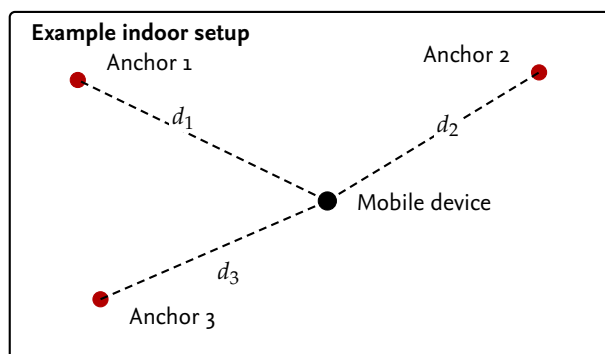


Title: Experimental Evaluation and Robust Distance Estimation for Bluetooth Channel Sounding

Bluetooth Channel Sounding is a new Bluetooth feature that can estimate the distance between two devices more accurately than classic Bluetooth signal-strength methods. This is useful for indoor applications such as finding the position of a device in a room. However, the accuracy can still drop when signals are reflected by walls or furniture, when there is no clear direct path between devices, or when the devices are rotated.

This thesis studies how well Bluetooth Channel Sounding works indoors with commercial development kits. The main goal is to evaluate the technology in controlled indoor scenarios and to develop a robust method that turns raw measurement data into reliable distance estimates. A small indoor localization case study is used only to examine whether the resulting distance estimates are accurate enough for a simple anchor-based setup.



A small localization case study can use measured distances to a few fixed anchors.

- Design and implement a repeatable indoor measurement setup for Bluetooth Channel Sounding at different distances, with and without a clear direct path between devices, and with different device orientations.
- Develop and compare several methods that turn raw Channel Sounding data into distance estimates, including filtering and outlier removal.
- Evaluate how room conditions and hardware configuration affect the ranging accuracy using metrics such as average error (MAE), root mean square error (RMSE), percentile error, outlier rate, and update latency.
- Use the resulting distance estimates in a small indoor localization case study to assess whether the achieved ranging quality is sufficient for a simple anchor-based setup.

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