

ABSTRACTS-YEAR 2001

RESEARCH STUDY

COMPUTER SCIENCE

RSPR-CS-01-1

SECURE MOBILE PAYMENT SOLUTION IN THE WIRELESS APPLICATION PROTOCOL ENVIRONMENT

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Wireless Application Protocol (WAP) is a new standard for cellular phone systems. It enables cellular phone based usage of Internet-model browsable services and information sources. The cellular platform offers great flexibility for the usage services, making the WAP-environment a very interesting and desirable platform for different electronic value added services. Mobile payment, mobile commerce and other transactional services in wireless world are among the most interesting issues in WAP or Mobile Internet environment. These services have very strict requirements for the security of the systems and for the confidentiality of the data. This work studies the applicability and limitations of WAP for these services. Wireless Application Protocol itself, cryptography and electronic payment systems are discussed as a basis for this research study. The results and improvement proposals are based on current research activities, WAP Forum's recommendations and personal experiences with a commercial WAP gateway. The results include among others introduction of new protocols to the WAP standard, cryptographic library and new APIs. Results concentrate specifically in the usage and management of smart cards (e.g. WIM) and in the proposals for application level and end-to-end security architectures. Key words: WAP, mobile payment, electronic payment, m-commerce, cryptography, mobile phone systems, mobile networks.

RSPR-CS-01-2

THE APPLICATION OF XML-BASED EDI STANDARDS IN THE SEED INDUSTRY

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XML/EDI is a powerful technology for electronic commerce and has been proposed to be applied in today's business-to-business e-commerce. It is a more cost effective way of e-commerce document exchange than traditional EDI. On order to implement XML/EDI, many initiatives are trying to develop standard XML documents. There are two initiatives, which try to develop the XML documents suitable for use in every kind of industry. They are xCBL and ebXML. Many companies recognize the value of these standard documents in e-commerce and apply in their trading systems in a variety of ways.

This research study uses the xCBL documents in business-to-business electronic trading of the seed industry. Although there are many ways to transmit XML documents over the Internet, this study applies electronic mail system as a document exchange medium as it is the cheapest way.

RSPR-CS-01-3

HODOGRAPHS OF GENERALIZED-BALL CURVES

Soe Soe Htwe

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Applications in CAGD require the computation of derivatives of curves and surfaces. This study employs a systematic approach to compute the derivatives of non-rational and rational generalized Ball curves and provides a representation of the derivative of each generalized Ball curve in the form of the same generalized Ball curve. The relationship between two generalized Ball curves and a Bézier curves, and as such the hodographs of two generalized Ball curves can be derives from the Hodographs of Bézier curve of the same degree.

The research establishes the Hodographs of non-rational Said-Ball and Wang-Ball curves and three different kinds of Hodographs of rational Said-Ball and Wang-Ball curves namely Scaled Hodograph, Floater Approach and Closed Form Hodograph.

INFORMATION MANAGEMENT

RSPR-IM-01-1

AUTOMOBILE BUSINESS TO BUSINESS MARKETPLACE

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What happens if a hundred different companies create their own schemas to describe an invoice? The schemas may contain the same elements, but each schema will use different element names. For example, all invoices will have invoice numbers, but the element names for invoice numbers may be called InvNum, InvNo, InvoiceNo, or InvoiceNum. A hundred different XML documents will be created. It is difficult to share these documents among companies. If each business partner uses his or her own schema, we need to write a different program to work with each XML document. Clearly, we do not want to do that. We want every partner to use the same structure.

The example we just described illustrates that we need for a framework for standard industry schemas. The xCBL document

framework provides schemas that all eMarketplace participants can understand, so all businesses can easily exchange business documents across e-marketplaces. This research study concerns automatic xCBL document exchange. A prototype has been developed to show some xCBL documents between buyer and supplier using the automobile B2B Marketplace web site.

RSPR-IM-01-2

VACATION PLANNING SYSTEM

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In the world of web site design and feature, personalization is the process of tailoring or customizing pages to meet or answer to the nearest individual users' characteristics or preferences. The process is commonly used to enhance customer service or e-commerce sales.

