

Dynamic Connection of Wearable Computers to Companion Devices using Near-Field Radio

Wearables - a new form of PC?

The perfect PC should support many different tasks, but still remain 'unconsciously wearable'. This is particularly hard to achieve when choosing peripheral devices such as displays or text-input devices. A peripheral that is great in one situation may be poor in another.

Our goal is to build a dynamically configurable wearable where people can effortlessly use the companion devices they need, whenever they need them. To achieve this

configuration must be completely transparent: no wiring and no dialog boxes! Natural gestures such as picking up a peripheral device must be detected by the wearable. The wearable must then take this as a cue to work with the peripheral.

Companion devices may either be personal or public. Personal devices are picked up in advance by the user. Public devices are located in public spaces for everyone to use as they pass by.

Foot-Bridge Wireless Link



To achieve our goal of a "dynamically configurable wearable", we have developed a 1 foot range radio transceiver called "Foot-Bridge". Foot-Bridge allows us to connect companion devices to the wearable computer without wires. By mounting the antennae around the user's wrist or shirt cuff, we can detect devices being touched or held in preference to others in the vicinity. This allows automatic configuration of the wearable.

Companion Devices...



A personal viewer and note-taker



A public viewer and internet access point



A digital camera - after the user has taken a picture the image is transferred directly for storage on the wearable computer.

Foot-Bridge Wireless Technology

Foot-Bridge is a low-bandwidth, short range wireless link, transferring about 300kbps over distances up to 1 foot.

It is based on near-field radio*, which provides:

- A well-defined pico-cell.
- Low cost
- Low power consumption
- Modest bandwidth of 100-400kbps

*Demers et al, "A Nano-cellular Local Area Network Using Near-Field RF-coupling", *Wireless Personal Communications* 1995



A door knob - grasping the door knob causes interaction between a building security server and identification held on the wearable.



A free-standing mouse - touch the mouse to be use it as your wearable's pointing device.

Foot-Bridge Implementation

Foot-Bridge operates at 10MHz using Frequency Shift Keying (FSK) and a direct conversion receiver. It acts as a "bit pipe" connected to a serial port. The MAC is provided by the wearable computer or companion device.

