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MAC Protocol for Interference Reduction

Abstract

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Over the last twenty years the use of wireless and especially ad hoc wireless communications has seen a phenomenal growth. The performance of the mobile ad hoc networks has been under intense pressure since its inception. A mobile ad hoc network (MANET) is a wireless network temporarily and spontaneously created by mobile stations without requiring any infrastructure or central control. Network managements and communications are typically performed in a distributed manner. Inherently mobile ad hoc wireless networks have to operate within limited resources and if the resources are not used efficiently the performance of the network is severely compromised. Though ad hoc networks are treated with little difference in IEEE standards for wireless networks as a whole, some unique features make ad hoc networks distinct from other types of wireless networks such as wireless LANs.

Although a lot of research has taken place over the two decades but there are still a lot of issues that have not been fully resolved. This research is attempting to resolve or minimize the impact of some of those issues on the performance of the whole network especially in case of medium to large size networks where the density of nodes is high. Main concentration of this research is on interference and on network resources compromised during communication which in turns minimizes the capacity of network to communicate more efficiently on the whole.

We have proposed a new Medium Access Control (MAC) protocol which will provide us with the flexibility to free resources during communication and allow the network to carryout more communications at any particular time then before. The new MAC layer protocol introduces the concepts of Signal Strength to Distance (SSD) ratio and Partial Back-off. SSD is sent out by each communicating node informing its neighbours about the interference range that can cause slowdown or even breakdown of its communication and hence advises its neighbours to apply Partial Back-off instead of complete back-off. Partial back-off would mean that the nodes which would usually fall into a back off to allow the existing communication to take place will be able to communicate but within limited conditions hence allowing them to carry out communications which was not possible before.

A Gateway Solution for Accessing Networked Appliances

Abstract

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Today modern technology has reached the point whereby electronic devices are commonplace in every facet of our life. We encounter numerous electronic devices that surround us within the home and office environment, including devices in shopping centres and other public spaces. All these devices are an essential part of our daily life, and we use them to perform numerous functions, for example, the DVD player in your home is used to play your favourite movies; the TV is used to watch your favourite programs, and your personal PC is used to perform a range of tasks including online banking and emailing friends, colleagues and family members. Imagine if all these electronic devices could be seamlessly integrated to enable intercommunication between the functions they provide. In this context, we would call such devices “Networked Appliances” (NA).

For example, if you left your MP3 player at work on a Friday night and the following day you wished to listen to the latest Rock album stored on it – while at home you could discover the MP3 player and play the audio stream on your Hi-Fi without knowing where the device is located. In order to achieve this seamless interaction we need an ad hoc gateway service to combine the devices we own into a personalised configuration enabling any device, irrespective of where it is located, to be discovered and used. Typically, if devices want to access the services offered by other devices they must go through a centralised gateway. If this gateway fails then all the devices using that gateway and the services provided by it will become unavailable within the network. However a better solution would be to enable the devices to dynamically discover an alternative gateway and reconfigure themselves into the user’s personalised configuration. We describe how we have to address these challenges, using our novel Ad Hoc Gateway Service for Discovering and Composing Networked Appliances that we have developed. Our solution explores how P2P technologies can be used to implement an ad hoc gateway service that enables devices at different locations to be combined into a personalised configuration. We provide novel mechanisms that enable zero configuration and automatic service discovery. Our evaluation demonstrates that current solutions do not fulfil user requirements, for example, zero configuration, security, Quality of Service and device capability matching.

**Addressing the Scale and Complexity of Digital Forensic
Investigations using Automation
Abstract**

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The growth in static storage has been tremendous, as has the increase in the quantity and diversity of embedded digital devices that can serve as repositories of information related to crime. Existing forensic tools are not designed to handle the amounts of data being recovered during modern investigations. In the corporate world, the identification of the need for a forensic investigation is often made late, and by untrained users, while system administrators are unequipped and untrained to perform thorough investigations.

As the complexity and scale of Digital Forensic investigations increases, tools and methodologies which simplify the complex process of information and evidence monitoring, collection, analysis and presentation need to be made available to law enforcement and corporate investigators. In this project, we are aiming to demonstrate that an automated approach to the extraction and analysis of evidence can be an effective solution to these challenges.

This presentation will present the problem background, the results of initial research, and our aims and objectives for the project.

Dynamic Creation of Objects and Behaviours in Heterogeneous Virtual Environments ABSTRACT

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There is undoubtedly an increase in the number of consumer appliances that are enjoying networking capabilities. With data throughput increasing among devices that are renowned to be less capable than personal computers, we see an increase in the consumption of multimedia. In parallel, gaming and social networking are at the forefront of next generation entertainment systems where new and novel usage scenarios are pushing technological boundaries. These advances have undoubtedly provided a platform for innovation, where a natural progression would be to blur the gap between the aforementioned technologies. For example, content sharing over networked devices, beyond simple file sharing is becoming a reality.

Furthermore, many devices are forming closer relationships with different virtual worlds, such as *World of Warcraft* and *Second Life*. In one sense the gap between the two is becoming increasingly more blurred. Consequently, this opens up many new avenues for content sharing, not only between devices, but also between sophisticated virtual worlds. Given such interoperable platforms a natural progression sees content that seamlessly resides within either. This will open up new opportunities where third-party content providers and users alike will now be able to create and share content over these new platforms.

