The SPOT* Personal Thermal Comfort System Dataset

Data Owner: Alimohammad Rabbani, I. Rios, L. Golab, and S. Keshav

Data Description: Unlike traditional conventional centralized HVAC systems that heat or cool an entire zone, Personal Environmental Control systems can provide personalized thermal comfort for each individual but are expensive and difficult to deploy. The SPOT* system, in contrast, is an individual thermal comfort system that can be rapidly and cost-effectively deployed.
This dataset contains data collected from a cumulative 58,000 hours of operation of 45 SPOT* systems in 15 offices. Invitations are sent out to approximately 1500 building residents of four selected campus buildings, and we distributed the systems in first-come-first-served order. Over the course of the data collection, only one person has withdrawn from the trial because they left the university, and only two failures have happened (both resolved by re-plugging the device to the power outlet fixed the problem). Details regarding the design and deployment of the SPOT* system can be found in the paper "*The SPOT* Personal Thermal Comfort System*" by A. Rabbani and S. Keshav:
http://blizzard.cs.uwaterloo.ca/keshav/wiki/images/b/be/Spotstar.pdf.

The AD22100 surface-mount temperature sensor with 0.1∘C resolution is used to obtain temperature readings. The AMN22111 passive infrared human detection sensor outputs analog values that are converted to values between 0 and 1000 on the Raspberry Pi. When there is no movement, the sensor output values are approximately 500. Each movement causes the sensor to first generate one value close to 1000 and then another close to 0. The closer these values are to 1000 and 0, the greater the intensity of movement. Over a 30-second window, a standard deviation close to 0 indicates almost no movement, and thus no occupancy, while higher standard deviations correspond to more movement. The user interface with SPOT* system is by means of a Web app, and we collect users' comfort preferences to the control app. More information on the data collection process can be found in section 3.1 and 4.1 of the paper "*The SPOT* Personal Thermal Comfort System*" by A. Rabbani and S. Keshav: http://blizzard.cs.uwaterloo.ca/keshav/wiki/images/b/be/Spotstar.pdf.

1. **PPVs.csv**:

Columns	Description
time	Epoch Unix Time Stamp (seconds since Jan 01 1970 (UTC))
Predicted Mean Vote (ASHRAE scale)	Predicted Mean Vote (PMV) model estimates an average worker's comfort level on the 7-point ASHRAE scale using a function $f_{pmv}(\cdot)$: $pmv = f_{pmv}(t_a, \overline{t_r}, v_{ar}, p_a, M, I_{cl})$
Predicted Personal Vote (ASHRAE scale)	PPV is a generalized version of PMV, computed as a*PMV + b. During a training period, the system collects comfort votes from the user to extract two user- specific parameters a and b using least-squares regression.
device id	ID of devices placed in each office

2. **Motions.csv**:

Columns	Description
time	Epoch Unix Time Stamp (seconds since Jan 01 1970 (UTC))
standard deviation of motion sensor in the last 30s	standard deviation of motion values (i.e. motion intensity) during 30-second time windows
device id	ID of devices placed in each office

3. **Occupancies.csv**:

Columns	Description
time	Epoch Unix Time Stamp (seconds since Jan 01 1970 (UTC))
occupancy	0(not occupied), 1(slight chance), 2(high chance), 3(definitely occupied)
device id	ID of devices placed in each office

4. **Temperatures.csv**:

Columns	Description
time	Epoch Unix Time Stamp (seconds since Jan 01 1970 (UTC))
temperature	degrees C
device id	ID of devices placed in each office

Citation: There is no restriction on the reuse of the dataset given the paper is cited as:

A. Rabbani and S. Keshav, "*The SPOT* Personal Thermal Comfort System*", Proc. ACM BuildSys'16, November 2016.