

# Web-based Authoring Tool for e-Salesman System

Magdalene P. Ting and Jerry Gao, Ph.D.

San Jose State University, Computer Engineering, San Jose, CA 95192-0180  
[jerrygao@email.sjsu.edu](mailto:jerrygao@email.sjsu.edu)

**Abstract.** Searching and finding items on the WWW is increasingly difficult for businesses and for consumers. Many navigation and keyword searches are inadequate for the modern consumer. What's plaguing e-commerce is the lack of intelligent assistance. The e-Salesman System (eSS) [11], based on a knowledge-driven intelligent model, aims to simulate the human element of traditional shopping for online sales. This paper presents a tool for authoring and managing an intelligent system that will change the current approach to online browsing, searching, and shopping. The contribution of this solution is to allow merchants to customize and change their e-retail shops to interact with online users based on their dynamic changed models to meet their business rules and marketing needs.

## 1. Introduction

E-commerce offers many advantages to both buyers and sellers alike. However, in reality, online sales are not what they were projected to be. While e-commerce has grown vastly with the great many advantages it offers both sellers and buyers, it contributes only to a very small percentage of total sales. Many are seen to use the Internet stores as more of a research tool than an actual store where they would buy products. The design of web-stores is one of the factors that influence browsers into becoming buyers. A number of credible surveys show that a large number of online shoppers feel many websites are difficult to navigate, and searching for the right products is not smooth or easy. For novice shoppers, being presented with many links, flashing text, attractive pictures, and numerous advertisements is often confusing and frustrating. A very important feature that many websites fail to show is a persona, the human element that exists in traditional shopping. We see the need of making websites more intelligent, personal, friendly, human, and less confusing while appearing more trustworthy to the customer, making the online shopping experience parallel to the traditional one.

To address the need for these missing factors in online shopping, an electronic salesman solution was developed in San Jose State University with the guidance of Dr. Jerry Gao. The e-Salesman System (eSS) is an intelligent system that allows creation of virtual-human sales representatives for web-stores. By providing intelligent sales, persona, and a

human element to customer-website interaction, the eSS offers a cost effective solution to the current online shopping problem. Virtual sales representatives can be employed for sales, customer support, general information and guidance, and numerous other applications. The eSS is an adaptable and an authorable system that can be customized to suit the needs and requirements of any web-store by providing the web-store own unique interaction model [1]. This paper talks about the architecture and design of the system by providing design models using UML. It presents an intelligent interaction and authoring solution that supports the interaction between the eSS, web-store administrators, and online customers.

## 2. Related Work

This section presents a brief summary of current existing work in the study and applications of web agents and artificial intelligence effects in e-commerce applications. In the recent years, a number of published papers addressed the needs of intelligent assistance to support e-commerce application systems. Caroline C. Hayes [6] discusses the escalating significance of agent-based approaches. Agents are changing the way people conduct businesses and manage information and investments. Nishida [7] and Takeuchi and Katagiri [8] discuss the personality or social characteristics of animated interface agents. People tend to expect personalized agents to behave intellectually, in the same way as humans. There is an increase of design approaches to intelligent authoring tools for tutoring and learning [9][10] but the focus on e-commerce is still scarce.

Current leading technology groups are increasing their efforts to produce “intelligent agents” to perform a number of web-based activities. Many companies see the need for employing sales and business intelligence on their business and retail portals. Currently, these forms of intelligence are seen in intelligent search agents, automated user driven product selection agents, animated personas, natural language search, intelligent advertising, intelligent recommendation, etc [2]. The more common forms of intelligence are seen in intelligent personalization, intelligent recommendation, and intelligent advertising [3].

The less common forms of intelligence are seen in the following areas:

1. *Intelligent interfaces*: Some companies, such as [www.nativeminds.com](http://www.nativeminds.com), do offer intelligent interface solutions.
2. *Intelligent search*: [www.askjeeves.com](http://www.askjeeves.com) is a search interface that provides searching capabilities with natural language inputs.
3. *Intelligent sales assistance*: [www.liveperson.com](http://www.liveperson.com) is one company that tries to bridge the gap between human assistance and online assistance but it still requires human representatives in the background.

