

Design, Construction, and Testing of a Novel Robotic Workstation

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Abstract

This paper describes the development of a novel robotic workstation which users configure to a variety of spatial forms. These configurations allow users to define their physical workspace as well as to situate computer and analogue tools precisely to support a broad range of work-and-leisure computing activities. The workstation is part of our *Animated Work Environment (AWE)* project aimed at programmable smart environments which fundamentally alter user experience. This paper describes, in detail, the design, realization, and initial testing of the multi-panel robot workstation which itself represents a novel type of robot surface.

Keywords: robotics, animation, human-robotic interaction, intelligent environments

1 Introduction

In an increasingly "digital" society, many of our everyday activities are becoming more efficient, stream-lined, and complex due to the wide-spread adoption of mobile Information Technologies [1]. People can answer e-mails, search the internet, record media such as audio files, photographs and videos, and edit documents on-the-move, using relatively inexpensive cell phones, PDAs and laptop computers – portable devices easily synchronized. But while Information Technologies have greatly expanded the mobility of computing, it has not offered as much to the relatively static, fixed work environments residing within our workplaces and homes. Here, printed materials and computer peripherals still clutter desks, while traditional furniture and lighting crowd rooms. A different kind of workplace incorporating intelligent, reconfigurable elements promises to better adapt to an increasingly digital world, allowing computer users to become more efficient, more organized, and potentially more creative.

Upon first approach, the robot workstation introduced in this paper appears to be nothing more than a flat wall (Figure 1). When the user takes control it transforms into a personalized, intimate space for the focused composing of documents (Figure 2); or, alternatively, a configuration designed for presenting to an audience (Figure 13a). The workstation efficiently utilizes space by dramatically transforming itself to match the needs and wants of different users. Computing, digital projection, and lighting will emanate from within the workstation itself.

The design concept is not limited to the office. The workstation can function inside distinct rooms of different sizes and purposes because it can adapt its physical form. At home, for instance, the workstation

supports home-office tasks; when these tasks are accomplished, the system provides configurations suited to online gaming (Figure 13b), shopping, viewing, tutoring, and creative/investigative activities.

The concept of a dynamically reconfigurable, intelligent environment is the focus of the larger *Animated Work Environment (AWE)* research project [1], [2]. The multidisciplinary research team is comprised of investigators in Architecture, Robotics, Sociology, and Psychology. In the first year of research, the Sociologists conducted detailed phone surveys of technology users while the Psychologists performed task analyses of a range of subjects chosen to represent a large spectrum of workers performing everyday tasks within their physical work environments [3]. These efforts helped the team identify the needs and wants of workers with respect to the physical environments in which they routinely perform their work. The results strongly support the need for embedded IT within a physical environment that is both intelligent and readily reconfigurable.



Figure 1: Workstation design as a flat wall

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Robots in K-12 Education: A New Technology for Learning

Barker, Bradley S., Nugent, Gwen, Grandgenett, Neal, Adamchuk, Viacheslav I., 2012-02-29 This book explores the theory and practice of educational robotics in the K 12 formal and informal educational settings providing empirical research supporting the use of robotics for STEM learning Provided by publisher

Robot Teams Tucker Balch, Lynne E. Parker, 2002-04-17

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