Personalization for others is sometimes developed to be used as a recommender system that provides personalized suggestions about item that users will find interesting.

In this research study, the purpose why this recommender system is used will be recognized because it helps a lot in spatial decision-making. Spatial decision-making is an everyday activity: for example when selecting a location to live, choosing a land development strategy, allocating resources, or managing infrastructure. Vacation planning also uses of spatial decisions by selecting a planned location to travel.

A personalization technique that is suitable and suggested in this research study for the recommender system to generate is called Computer-Assisted Self-Explication (CASE). CASE is an online system that asks users questions about user's interests. It then relates to a large database of possible choices and reflects the complicated set of user interests. The goal is to help users narrow their choices from all of possibilities to a few highly ranked alternatives.

In this study, CASE and spatial decision-making will not only comprise a part of GIS that are implemented together to help TAT but more importantly, will meet TAT's goal and policy.

RSPR-IM-01-3

JEWELRY PROPERTY DESCRIPTION USING RESOURCE DESCRIPTION FRAMEWORK

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The Resource Description Framework (RDF) is used to describe the properties of the jewelry products for an on line shopping Web application. It consists of three concepts: RDF model and syntax for metadata, RDF Schema for vocabulary structure definition, and ontologies approach representing on top of the Jewelry web application. Metadata definitions such as Dublin Core Element Sets are verified at the RDF Parser. Schema specification, based on RDF Schema, is used to constrain domain and range of properties, which is similar to the object-oriented framework. The data implementation of the system can employ the inheritance mechanism. At the upper layer of application is the structured data using DAML+OIL vocabulary that is a semantic markup language for Web resources.

To support the implemented Jewelry property descriptions, XSL Transform language (using Microsoft XML Parser version 3.0) is used to transform the resources (properties) into HTML, which serves as the front end user interface for a Jewelry Web site. A shopping cart system by using Active Server Pages is also implemented to achieve the completeness of the e-commerce system.

RSPR-IM-01-4

USAGE OF INTERNET TECHNOLOGY FOR DISTANCE EDUCATION IN DEVELOPING COUNTRIES: A CASE STUDY OF PROSPECTS IN SRI LANKA

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The Internet is the largest computer network in the world. It has revolutionized the world. It is growing very rapidly and it has the capability of communication and transmitting information at a lightning speed. The whole world has become smaller because of the Internet. The World Wide Web is bringing rapid and drastically change into the communication media.

The Internet has created new possible ways of accessing knowledge and disseminating education. Its audience and its territory are unlimited. This is an era of population explosion and knowledge explosion. Most of the countries have faced the need of classrooms without walls because of population explosion and increase of enrolment for elementary and secondary school. This situation has led to a shortage of teachers in the traditional classroom. Adult learners who seek vital skills to face the rapidly changing information age are growing. Institutions and corporations are facing the problem of training their employees in time.

The Internet has the ability to address those problems and challenges. Distance and time is no longer problems for the Internet. It is obvious that schools, universities and corporations can use the Internet technology to achieve the necessary targets of education and training.

The Internet provides opportunity for everyone to learn eliminating discriminating factors such as age, dress, physical appearance, disabilities and gender.

Effective Distance Education programs are born as a result of careful planning and dedicated efforts of individuals and organizations.

The Internet is a very powerful tool. We can use this powerful tool to address the challenges of the twenty first century.

RSPR-IM-01-5

PEDAGOGICAL ASPECTS OF APPLYING INFORMATION TECHNOLOGY IN SECONDARY MATHEMATICS EDUCATION IN SRI LANKA

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This research is concerned with applying a computer-assisted methodology for teaching and learning mathematics at secondary level education in Sri Lanka that is a need for the 21st century, the "information centred century". Information Technology is used in a wide variety of educational environments, especially for mathematics. Information Technology facilitates applications of school mathematics to real world situations by providing access to worthwhile data and tools that alleviate the computational constraints often involved in the analysis of real world data.

Analysis of existing experience in developed countries emphasis Information Technology as an integral part of mathematics education. Those countries have identified five basic modes of using Information Technology resources in teaching and learning mathematics. Further more the research illustrates exemplary mathematical activities for those five basic modes.