4. *Intelligent purchase assistance*: A. Burns and G. Madely discussed how web-based agents might be used to aid buyers in fashion selection and the online purchasing process [4].
5. *Intelligent customer services*: Aberdeen Group Inc. discussed the demand for increased online customer service and how automated agents may help meet these demands [5].

We see the need to develop an intelligent integrated solution that uses all the commonly seen and less commonly seen intelligent applications. The main reason is to make online commerce a more human, personal and friendly experience that appears to mimic the traditional shopping experience for shoppers.

### **3. The e-Salesman System**

This section contains an overview of the e-SS, including its architecture, high-level models, technology, rules, and features [11][12]. There are many qualities and traits that form a good sales person. A good and intelligent sales person should possess an intelligent aura and a likeable persona. This impression creates a welcoming and sincere environment to customers. He or she should be able to communicate using a common language so as to be clearly understood by customers and should possess ample knowledge about products, knowledge about clients, and strategic knowledge. The sales person should know how to sell the right product, to communicate with buyers, to recommend products, and to negotiate with customers.

#### ***E-Salesman***

The eSS is designed to be an intelligent sales platform that employs all of the intelligent application areas in e-commerce. Unlike existing work, our goal is to develop an intelligent customer representative with human-like conversational capabilities, reasoning, knowledge, and persona. The platform will be based on knowledge driven model with knowledge-based reasoning and architecture. It can be authored to provide information services, as well as sales and business knowledge driven services. The purpose is to make e-commerce as natural, as effortless, and as intelligent as traditional shopping experiences.

The eSS has a set of requirements that makes it useful in its areas of application and must have a few basic qualities to achieve the expected results. The eSS has a *persona*. One of the main features that influence how users perceive intelligence is the interface. The use of animated characters and human persona has proven to be successful. The different expressions of a persona are shown in .Fig.1. The eSS must have *natural language support*; the conversation that a customer has with a salesman should be as seamless and effortless as an online chat or a phone call with an actual human representative. The eSS must possess *product knowledge* and be able to use and query that knowledge on the

customer's request. The eSS must also be equipped with *sales knowledge*. It must be aware of any special offers, promotions, and over-stocked inventory and pricing, and should be able to use this information to make a successful sale. The eSS servicing a customer in a session must remember the customer, his or her needs, his or her stated queries and all other customer information throughout the session. The eSS needs *persistence* to keep track of the customer's navigation, choices, needs and purchases all throughout the customer's visit.



Fig. 1. Persona with Different Expression

**System Architecture**

The overall architecture for this system is a three-tier web-based system that includes the clients, a web server and application server and the database server. Fig. 2 shows the system architecture.

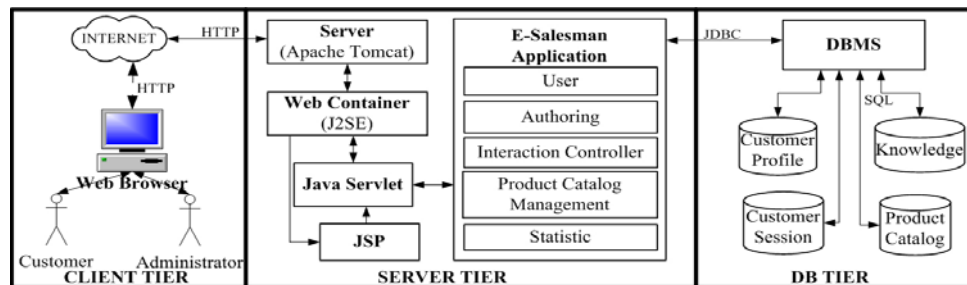


Fig. 2. Overall Architecture

**Design for the Authoring Tool**

Fig. 3 shows the authoring module design consists of a collection of components that allow the user to access the authoring services provided by the eSS. It consists of the knowledge data access component supporting the display servlet and the author controller component. The knowledge data controls access to the models, nodes, templates, tokens, and expressions that allows the access, author and management of the components. User can access and author model elements or node elements. Model elements include general properties and information of a model whereas node elements consist of general properties, seller properties, buyer properties, node condition, and URL. Buyer properties may also include one or multiple token values. The eSS's authoring tool is a subsystem that is adaptable and can be used with existing e-commerce websites. Our application was

implemented with JAVA, JSP, Servlets, HTML, JavaScript, JDBC, and SQL. The web-server used was Jakarta Tomcat.

