ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION

Paper ID #35240

A biofeedback device to facilitate a normal gait pattern for patients with peripheral neuropathy

Dr. George D. Ricco, University of Indianapolis

George D. Ricco is an assistant professor of engineering and first-year engineering coordinator at the University of Indianapolis. He focuses his work between teaching the first two years of introductory engineering and engineering design and research in student progression. Previously, he was a special title series assistant professor in electrical engineering at the University of Kentucky, and the KEEN Program Coordinator at Gonzaga University in the School of Engineering and Applied Science. He completed his doctorate in engineering education from Purdue University's School of Engineering Education. Previously, he received an M.S. in earth and planetary sciences studying geospatial imaging, and an M.S. in physics studying high-pressure, high-temperature FT-IR spectroscopy in heavy water, both from the University of California, Santa Cruz. He holds a B.S.E. in engineering physics with a concentration in electrical engineering from Case Western Reserve University. His academic interests include longitudinal analysis, visualization, semantics, team formation, gender issues, existential phenomenology, and lagomorph physiology.

Dr. Megan Hammond, University of Indianapolis

Megan Hammond received her Ph.D. in Industrial Engineering from Western Michigan University. She is an assistant professor in the R.B. Annis School of Engineering at the University of Indianapolis. Her research interests include cluster analysis, anomaly detection, human centered design, and engineering education.

Alyssa Ruder-Wasylko
Dr. Mohammad Shokrolah Shirazi, University of Indianapolis
Ms. Kendra Marie Seymour
Mr. David Lee Hout III, University of Indianpolis
Joshua Benton, University of Indianapolis
Mr. Sander Lauwers

©American Society for Engineering Education, 2021

A Biofeedback Device to Facilitate Normal Gait Patterns for Patients with Peripheral Neuropathy

Alyssa Ruder-Wasylko*
Univ. of Indianapolis
ruderwasylkoa@uindy.edu

David Hout*
Univ. of Indianapolis
houtd@uindy.edu

Joshua Benton
Univ. of Indianapolis
bentonje@uindy.edu

Kendra Seymour
Univ. of Indianapolis
seymourk@uindy.edu

Sander Lauwers
Univ. of Indianapolis
lauwerss@uindy.edu

Megan Hammond
Univ. of Indianapolis
hammondm@uindy.edu

Mohammed Shirazi
Univ. of Indianapolis
shirazim@uindy.edu

George Ricco
Univ. of Indianapolis
riccog@uindy.edu

This work summarizes the efforts of a student design team project in the R.B. Annis School of Engineering at the University of Indianapolis. Implementing Design for Six Sigma (DFSS), human centered design methodologies (IDEO, d.School, etc.), and a four-stage gate design framework (DesignSpine™), the team interfaced with an industrial client to develop a novel biofeedback device to assist patients with peripheral neuropathy and abnormal gait patterns. In this work, we aim to design and build a system that will assist patients with peripheral neuropathy and abnormal walk patterns, to re-learn the notion of how to walk. The system consists of several sensor devices for data collection and providing feed-back. One device has a knee brace that will not only support the knee, but it also has a flex sensor that will measure the angle of the knee's bending. It also has a foot pressure sensor that is attached to orthotics that fit into the patient's shoe. We are in the second gate of the design framework which focuses on formulating design alternatives and concepts. In the design process we have learned that our device needs to account for this visual and audible feedback within the peripheral vision and that it has to be easy to put on and take off to limit the risk of falling and injuring. That's why we came up with a baseball cap which has LED's on top and a buzzer on the side in order to give visual and auditory feedback without having the patient looking down. The next phase of our project is the third stage of Design Spine, where we can begin the assembly of our product and test the device to see if it meets all the criteria established by our client.

© American Society for Engineering Education, 2021