This provides obvious benefits. First, the freedom this affords allows us to very easily move between real and virtual environments where the content and services we use are always at our disposal. Second, utilising the benefits of being connected will allow us to manage our content and services independently of where they reside, whether this is on the device itself or remotely, via its associated avatar, where an avatar is a computer representation of a user, in the form of a 3D or 2D object. Lastly, and perhaps less obvious, it will significantly influence the applications underpinned by digital content where solutions not yet envisioned will emerge, such as dynamic game development, immersive and interactive 3D multimedia, and on-the-fly scene analysis. We aim to provide a basis on which this vision can be realised where mechanisms have been developed that facilitate the sharing of objects across different environments (both virtual and real).

A Model Driven Framework Proposal to Support Serious Games Development Abstract

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Serious games are designed and developed using games principles and technology for a primary purpose other than pure entertainment. Although the application of computer games in the area of education and training may differ from other domains, engineering serious games software remain unchanged. The underlying technologies for serious games are the same as mainstream entertainment games. Distinctions between the different applications of computer games are notable in the definition of *rules*, *play* and *aesthetic representation*. Such characteristics enable serious games to be represented in models and altered accordingly to meet teachers' requirements without much concern about the technicality involved. Design requirements of serious games (excluding art and technical aspects) can be captured through modelling and analysed with the Model-Driven Engineering (MDE) approach. This presentation introduces the Model Driven Framework to support development of serious games, the domain specific models used in the framework and further works involved in the framework development.

A Software Engineering Approach for the Observation of Large-Scale & Complex Systems Abstract

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Observation, monitoring and instrumentation are all widespread and important techniques within software engineering - used to keep track of the state of software components, external devices, and importantly, other software systems. However, complex software systems present a challenge in both their extremely large scale and the kinds of self-organising and emergent behaviour they exhibit.

Exhaustively observing these types of system may well be prohibitive due to the computational cost involved, and the evolving nature of a complex system's organisation can lead to monitoring components relying on design-time-specified observation patterns that no longer adequately reflect the system they are supposed to monitor.

As such, this research looks at techniques that can be used by software engineers to develop observation subsystems that can (in real time) adapt to suit the system on which they are deployed. They should adjust their observation granularity to balance coverage, computational-load and domain-specific requirements. This will involve reasoning on appropriate monitoring strategies that suit the present system organisation, and recognition and exploitation of a system's structural and topological features.

Self-Managed Fault Management in Wireless Sensor Networks

Abstract

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Recent studies of bioinformatics in computer technology have brought us many unforeseen opportunities to develop the robust systems under the rapidly changing operational environments, especially in Wireless Sensor Networks (WSNs). The biological nature, such as self-management, self-adaptation and self-adaptation, ultimately becomes a desirable necessity for the applications of wireless sensor networks to operate in areas where the physical maintenance of human administrators is impractical. For example, in the dense forest, in the battlefield behind the enemy line, or at the bottom of the ocean bed. These systems demand significant self-management capabilities adapting to various requirements (e.g. sensor node failure) in rapidly changing environment. In this paper, we examine this feature by applying fault management. We are particularly interested in studying how the self-managed feature can contribute to the design of energy-efficient fault surveillance and monitoring systems in sensor networks.

Management decentralization has already been recognized as an efficient paradigm by existing research approaches to design robust self-managed sensor networks. The general idea of this is to facilitate sensor nodes with more self-managed capabilities instead of heavily relying on the centralized management manner. To tackle this issue, one technique is to apply the architecture-based solution. In this approach, we consider our proposed fault management architecture in a homogeneous sensor network environment. Sensor nodes start with the same management capabilities including both hardware and software resources. They are expected to adjust their fault management performance dynamically to the changing events occurred in the network.

In addition, we also consider an alternate solution to self-reconfigure fault management function of sensor nodes adapting to various system requirements, such as replacement of a faulty node.

Mobile Ad-hoc Networks Route Discovery

Abstract

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The definition of a Mobile Ad-Hoc Network (MANET) can be described as a network of self configuring nodes. The nodes are free to join the network at any given moment with no prior warning. The nodes can be highly mobile which makes this type of network very dynamic in nature. There is no defined topology for this type of network as there is no fixed infrastructure.

The initial development of a mobile ad hoc network was started by DARPA. This project was started with the aim that it could assist in various combat operations and was considered of great importance. In a military situation where there is a hostile environment many factors associated with the communication of data are considered. MANETs are such a consideration because of the ease of deployment, lack of cost and versatility in regard to the constantly changing topology. Although the development into MANET's started with the intention that it would be used for military operations, a network with this lack of infrastructure that was proven to be reliable and secure could serve extensive applications, both military and non military. One example of such an application might be used by the government or local council and could use this type of network to monitor your car, checking its location, say, if it entered a zone that was required an entry fee. Such zones have been established in London City and are being introduced in other cities that are prone to congestion in a bid to encourage the use of public transport. Average speeds could be measured from a start destination to an end destination and be used to quickly work out if any speed limits had been broken for that section of the journey, which could be very applicable in dense areas where mobile ad hoc networks would be easiest implemented. The government are also looking at new ways to manage road taxation, it has been proposed that the longer the distance driven the more road tax should be charged, thereby not penalising car users who infrequently use their cars. This could also be extended to work with satellite navigation, and provide more information to the driver in regards to congestion and maybe offer an alternative route to avoid the congested areas.