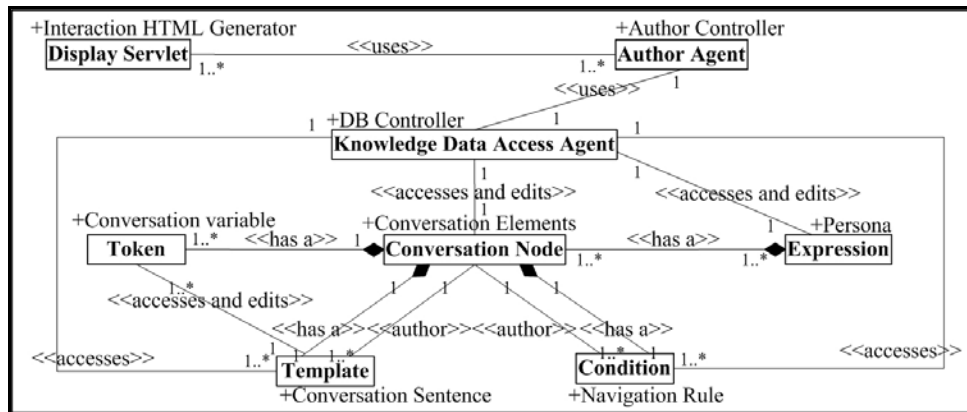


Fig. 3. Authoring Tool Design

## 4. The Authoring Solution

The eSS includes a comprehensive solution for the interaction between the system and the users and an intricate authoring solution for customization support for web-stores. In order to magnify the details of the authoring subsystem solution, we need to first proceed to give some details of the interaction of the eSS.

### 4.1. The Underlying Interaction Solution

The interaction structure of the eSS is an intelligent condition-based system. The interaction-processing piece includes the intelligent agent and the interaction controller. The interaction controller receives selected conversation template, with or without token values, from the customer through the user interface and dispatches it to the intelligent agent. The intelligent agent takes the information and dynamically accesses the knowledge repository for the condition that corresponds with the customer's selection. The new information will then be displayed by the user interface after receiving them from the interaction controller.

A conversational model is a graph  $M = (N, L)$ , where  $N$  is a set of conversational nodes and  $L$  is a set of directed links. A single node,  $N_i = (CT, P, U, E, C)$ , is a single

conversation element that is an utterance from the salesman and customer. A link is a transfer of interaction from one node to another. A node consists of a set of conversational texts called templates, CT, a notice, P, a URL, U, a persona expression, E and a condition, C. A single template,  $CT_i = (S, T, T)$ , consists of a template text, S, a role, R and a set of tokens, T. A single token,  $T_i$ , is a variable in the template text that can take a value during the customer-salesman conversation. Examples of tokens are “make” or “model” or “manufacturer” or “price”. A token,  $T_i = (m, f, y)$ , consists of a token name m, a list filename f, which is a locator of the list of possible values, and a type y, which describes the nature of the token. The values that a token may take at any given point are dynamic data generated from a source. Every node has a condition, C (1). The condition is a test case which returns a true or false value when executed. This value determines whether that particular conversation node is to be traversed during the conversation. The condition utilizes a number of variables that can be tested - the identity of the parent node, the values of tokens previously determined, and the conversation template picked by the customer in the parent node.

