

A Practical Measurement of Parkinson's Patients Gait Using Simple Walker Based Motion Sensing and Data Analysis

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**Abstract:**

We present PAMM II, the Personal Aid for Mobility and Monitoring II, an instrumented walker for Parkinson's Disease (PD) patients' gait monitoring. The objective of the walker is to aid in the diagnosis and monitoring of PD progression as well as the effects of clinical treatment and rehabilitation. In contrast to existing devices, the walker is a low cost solution that is simple to operate and maintain, requiring no adjustments, special usage instructions or infrastructure. This preliminary study reports on the efficiency, reliability and accuracy of PAMM II when used to evaluate 22 PD patients and 20 control individuals. All subjects walked two prescribed paths while pushing the walker, and their kinematic motion signals were automatically collected by the walker. Feature derivation from the walker's signals was followed by combinations of two classical feature selection methods and two learning algorithms, with the objective of discriminating PD patients from control subjects. Sensitivity and specificity scores of 91% and 95% were achieved for the first walking protocol, whereas discrimination over the second walking protocol produced sensitivity and specificity scores of 96% and 100%. These preliminary results provide insight as to the usefulness of PAMM II and its data processing algorithms for the assessment of PD patients' condition.