	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)+

	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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