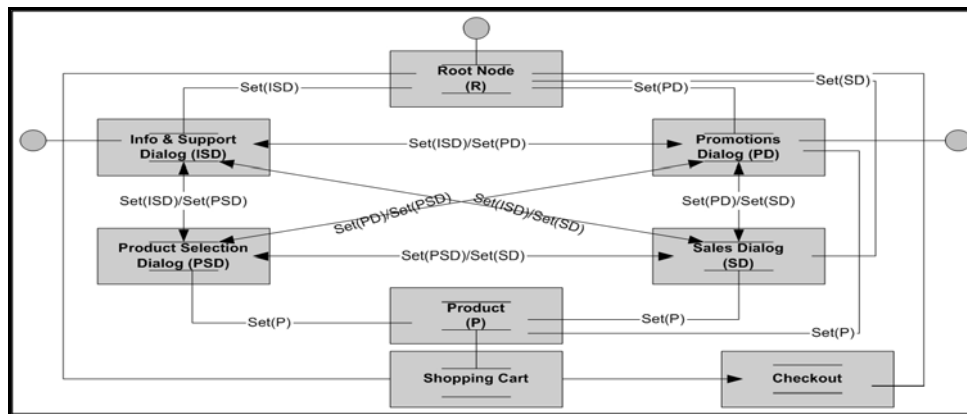


Fig. 4. Context-based Interaction Model

Fig. 4 presents a context-based interaction model for the eSS interaction. The model illustrates major conversation subjects for the interaction between the eSS and a shopper. These subjects can be classified into the following four major categories: sales-oriented dialog, support and information oriented dialog, promotion oriented dialog and product selection oriented dialog. The links between two subjects represents a transfer of conversation from one subject to another. From the figure, conversation may start from the root node, promotions dialog or support and information dialog. Conversation may transfer from one subject to another depending on the shopper or the eSS.

## 4.2. The eSS Authoring Solution

Fig. 5 shows the authoring processing component that includes the authoring agent and the data controller. The data controller controls receiving data from the user interfaces and handing it to the authoring agent. The authoring agent takes the information and appropriately processes it as creation or editing of node, token, or expression. The user interfaces are customized by the different elements that may be authored. The administrator, as the user, can author node, tokens and expressions through the respective interfaces. One of the main objectives of creating the authoring tool is to make the tool straightforward to author the elements; the different user interfaces make it simple for the user to author the different elements. The authoring processing component is designed with detailed rules that build and change the growth of the entire interaction repository. There are many different nodes that make up the entire sales conversation. The features of a node can be that of inquiry, informative, critical, or supplementary.

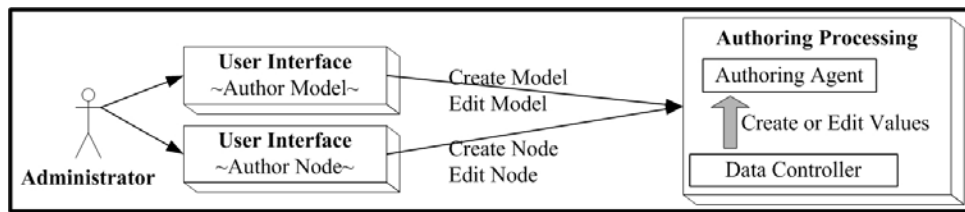


Fig. 5. Agent Architecture for Authoring

### *The Authoring Module*

The authoring module is a detailed ensemble of helpful and user-friendly interfaces, complex rules for managing the collection of nodes and links that form a part of the entire sales-oriented conversation, and intricate algorithms for performing the intelligence of the authoring system. The authoring tool is designed to be rich in usability; methodical with accepting valid information and clever with the ability to recognize errors while portions of the nodes and links and being authored. The algorithm supporting this feature is highly significant in this system because the information of conversations entered by a person can grow extremely vast and keeping track of accurate conversational input can very quickly be beyond human capabilities. Thus, this tool is complex yet highly supportive to the end user.

### *Authoring Application*

Authoring the eSS system requires a combination of knowledge; sales, marketing, and some technicality of the eSS system. There are various ways to author the system for the model to represent an intended interaction between the eSS and a user. The next few figures will show one way for authoring a specific car dealership.

