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vCOM: Electronic commerce in a collaborative virtual world

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Abstract

Existing e-commerce applications on the web provide the users a relatively simple, browser-based interface to access available products. Customers are not provided with the same shopping experience as they would in an actual store or mall. This experience, however, can be achieved by the creation of a virtual shopping mall environment, simulating most of the actual shopping user interactions. The virtual mall brings together the services and products of various vendors. Users can navigate through the virtual shopping malls, adding items of interest into a virtual shopping cart, and perform searches assisted by 'intelligent agents'. A Collaborative Virtual Environment (CVE) can realize a sophisticated virtual shopping application. In such a CVE, a large number of potential users may interact with each other. In this paper, vCOM, a VRML and Java3D-based prototype is presented, which permits users to navigate around virtual e-commerce worlds and perform collaborative shopping and intelligent searches with the assistance of software agents, in order to find the products and services of interest to them. They can then negotiate with sales agents to bargain for the best possible price and then make a secure buying transaction. The virtual mall prototype also allows the user to communicate with an 'intelligent shopping assistant' using simple voice commands. This assistant interacts with the shopper using voice synthesis and helps him/her use the interface to efficiently navigate in the mall. Real-time interactions between the entities in this shared environment are implemented over the High Level Architecture (HLA), an IEEE standard for distributed simulations and modeling. The paper focuses on user interface design, collaborative e-commerce through HLA and multi-agent architecture.

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1. Introduction

It was hard to imagine 10 years ago that people could handle their lives so easily, by just logging

onto the Internet, using computer networks, to find out all sorts of information they need, evaluating the products or services they need, comparing prices and making a purchase right away. All these things, which would have been completed in more traditional ways before the evolution of the Internet, are being conducted today through the new business tool—Electronic Commerce (EC). Electronic commerce refers to commercial activities conducted electronically, such as the buying and selling of

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products and services, and the transfer of funds, through public or private digital networks. The goals of e-commerce are to reduce cost, expand business, and improve customer response time and quality. The core of e-commerce, as distinguished from traditional commerce, is referred to as a 'fully-digital business.' A market is composed of three components: sellers and buyers (or agents), products, and processes [3]. These components are mostly digitized at the core of e-commerce. E-commerce is not simply an interactive Internet version of traditional retail business. E-commerce, as a new medium of communication, provides more useful information, expands choices, simplifying purchasing processes and lowering costs.

While the actual execution of e-commerce is so different from its real-life counterpart, what shoppers want to experience online, ironically, are characteristics of the real-life-shopping environment. Existing electronic commerce applications have the following characteristics:

1. Only provide the users with a relatively simple, browser-based interface to access the available products and services.
2. These applications often lack in the emulation of the social factor. The customers are mainly kept separated and everyone is shopping, as if s/he was in an empty shop. Thus, customers are not provided with the same shopping experience, as they would be in an actual store or mall.

Shopping actually is a social activity people enjoy doing along with friends and relatives. In particular, it is likely that shopping is an activity that is socially facilitated, meaning that when done in the company of others, people engage in it more often and enjoy it more. Marathe [25] states 'people don't like to shop in an empty store.' To substantiate this opinion, he cites a survey, which shows that 90% of shoppers prefer to communicate while shopping. Warms et al. [26] argue for shopping communities because they 'increase stickiness (customer loyalty) [and] viral marketing (word of mouth), reduce [the] cost of customer acquisition, and drive higher transaction levels.' Considering the current growth in e-com-

merce on the Web and the desire to make shopping as easy, natural and enjoyable as possible, it is imperative to extend the way people currently shop on the Web by adding support for more collaboration between customers and salespersons or among customers. Therefore, providing a virtual reality web shopping experience is closer to the experience people have in real shopping environment.

Based on the innovations in 3D Virtual Reality online store technology, it would not be long that customers would find online malls of the future more like their offline counterparts. Shoppers would imitate 'walking' around the virtual mall using their 'avatars' and controlling their moves by pointing their mouse or using simple voice commands. If they find items of interest in the navigation process, they can purchase them. Users navigate the virtual commerce world, visit stores and manipulate items therein, only using their browsers. In this paper, a solution called vCOM is presented, which is based on Collaborative Virtual Environment (CVE) technology. With the creation of a virtual shopping mall, simulations of the actual shopping environments and user interactions can be achieved to a great extent.

The virtual e-commerce prototype presented in this paper holds three major advantages over existing online HTML-based e-commerce applications. First, the multi-faceted dynamic virtual reality environment allows merchants to implement stronger marketing and branding initiatives than what is available on a 'flat' Web page. The second benefit of the 3-D environment is a longer shopping retention period. According to the survey conducted by Active Worlds [10], the average user session in a 3-D shopping mall is 45 min—an abundance of time to market effectively to shoppers. In comparison, the average user session at regular web site is less than 5 min. The third advantage of this new technology is the enhanced interactivity between merchants and consumers, among customers and visitors. Virtual mall technology enables online merchants to offer features that are lacking in most of today's e-commerce stores. For example, the virtual mall makes it easy for storeowners to provide real-time customer support, sales assistance, cross-selling, promotion and individualized care that have traditionally been proven to improve sales.

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