WEBSIGN: A looking glass for e-services

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Abstract

Desktop browsers are excellent for browsing web sites but they keep users tethered. Wireless browsing technologies such as WAP and i-mode untether nomadic users by making these services available on the move. However, it is not clear if users will be satisfied with free form browsing offered by these wireless technologies. We believe that in addition to free form web browsing, nomadic users will choose to interact with e-services in their environment, if the interaction is transparently setup. Based on this belief, we have created a PDA based system that essentially provides nomadic users with a digital looking glass for viewing and interacting with e-services associated with physical objects and places (fig 1). In this paper, we present an overview of this system – Websign.

Fig 1: Websign is a e-services viewing glass

1: Introduction

The CoolTown[1] research program at Hewlett Packard Laboratories operates on the premise that web technologies and base protocols provide a sound basis for building nomadic computing systems. We assume that nomadic users will carry one or many of the diverse range of electronic devices (such as PDAs, phones or even digital cameras) equipped with some standard form of wireless communication and choose to interact with computing resources in their environment. To support this, our approach is to extend wireless web browsers and back end infrastructure to sense physical entities in the environment and map them into web resources. Typically, beacons are placed near physical objects of interest. The current generation CoolTown beacons use infrared technology to broadcast a url of the associated web resource. Such web resources are typically web representations for physical places, people and things. These web pages can provide maps and directions, and also a context: a virtual collection of related resources.

2: Websign

A Websign is a point in space that link people who select it with a web resource. Since there might not be an identifiable object such as a beacon at a point, we have to rely on other techniques to augment a user's perception to 'see' the websign.

> ***web·sign (web´sīn), n. A personalized virtual beacon deployed in space and time, directing intended visitor(s) to the associated web resource.***

Fig 2: definition

Unlike the Cooltown Physical Beacons[1], websigns do not point broadcast URL and other information. Instead, the information is locally resolved based on the user's current location and orientation. The system consists of wireless internet-enabled mobile devices such as PDAs or smart phones equipped with the client software, a positioning system such as GPS and an orientation system such as magnetic compass. On request, a mobile device connects to a service and downloads XML descriptions of websigns in the wider area. The description consists of the location of the websign, an associated URL and other control information. The client software uses this information to project out relevant websigns in the users vicinity.

Websigns have arbitrary access ranges and are activated when the intended visitor enters this access range. Such active websigns are usually presented to the nomadic user when she points her mobile device in their general direction. In fig 3 we see websigns representing stores in the Union square area in San Francisco (represented by red spheres) presented on the mobile

device prototype (PDA).

At a broad level, we envisage three categories of Websigns – personalized, group-targeted and universal. While personalized websigns are uniquely created for a receiving individual, universal are available for everybody who may choose to have them. The universal websigns are further taxonomized into classes, such as restaurants, theatre etc. This makes it easier for class specific filtering.

Fig 3: Websigns at Union square, San Francisco

Creating a websign involves binding a physical location with a semantic location[2] such as URL. The XML binding can also include parameters for temporal activation, access range etc. A binding can be created by any number of means including by typing a simple XML description. In our current implementation, the service presents users a web page containing a form for entering the url and a map of an area as a reference point for selecting a location. Websigns may also be created using a mobile device. In such scenarios the device's current location – as reported by a positioning system – is bound to a specified URL.

3: Benefits

Since websigns are virtual entities they can be created and deployed directly from computing infrastructure. There are no physical entities to deploy and maintain.

With most location-based systems, the user's physical location is transferred back to a service where it is looked up in a database and the services in the vicinity are resolved. This is a closed solution requiring users to entrust their physical location to a service. Once the user downloads the information for his broad location, the device locally resolves the set of websigns relevant for the user, depending on position, orientation, time and preferences. With Websign, user privacy is better protected.

4: Client prototype

The current prototype is implemented in C++ on a HP Jornada 548 running the Pocket PC operating system. Websign clients could also be implemented on any reasonable hardware platform such as the Palm or a cell phone. For wireless connectivity we use 802.11B indoors

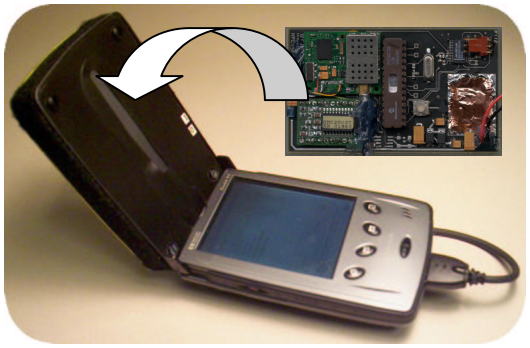

Fig 4: Websign prototype

and CDPD wireless modems outdoors. The prototype positioning hardware includes a magnetometer (sensor for digital compass), a GPS receiver and a PIC microprocessor to control the sensors and to multiplex the sensor data into a single stream. It communicates with the PDA over a standard RS232C serial link.

5: Applications

The applications field covered by Websign is large. Our goal is to provide a platform for applications needing a way to map, deliver and discover e-services in a physical context.

For example, this system enables the following scenario:

Jeff is driving in front of the movie theater with Ellen. Looking at the theater they would like to know which movies are about to start, the seat availability and the prices. Pointing her Websign enabled cell phone to the theater entrance, Ellen directly accesses the theater e-service. She is then able to choose the movie and to book 2 seats.

Another application can be peer-to-peer communication: Websign can be used to leave virtual graffiti for specific person(s) at any locations.

References

[1] CoolTown home page. http://www.cooltown.hp.com/

[2] Pradhan, S. Semantic Location. Personal Technologies, vol. 4(4), pp.213-216, Springer, 2000.