

Clinically Deployable KinesiaTM Technology for Automated Tremor Assessment

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Abstract: The objective was to design, build, and assess KinesiaTM, a wireless system for automated assessment of Parkinson's disease (PD) tremor. The current standard in evaluating PD is the Unified Parkinson's Disease Rating Scale (UPDRS), a qualitative ranking system typically completed during an office visit. Kinesia integrates accelerometers and gyroscopes in a compact patient-worn unit to capture kinematic movement disorder features. Objectively quantifying PD manifestations with increased time resolution should aid in evaluating efficacy of treatment protocols and improve patient management. In this study, PD subjects performed the tremor subset of the UPDRS motor section while wearing Kinesia. Quantitative kinematic features were processed and highly correlated to clinician scores for rest tremor ($r^2 = 0.89$), postural tremor ($r^2 = 0.90$), and kinetic tremor ($r^2 = 0.69$). The quantitative features were used to develop a mathematical model that predicted tremor severity scores for new data with low errors. Finally, PD subjects indicated high clinical acceptance.

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