

Filtering and Interpreting data from IoT systems

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IoT in Reality

- ❖ S.E is not just about coding.
 - ❖ Understand: Technology, Data
 - Environment more and more connected
 - A lot of data sources
 - However, the data is not always relevant
 - ❑ Big gap between expectation and reality
 - ❑ Inaccurate data
 - Purpose: Optimise Data Quality
 - ❑ Improve data quality = Improve decision-making process.

BLE (Bluetooth Low Energy)

➤ Facing some challenges

Dimensions of Data Quality		Encountered problem
Accuracy	Identification	Dynamic identification
		Identification outside the zone
	Tracking	Identification outside the zone
		Interference
	Low accuracy (+/- 5m)	
Conformity		Identification outside the zone
Consistency		Disappearance of Id

Optimise Data Quality

➤ Focus on Data Accuracy

- Ensure data accuracy by filtering

Optimize Data Accuracy

- Two ways:
 - ❑ Hardware and technology improvement
 - ❑ Software improvement: Filtering and cleaning the data

Filtering Data

- *Business rule*
- *Requirements*
- *Example:*
 - ❑ Based on RSSI (Signal Strength)
 - ❑ Based on Timestamp (Session duration)

Filter implementation

- From RSSI to meters (Kalman filters)

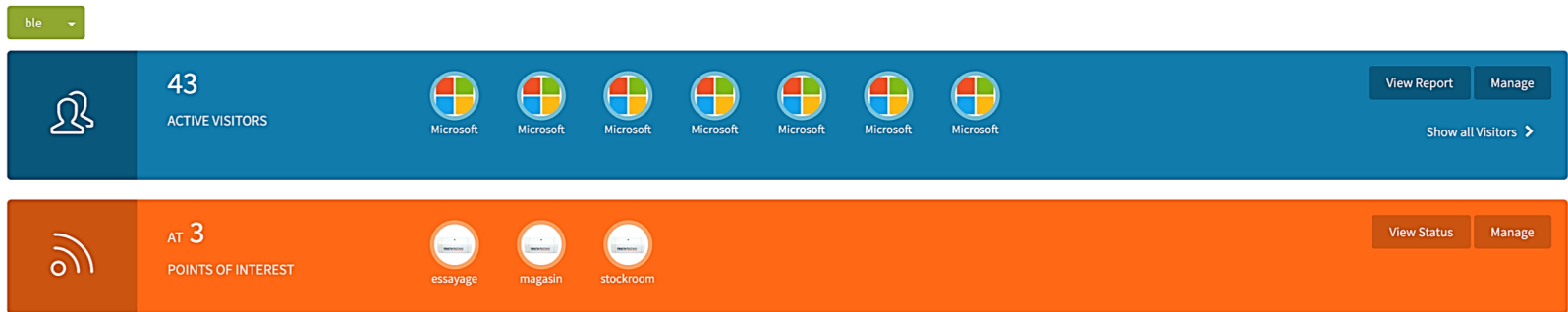
Distance = $10^{((\text{Measured Power} - \text{RSSI}) / (10 * N))}$

```
function getDistance(tag, receiver) {  
    var n = 2;  
    var px = receiver.px;  
    var distance = 10^((px - tag.rssi)/(10*n))  
    return distance;  
}
```

```
function applyFilters(event) {  
    if(tag.rssi != 0) {  
        distance = getDistance(tag, receiver);  
        if(distance > maxDistance) {  
            event.passedFilters = false;  
            return;  
        }  
    }  
    event.passedFilters = true;  
}
```

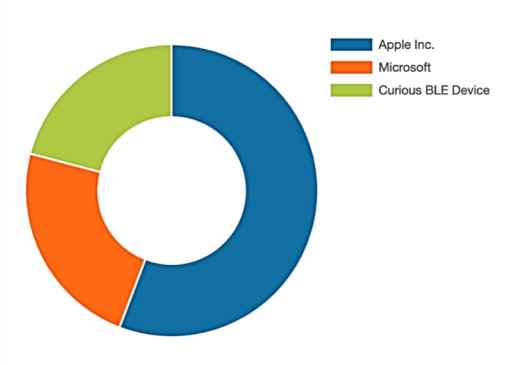
Data Interpretation

- Understand technology, understand data
- Improve data quality = Improve interpretation of Data.



Updates every 5 seconds

Device Segmentation



Point of Interest Popularity