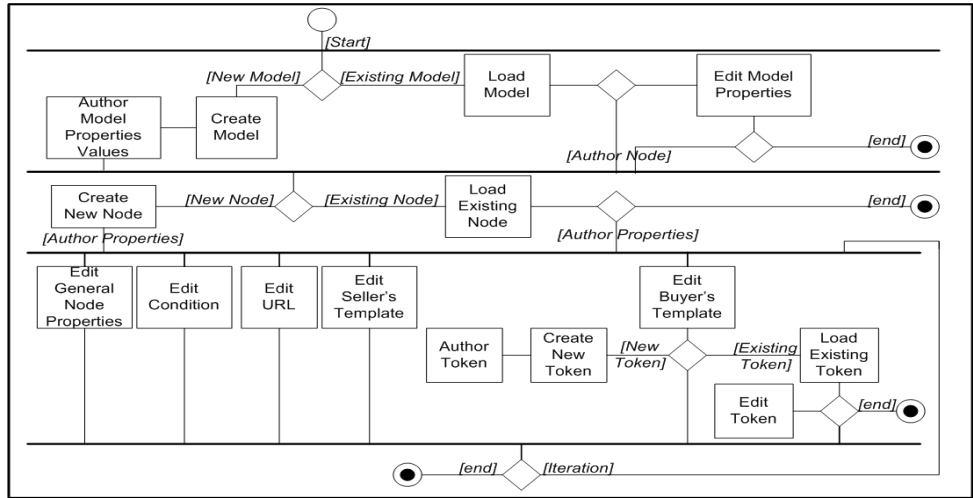


Fig. 6. Authoring Model

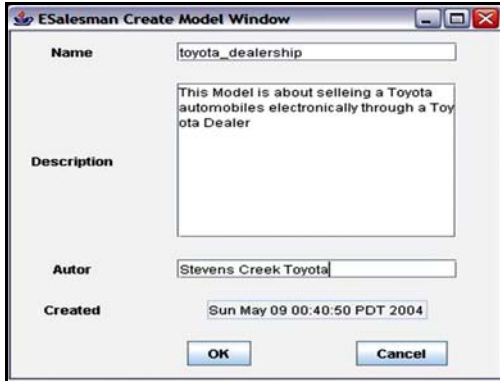
Fig. 6 show the model of how the system can be authored. The author starts with either creating a new model or loading an existing model and goes on to either editing model properties or authoring a node. The author may author a new node or edit an existing node. The node properties include the general properties, node condition, node URL, seller's template, buyer's template, and token values. While authoring the templates, the author can also create or edit tokens associated with a node. The author can end the authoring at several instances or continue in the iteration of authoring the node properties.

## 5. Application Example

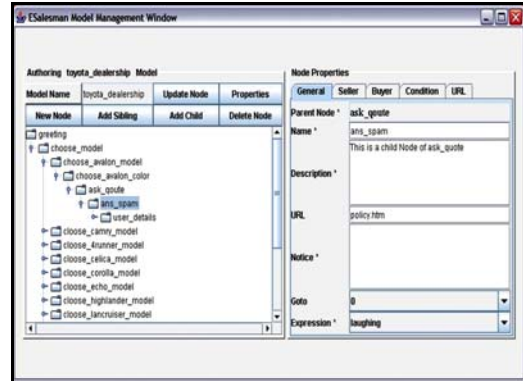
### *Authoring GUI*

The authoring interface is one of the significant features of the authoring tool. It is the liaison between human and digital knowledge. The following figures show the subsequent GUI after loading an existing car dealership model. Fig 7(a) shows how to create a new model. In the Model Management GUI in Fig 7(b), the window is separated into two important sections; the Model Panel and the Node Properties Panel. These two panels allow the author to manage all the nodes in a tree view and also the information within a single node. Users can author or manage the conversational nodes and links in the Model panel. This panel gives a visual representation of the conversations nodes in a tree view. This visual feature is an organized way to help the author manage the entire conversation nodes.