A node participating in this network will connect with all other nodes within its transmission range, this gives the visual representation of a mesh type network, however, unlike wired networks the nodes are less likely to maintain their connection with the network. Due to the nature of this type of network one of the challenges that face the MANET community is the implementation of a routing protocol that is able to discover paths between source and destination nodes and the flexibility to perform route maintenance as required. The current problem is that there are few actual original protocols available, the most popular being AODV. Although AODV has been proven to be reliable and scalable, it is not an ideal protocol in all situations. Many enhancements have been proposed, however, few have made it past theory stage due cost in regards to overall performance of the network.

This presentation highlights our work conducted in regard to routing protocols. The presentation starts by defining a MANET (very briefly), a little background on MANET, some routing protocol techniques for route discovery and route maintenance (Reactive, Proactive and Hybrid). A brief discussion on other researchers work that is pertinent to the problems with MANETs will also be discussed.

The current stage of my research has been focused on the research of: protocols, scenarios, application and the simulators available for use, including deciphering the data generated from the results of the simulation. The proposed direction of my research is to continue the research into protocols but with more of an application of use in mind and to try and establish if AODV is suitable for most applications, or if applications should be protocol specific.

**Sensor Blanket: Monitoring, Identification and Treatment
of Medical Conditions
Abstract**

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The use of technology in healthcare and medicine has made significant advances over the past several decades and helped make noted medical breakthroughs. This said there still remains much to do, particular in the ever increasing non-medical setting, such as primary care. Widespread communications and networked devices, such as consumer devices and specialized devices used within the medical profession, now provide a platform to pervade primary healthcare solutions on the fringes of healthcare treatments, for example in a home setting. Connecting networked devices from the fringes to medical infrastructure would allow for the administration of better treatments, such as monitoring health remotely. This position paper identifies the current state of the art in wireless medical technologies and details our own framework we call Sensor Blanket. Sensor blanket is hybrid of existing wearable sensors designed to monitor and detect medical conditions and diseases at an early stage, and provide appropriate responses.

Security Policy within the System-of-Systems Domain – Translation and Reconciliation

Abstract

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In order for System-of-Systems to communicate effectively security policies need to be agreed between the participating component systems. There are two important challenges to be faced during this process – translation and reconciliation. Translation is a problem because different systems will likely use different languages for the expression of their policies; and reconciliation because the process of finding a unifying policy for the composition is difficult and complex.

In this presentation, we will discuss the problems associated with translation and reconciliation of security policies, and the approaches we are taking and the methods we are utilising to solve these problems.

Application Independent Fault Management Architecture for Wireless Sensor Networks Abstract

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Wireless Sensor Networks (WSNs) consist of embedded and distributed sensor nodes that operate on harsh operating conditions with limited computation, memory and communication capabilities and scarce energy resources. Due to its varying nature, faults (node, sink & network faults) in WSNs are not an exception and tend to occur frequently; thus fault management is a critical function. To ensure the desired level of services, it is essential to *detect*, *diagnose* and *recover* occurring network and node faults.

In general, WSNs are tightly application-dependent. When WSNs are deployed, applications are not stand-alone but are integrated into a larger computing infrastructure. The design of applications and management architecture in WSNs are also dependent on application semantics (e.g. application-specific data processing combined with data routing). Therefore, unlike traditional network the resources constrained nature of WSNs limits the sensor nodes to accommodate a wide variety of applications. The application designers have to develop complex and special programs for specific sensor applications. It can not guarantee that one program for one specific application can carry over directly from one application to another, since the application-specific requirements on WSNs are varied in terms of resource usage and communication patterns. To design an application independent and efficient fault management architecture, we must have to take into account a wide variety of sensor application with diverse needs, different sources of faults, and various network configurations. In addition scalability, mobility, performance and timeliness may have to be considered. Moreover, most of the already proposed fault management techniques for WSNs have been integrated with application requirements. For all these reasons, fault management in WSNs needs to be dealt with added care and efficacy.

The aim of this research is to develop fault management architecture for WSNs in order to improve their robustness, reliability and to enable a wider adoption of WSNs applications and technology. More specifically the focus will be to propose an application independent, locally distributed, self-organizing fault recovery mechanism.

We have completed a research survey on the topic, and are working on the architecture. The proposed application-independent architecture will need the application knowledge to direct its operations in order to tailor to the special needs from one application to another. The fault management and recovery are most likely to perform in a distributed fashion within the resource constrained WSNs.

Identifying Personal Lifetime Memories and Shared Experiences through the Analysis of Digital Memories in P2P Networks

Abstract

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The need to capture our lifetime memories, and to save and share them with others in digital form has become important through the necessity to remember so many things such as names of people, places, and events and to identify relevant information and evidence in our minds. Sometimes we even need to think hard to remember when some event happened, what happened there, with whom, where, why and how it happened. The worst thing is we might forget or lose some of our lifetime memories forever. Sometimes we also want to evaluate, justify or identify our lifetime using the collection of digital content held in our memory storage.

