# Can we objectively measure the symptoms of Parkinson’s disease with a smartphone? We have the data to find out!

There are many symptoms and features of Parkinson’s disease which can be objectively measured and monitored using simple technology devices we carry every day. Mobile phones are some of the most pervasive forms of monitoring devices, with many smartphones carrying basic sensors that can be used to give a window into a patient’s life. We have taken the initial steps with such a device, developing a basic collection application, and collecting data from a group of Parkinson’s patients and control subjects.

Now the challenge is on you to determine the best way to use it!

The challenge is to develop a way to help patients and clinicians using objective, passively collected data points. The goal is to use the provided data to distinguish PD patients from control subjects and/or to quantify PD symptoms in a way that could enable the measurement of disease progression.

You are invited to submit an entry showing the way you would use the data to describe a solution that addresses the objectives of the contest, including next steps to be done if more data were available.

Data collection

Over a period ranging roughly December 2011 – March 2012, data was collected from 9 PD patients, at varying stages of the disease, and 7 healthy controls (not manifesting PD at the moment of recruitment), roughly matched for age and gender.

Subjects were asked to do the following:

* Carry a supplied Android smartphone on their person for at least 1 charge cycle per day (about 4-6 hours) and allow data to be collected about them.  If they could go through more than 1 charge cycle, all the better.
* PD patients only were asked to fill out the first two sections of the UPDRS score survey at the beginning and end of their participation, with some doing it more frequently
* All participants were asked to help collect these data for a minimum of 8 weeks, as consistently as possible

Data Description:

The data contains the following streams:

1. Audio (L1-norm, L2-norm, L-inf norm, power spectral density across four separate bands, 12 lowest mel-frequency cepstral coefficients)
2. Accelerometry (for each of the 3 axes: mean, absolute central moment, standard deviation, maximum deviation, power spectral density across four separate bands)
3. Compass (for each of the 3 axes: mean, absolute central moment, standard deviation, maximum deviation)
4. Ambient light (lux)
5. Proximity (binary on/off)
6. Battery level (percentage)
7. GPS (latitude, longitude, altitude)

All streams contain data recorded at most once per second. Aggregate of over 6,000 hours of data has been collected to date (over 18,000 hours of all individual streams). All this data currently sits in raw data form, in hour long zip packets

**Entries:**

* Submissions to the contest will include an entry describing all data/inputs, use of the data, preliminary findings/evidence to support the use of objective, passively collected data points to address the contest objectives and the potential utility if used in a broader way.

**Evaluation Criteria:**

Researchers should use the data set as a means for monitoring and measuring the progression, stage, and/or behavior of patients with Parkinson’s disease and to distinguish them from control subjects. Entries do not have to exclusively use the provided data; we encourage creative, innovative, collaborative approaches that will help patients.

Judges will be looking for winning submissions that can best answer the following questions:

* Can the data help distinguish PD patients from control subjects?
* Can the data help to measure the progression, change and/or variability of symptoms in PD subjects?
* Can the data be used in other creative ways to inform patient treatment, care and/or quality of life?
* Do the analyses and proposed uses of the data use innovative approaches and methods?