Indoor Localization System Framework

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Motivation

To build a framework to combine different indoor localization techniques.

• Different indoor localization techniques have different assumptions and limitations.
• Context-awareness in localization techniques is feasible.
• Use data fusion techniques to improve accuracy of the target position estimation.

System Architecture

Methodology

• Each localization module estimates a confidence value.
• The framework determines weights for each localization module.

Evaluation Setup

• LG Revolution VS910 with Android 2.3.4 was used to collect WiFi RSSI value.
• Apple iPhone 5 was used as the sound recorder
• Database contains 98 points as ground truth.
• Three paths in RADLab were used for evaluating the system.
  • 166 points on Path 1 for 680 seconds.
  • 113 points on Path 2 for 182 seconds.
  • 125 points on Path 3 for 208 seconds.

Results

Confidence level estimation

• Fig 2. Confidence Level of WiFi for each path

Accuracy of estimation

• Fig 4. Error plot for linear combination technique for each path

Fingerprint matching overhead

• Fig 6. Error plot for WiFi number of Signatures/Point

Fig 1. Floor Map of RAD Lab in Soda Hall

Fig 3. Confidence Level of ABS for each path

Fig 5. Error plot using Kalman Filter for each path

Fig 7. Error plot for ABS number of Signatures/Point

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