With currently available technology, there exists the opportunity to keep a lifetime's worth of digital images, analyse them and produce reports about our lifetime memories. Therefore we have designed a new framework for identifying personal lifetime memories through photo image analysis and a report system. This framework can help a person to retrieve, update and use their photo images throughout their entire lifetime. It can then be used to generate a report about their lifetime activities, as well as to evaluate their characteristics.

The life analysis will be generated through the use of a photo image detection system. This program will analyse photo images and will create metadata to be used by the report system. The metadata contains detailed information such as people's faces, GPS locations, text, symbols and date annotations and digital file information. This metadata will be used in the report system to produce reports about personal characteristics or identities, personal activities during any given month or year, favourite objects, colours, places, people and photo images, events and serendipitous moments. It will even allow us to share all or a selection of our images and the results established by the system with our trusted friends by using peer to peer groups. We consider the use of JXTA peer to peer networking technology since this provides an open set of peer to peer protocols that enable any devices on a network to communicate, collaborate, and share resources.

Through developing this report system for lifetime image analysis, we believe that there is significant potential to improve the way we evaluate ourselves, our friends and our memory relationships, both within an individual's lifetime memories and across the lifetime memories of multiple individuals, as a primary consideration of our memory storage systems.

A Framework for User-Centred Identity Management (UCIM)

Abstract

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The area of MANets (Mobile Ad-hoc Networks) is still in its infancy in the research community, but it plays a vital role surrounded by the growing trend of mobile technology for business as well as private and governmental uses. The concept of ubiquitous/pervasive computing is almost intrinsically tied to wireless communications. Apart from many remote services, proximity services (context-awareness) will also be widely available. People currently rely on numerous forms of identities to access these services. The inconvenience of possessing and using these identities creates significant security vulnerability, especially from network and device point of view in MANet environments. The emergent notion of ubiquitous computing also makes it possible for mobile devices to communicate and provide services via networks connected in an ad-hoc manner. Digital identities are at the heart of many contemporary strategic innovations for crime prevention and detection, internal and external security, business models etc. This requires disclosing personal information and the applicability of contextual information as well as allowing users to be in control of their identities. The presentation will mainly focus on 1) highlighting the weakness of current solutions, 2) identifying the requirements for the development of an innovative, easy-to-use identity management mechanism within MANet environments, 3) addressing how contextual information is represented to assist in identity management, and 4) presenting the proposed User-centred and Context-aware Identity Management (UCIM) framework for MANets.

Keywords: user-centricity, contextual computing, Mobile Ad hoc Networks, ubiquitous computing

**The application of the neural network in financial time series
prediction
Abstract**

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In this presentation, a novel application of the MLP neural network inspired by the immune algorithm in financial time series forecasting is introduced. In this study, the Back-Propagation neural network supported by Immune learning Algorithm (BPIA) is used for financial time series prediction. In this MPhil work, the feasibility of (BPIA) in financial time series forecasting is examined and the results are compared with other types of neural networks, which are the standard Multilayer back-propagation (Bp) network and the higher order Functional Link neural network (FLNN). Four sets of financial time series data are used in the experiment, which are the USD/UKP exchange rate, the USD/EUR exchange rate, the DJIA stock opening price, and the DJIA stock closing price. The experiment results showed that the (BPIA) outperforms the Bp neural networks based on the profit. However, it produced a lower profit when predicting stock price in comparison with the Functional Link neural networks.

A Reputation Based Scheme to Deter Identity Based Attacks for Clustered MANETs

Abstract

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Ad hoc networks have very different properties as compared to conventional networks. An ad hoc network is a collection of nodes forming a temporary network without any centralized architecture or control. Most of the routing protocols in pure ad hoc networks are based on the assumption that each node must cooperate and forward other nodes' packets to extend the range and enhance network performance. However, in open mobile ad hoc networks nodes belong to different organisations each having their own objectives and trying to maximise their own interests. They may not want to share their resources for others' interests and hence may exhibit selfish behaviour by dropping other nodes' packets. These selfish or misbehaving nodes can disrupt the whole network and severely degrade network performance. Reputation, credit and trust based models have been developed to enforce cooperation and discourage node misbehaviour. These models are vulnerable to two types of attack: i) whitewashing- a node having poor reputation/trust changes its identity to start afresh as many times as he wants, and ii) a malicious node generates and controls a large number of logical identities on a single physical device, which is termed as a Sybil attack. These identity based attacks significantly affect the performance of the above mentioned models.

We propose a reputation based scheme for clustered MANETs that acts as a deterrent for both of these attacks. We introduce a recommendation process conducted by the cluster heads where newcomers can join the network only when they are recommended by the existing trusted nodes called recommenders. They will also send location information along with the recommendation request to the cluster head only at the time of new identity emergence. The cluster head will use the location information to make sure that the new identity is not the recommender's Sybil identity and will select a winner from the reputed recommenders taking part in the competition process. Recommenders will get a reward when the nodes they recommend increase their reputation beyond a threshold level Y before their time limit expires. Nodes are required to sustain their reputation level above Y in order to access all services and gain full advantage of the network; they will be deemed as misbehaving otherwise. The threshold Y is carefully designed to ensure that when a node increases its reputation it doesn't become beneficial for it to perform a whitewash. Furthermore Sybil attack is prevented via one-time location information at the time when new nodes join the network which substantially reduces the overhead incurred by periodic dissemination of location of information.

