# Monitoring and Evaluation of Parkinson's Disease Patient Performance using Kinect and Motion Sensors

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## Introduction

**Motivation:** There is a critical need to develop monitoring technologies for the management of individuals aging with and into disabilities that affect mobility.

▪ Developing Point-of-Care Mobility monitoring system (PoCM-MS) technologies that facilitate effective communication of functional status, including compliance, can impact the patient's overall quality of life and may reduce future costs associated with chronic illnesses

## Objective

▪To initiate early stage development of a prototype PoCM monitoring system for individuals with stroke-induced hemiparetic mobility limitations (upper and lower extremity hemiparesis)

▪To initiate early stage development of a second prototype PoCM monitoring system for individuals with Parkinson's Disease to optimize pharmacologic interventions to ameliorate symptoms more effectively.

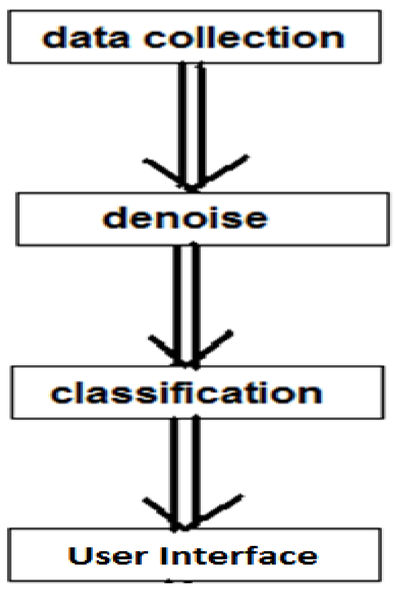
## System Architecture

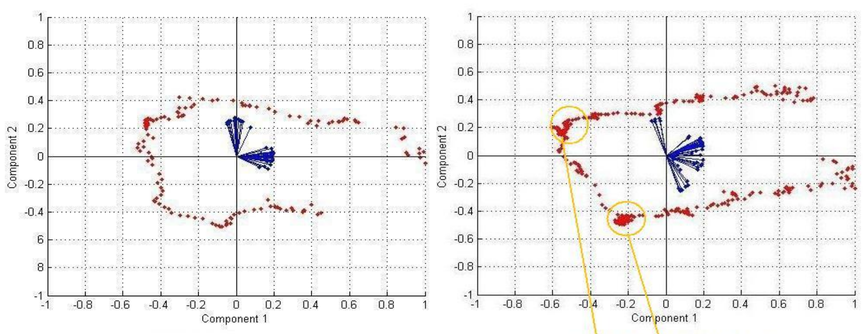
•Data Collection: Provides data sense and communication capabilities that enables real-time data acquisition in various selected modalities

•Denoise: Remove noise from the raw data

•Classification: Define and classify the performance of the patient

•User Interface: Enables efficient management of the patient performance




▪By integrating bidirectional communications conduits for data acquisition and developing data analysis algorithms, clinicians will be able to monitor the effectiveness of the therapeutic intervention and patient compliance

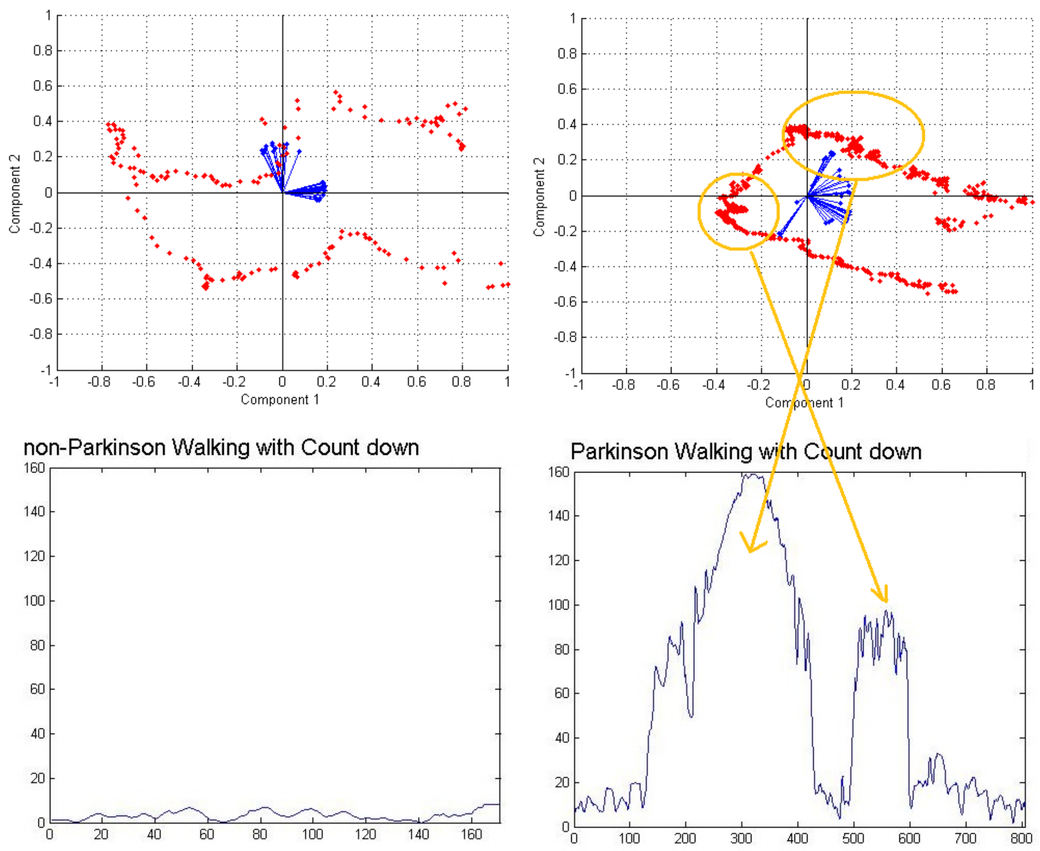
## Data Analysis

▪Data collected using Microsoft Kinect is skeleton data has 15 features Head, Neck, Torso, Left shoulder, Left elbow, Left hand, Right shoulder, Right elbow, Right hand, Left hip, Left knee, Left foot, Right hip, Right knee, Right foot.

▪The trajectory of the person performing a certain is drawn by partitioning , normalizing and project the data into 2 main principal components.

▪Based on the trajectory, pause feature can be detected by clustering and calculate the density its neighborhood.

▪By looking at the density graph below, we can decide how well the patient perform the task and based on the historical data, we can decide the level of medication of the patient




## Related Research

- Patient Rehabilitation Using Kinect technology
- Towards Pervasive Physical Rehabilitation Using Microsoft Kinect
- A home recovery system for stroke patients using Microsoft's Kinect gesture control device
- Latent Space Segmentation for Mobile Gait Analysis

## Conclusion and Future Work

- Collect more data from the patient to detect more feature and set the standard of performance.
- Building the User Interface to monitor the patient

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