Mathematics is a compulsory subject beginning from primary education until senior secondary education in Sri Lanka. The proposal for Ministry of Education, Sri Lanka emphasizes on a systematic procedure to link Island wide schools to national and international mathematics resources.

RSPR-IM-01-6

ORGANIZATIONAL GUIDELINES FOR APPLYING INFORMATION TECHNOLOGIES IN SECONDARY SCIENCE EDUCATION IN SRI LANKA

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The Simple meaning of science is acquiring knowledge about the environment. This scientific knowledge with new technologies is encompassing the whole world. It provides avenues for better understanding of matter and materials of the universe. In many countries there seems to be a growing recognition that science education is important not just for scientists, but for the majority of students who will never become scientists. Every one needs scientific knowledge to carry out their day-to-day activities. The established education system will not be able to cope with these changes alone and the changing needs of population at various levels. Therefore the conventional teaching and learning process will have less use in the future. A nevertheless new information technology, which is a result of scientific advancement, can be used in a wide variety of educational environments. Most of the developed countries have been able to successfully implement Information Technology (IT) in science education at secondary level, because they have the necessary technological infrastructures, human resources and financial resources. Moreover, these resources have been organized in an efficient manner in these countries. The countries in this study have used different methods in introducing IT for science education at secondary level. Some of these methods can be easily implemented for Sri Lankan education system too. The importance of IT for social, economical and professional development has been well recognized in Sri Lanka. The Ministry of Education has recently set-up an IT unit to design a strategy to introduce computer education in schools. In addition, several pilot projects have been introduced to improve the level of using information technology in secondary education with the collaboration of foreign aid. In implementing IT for secondary science education in Sri Lanka, IT related hardware, development of high quality educational software, teacher training for usage of IT and proper management becomes imperative.

RSPR-IM-01-7

TRADEZONE MARKETSITE: A CASE STUDY IN B2B MARKETPLACE TRADING

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Today, different companies have created their own schemas to exchange business documents such as invoice or shipment notice. Therefore, those companies will have different styles of invoice and shipment notice documents. Companies that use XML documents to collect information of their buyers may use different names to reference invoice numbers. For example, some companies use "InvNum" to reference an invoice number but other companies use "InvNo". The problem is the difficulty to share business documents among companies so we try to make all companies use the same schema to exchange business documents together.

In this paper, we try to create a market site that acts as the intermediary. Market site manages tasks between buyers and suppliers in B2B e-commerce such as exchange of business documents or search of the supplier's product catalog. We use xCBL standard instead of using XML schema so that all companies can use same standard to exchange documents between buyers and suppliers. The prototype will demonstrate how the market site also helps trading partners to exchange business documents automatically.

RSPR-IM-01-8

A BAYESIAN NETWORK MODEL OF COMPUTING THE PROBABILITY OF CONFLICT IN AIR TRAFFIC TRAJECTORY

Somchai Kitivivoraphan

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Bayesian belief networks have proven to be an effective technique for representing and reasoning with uncertain knowledge. A Bayesian network is a graphical representation of a probability distribution. Therefore statistical techniques can be used to construct Bayesian networks from data.

This research presents a Bayesian network model for Air traffic trajectory conflict. The purpose of the research is to aid the air traffic controller to control the aircraft. When the air traffic is busy, the air traffic controller on the ground has a short time to consider the situation for avoid air traffic conflict and must decide how to suggest the pilot on the aircraft. However, it has many variables, which must be considered for safety such as weather, type of fly and number of engines.

Therefore, the Bayesian network was built to estimate the air traffic conflict in trajectory based on many variables, which concern air traffic environment and the controller knows at that time. In this research, the Bayesian network model was built using eleven variables. A user interface was constructed that permits the user to enter events and then the response suggests the probability of the damage for the air traffic conflict. The user interface is domain specific and does not require the user to have any knowledge of Bayesian networks. Empirical evaluation shows the model to have 77.19 % accuracy when evaluated on a database of 3,697 cases.