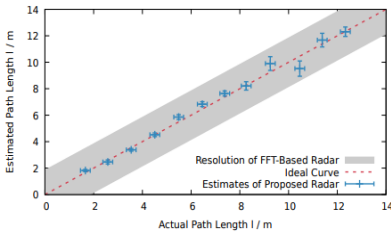


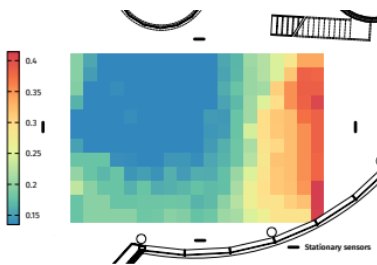
Multiple Tones Extension (MTE)

Localization to within a centimeter with Bluetooth for near field communication systems

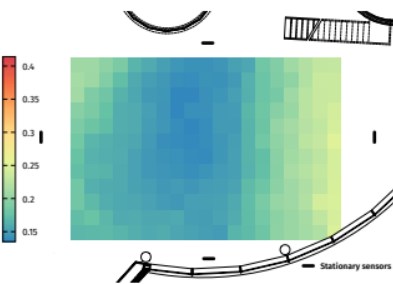
Invention



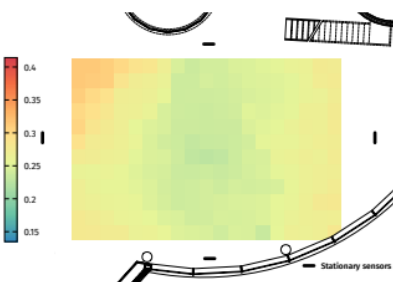
Comparison between target and actual values when measuring a distance



Local median accuracy (in m) achieved with the Bluetooth Direction Finding based localization system



Local median accuracy (in m) using a combined approach of both Bluetooth Direction Finding and Bluetooth Channel Sounding technology



Wireless systems are used not only for communication, but also for such secondary applications as localization. In recent years, the cost advantages of Bluetooth indoor localization systems in particular in such areas as asset tracking have led to great popularity.

A new technology from the University of Wuppertal improves localization precision by expanding the protocol structure to support Bluetooth 5.1. In this structure, the CTE (Constant Tone Extension) package is complemented by an MTE (Multiple Tones Extension) package: Measuring the phase change between two signals, each with a constant frequency, allows the distance the wireless signal has travelled to be determined. Combined with the signal direction determined with the CTE method, this improves localization. The method can also be used with other wireless systems.

Current Status

This invention is especially useful with the Internet of Things: It can be used not only in Bluetooth systems, but in principle in all wireless systems that send a Multiple Tones Extension (MTE) package at regular intervals and analyze phase information with an appropriate receiver module to determine direction and travel time. Initial test data sets are available. They indicate that general functionality is to be expected.

The technology has been registered with the German Patent and Trade Mark Office. Other national patents can be obtained with a PCT application.

An invention from University of Wuppertal.

Competitive Advantages

- Improved localization precision
- Resolution to the centimeter
- Can be used for other wireless standards

Technology Readiness Level

1 2 **3** 4 5 6 7 8 9
Experimental proof of concept

Industries

- Communication technology
- Telecommunication

Ref. No.

6616

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