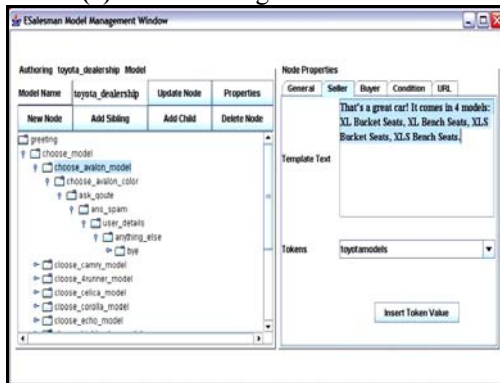




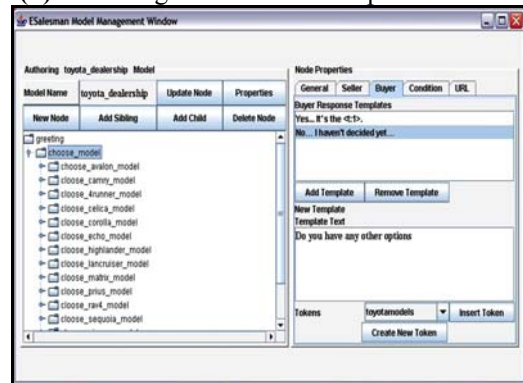
(a) Model Management Window



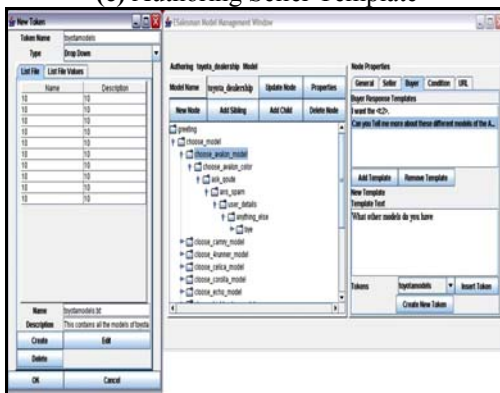
(b) Authoring General Node Properties



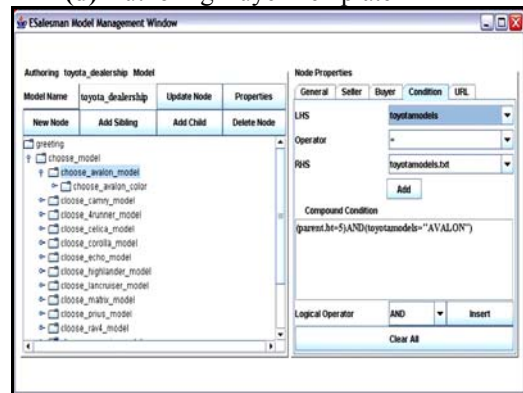
(c) Authoring Seller Template



(d) Authoring Buyer Template



(e) Authoring Token



(f) Authoring Node Condition

Fig. 7. Authoring GUI

The Node Properties panel allows the authoring of the content within a single node. This figure shows how a user can author general node properties. Users can author name, description, URL, notice, “goto” node and eSS’s expressions for a node. Fig 7(c) and Fig 7(d) show how to author and manage the eSS and the buyer conversations by editing the seller’s or the buyer’s template. The author can also create or edit tokens within the buyer’s template. Fig 7(e) illustrates the GUI when a new token is authored. The condition needed to traverse to a node is authored within the Node Properties panels. Fig 7(f) shows how tokens are linked to token files using Boolean expressions.

### Interaction Example

As a test example for our eSS, we chose the online car sales industry. We specialize in selling new Toyota models. The website is like any other Toyota dealership website with numerous links, pictures, and advertisements. But with an addition of a friendly salesperson face with a talk button that customers can talk with. On clicking the talk button, the customer is taken to the salesperson page which is a five-panel layout page shown in Fig 8. All interaction with the salesperson takes place on this page. The salesperson page consists of five panels: *the URL panel, the persona panel, the salesperson interaction panel, the customer interaction panel, and the notice panel*

