Abstract

I present a framework for wearable computing, based on the principle that it be unobtrusive, and that it be integrated into ordinary clothing. This design philosophy, called ‘eudaemonic computing’ (named in honor of the group of physicists who designed the first truly unobtrusive wearable computers with vibrotactile displays) is reduced to practice through the ‘underwearables’ (‘underwearable’ for short). The ‘underwearable’ is a computer system that is meant to be worn within or under ordinary clothing. The first ‘underwearables’ were built in the early 1980s, and have evolved into a form that very much resembles a tank-top[1]. There were three reasons for the tank structure: (1) weight is evenly and comfortably distributed over the body, and bulk is distributed unobtrusively; (2) it provides privacy by situating the apparatus within the corporeal boundary we consider our own (personal) space, and others also so-regard; and (3) proximity to the body affords capability to both sense biological signal quantities (such as respiration and heart signals which are both accessible to a vest-based device), as well as produce output that we can sense, unobtrusively. The vibrotactile output modality (VibraVest) was explored as a means of assisting the visually challenged (to avoid bumping into objects through an ability to ‘feel’ objects at a distance). The success of VibraVest suggests other possibilities for similar unobtrusive devices that can be worn over an extended period of time, in all facets of day-to-day life.

KEYWORDS: eudaemonic computing; eudaemonic space; wearable computing; humanistic intelligence; existential technology; vibrotactile; vibrotactile display; vibrotactile tachometer; vibrotach; corporeal envelope; radar; BlindVision; prosthetic; personal imaging; WearComp; WearCam.

1 Introduction

1.1 Wearable computing with vibrotactile displays

In the late 1970s and early 1980s, a group of west-coast physicists, known as the Eudaemons, built a class of wearable computers, equipped with vibrotactile displays and wireless communications, that were almost completely undetectable — so undetectable as to pass the scrutiny of the keenest eyes of all — those of croupiers and pit bosses within the gambling casino environment[2][3].

1.2 The WearComp effort

While the Eudaemons were developing their shoe-based computer, I was developing a much different kind of wearable computer. The two efforts took place independently, the author's being a 'personal imaging' system[4] (wearable computer system that would function as a photographer's assistant).

The recent proliferation of surveillance cameras suggests that, in the future, there may be serious threats to personal privacy. Therefore, it is hoped that, if personal privacy should be so-threatened, at least there might be universal accountability for all. Toward the goal of a balanced and democratic society, it was therefore the author's wish to develop a completely unobtrusive wearable computer. This system is almost completely undetectable to the naked eye, upon inspection from a typical conversational distance.

Furthermore, the author's apparatus is not just a wearable computer in the traditional sense, but, rather, a complete multimedia computer system, with personal imaging capability. Input comprises both radar and video with applications ranging from journalism and personal documentary, to prostheses for the visually challenged.

In this poster, I will present some directions/suggestions for the industry to move in, based on my belief that the wearable computer should fall under the domain of personal electronics, owned, operated, and controlled by the wearer, and that it should be unobtrusive, so that the user can look as "normal" as possible while wearing it. The application domain of prosthetic devices for the visually challenged[5][6] is emphasized, for this is an application domain that requires sustained usage over an extended period of time, in nearly all facets of ordinary day-to-day life, e.g. banking, shopping, traveling, or the like. Assistive technology for the disabled falls into a different class than the more task-specific applications of wearable computing[6], in the sense that the former requires that the computer meet the needs of the individual, while the latter requires that the individual meet the needs of the computer/establishment. This dichotomy is best captured in considering the difference between 'smart clothing' and 'smart uniforms'[7].

I also suggest 'underwearables' — wearable computers as undergarments (e.g. tank tops) — with the goal of situating the computer within the personal and private space of the individual, distributing the weight and bulk evenly and unobtrusively, and for applications, such as a vibrotactile aid for the visually challenged, possible because of the proximity of the apparatus to the body.
3 Underwearables ∀ occasions

What is really needed, is a change in the direction of wearable computing from task-specific applications (e.g. maintenance, factory work, etc.) toward a computer that is acceptable for the common everyday lifestyle. The wearable was proposed for its privacy, comfort, and ability to monitor as well as actuate the body. In this sense, the issue of privacy is even more important, for it resides within the wearer’s own space, and has access to personal information, that is, in the future, perhaps our most up-to-date medical records will be those that reside upon our bodies.

Further toward the Oranchak principle — that the apparatus should function as a “third hemisphere” of the brain, and perform the tasks that the other two hemispheres are not good at — tasks such as accurate record-keeping and provision of additional sensory capabilities (e.g. Electric Feel Sensing) — the wearable is an important first step.

References


