Studienarbeit

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1 Studienarbeit

1.1 Working Title

An Implementation of the Horus WLAN Location Determination System

1.2 Summary

Recently, various indoor location systems based on Wireless LAN have been proposed (e.g., [1], [5]). These systems utilize the network infrastructure that has been built for communication purposes to determine the position of the object in question. Basically, Wireless LAN-based indoor location systems work as follows: access points periodically transmit beacons and every mobile device that receives beacons from at least two access points is able to estimate its position. Due to effects caused by the physical characteristics of the wireless channel, it is not possible to accurately estimate the distance between a mobile device and an access point by investigating the signal strength [4]. The error introduced by the wireless channel prohibits the use of lateration algorithms.

The so-called *fingerprinting* technique is applied by many Wireless LAN-based indoor location systems to cope with the drawbacks of the channel. Fingerprinting approaches work in two stages: in the training phase a database that stores the physical coordinates and radio fingerprints of the measurement points is created. A radio fingerprint comprises the signal strength values of access points in communication range at a particular position. The database is then used in the online phase to compute the position of mobile devices. If a mobile device wants to know its position, it collects the signal strength values of the access points in its communication range and matches this samples with the data stored in the database. If no direct match can be found the nearest fingerprint is selected and based on the selected fingerprint the position is derived.

As shown in [5], the aforementioned Wireless LAN-based indoor location systems work well in various indoor conditions and provide location accuracy up to a few meters.

1.3 The Thesis

Subject of this thesis is an implementation and evaluation of the Horus WLAN position determination system [5]. In a first step, the student should read the

relevant literature and understand the approach.

The second task is to implement the algorithm using the Loceva framework (*Loceva – A Location Evaluation Framework* developed at Praktische Informatik IV [3]). Loceva is a framework to analyze different positioning algorithms regarding their performance.

In a next step, the implementation should be compared with already implemented algorithms such as [1] or [2]. In a deep analysis the advantages and disadvantages of this approach should be described. For this, various scenarios have to be considered and possibilities for improvements should be pointed out.

Literatur

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[3] T. King and S. Kopf. Loclib - A Location Library. Website: http://www.informatik.uni-mannheim.de/pi4/lib/projects/loclib/, November 2005.

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[5] M. Youssef and A. Agrawala. The Horus WLAN Location Determination System. In *Proceedings of the 3rd international conference on Mobile Systems, Applications, and Services (Mobisys)*, pages 205–218, 2005.