Chapter VIII

Kinetic User Interfaces:
Physical Embodied Interaction with Mobile Ubiquitous Computing Systems

Vincenzo Pallotta, University of Fribourg, Switzerland

Pascal Bruegger, University of Fribourg, Switzerland

Béat Hirsbrunner, University of Fribourg, Switzerland

Abstract

This chapter presents a conceptual framework for an emerging type of user interfaces for mobile ubiquitous computing systems, and focuses in particular on the interaction through motion of people and objects in physical space. We introduce the notion of Kinetic User Interface as a unifying framework and a middleware for the design of pervasive interfaces, in which motion is considered as the primary input modality.

Introduction

Internet and mobile computing technology is changing the way users access information and interact with computers and media. *Personal Computing* in its original form is fading and shifting towards the ubiquitous (or pervasive) computing paradigm (Want et al., 2002). Ubiquitous Computing systems are made up of several interconnected heterogeneous computational devices with different degrees of mobility and computing power. All of these devices and appliances are embedded in everyday objects, scattered in space, capable of sensing the environment and of communicating with each other, and carried or exchanged by people. Therefore, we are facing a new ecology of computing systems that poses new issues in their integration and usability. Human-computer interfaces that were designed for desktop personal computers must be re-conceived for this new scenario. Due to the different capabilities of mobile and embedded devices, the pervasive computing infrastructure, and the nature of their expected usage, it is apparent that new types of user interfaces are needed in order to unleash the usability of new generation distributed computing applications (see (Rukzio, 2006) for a classification of mobile devices interfaces). Additionally, the concept of user interface itself seems to be no longer adequate to cope with ubiquitous computing systems. Rather, it is the concept of interaction and user experience that will take over (Beaudouin-Lafon, 2004).

Ubiquitous Computing

Ubiquitous Computing (henceforth Ubicomp) is an emerging research sub-area of Distributed Systems whose main focus is studying how heterogeneous, networked computing devices can be embedded in objects of daily use in order to enable new applicative scenarios and user experiences. Mark Weiser (1991; 1993; 1994) introduced the term Ubiquitous Computing in the '90s as a new way to understand computer technology and to lay the foundations of an expected and necessary computing paradigm revolution. Weiser's vision has been adopted and interpreted by a great number of researchers, among whom we consider relevant for our goals the works of (Abowd & Mynatt, 2000; Abowd et al., 2002; Banavar & Bernstein, 2004; Bellotti et al., 2002; Greenfield, 2006; Norman, 1999; Want et al., 2002). We summarize the Ubicomp vision in four fundamental points that motivate our effort of providing a new conceptual framework for Ubicomp user interfaces:

1.   Today's computer (e.g., the personal computer) will disappear, and the computing power will fade inside the network infrastructure, as it is already the case to some extent with existing web-services.

Related Content

A bio- medical Question Answering system for the Malayalam language using word embedding and Bidirectional Encoder Representation from Transformers.
(2022). *International Journal of Security and Privacy in Pervasive Computing (pp. 0-0).*
www.irma-international.org/article//302009

Using Multimedia and Virtual Reality for Web-Based Collaborative Learning on Multiple Platforms
Gavin McArdle, Teresa Monahanand Michela Bertolotto (2007). *Ubiquitous and Pervasive Knowledge and Learning Management: Semantics, Social Networking and New Media to Their Full Potential (pp. 118-157).*
www.irma-international.org/chapter/using-multimedia-virtual-reality-web/30478

Design and Implementation of Bipolar Digital Signal Acquisition and Processing System Based on FPGA and ACPL-224
Guangfu Lin, Zhenxing Yinand Guo Feng (2011). *International Journal of Advanced Pervasive and Ubiquitous Computing (pp. 1-5).*
www.irma-international.org/article/design-implementation-bipolar-digital-signal/66060

New Hybrid Proposed Solution for Video Steganography Based on Clustering Algorithm
Ahlem Fatnassi, Hamza Gharsellaouiand Sadok Bouamama (2020). *International Journal of Security and Privacy in Pervasive Computing (pp. 30-43).*
www.irma-international.org/article/new-hybrid-proposed-solution-for-video-steganography-based-on-clustering-algorithm/259341

Multiple Quantum Spaces Based Genetic Coding Method
Tao Gao (2014). *International Journal of Advanced Pervasive and Ubiquitous Computing (pp. 48-57).*
www.irma-international.org/article/multiple-quantum-spaces-based-genetic-coding-method/116035