

Some optimizations of WiFi- Based Indoor Positioning

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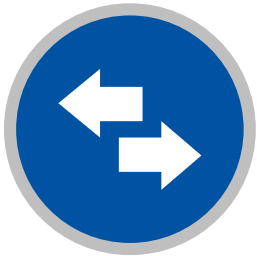
**Research
Background**

Research Background



Indoor localization

The implement of positioning in indoor environment.



WHY?

The signal from the satellite is too weak.



How?

Using wireless communication, base station positioning, inertial navigation to form indoor location positioning system



PART
TWO

Related Work

Basic Concept

Received Signal Strength Indication(RSSI)

The basis of Wifi-based indoor positioning system!

Can be predicted by a **LDPL model**.

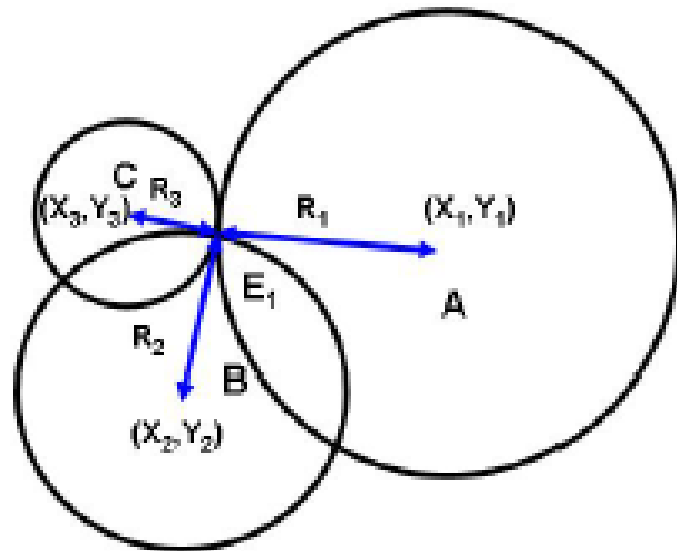
LDPL Model

$$p_{ij} = P_i - 10\gamma_i \log d_{ij} + \mathbf{R}$$

If P_i and γ_i are known, then **an RSS measurement** p_{ij} can be converted into the **distance** d_{ij} .

A Basic Positioning Method

Triangular positioning and LDPL Model



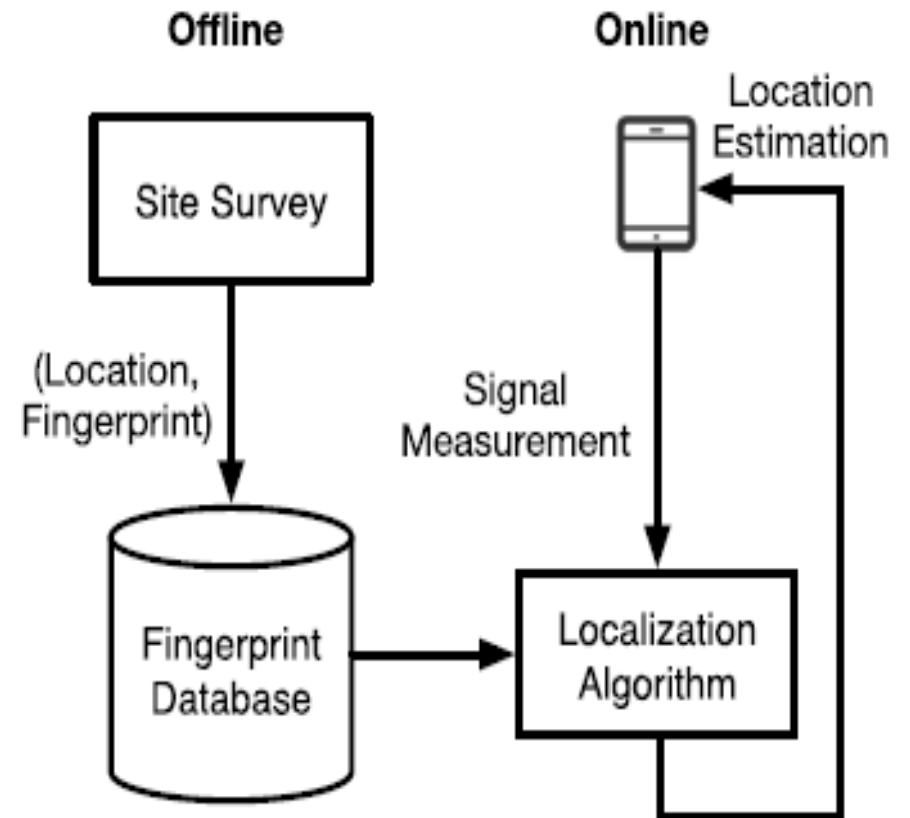
- The LDPL Model provides a connection between the location of the user and RSS.
- The cross point **does not** always occur in real case!

