

# **Pre-Processing of Fingerprints to Improve the Positioning Accuracy of 802.11-based Positioning Systems**

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Mobile Entity Localization and Tracking in GPS-less Environments  
(MELT)

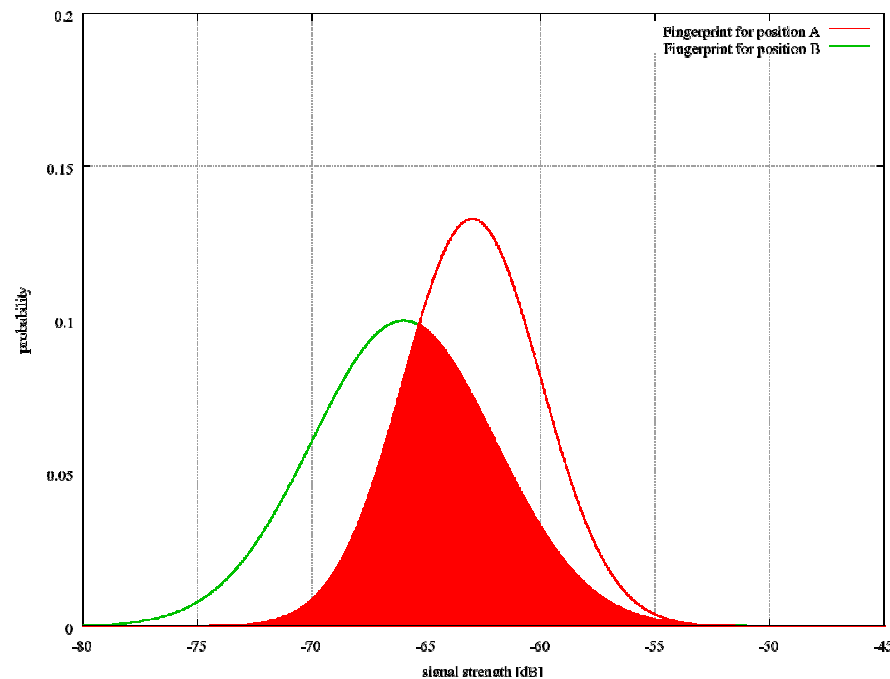
19. September 2008

# MOTIVATION

- Position determination based on 802.11 is a hot topic in research
  - Compass, PlaceLab, Skyhook Wireless, ...
- But: Setting up and operating an 802.11-based positioning system with fingerprinting still is a very time-consuming task
  - Many reference positions are necessary
  - Many samples need to be collected (20 to 30 per position)
  - The fingerprint database has to be updated when the environment changes

# OBSERVATION

- At a given reference position, the signal strength constantly varies due to
  - Scattering, diffraction, multipath propagation, ...
- Considering a grid of reference positions, the signal strength distributions of adjacent positions partly overlap



# QUICK FINGERPRINTING

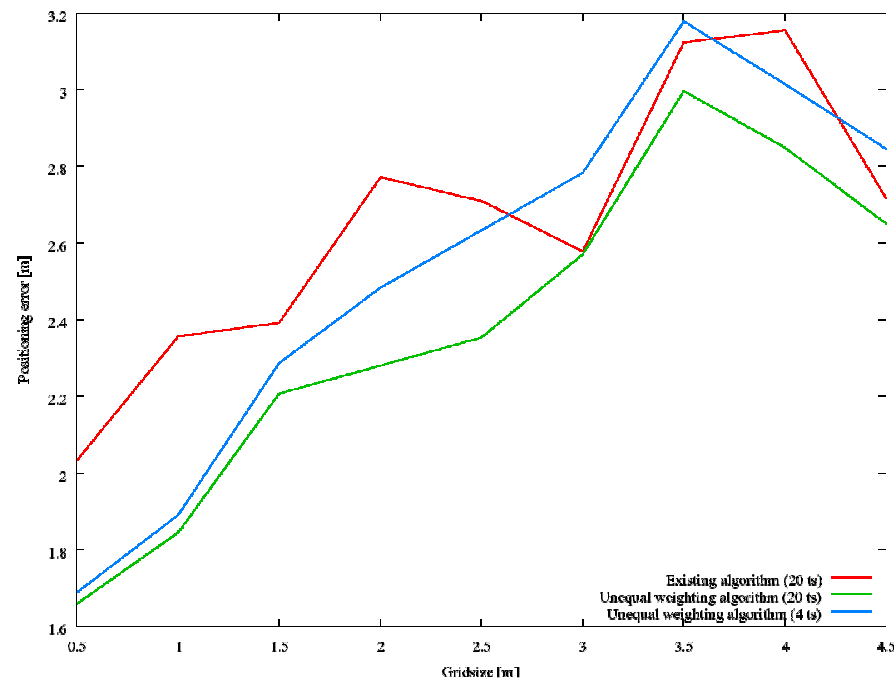
- Question: Can we use the additional information collected for the fingerprints of adjacent reference positions?
- Answer: Yes, with “QUICK” FINGERPRINTING!
  - Not only use the samples collected at the reference position, but also samples from adjacent positions
  - Merge the samples in a suitable fashion to create the fingerprint
  - The new fingerprint now covers the area enclosed by adjacent reference positions instead of just a single position

# APPROACH

- Equal weighting
  - Our first approach equally considers the measurements from the reference position as well as from the adjacent positions
  - This works well for smaller grid sizes but fails when the grid size is increased
- Unequal weighting
  - We therefore introduced a factor  $w$  that can be used to adjust the influence of measurements collected at adjacent positions

# RESULTS

- When using the same amount of training data, the accuracy can be noticeably increased
- Alternatively, a reduction of the amount training data by about 80% without losing positioning accuracy



Thank you for your attention!

For more details, please meet me  
at the poster...

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