Demo: The Airplace Indoor Positioning Platform

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ABSTRACT

In this demo paper, we present the *Airplace* indoor positioning platform developed for Android smartphones [1]. *Airplace* relies on existing WLAN infrastructure and exploits Received Signal Strength (RSS) values from neighboring Access Points (AP) to infer the unknown user location. Our system utilizes a number of RSS fingerprints collected a priori to build the so-called radiomap. Location is then estimated by finding the best match between the currently measured fingerprint and fingerprints in the radiomap [2].

We will demonstrate the real-time positioning capabilities of *Airplace* by allowing attendees to carry an Android tablet and viewing their position on a floorplan map, while walking around the demo area[1]. Our goal is to highlight the effectiveness of various algorithms found in the literature, as well as two state-of-the-art algorithms developed in-house [1].

The *Airplace* system consists of the *RSS Logger* and *Find Me* applications and the *Distribution Server*, while it follows a mobile-based network-assisted architecture to eliminate the communication overhead and respect user privacy. In a typical scenario, when a user walks inside a building a smartphone client conducts a single communication with our server to receive the RSS radiomap and is then able to position itself independently using the observed RSS values.

The *RSS Logger* application is developed around the Android RSS API for scanning and recording data samples in specific locations at predefined intervals; see Fig. 1a. These samples contain the MAC addresses and RSS levels (in dBm) of all neighboring WLAN APs, as well as the coordinates of the location where the user initiated the recording. The collected data are stored locally in log files and users may contribute their data to our system for building and updating the radiomap through crowdsourcing.

The *Find Me* application is a positioning client that downloads the radiomap from the server, thus enabling the user to self-locate independently thereafter. The interface is shown in Fig. 1b (left), where the user can set the preferences and select any of the available algorithms. Subsequently, the *Track Me* button can be switched on for tracking the user while walking indoors. In this case, the current location estimate (green circle) is updated every one second, while the past locations are shown as red dots; see Fig. 1b (right).

(a) (b)

Figure 1: *RSS Logger* (a) and *Find Me* (b).

Our *Distribution Server* is responsible for the construction and distribution of the radiomap. The server parses all available RSS log files, which may be contributed by several users, and merges the data in a single radiomap file.

For the demonstration we will use a Motorola Xoom tablet running Android 3.1 and featuring a 10.1´ screen that facilitates presentation. The *Distribution Server* will be running on a linux-based workstation and clients will use the tablet's built-in WLAN adapter to connect to the server, through the WLAN hotspots at the conference venue, for downloading the radiomap. First, our team will have collected adequate samples before the demo to guarantee good performance. Next, the participants may start positioning themselves with the *Find Me* application and they will be able to appreciate the potential of indoor location-oriented applications. To make the demo more appealing, a floorplan map of the demo area in .jpg format will be required for facilitating the collection of the data for the radiomap and displaying the location estimates during positioning.

Categories and Subject Descriptors

H.4 [**Information Systems Applications**]: Miscellaneous

Keywords

Indoor positioning, WLAN, Signal strength, Android

[1] A video demo of the *Airplace* system is available at: `http://www2.ucy.ac.cy/~laoudias/pages/platform.html`

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1. REFERENCES

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