

## A Fast Calculation Approach for Position Identification in a Distance Space

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**Abstract :** The market of localization based service (LBS) is expanding. The acquisition of physical location is the fundamental basis for LBS. GPS, the de facto standard for outdoor localization, does not work well in indoor environment due to the blocking of signals by walls and ceiling. To acquire high accurate localization in an indoor environment, many techniques have been developed. Triangulation approach is often used for identifying the location, but a heavy and complex computation is necessary to calculate the location of the distances between the object and several source points. This computation is also time and power consumption, and not favorable to a mobile device that needs a long action life with battery. To provide a low power consumption approach for a mobile device, this paper presents a fast calculation approach to identify the location of the object without online solving solutions to simultaneous quadratic equations. In our approach, we divide the location identification into two parts, one is offline, and other is online. In offline mode, we make a mapping process that maps the location area to distance space and find a simple formula that can be used to identify the location of the object online with very light computation. The characteristic of the approach is a good tradeoff between the accuracy and computational amount. Therefore, this approach can be used in smartphone and other mobile devices that need a long work time. To show the performance, some simulation experimental results are provided also in the paper.

**Keywords :** indoor localization, location based service, triangulation, fast calculation, mobile device

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