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|  | **Long term Objectives** | **Sort term Objectives** | **Features and Data Collection** | **Sensors** | **Subjects** |
| 1 (2006) | Characterize dyskinesia | * Monitor patients while they performed a set of standardized motor tasks | * Intensity was measures as the RMS value of the detrended accelerometer signal * The modulation of the output of each sensor was calculated as the auto-covariance of each channel * Rate of movement was represented by dominant frequency component <10HZ * Periodicity was measured by computing the ratio of energy * Coordination between body segments | * accelerometer   (8 sensors) | 12 |
| 2 (feb 2007) | Quantification of Tremor and Bradykinesia | * design an ambulatory system using miniature gyroscopes * develop two algorithms, one to detect and quantify tremor and one to quantify bradykinesia | * Remove the drift of signals using infinite impulse response (IIR) filter * Burg method for the estimation of the frequency spectrum of the signal for each window | * Gyroscope   (2 sensors) | 1st study: 10 PD patients  10 control subjects  2nd study: 11 PD patients |
| 3 (aug 2007) | Characterize  dyskinesia & bradykinesia | * Develop a software platform to efficiently process on-board data | (1) | * accelerometer * gyroscope   (8 sensors) | 12( in-lab) |
| 4(jan 2009) | Monitor neuromotor activity | * overcome challenges of battery lifetime and high data fidelity for long term studies * high level programming interface for clinicians | * maximum peak-to-peak amplitude * mean * RMS * Peak velocity * RMS of the jerk time series | * accelerometer * gyroscope   (8 sensors) | 6(in earlier version of Mercury platform) |
| 5 (jun 2009) | FOG detection | * design an unobstructed system * maximum battery life |  | * accelerometer * gyroscope   (1 sensor) | 5 subjects\* |
| 6 (nov 2009) | Monitor  motor fluctuations | * a support vector machine (SVM) classifier was implemented to estimate the severity of tremor, bradykinesia and dyskinesia | * The range of amplitude of each channel * (RMS) value of each accelerometer signal * cross-correlation-on-based features * Frequency-based features * Signal entropy | * accelerometer   (8 sensors) | 12(in-lab) |
| 7 (mar 2010) | FOG detection | * Automatically detect FOG * Rhythmic auditory signal feedback * Reduce the number and length of their motor blocks |  | * accelerometer   (3 sensors) | 10(in-lab) |
| 8 (sept 2010) | Monitor  motor fluctuations | * Home monitoring for improving * Making efficient and cost effective the process | * Signal entropy * RMS * Data range * Cross-correlation | * accelerometer   (8 sensors) | Not mentioned |
| 9 (mar 2011) | Monitor  motor fluctuations | * a resource-aware data collection engine * web services for live-streaming and storage of sensor data * web-based GUI |  | * accelerometer   (8 sensors) | Not mentioned |
| 10 (may 2012) | Assessment of tremor | * propose an automated method for both resting and action/postural tremor assessment | * angle between sensors /Low-Frequency (LF) energy * Spectrum entropy/LF and HF energy/Ratio of high to total energy | * accelerometer   (6 sensors) | 23  (18 was PD’s patients)+ |

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|  | | **Long term Objectives** | **Sort term Objectives** | **Features and Data Collection** | **Sensors** | **Subjects** |
| 11 (2012) | | FOG detection | * Automatically detect FOG * Rhythmic auditory signal feedback | * mean * variance * standard deviation * entropy | * accelerometer * gyroscope   (3 sensors) |  |
| 12 (jan 2013) | | Characterize motor symptoms during TUG and FOG | * innovative technology based on wearable sensors * processing algorithm which provides outcome measures | * Midswing was first detected by the positive peak of pitch angular velocity | * accelerometer * gyroscope   (1 sensor) | 20  (10 was PD’s patients) |
| 13 (sep 2013) | FOG detection | | * Support gait rehabilitation * Automatically detect FOG * Rhythmic auditory signal feedback * comfortable | Gait parameters:   * cadence * step length * trunk posture * gait speed * gait asymmetry | * accelerometer * gyroscope * magnetometer   (3 sensors) | Not mentioned | |
| 14 (mar 2015) | FOG detection | | * Independent use * Gait assistance at unsupervised envir. * Automatically detect FOG * Rhythmic auditory signal feedback | * Power of locomotion band (PL) * Power on freeze band (PF) * Total Power (TP) * Freeze Index (FI) | * accelerometer * gyroscope * magnetometer   (2 sensors) | 23(in-lab)  9(out-lab) | |
| 15 (2017) | FOG detection | | * Automatically detect FOG * Real time signal processing platform | * Freezing index * Spectral coherence | * accelerometer   (3 sensors) | 10 PD patients | |
| 16 (2017) | Monitor  motor fluctuations | | * explore the capability of machine learning algorithms to recognize activities of healthy people and people with Parkinson’s | * (RMS) value of each accelerometer signal * Wrapper feature selection method based on random forest algorithm | * accelerometer * gyroscope   (1 sensor) | 2 PD patients  10 control Subjects | |
| 17 (2017) | Monitor  motor fluctuations | | * investigate the validity of an objective gait measure for assessment of different states of advanced PD patients | * mean, standard deviation, skewness * Irregularities in movements * A three level discrete wavelet transform (DWT) | * accelerometer * gyroscope   (2 sensors) | 19 patients with advanced PD | |
| 18 (2017) | Estimating bradykinesia | |  |  | * accelerometer | 10 PD patients | |
| 19 (2017) | Early stage diagnosis of Parkinson’s disease | |  |  | (2 sensors)  \*Accelerometer\* | 19 mild PD patients  24 severer PD patients  17 young control subjects  17 old control subjects | |

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