Dynamic Interactive Storytelling for Computer Games Using AI Techniques

Abstract

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In this research project we propose to investigate Artificial Intelligence techniques that will enable novel approaches to procedurally generating digital interactive storytelling for computer games. These techniques will provide new and immersive experiences for players. Many systems based on rules and planning have been proposed in related literature, but these have many limitations and drawbacks. We propose to develop systems based on heuristics and meta-heuristics to provide a new view of emerging digital storytelling. These techniques will be developed in the form of a Storytelling engine, applied and evaluated within a variety of game genres involving interaction, non-player-character groups, dialogue and cinematography.

Presentation Outline

This presentation will provide an overview of the design and implementation of our system which is called The Digital Interactive Storytelling Engine (DISE) [1]; including the DISE editor and the Homura Engine, depicted in Figure 1.

The Digital Interactive Storytelling Engine (DISE) [1] dynamically creates interactive narratives which are focused on user's actions to create alternative storylines and dramatic tension. The engine is provided with knowledge of generic story actions met in many storytelling domains. The story designer is required to provide domain specific information, for example regarding characters and their relationships, locations and actions.

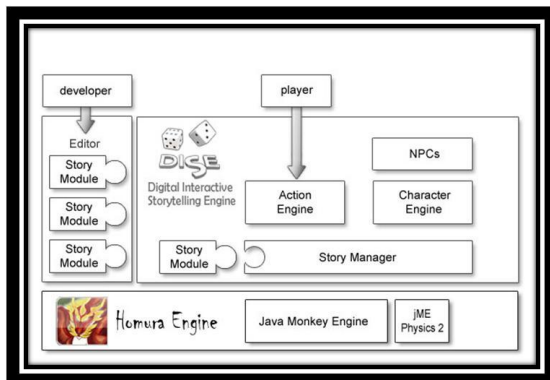


Figure 1 - DISE Architecture

A planner creates sequences of actions that each lead to a situation where many new actions are possible for a character. The user interacts with the story-world by making decisions on relevant actions. Using this action the engine chooses and adapts new story lines according to the users' past behaviour, mood, etc. Previous interactive storytelling systems have architectures which are not capable of maintaining the change in dramatic tension of the narrative over a long time period.

Works Cited

1. *Dynamic Interactive Storytelling for Computer Games Using AI Techniques*. Cooper, S, A. El Rhalibi, M. Merabti, Marc Price. Liverpool : LJMU, 2008. 6th International Conference in Computer Game Design and Technology (GDTW). ISBN: 978-1-902560-21-2.

**An Experimental Investigation into an amorphic Wayfinding
Framework and Human-Computer Interface for Visually Impaired
People
Abstract**

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In recent years, there has been an escalation of orientation and wayfinding technologies and systems for visually impaired people. These technological advancements, however, have not been matched by a suitable investigation of human-computer interaction (e.g. designing a human-computer interface for people who form different cognitive maps for navigation) on the one hand and, on the other different requirements for signals that describe the spatial context. The first aim of this study is to investigate whether an augmented framework can take into account different visually impaired group's requirements for spatial signals that subsequently form different cognitive maps describing their perception of the spatial context. The second aim of the study is to identify a human-computer interface that can adapt to the needs of individuals with different user requirements based on their visual impairment and deliver suitable information for wayfinding that is tailored to specific user requirements. The objective assessment in this study is to design an experimental amorphic framework and human-computer interface that relies on agent-based software that demonstrates and takes into account different user requirements and provides wayfinding instructions appropriate to different visual impairment. Tests measure the effectiveness of the framework and human-computer interface for a group of people with a range of visually impairment to reach landmarks in an unfamiliar case study area.

Robust Information Hiding Technique in Digital Images

Abstract

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Information hiding is a process of inserting hidden messages into a collection of data such as texts or images in such a way that apart from the message sender and the intended recipient, no one would realize that such message exists. The application of information hiding technology ranges from free software used by individuals who just want some privacy when sending private data, to commercial applications, and to military systems that employ multiple layers of steganography as well as cryptography techniques. Military communications systems make increasing use of trace security techniques which, rather than merely concealing the content of a message using encryption, seek to conceal its sender, its receiver or even its very existence. Watermarking, a subset of information hiding techniques, contributes towards the protection of copyright of publisher and is widely used by commercial organizations.

Although modern information hiding research is relatively new, its uses can be traced back to antiquity as far as the ancient Greek era. In this era, a Greek named Histaïæus wanted to revolt against the Persian King. In order to inform his followers that it was time to begin a revolt, he shaved the head of one of his trusted slaves and tattooed the secret message on the scalp, and he then waited for the hair to grow back. The technique worked; the message got safely to its intended recipients in Persia and the revolt started. Modern information hiding techniques in digital images employs a wide range of utilities depending upon the domain in which the hidden data is inserted. In spatial domain, techniques such as Least Significant Bit (LSB) and Wet Paper Code (WPC) are popular. In transform domain, several papers proposed that the data insertion to be carried out in the image Discrete Fourier Transform coefficients, Discrete Cosine Transform coefficients to Wavelet Transform coefficients.

