

*COMP9336/4336 Mobile Data Networking*  
*Assignment Project Exam Help*  
*www.cse.unsw.edu.au/~cs9336 or ~cs4336*

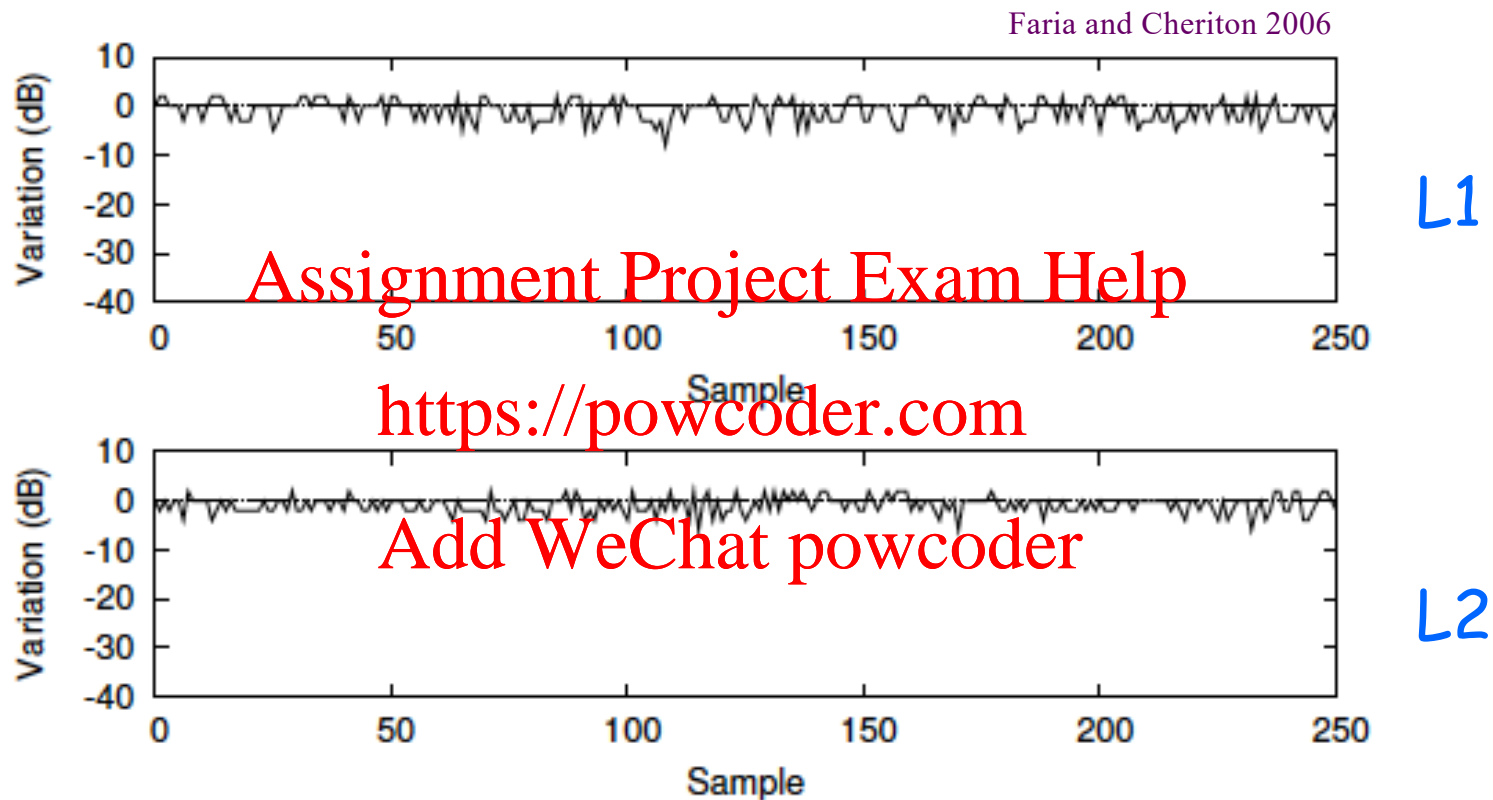
<https://powcoder.com>  
*WiFi Fingerprinting*  
Add Wechat powcoder

