Indoor positioning using audio features of FM radio signals

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Introduction
• GPS is not available indoors.
• Wi-Fi has limited coverage and can be prohibited in sensitive environments.
• Specialized systems are expensive.

Why FM audio localization?
• FM is embedded in many devices;
• Off-the-shelf transmitters (10-20 euro);
• Signal-strength based FM localization shows good performance [1].
• However, signal strength readings might not be available or could be too coarsely-grained.

Stereo FM signal structure

Three signal features potentially dependent on distance/noise:
- Received signal strength (RSS)
- Signal-to-noise ratio (SNR)
- Separation of stereo channels (SCS)

Results

Dependence on distance

Localization accuracy (in a 12×6 m room)

Relationship between features

Summary
• SCS works best at short distances.
• SNR is more suitable at longer ranges.
• RSS works at all distances.