The information hiding research field has attracted much attention from researchers, however there are still numerous challenges that are yet solved. This is shown from the surprisingly easy way to circumvent most of the techniques proposed in the literature. Meeting some of these challenges is the objective of this research work.

The first challenge is to find a robust technique that is able to withstand different types of attack. Types of attack vary, but in digital image domain this ranges from a simple rotation of the image to a complex transformation. The second challenge is achieving a high payload ratio. The higher the payload the more hidden data can be encoded into the cover medium. The third challenge to achieve low computational cost of the encoding and decoding processes. The computational cost determines how fast the technique can be executed and how many resources required to do so.

Automated Service Level Management Abstract

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My research is to build a framework based on autonomic computing that adjust the vital figures of WSLA as an approach for total automated Service Level Management process over on-demand web services construction.

Success of dynamic outsourcing and quickly forming new business relationships are, however, dependent on three critical factors. First, to meet interoperability requirements, access to services needs to be based on open and emerging standards for enabling the service-oriented architecture (SOA) model, and in particular Web and grid services. These services may span a wide range of the outsourcing spectrum, including access to business applications, such as financial services, human resources (HR), and enterprise resource planning (ERP), and infrastructural resources, such as storage, computing resources, and application-hosting platforms. Second, the decision to outsource a part of the business process or application is critically dependent on whether a business partner can be trusted to provide an on-time reliable service. To ensure this quality of service, the service client jointly with the service provider should define a service level agreement (SLA) as a part of a service contract that can be monitored by one or both parties. The same service may be offered at different service levels (in terms of responsiveness, availability, throughput) and priced accordingly. Third, to provide fine-grained outsourcing in a cost-effective and on-time manner, it is essential to support automated management of the entire life-cycle of the business relationship: creation of service offering, creation of SLAs with possible negotiation, provisioning of applications and environments, and monitoring of SLAs both for dynamic allocation of resources and for compliance. To facilitate this automated management, the SLAs and other agreements need to be specified in machine-executable forms. In addition to SLAs with customers, the business defines additional objectives for managing the utility computing infrastructure. This may include resource arbitration policies across SLAs (in terms of optimization of profits, customer satisfaction, etc.) and strategies for provisioning additional resources.

Resource provisioning and workload management in meeting SLAs with clients and other business objectives may differ significantly across service providers, thus reflecting their unique strategies and automated management processes.

A less agile utility computing provider may depend on fixed allocation of resources, whereas a more efficient provider can dynamically redistribute resources across multiple customer workloads. This paper presents a framework for providing differentiated levels of Web services to different customers through the use of automated management and service level agreements (SLAs). The execution environment is referred to as a "Web-services-on demand" environment because it exhibits two important on demand characteristics. First, it supports dynamic outsourcing (on demand) where service customers can dynamically form outsourcing relationships with providers, and the execution environment supports the required functionalities for managing the SLA life cycle. Second, to be

efficient and profitable, the service provider provisions resources dynamically (i.e., on demand). In this paper we use the terms “Web services” and “utility computing services” interchangeably. Figure 1 illustrates a high level architecture of our implementation, in which functions are grouped into three components: Web service contracting, Web service provisioning, and the Web service execution environment. The Web service execution environment includes the computing platform and workload management. All customer interactions other than the service invocation itself are managed by Web-service contracting. The utility computing provider creates various service offerings that are defined in terms of service levels (fixed or negotiable), rating (pricing), and various restrictions that may be placed on the usage of this service. Tools for creating an offering may take into account various business objectives, resource availability, as well as considerations on the profitability and the difficulty of supporting such an offering. A customer order (also referred to as a subscription) for an offering results in the creation of an SLA as part of a contractual agreement. The SLA is expressed via the Web Service Level Agreement (WSLA) language.⁴ For flexibility, certain terms of the contract can be negotiated.^{5,6,7} The subscription is tracked during the fulfillment process to make sure that the service level guarantees agreed upon in the SLA are adhered to, a process referred to as compliance monitoring.

Delivering the Worldwide Sensor Web Abstract

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The amount of environmental data captured in order to more fully understand its processes and the likely effects we are having on them is increasing. Social and scientific concerns are increasing particularly in light of the, seemingly, increasing frequency of extreme weather events and rate of climate change. Much of this data gathering activity aims to answer direct questions within a limited scope, in terms of both their geographical coverage and physical effect. The concept of a Worldwide Sensor Web facilitates co-operation between organisations, scientific institutions and private owners of sensing devices in the gathering and understanding of physical data.

The Worldwide Sensor Web provides access to a wide variety of heterogeneous sensing devices, over a wide geographic area, and over a wide timescale. There are many research areas open when considering the development of such a system. The major focus of our efforts to date lies in the design of a data collection network which has to be, to all intents and purposes, infinitely scalable. We expect the network architecture to be overlaid onto the Internet, facilitating the introduction of new sensing devices, routing of queries and the return of results to interested parties. We intend to present our work to date demonstrating the architecture, its constituent parts and their organisation.