Some Advanced Scheme of Indoor Positioning

Fingerprint-based positioning

■ Offline phase: a site survey is conducted to collect the vectors of RSSI.

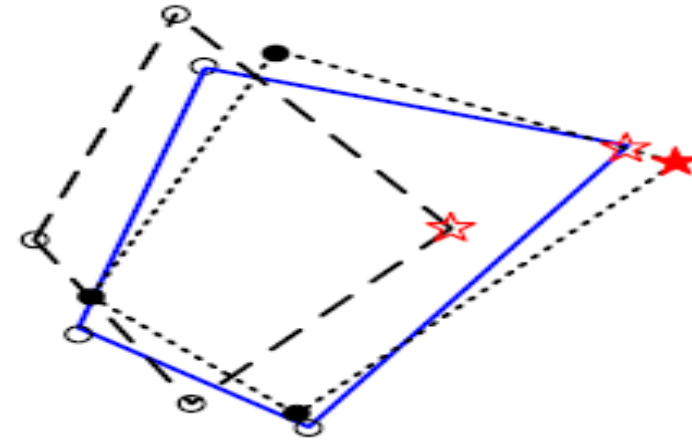
■ Online phase: a user samples or measures an RSSI vector at his/her position and reports it to the server.



Some Advanced Scheme of Indoor Positioning

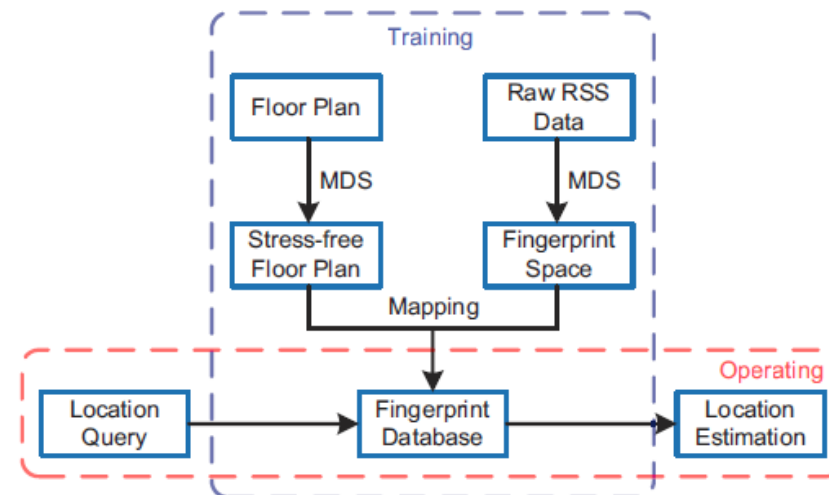
Peer Assisted Positioning

- The device broadcasts a special audio signal.
- Distance between peers is calculate based on TOA.



