study. Apathy was measured using the clinically validated MAI and postural control was measured by two force platforms positioned under the individual's feet. Participants stood in a self selected stance width with one foot on each force platform for three 20-second trials. The net center of pressure (COP) was calculated from the two force platforms. From the data, the range of movement of the COP in the anterioposterior and mediolateral directions was calculated and the overall sway area was computed.

Result: Range of COP movement in the anteriorposterior and the overall sway area were significantly related to scores on the AS (Spearman's rho = 0.53, p = 0.01; Spearman's rho = 0.55, p = 0.01, respectively). Only a statistical trend was identified for the relationship between mediolateral sway and AS (Spearman's rho = 0.35, p = 0.08).

Conclusion: Apathy has been significantly associated with more severe motor symptoms in a few previous reports. We specifically identified a significant relationship with the axial symptom of postural control suggesting perhaps a common underlying pathophysiological mechanism.

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LIGHTWEIGHT CONTEXT-AWARE SMART INSOLE FOR GAIT ANALYSIS, RESEARCH AND REHABILITATION

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Embedded networked and wide area cellular wireless systems recently have been adopted to support the emerging research in Wireless Health. Wireless Health merges data, knowledge, and wireless technologies to provide healthcare and medical services, such as prevention, diagnosis, and rehabilitation outside of the medical enterprise.

We proposed a system combining embedded networked sensing, signal processing and state detection algorithms with its supporting infrastructure to be utilized by researchers, physicians, clinicians and therapists to assess various aspects of human gait within different context. Our system is composed of a pair of insoles, which are capable of sensing plantar pressure, direction and rotation of the foot during movement with a wireless transceiver.

Our context aware system aimed at extending gait analysis and rehabilitation outside of the laboratory setting. By combining embedded sensing, signal processing and modeling techniques we created a scientific tool capable of quantifying high-level and sensitive measures.

Figure shows the sensitivity of our system in distinguishing gait parameters in normal walking while performing no task; single and dual tasks.
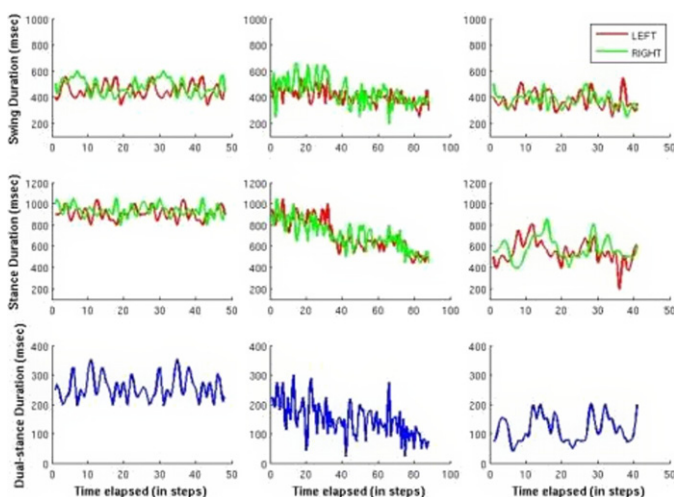

Figure 1

Our proposed system will enable researchers and clinicians to assess patients gait in a non conventional setting and correlate the concepts related to functional gait with actual real time gait parameters.

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ROBUST NORMS FOR QUANTITATIVE GAIT PARAMETERS IN COMMUNITY DWELLING OLDER ADULTS

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Background and Aims: Gait is widely used to assess health status in older adults, however, reliable normative data is lacking. The objective of this study is to provide robust norms for quantitative gait parameters.

Methods: We examined gait performance using an instrumented walkway (GAITRite) in 837 participants (age >70) in a community based aging study. Eight variables; velocity, cadence, stride length, stride length standard deviation (SD), swing time, stance time, swing time SD, and double support percent, were examined in overall cohort (conventional normal; CN) and the 'robust normal (RN)' sample. Subjects without prevalent or incident clinical gait abnormalities within 1-year follow-up were used to derive 'robust normal' sample. Presence of clinical gait abnormalities was used as a proxy for disease effects on gait and diagnosed by study clinicians using established scale at baseline and annual follow-ups.

Results: Of 837 CN sample, 333 had clinical gait abnormalities at baseline, 89 developed gait abnormalities over 1-year, and 110 had no follow-up gait examination. Hence, 305 were in RN sample. Gait variables showed better characteristics in RN sample compared to CN (e.g. velocity; 105.9±17.8 RN, 92.8±23.8 cm/s CN). Applying one SD below the mean (69 cm/s) derived from CN to define slow gait, 15.7% in overall cohort were classified as abnormal whereas RN cut-off (88.1 cm/s) classified 40.5% as abnormal.

Conclusions: We provide conventional and robust norms for quantitative gait parameters in older adults. Previous normative data does not account for disease effects on gait, which may underestimate gait performance in normal aging.

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DYNAMIC FOOT PRESSURE MEASUREMENT IN PARKINSON'S DISEASE WITH FOOT SCAN SYSTEM

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Background: Foot Scan System (RS scan international cooperation) measuring the plantar pressure distribution is simple and inexpensive tool for gait analysis. And the analysis of plantar pressure distribution of the feet during gait maybe helps the assessment of motor symptoms or gait stability of Idiopathic Parkinson's disease (IPD).

Methods: We compared the parameters of foot scan system between 34 normal controls and 23 IPD patients before and after levodopa administration. Data of plantar force distribution and time of stance phase were collected using pressure-sensitive insoles as parts of the Foot Scan System.

Results: There were significant difference between normal controls and IPD patients in fore foot peak pressure/rear foot peak pressure ratio, time percentage of heel strike phase, mid stance phase, propulsion phase in stance phase. But in these parameters there were no significant difference between IPD patients before dopamine with after dopamine medication.

Conclusions: Using the Foot Scan System (RS scan international cooperation) measuring the plantar pressure distribution, we showed that F/R ratio and time percentage of propulsion phase