FAULT TOLERANCE MAGNETIC COORDINATE ROUTING FOR MOBILE SINKS WIRELESS SENSOR NETWORKS (FTMC)

Abstract

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A basic premise of wireless sensor networks (WSNs) is composed of a large number of sensor nodes scattered in a terrain of interest. These sensors are typically small in size and able to sense, process data, and communicate with each other over wireless communication channel. This envisaged tremendous wireless networking applications such as environment monitoring, military surveillance, manufacturing facilities control, and traffic safety system. As a result, there have been a lot of research activities in the area of WSNs over the past few years. Since these sensor nodes are typically operated with limited energy, computing and communication capabilities and distributed deployed in harsh environment that suffers numerous attackers. Therefore, how to extending system lifetime with fault tolerant routing mechanisms are important objectives and challenges in WSNs.

To achieving this goal, we identify the following key requirements for fault-tolerance in wireless sensor networks:

1. Eliminate communication overhead of data dissemination to extend system lifetime.
2. Provide fault tolerant mechanism for maintain the network reliability.

To address these challenges, we propose a novel efficient data dissemination algorithm with fault tolerance capability for mobile sinks wireless sensor networks which we call FTMC (Fault Tolerance Magnetic Coordinate), This FTMC approach is based upon representing the network as a virtual grid and using coordinate conception and magnetic phenomenon for data dissemination in network. This could provide energy efficient and fault tolerant routing protocol in WSN and support dynamic deployed, wild field environment. Extensive simulations evaluation will be conduct by our proposed algorithm.

PAA Mashup Creates On-Demand Programmable Web Platform

Abstract

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As users of the Internet, we are all familiar with the fascinating, innovative, creative ways in which it has changed how we work and play. Much of that excitement comes from the flexibility and the ease to create, share and consume content including software components and services. Though, inevitably such innovations are changing how we programmatically work with contents, components and services for instance to design, deploy and manage software applications.

While yesterday's business applications required sometimes years of professional services help to design, set up and customize, as well as in today's service oriented On-Demand Platforms like the one offered by (SalesForce.com) uses point-and-click way through the web services which seems easier but in reality invaluable due to the interwoven dependencies from which these services are comprised create the case that a failure in one service can produce failures in a set of services.

Thus, the need for Provision, Assurance and Auditing/Accounting (PAA) modelling approach that intelligently reacts and adapts to the different runtime circumstances is paramount. PAA spurred on by *Mash-Up*, an application that combines tools, services from multiple on-demand platforms to create new functionality, make it much easier and robust to create, configure, modify, integrate and use business applications of all kinds. Indeed, the power of the PAA has given us the ability to solve new kinds of business problems that, because of complexity or cost, had previously remained out of reach. With the PAA Mash-Up, Not only can we reuse or mash up on-demand platform tools and services in a new and interesting way, but these tools and services are becoming customizable, amendable and programmable creating On-Demand Programmable Web Platform.

Convergence of OSS for the next generation Wireless Networks

Abstract

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The communications industry is undergoing profound redefinition, driven by the forces of consolidation, competition, convergence, and customers' increasing demand for convenience. These factors together with the vision of next generation networks pose significant challenges for convergences and transformation to an appropriate architecture for operation, administration and maintenance of future wireless networks services.

In order to maintain a competitive advantage we must rise to these challenges by making the systems environment more flexible and extensible so that it does not present any technical or economic barriers to change. As the expected next generation networks (NGN) will be all IP based, all service providers will migrate to an IP-centric network—the key is in the timing and planning. Convergence for NGN not to become a replica of the challenges we see in present days networks, the network management side of it has to be treated in parallel and with equal importance.

The main objectives of this research are, to identify the needs, trends and technology drivers of the telecommunication industry concerning OSS/BSS in NGN service and to evaluate the major issues/challenges need to consider for convergences and provide the required solutions which will capable to offer unique service platform for NGN and works together with TMFs service model.

Development of New Non-Blocking Mechanisms for High Availability Distributed Database Systems

ABSTRACT

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Recently, the interconnection of massive data-sites has given rise to the formation of power- distributed systems. In such situation, the execution overhead for distributed transaction becomes more problematic than movement of large amount of data in the network. Due to existence of highly reliable database Management system, it is expected to perform in better way beside the complex issues such as location of data, different database-platforms, complexity of distributed transaction etc. Commit protocols, in distributed transaction execution, ensures transaction atomicity to keep the data consistent. System performance of commit protocol depends on whether commit protocol is blocking in nature and how expensive it might be to achieve atomicity in terms of communication overhead. Many protocols have been proposed to achieve atomicity, for example 2PC, 3PC, Presumed Commit etc. Majority of these protocols are blocking in nature; which emphasis on minimizing the communication cost. The presentation highlights the new proposed protocol. This protocol is non-blocking and has low communication cost. Non-blocking is achieved by making two copies of protocol database available on network which are needed to execute the transaction. Idea of presumed Commit is modified to further minimize the communication overhead.