SLAM

- The training phase
- The operating phase

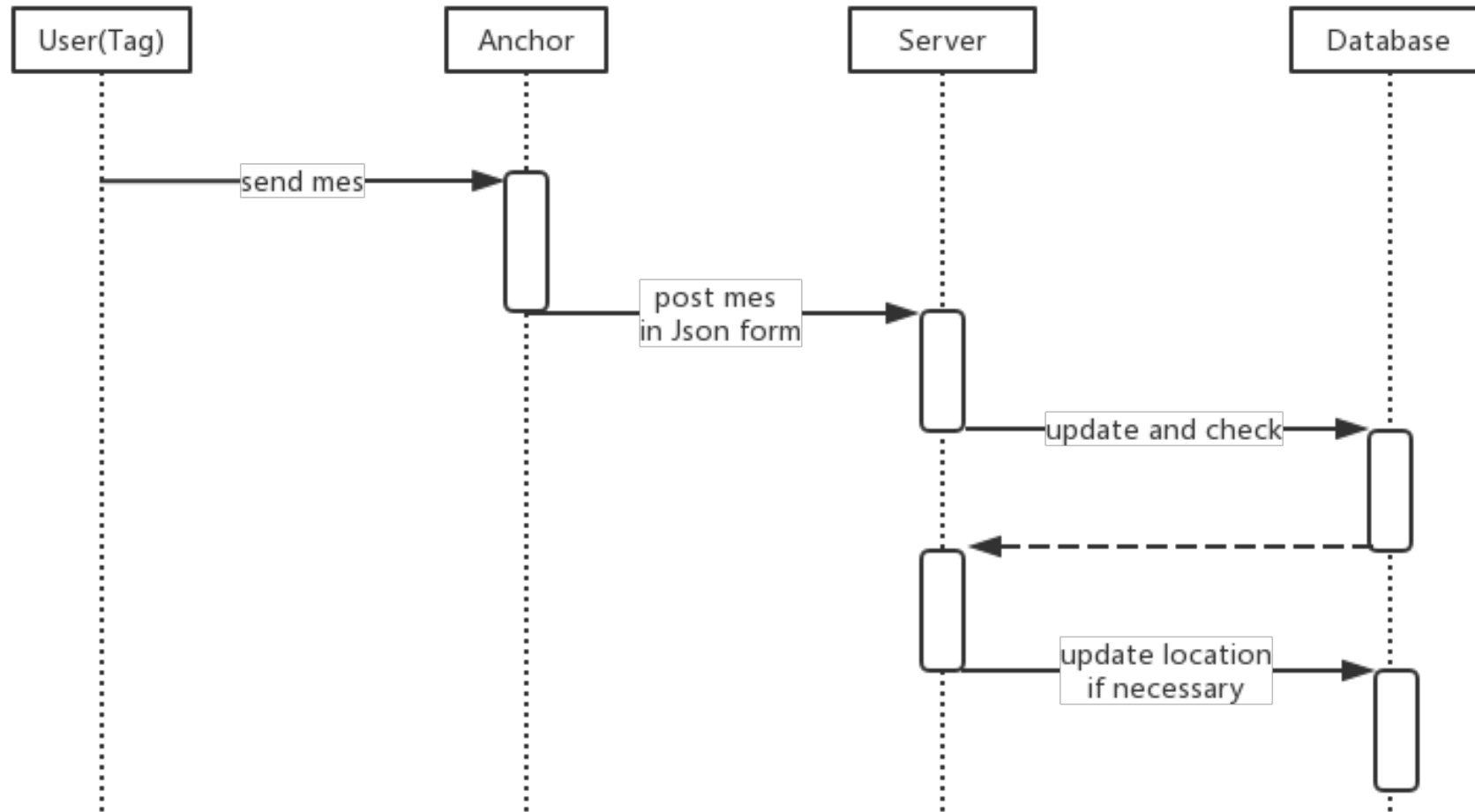


PART

**Our
Project**

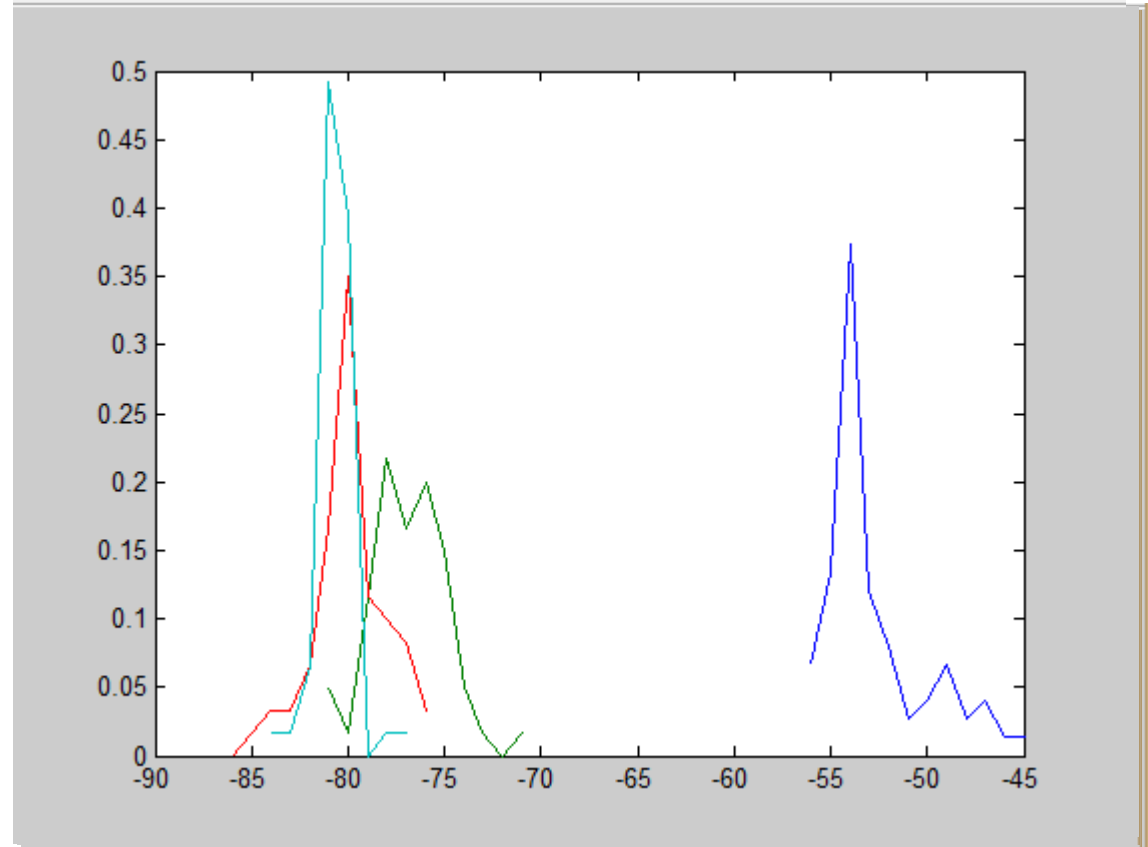
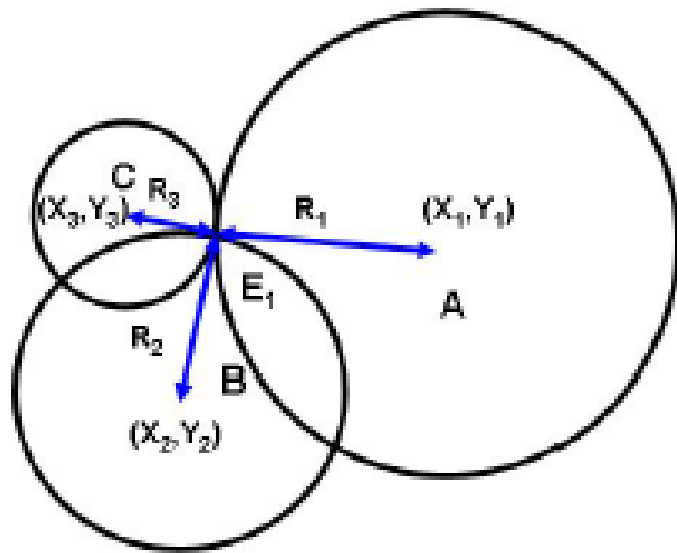
THREE

Our indoor positioning based on RSS



```
Tables_in_foxconn
BLE
Lyy
account
anchor
books
invitation_code
locrecord
mapdb
position_history
rho_pos
rss_pos
rssi
rssihis
rssitable
tempo
users
wifi_name
```

Stage 1: Triangular Positioning Only



Stage 2: Triangular Positioning With Some Optimizations

1. Estimating position based on position history.

2. Estimating RSS value through Kalman filtering

$$\text{Prediction} = \text{last_est} + kg^*(\text{rssi} - \text{last_est})$$

PART
FOUR

**Follow-up
Work**

Follow-up work of project

1. Pressure test

**To find
Bottleneck!**

2. Adjustment of API

Pressure Test

The screenshot shows a web pressure testing tool interface with the following configuration:

- Web服务器:** 协议: [], 服务器名称或IP: 202.120.36.29, 端口号: 5000
- HTTP请求:** 方法: POST, 路径: /import_inf/, Content encoding: []
- Options:** 自动重定向, 跟随重定向, Use KeepAlive, Use multipart/form-data for POST, Browser-compatible headers
- Parameters:** []
- Body Data:**

```
1 {"eui": "0015580002400868",
2  "time": "${__time(yyyy-MM-dd HH:mm:ss,)}",
3  "value": [{"mac": "123b6a1a9b01", "rssi": "bb"}]}
4 }
```
- Files Upload:** []

At the bottom, a table shows test results for a thread group:

线程组	线程数	线程组	线程数	线程组	线程数	线程组	线程数	线程组	线程数
线程组 3-250	3796	线程组 3-250	3796	线程组 3-250	3796	线程组 3-250	3796	线程组 3-250	3796

Bottleneck:

1. Connection to DB
2. Max Connection to Apache
3. CPU

THANKS