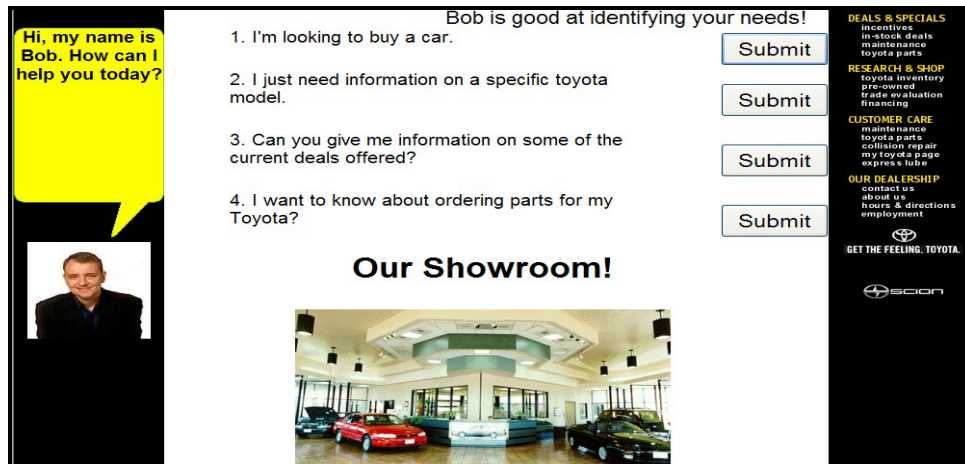


Fig. 8. Homepage

## 6. Conclusion and Future Work

In this paper, we propose an intelligent eSS solution to current e-commerce systems. We planned, designed, and implemented the eSS as an entity with an intelligent interaction

engine. This eSS possesses persona, natural-language support, and intelligence for smart interaction with users. This system is a cost effective solution for companies wishing to enhance their customers' shopping experience. In addition, we extended our project with a complete design and implementation of a web-based authoring tool to provide data to the interaction component. This authorable component makes the eSS customizable to meet different industries' needs. Future work and research will include support for different clients, for marketing and sales intelligence, for intelligent advertisements, for intelligent negotiations and recommendations, and for voice and video enhancements.

## References

1. Ryszard Kowalczyk, Mihaela Ulieru, and Rainer Unland, "Integrating Mobile and Intelligent Agents in Advanced e-Commerce: A Survey", Agent Technologies, Infrastructures, Tools, and Applications for E-Services, 2002.
2. Sanwar Ali, Monsurur Rahman, and Kustim Wibowo. Indiana University of Pennsylvania. "Artificial Intelligence and E-Commerce", *First Annual ABIT Conference*, Pittsburg, Pennsylvania, May 3-5, 2001.
3. Ronald R. Yager and Iona College, "Targeted E-Commerce Marketing Using Fuzzy Intelligent Agents", *2000 IEEE Intelligent Systems*.
4. A. Burns and G. Madey. "Development of a web-based Intelligent Agent for The Fashion Selection and Purchasing Process via Electronic Commerce", *Proceeding from Americas Conference on Information Systems*, 1998, pp. 140-141
5. Aberdeen Group Inc., "Interactive Customer Care: Enriching the Self-Service Experience with Automated Agents. An Executive White Paper", November 2000.
6. C. C. Hayes, "Agents in a nutshell- a very brief introduction", *Knowledge and Data Engineering, IEEE Transactions*, Vol. 11, No: 1, pp: 127 -132, 1999.
7. Toyooki Nishida, "Social Intelligence Design for the Web", *IEEE Computer*, 2002.
8. Y. Takeuchi and Y. Katagiri, "ATR MI&C Res. Labs., Kyoto. Social character design for animated agents", *Proceedings of RO-MAN '99, 8th IEEE International Workshop*, Pisa, Italy. September 27-29, pp: 53-58, 1999.
9. José A. Macías and Pablo Castells, "An Authoring Tool for Building Adaptive Learning Guidance Systems on the Web", *Proceedings of the 6th International Computer Science Conference on Active Media Technology*, p.268-278, December 18-20, 2001
10. T. Murray, "Authoring Intelligent Tutoring Systems: An analysis of the state of the art", *International Journal of Artificial Intelligence in Education*, Vol. 10, pp. 89-129, 1999.
11. Magdalene Ting, Vishal Seth, and Jerry Gao, Ph.D., "The e-Salesman System", *CEC 2004 Proceedings - IEEE Conference on E-Commerce Technology*, p.353-357, July 6-9, 2004
12. William Korbe, Valerie Stanton, and Jerry Gao, "iES: An Intelligent Electronic Sales Platform", *Proceedings of International Conference on E-Commerce Research (ICECR2003)*. Dallas Texas, Oct. 23-26, 2003.