POCM$^2$: Point of Care Mobility Monitoring
Using Microsoft Kinect

Lorraine Sposto, Ibrahim Sorkhoh, Luan Nguyen, Cesar Blanco, Luciano Nocera, Farnoush Banakei, Cyrus Shahabi

Integrated Media Systems Center
University of Southern California

**Introduction**
- Current motor evaluation is done in clinical setting using subjective observations.
- Musculo-skeletal disorder patients whose medication is greatly impacting motor capabilities are exposed to injuries during transportation to and from the clinic.
- Behavior deviation of patients during clinical evaluation leads to inaccurate evaluation of their motor state.
- POCM$^2$ system allows more continuous monitoring in the natural setting of the home.

**Motivation**
- 50,000 - 60,000 new musculo-skeletal disorder patients every year (National Parkinson Foundation)
- Current practice need significant training before obtaining valid and reliable metrics.
- POCM$^2$ goal is to help automate the evaluation of motor capability in PD patients & provide metrics to adjust medications hence reducing the risk of falls and injuries.

**Data Acquisition**
- POCM$^2$ uses Microsoft Kinect to collect motor data.
- Other sensors are used to help validate and complement Kinect data, including Shimmer and APDM accelerometers.
- We acquired demographic data from 15 subjects who performed 7 different tasks.
- We conducted a Focus Group to collect input on the system to be used to validate and improve the design.

**Related Research**
- Video Objects Retrieval, features detection and motion modeling.
- Error modeling/reduction: data are extremely noisy.
- Signal Processing, segmentation and alignment.
- Gyroscopic Stabilization of Gait (James Finley et al.),

**Conclusion and Future Work**
- Develop new metrics to characterize motor state.
- Use of Kinect One.