Hamid Najafi, J Clin Trials 2017, 7:5 (Suppl)
DOI: 10.4172/2167-0870-C1-019

A high prescision gait analysis system for in community monitoring of patients with neurological and musculoskeletal disorders

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Neurological disorders, such as Parkinson's, amyotrophic lateral sclerosis (ALS), and multiple sclerosis (MS) and musculoskeletal disorders, such as muscular dystrophy, significantly affect the patients' gait. Monitoring, analyzing, and quantifying patients' gait with high precision is achieved in motion analysis laboratories using optical systems as well as pressure sensitive mats. This method has inherent limitations and disadvantages such as having the patient to go to these labs, the expense of conducting the tests, the limitation of time when data is collected, and more. By contrast, an in community wearable system does not suffer from the disadvantages listed above, as long as it is accurate enough to produce medical/clinical quality data. The system presented here consists of a small wearable device worn around the ankle of the patient and high precision motion analysis algorithms and software that accurately measures gait parameters such as stride length, stride speed, double support time, cadence, distance traveled, 25-ft straight walk speed, six-minute walk speed and distance and more. It also detects context such as walking up/down stairs, running vs. walking, walking on a non-straight line, etc. The above information is used as a biomarker of how the patient is doing, the severity of the disease, its progression over time, and the effectiveness of treatments. Case studies for sroke, MS, and muscular dystrophy patients are presented from patient data collected over extended periods of time.

Biography

Hamid Najafi is currently the CEO of Sensoplex, Inc., a company specialized in development of wearables, software, and algorithms for clinical trials, which he co-founded in 2012. Prior to Sensoplex, he was General Manager of Invensense International at Invensense, a leading Silicon Valley manufacturer of MEMS motion sensors. He co-founded Broadlink Research Inc., in 2005 which developed the first disney mobile phone which was marketed by Vodafone in Europe. He was the Founder of wireless link, a developer of advanced wireless products. He has 14 patents and received his PhD in Electrical Engineering from Stanford University in 1983.

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