

Paper Review

RADAR: An In-Building RF-based User Location and Tracking System

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Paper Summary:

This paper introduces RADAR, a radio-frequency (RF) based system for locating and tracking users inside buildings. The paper states that current methods, which use Infrared wireless networks to localize people, are limited by range and are used only for the purpose of localization. RADAR on the other hand simultaneously conducts data networking and user location and tracking with RF wireless LANs. To test their system, they use a FreeBSD 3.0 WaveLAN driver to extract the signal strength and the signal to noise ratio of received UDP packets. They then compare their system's accuracy to when they provide fewer data points, number of samples or change user orientation. The author finds that significant effort is needed to collect and construct a signal strength data set for each area their system is deployed in. They then provide an additional system that uses a radio propagation model during the locating process. In doing so, their algorithm can compare the computed signal strength data points with the real-time signal strength measurements and successfully locate a user with a couple meter precision. This system also improves on the purely empirical method by allowing for the redeployment of base stations in different rooms without having to change the model parameters to gain acceptable accuracy.

Strengths:

- The Radio Propagation Method can be relocated without recomputing the model parameter values
- It investigates the impact of number of data points, samples, the user orientation and tracking mobile users
- They combine data networking with user localization adding onto systems already in place
- They track users with a fair degree of accuracy

Weaknesses:

- The orientation of a user can greatly affect the data
- There are tradeoffs between accuracy and cost of setting up and using a system.

Future Work:

-To analyze the data, a centralized computer must run the algorithm to localize people. Future work could be to find a way that location information can be transmitted without the use of a centralized server.

-Another area for future work is how to easily generalize this system. Every new floor this system is deployed in must have at least 40 physical points and 3 real-time signal strength samples for the empirical data set.

-The only devices this system can track must have wireless LAN and is not as widespread as Wi-Fi on mobile devices

-Although it is out of the scope of this paper, security is important. How can this system protect the data collected on user location?

Comments for author:

This paper does a very good job of analyzing the accuracy of the system in different scenarios whether it is with a smaller data set or moving users. It also does a great job of building upon this data by adding the Radio Propagation Model to the paper to decrease the cost of setting up and using the system in some scenarios. This paper would benefit from discussing how the system would change if there was clutter within the room, where the best location for base stations would be and how a group of moving people would change the accuracy of the system. These are areas that would be common in places this system would be deployed and would serve as an important analysis for the pros and cons of this system in the real world.