Videos:

[Parkinson's Disease : Freezing of Gait - A simple Solution](https://www.youtube.com/watch?v=lwd4AY5-Ebc)

[Gait and Balance Strategies for Parkinson's Disease, PT & Trainer Info](https://www.youtube.com/watch?v=pLN6x1nOGPA)

Papers:

* + **2011\_Detecting freezing-of-gait during unscripted and unconstrained activity** (PDF downloaded)
    - Engineering in Medicine and Biology Society, EMBC, 2011 Annual International Conference of the IEEE
    - Summary:
      * They presented a dynamic neural network (DNN) solution for detecting instances of freezing-of-gait (FoG) in Parkinson's disease (PD) patients while they perform unconstrained and unscripted activities.
      * The ACC sensors are placed on the shin and thigh of one leg and on one of the forearms while the EMG sensor is placed on the shin.
      * FoG detector exhibited **83% sensitivity** and **97% specificity**
        + **Sensitivity**: If a person has a disease, how often will the test be positive (**true positive rate**)? Put another way, if the test is highly sensitive and the test result is negative you can be nearly certain that they don’t have disease.
        + **Specificity:** If a person does not have the disease how often will the test be negative (**true negative rate**)? In other terms, if the test result for a highly specific test is positive you can be nearly certain that they actually have the disease.
      * Training set and results

Machine generated alternative text:
TABLE 1 
RESULTS 
Subject 
FOG Episodes 
28 
30 
84.7% 
86.6% 
750% 
92.3% 
82.9% 
96.9% 
97.8% 
97.3% 
Results Of FOG testulg on 4 PI) patients (P I -po 
and 2 healthy controls (C I-C2). P2 and P4 were included in 
training, while PI, P3, Cl. and C2 were not included in 

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* + **2015\_Gait, Wrist, and Sensors: Detecting Freezing of Gait in Parkinson’s Disease from Wrist Movement**
    - Summary:
      * Freeze hit-rate of 90% and 83% specificity in a subject-dependent evaluation scheme.
      * This suggests that **wrist sensors can be a feasible alternative to the cumbersome placement on the legs**.

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* + **2015\_ A real-time detection algorithm for freezing of gait in Parkinson's disease**
    - Summary:
      * The **time delay** of the proposed algorithm is **only 1 second**, which is **2.25-3.75 times less than that of existing methods**.

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* + **2013\_Characteristics of gait freezing: Possibilities for rehabilitation**
    - Summary
      * In this study, we examined mean **center of pressure (CoP) for patients during freezing and compared them against mean CoP during standing and walkin**g. Patients experienced a significantly forward CoP (p<;0.01) during freezing than standing and walking, which is associated with an increased risk of falling.

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* + **2012\_Online Detection of Freezing of Gait with Smartphones and Machine Learning Techniques**
    - Summary:
      * We propose a **wearable assistant**, composed of a smartphone and wearable accelerometers, for online detection of FoG. The system is based on machine learning techniques for automatic detection of FoG episodes.
      * 8h of recorded lab data from PD patients that experience FoG in daily life.
      * able to detect FoG events with an average sensitivity and specificity of more than 95%, and mean **detection latency of 0.34s** in user-dependent settings.

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* + **2015\_Analysis and Prediction of the Freezing of Gait Using EEG Brain Dynamics**
    - Summary:
      * They analyzed **Electroencephalogram** (EEG) is a test that detects **electrical activity in your brain using small, flat metal discs (electrodes) attached to your scalp**.

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* + **2015\_Intelligent Fall Prevention for Parkinson’s Disease Patients based on Detecting Posture Instabilily and Freezing of Gait**
    - Summary:
      * The main advantages of this proposed approach includes:
        + (1) safety: to detect the **stooped posture and freezing of gait** and to produce **audio cue** to help the patients to **break the block**
        + (2) portability: not limited at specific locations
        + (3) expendability: easy to update or upgrade by using app install online.

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* + **2015\_Prediction of Freezing of Gait in Parkinson's From Physiological Wearables**
  + **2015\_Recognition of postures and Freezing of Gait in Parkinson's disease patients using Microsoft Kinect sensor**
  + **2015\_Smartphone Based Freezing of Gait Detection for PD Patients**