

# Asset tracking and attribution in buildings made practical

## 1 Contributions

1. Swipe for context inference.
2. Disconnected operation architecture.
3. Fast query speed over time-varying relationships

## 2 Evaluation

1. Ask the user each time it happens. Record the false/true positives/negatives.
2. Record how often and for how long users are typically disconnected.
3. Measure the query overhead of performing the query. Discuss the algorithms/strategies and then measure the query time for a typical query versus a regular timeseries one.

## 3 Introduction

Asset management is an important problem in many industries. Asset management typically involves tracking the location of materials from the factory, to the warehouse, to the customers who purchase the item. There's a bunch of work on system that perform this tracking cite. The general formulation of the problem involves a set up of known locations and uniquely identifiable object. When the object moves from one location to another, the arrival time is record along with the object identifier. In most cases, both the arrival and departure time is recorded. When the item is purchases, the customer identifier is associated with the object identifier.

Buildings consume 40% of the energy produced in the United State and about 30% of that is consumed by plug-loads in the building. Given the nature of plug-loads – hundred of distributed, personal, mobile energy-consuming objects in the building – it is difficult to track and understand how they are used and therefore it is difficult to formulate a reduction strategy for this portion of building energy consumption. The problem here is similar to the generalized asset management problem, with

the addition of object state. What is the energy consumption of the 4th floor of this building? How does it compare to yesterday? The generalized form appears in other contexts as well. For example, hospitals need to track where they stuff is and how many times it's been used because some items have a recharge cycle that's closely correlated with the usage count.

### 3.1 Eval: Network access

In the building we have access to many access points, but for some reason, if we're idle for a certain period of time or we move from one location to another, our phones become disconnected, and this happens often. The implications of this motivate the need to deal with disconnected operation of this particular application, but we can broaden the impact of the observation by including wardriving data and connectivity in the general area, perhaps comparing it with wifi maps.

We're particularly interested in buildings for this work, but this may be a broader problem and it should be explored. Furthermore, we'll decompose the API choice and how we exposed cache misses.

- Connectivity
- location
- Connection type (wifi, 3g, 4g). Maybe we could also include a list of unique access points and whether we are actually connected to the one with the highest signal strength. Also, we can discuss what happens in the gray zone where it's not clear which one to connect to.

## 4 References