# Supporting information

**S1 Algorithm:** Anomaly detection algorithm

1. Filter and pre-process the original data. This includes defining a common sampling rate for the given environmental sensors (e.g. one sample per minute)
2. Aggregate the integrated data within ten minutes intervals (each day is represented via $144(24 \times 6)$ windows and each window is an array of $n$ observations)
3. Cluster the daily data into categories; In this case to $D1$ and $D2$ (low-active and high-active days)
4. Cluster individual windows in order to map each window into a single state, i.e. the data is distilled into a discrete format: at time interval $\tau_t$ the user is in state $s_i$.
5. Separate the historical data into training, verification and test datasets. In this experiment we have used training (%50), verification (%20), and test sets (%30)
6. Construct the Markov chain model for each cluster and learn the corresponding training transition matrices
7. Calculate the entropy rate $\xi_T$ via Eq. (4)
8. Repeat steps 3-4 for the verification set and calculate the entropy rate for each day in this dataset
9. Determine a confidence interval (expected variation) for entropy rate values, see Eq. (5)
10. Repeat steps 3-4 for the test data, calculate the entropy rate, and compare with the confidence interval to detect anomalies