A comparison of range-based technique and fingerprinting methods for indoor localization

Nadia ALOUI
University of Grenoble, GIPSA-Lab, France
National Engineering School of Tunis, 6'COM-Lab, Tunisia
Email:nadia.aloui@gipsa-lab.grenoble-inp.fr

Kosai RAOOF[a], Ammar BOUALLEGUE[b]
[a]National School of Engineering of Le Mans, France
[b]National Engineering School of Tunis, 6'COM-Lab, Tunisia
Email[a]: kosai.raoof@univ-lemans.fr
Email[b]: ammar.bouallegue@enit.rnu.tn

ABSTRACT

Indoor localization offers interesting services and applications in different domains. We mainly distinguish two categories of techniques used for localization: range-based and fingerprinting techniques.

Many research papers have dealt with the comparison of fingerprinting techniques namely probabilistic methods, deterministic methods and neural networks. However, very few papers are focused on the comparison between range-based and fingerprinting methods. In the latest research, authors use the Received Signal Strength Indicator (RSSI) for location estimation and the experiment was conducted in a blank room.

To this end, this paper compares lateration and K-nearest neighbours algorithms in an effective area of 1.2 m *1.2 m in a hall of interns. The latter consists of computer areas, desks, chairs...

The distance between the speaker, the object to be localized, and the microphones is computed from the time of flight measurement of the acoustic signal emitted by the speaker. This signal is a Binary Phase Shift Keying modulated m-sequence that is characterized by good autocorrelation properties.

Results have shown that the lateration algorithm presents an accuracy of 3 cm; while the nearest neighbour and the 3- Nearest neighbours algorithms give respectively an accuracy of 15 cm and 10 cm.

The robustness of the two methods against interference with other acoustic signals will be investigated.

KEYWORDS: Time of flight, acoustic localization, lateration, k-nearest neighbors algorithm, m-sequence.