

Design of a Wearable Micro Info-Broadcasting System

Kenji Sasaki[†], Ushio Inoue[‡], and Yoshito Tobe[†]

[†] Department of Information System and Multimedia Design, Tokyo Denki University

[‡] Department of Information and Communication Engineering, Tokyo Denki University

E-mail: {kenji, yoshito}@unl.im.dendai.ac.jp

inoue@c.dendai.ac.jp

We have recently seen much progress in the development of wireless communication and semiconductor technologies, which enables advanced ultra small personal computers (PCs) with wireless communication devices. Furthermore, the development of Global Positioning System (GPS) is remarkable. Small GPSes have already been installed in several cellular phones to notify users of the phones of their current location and to navigate the users to their destination point in a town. In addition to GPS, various sensors with reduced size are becoming available. These sensors include temperature, pulse, and sweat sensors, which can measure the healthiness of human bodies, and CO_2 , NO_x , and pollen sensors, which collect the environmental information.

These all miniaturized sensing devices can be integrated into wearable computers. Assuming that wearable computers become common in the near future, we can say that each individual person will obtain tremendous amount of information in urban lives; each person will collect climate information, the status of atmosphere, and traffic jam at the person's location as well as person's health status. This kind of information is small to the person and may be discarded. However, in an urban area, people may gain benefit by accessing to the status of the environment. Therefore we can collect each person's small data and create a global view of the environment.

In this paper, we propose Wearable micro-INformation broadcaster (WINFO). WINFO collects urban environmental information from people holding wearable computers and provides necessary information to the people.

The initial motivation for this work became apparent during our work on wireless ad hoc networks using PDAs and mobile phones carried by people in an urban area. The basic idea behind the ad hoc networks is utilizing an intrinsic nature of high density of people. Similarly, we can utilize this nature to form rich information by collecting individual small amount of data. In addition, recent trend of computerized mobile phones will accelerate wearable computers. These two aspects underlie constituting fine-grained information created by individual persons.

From the point of view of information clients, obtaining fine-grained information in the city leads to optimization of personal plans. For instance, a person will be able to know when to go out during temporary rain.

We assume that each person holds a wearable PC that GPS and several sensor devices are installed in. The GPS acquires a user's current location information. On the other hand, the sensors acquire various kind of information as follows:

- Information of a user
(Temperature, Heart beat, Blood pressure)
- Information of the user's movement and actions
(Walking, Sanding, Stopping, Running, Beginning to use an umbrella)
- Information of the user's surrounding environment
(Illuminance, Humidity, Temperature, Density of CO_2 and pollen)

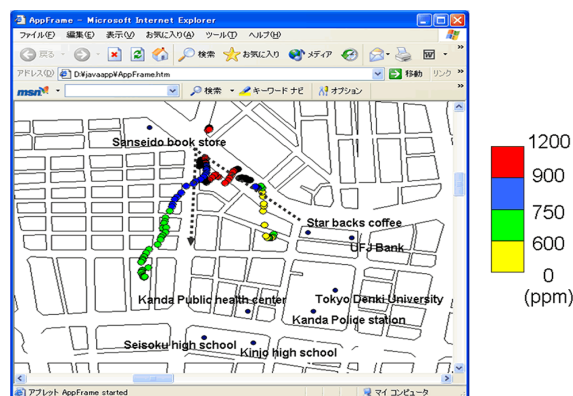


Figure 1: Map of urban environmental information.

We implemented a prototype and conducted a simple experiment using the prototype system. The experiment was conducted by walking in the urban area for six minutes while acquiring location, CO_2 , temperature, and humidity data. We constructed map of urban environmental information.