

MyPlace: Double-personalised views of invisible items in a ubiquitous computing environment

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ABSTRACT

In this poster we present MyPlace, a system which enables the user to get a personalised view of invisible information within an ubiquitous computing environment. The information is tailored to the user's preferences, first by the environment, then by the user's personal device. We also describe our approach to modelling the world: space, place, people, devices, context and services in a uniform manner.

Keywords: Intelligent Environments, Invisible Information, User Modelling, World Modelling

1. INTRODUCTION

One branch of Ubiquitous Computing aims to augment the physical environment with many computational devices and sensors to assist people in their activities. Such environments are called Intelligent Environments (IEs).

Unobtrusiveness and Invisibility are goals of good intelligent environments. Systems should be so natural and well hidden in the environment that unless a user knows what components are there, they are almost invisible. However, this invisibility also poses a problem: if things are so well hidden how does a new user find out what services are available to them and what sensors are detecting them. We call this *The Invisibility Problem*.

As an example consider Fred and Jenny, new postgraduate students commencing their degrees in a smart building. The building contains a number of invisible or non obvious systems such as bluetooth-based location sensors, e-ink based notice boards, and wireless networking.

As Fred enters the building he passes a notice board covered in undergraduate notices which he ignores and keeps walking. He does not realise that, were he to identify himself as a postgraduate student, the notice board would present items relevant to postgraduates.

Jenny, on the other hand, enters the building carrying a bluetooth-enabled phone and is detected by the location system. As she approaches the notice boards, they change to show information relevant to new postgraduate students. She is somewhat disturbed by this as she

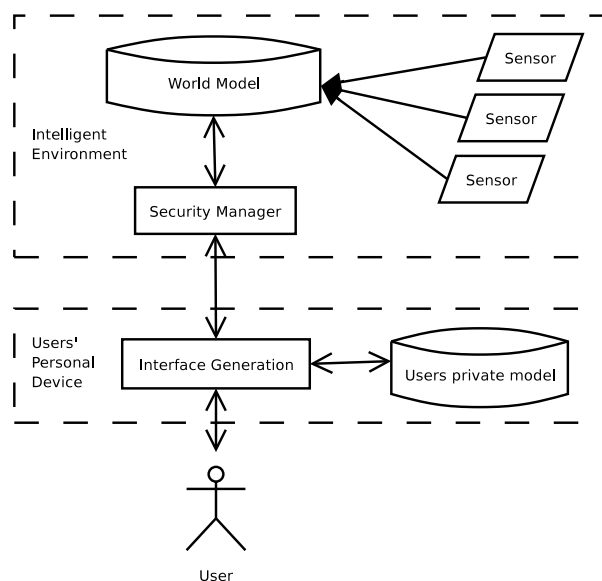


Figure 1: The delivery architecture for MyPlace.

doesn't know how the system knows she is there.

These two cases give examples of both parts of the invisibility problem: in the first example, Fred is unaware of the services available to him and in the second, Jenny is unaware the sensors are detecting her.

2. MYPLACE

The MyPlace system[5] provides personalised views of ubiquitous computing environments in order to alleviate issues such as the invisibility problem described above. The novel aspects of this system are the uniform representation of users, places, locations, devices and services, the double personalisation and the *accretion-resolution* used for the world model.

Figure 1 shows the delivery architecture for MyPlace, in which content is personalised for the user in two stages. First the Security Manager generates a subset of its total world model, based on what the user is allowed to use or know about. Second, the user's personal device selects those parts of the restricted world model the user is interested in, based on the user's private user

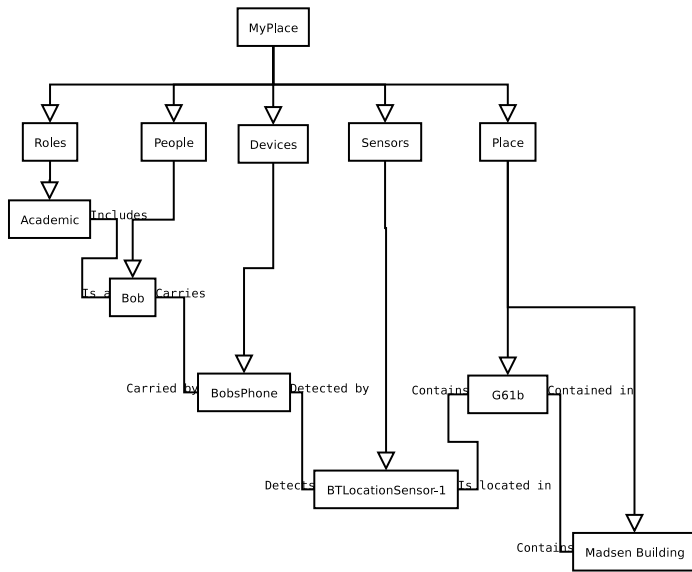


Figure 2: An extremely simplified world model showing the linkages between items

model. To assist with the selection of relevant aspects, the IE can also include recommendations along with the restricted world model.

The uniform representation means that all entities in the system are organised into an inheritance hierarchy of concepts. General concepts form the higher level nodes and the entities modelled become more specific as one moves down the tree. In Figure 2, a particular room (G61b) is a child of the more general concept of place. The nodes of this tree are also interconnected by their semantic relationships. In this example ‘BTLocationSensor-1’ is located in ‘G61b’.

Another interesting aspect of this system is representation of changing values. As information is received from sensors in the system, it is simply stored as evidence without interpretation - this is the *accretion* step. Then when a value is requested the stored evidence is examined and *resolved* to a value. For example in Figure 2, when BobsPhone is detected by the BTLocationSensor-1, it is noted in the models for both entities as time stamped evidence. When we wish to know Bob’s location the system considers all the evidence about what devices Bob is carrying and by what sensors they have been detected to determine a value. The advantage of this approach is that it saves the system from having to put effort into interpreting sensor data as it enters the system.

More information about the MyPlace system can be found in [5].

3. RELATED WORK

The Digiscope [6] provides the user with an augmented reality view of invisible information in the environment by looking through a movable large semi-transparent perspex window. Chalmers et al.[2] have constructed

a framework for *context mediation*, where they adapt the content of documents based on preferences about its semantic and syntactic properties. At Dartmouth College researchers have worked on an event based system for processing context data by defining processing operators and connecting them in an acyclic graph[3]. In our work we are attempting to allow users to specify what they want displayed to them using a similar idea. Other approaches to modelling the world have not taken a uniform approach. CMU’s project Aura[4] models entities in the world as one of devices, people, areas or networks. The NEXUS project[1] focuses more on location and has a much stricter schema.

4. CONCLUSIONS AND FUTURE WORK

The MyPlace system currently works for users’ personal devices within our department. We are currently working on ways for the user to further customise which elements of their world model that they are interested in.

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