# *Identifying balance impairments in people with Parkinson’s disease using video and wearable sensors*

### *https://www.sciencedirect.com/science/article/pii/S096663621830287X*

### Results

Data was available for 117 performances: 82 (70%) appeared stable on video. Ratings agreed in 86/117 cases (74%). Highest agreement was noted for chair transfer, [timed up and go test](https://www.sciencedirect.com/topics/medicine-and-dentistry/timed-up-and-go-test) and 3 m walks. Video analysts noted caution (slow, contained movements, safety-enhancing [postures](https://www.sciencedirect.com/topics/medicine-and-dentistry/posture) and concentration) and/or instability (saving reactions, stopping after stumbling or veering) in 40/134 performances (30%): raw wearable sensor data identified 16/35 performances rated cautious or unstable (sensitivity 46%) and 70/82 rated stable (specificity 85%). There was a 54% chance that a performance identified from wearable sensors as cautious/unstable was so; rising to 80% for stable movements.

### Significance

Agreement between wearable sensor and video data suggested that wearable sensors can detect subtle instability and near-falls. Caution and instability were observed in nearly a third of performances, suggesting that simple, mildly challenging actions, with clearly defined start- and end-points, may be most amenable to monitoring during free-living at home. Using the genuine near-falls recorded, work continues to automatically detect subtle instability using algorithms.

# *Wearable strain sensors based on electrically conductive natural fiber yarns*

*https://www.sciencedirect.com/science/article/pii/S0264127518304222*

Herein, we report a systematic study on the fabrication of electrically conductive yarns made of [natural fiber](https://www.sciencedirect.com/topics/materials-science/natural-fiber) yarns coated with [graphene](https://www.sciencedirect.com/topics/materials-science/graphene) nanoplatelets (GNPs) and carbon black (CB). The highly conductive yarns are then utilized to fabricate wearable, stretchable, and durable [strain](https://www.sciencedirect.com/topics/materials-science/strain) sensors. Our strain sensors demonstrate a good sensitivity with gauge factors (GFs) in the range of 1.46 to 5.62, depending on the magnitude of the applied strain and displacement rate. The strain sensors show reliable electromechanical response to strains as large as 60%, suggesting their potential application in human motion detection. They can successfully detect a range of human movements, such as finger, wrist, and knee joint movements, pronunciation, breathing, and swallowing.

**Recognition of Military-Specific Physical Activities With Body-Fixed Sensors**

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