members in translation
- technology received FDA and CE Mark approval