Adapted from Faria and Cheriton 2006

# *Signal fingerprint based positioning*

- Received signal is extremely location-specific
  - dependence on terrains and obstacles
- Multipath structure is unique to every location
  - considered a fingerprint or signature of the location
- Create fingerprint database for locations of interest
- Received signal is matched against database
  - to identify location of the transmitted signal

# *RSSI Oscillation*



In most cases, for a given location, RSSI remains within a few dBm of the median value (median shown as '0')

L1 could be differentiated from L2 using a **single** WiFi AP if the **RSSI medians** were 10dB apart in this case

# *Why a single WiFi AP is not adequate?*

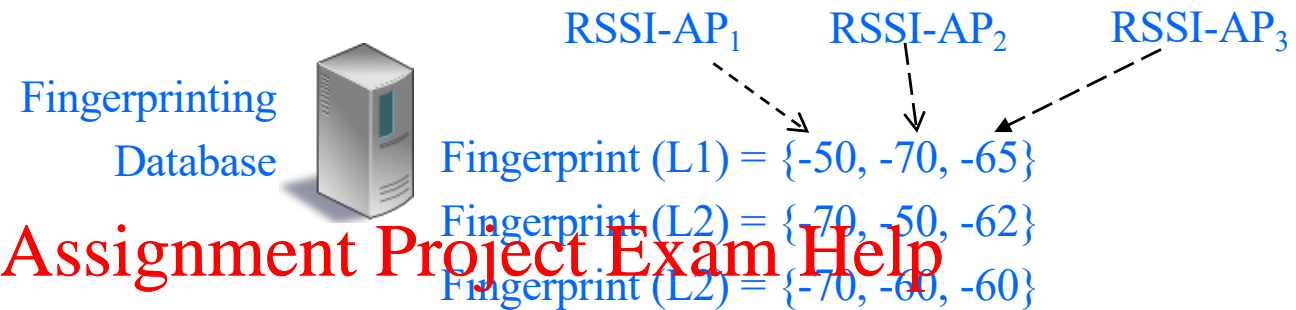
- In the previous example, L1 and L2 could not be always separated if the median RSSIs were less than say 5dB
- A single WiFi AP therefore cannot provide high-resolution localization with good accuracy
- What if the mobile device can hear from multiple WiFi APs?

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# Basic WiFi Fingerprinting Example



<https://powcoder.com>

AP<sub>1</sub>

AP<sub>2</sub>

AP<sub>3</sub>

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Location 1

Location 2

Location 3

- **Vector** of RSSIs
- One RSSI for each AP
- Vector length could be variable

Median RSSI for AP3 is within 5dB for all three locations, yet the vector of three APs provide unique WiFi fingerprint for these locations!

## *A basic algorithm for identifying locations with WiFi fingerprint*

1. Mobile obtains a real-time fingerprint
2. Compare the real-time fingerprint with each signature in the database (RSSI differences in vector elements) <https://powcoder.com>
3. Attach a score to each comparison (number of elements differed less than  $\Delta$  dBm) Add WeChat powcoder
4. Maximum match = signature with max score

# Example

- 2 signatures in the database for two different locations
  - $S1 = \{-50, -70, -45\}$  and  $s2 = \{-40, -70, -35\}$
- Real-time fingerprint of a client =  $\{-44, -66, -34\}$
- Assuming a  $\Delta = 5\text{dBm}$  (needs to be finetuned for real environments)
  - Score for  $S1 = 1$ , and
  - Score for  $S2 = 3$
- Maximum match is with location 2 ( $s2$ )
- The client positioning is predicted as 'location 2'