**An Innovative Set Theory Interpretation of Beer's Cybernetic Viable
System Model: Aspirant of Viable Computer Systems**
Abstract

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Presented is innovative research examining both Cybernetic and Autonomic computing genii, evolving a set-theory oriented, atomically-derived, emergent model. Our research reflects a functional, decomposition of Beer's recursive, multi-agent Viable System Model, integrated management of the holism, promoting each sub-system as an entirety within a closed meta-boundary. Identification of the relationships between the systems is demonstrated via the syntax subscripts, whilst, normally, the relationships linking the recursive levels is recognized via superscripts. By endorsing autonomy versus governance, the resultant design grammar is akin to self-aware systems. Seeking inherent learning and control through communicative system-environment interplay, work fuses concepts pertinent to both Autonomic Computing development and historic bases of cybernetic enquiry. Current research focuses towards System Four of the Beerian model, exploiting cybernetic, mathematical and biological metaphors. Investigations ultimately aspire to a software demonstrator, fostering subsumation of the Autonomic Computing state of the art into the innovative field of Viable Computing Systems.

A cellular approach to fault detection and recovery in wireless sensor networks

Abstract

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In the past few years wireless sensor networks (WSNs) have received a greater interest in application such as disaster management, border protection, combat field reconnaissance and security surveillance. Sensor nodes are expected to operate autonomously in unattended environments and potentially in large numbers. Failures are inevitable in wireless sensor networks due to inhospitable environment and unattended deployment. The data communication and various network operations cause energy depletion in sensor nodes and therefore, it is common for sensor nodes to exhaust its energy completely and stop operating. This may cause connectivity and data loss. Therefore, it is necessary that network failures are detected in advance and appropriate measures are taken to sustain network operation.

We extend our cellular architecture and proposed a new mechanism to sustain network operation in the event of failure cause of energy-drained nodes. In our solution the network is partitioned into a virtual grid of cells to perform fault detection and recovery locally with minimum energy consumption. Specifically, the grid based architecture permits the implementation of fault detection and recovery in a distributed manner and allows the failure report to be forwarded across cells. The proposed failure detection and recovery algorithm has been compared with some existing related work and proven to be more energy efficient.

Virtual Worlds Development: Bridging the Physical and Virtual Worlds for an Immersive Internet World

Abstract

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This presentation reviews the work in virtual worlds development from the early 1960's to date that is contributing to the creation of a 3-D Internet or next generation web. Taking early Multi-User Dungeon (MUD) and Massively Multi-player On-line (MMO) gaming as a starting point, we trace the development of virtual internet worlds that has culminated in such current offerings as Second Life, Sun Microsystems Wonderland Project, There.com, Entropia Universe and Habbo Hotel to name but a few. The differing architectural approaches used in such worlds, for example, peer-to-peer, client server and grid/cloud modes will also be considered. Finally, the presentation reviews the possible research areas that may be considered for the further development of more immersive virtual worlds such as integrating gestures, physical objects and architectural improvements.

Analysis of Distributed Data in a Service Orientated Computing Platform
Abstract

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Open access to distributed service orientated computing (DSOC) platforms such as Google Apps, Amazon EC2 and also to a lesser extent the many distributed systems which host web mail services or sites which allow user generated content (e.g. YouTube) pose a problem to current digital forensic techniques. Large amounts of data generated by multiple users is stored in these distributed systems.

Analysis of large distributed systems will rely on the analysis process also being distributed. The architecture and methodologies used are the subject of this research. Collection of consistent data in a distributed system is challenging as the data may be stored on multiple nodes, there may also be multiple versions of the data on each node. Collation of results from the analysing nodes poses a similar problem as their may be conflicting results which require reasoning if the system is to produce robust results. To successfully analyse the data stored in a DSOC platform a method of creating signatures from distributed file fragments is required. Before such signatures can be created the locations of the blocks which make up the file fragments need to be determined. Due to large amount of potential evidence it is also necessary to reduce the scope of search by identifying files relevant to the analysis process.

The challenges to applying digital forensics lie in the collection, unification and analysis of the huge datasets found in the distributed infrastructure of service orientated computing. This research aims to provide a method to apply forensic computing to the service orientate computing paradigm. By developing a distributed method to identify files stored in a DSOC platform, determining the physical location of data stored on hard drives within the DSCO platform and creating signatures from them, which can be used to detect malicious file content regardless of how the file is distributed. The work is in its early stages so our results are limited to literature survey and problem analysis.

The advancing complexity of software systems

Abstract

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The advancing complexity of software systems and their increasing interaction with their external environment is set to increase dramatically in the near future.

The requirement for adaptive software is made more urgent by the fact that software development is becoming more complex and unpredictable. External pressures such as increasing competition and more sophisticated requirements has meant that traditional software development techniques are likely to find it increasingly difficult to satisfy the requirement for quality software. Future software development will increasingly require software to adapt with its operating environment in order to operate robustly and dependably.

In order for adaptive software to be successfully developed it will be vital to be able to model the external environment in which the software operates. Therefore, this work presents a novel development framework and software tool, which will enable these complex environments to be modelled in order to allow more robust dependable systems to be developed. The main novel contribution of this work is that it provides the means by which software can monitor their environment and more effectively adapt to changes in their environment. Detailed novel contributions include an environment model approach to improving system robustness, the use of adaptive forecasting techniques to detect environmental instability and the concept of an environment control centre (ECC) to manage the various elements required to achieve effective environmental monitoring.

The work is presented utilising a virtual world platform called "Second Life". This platform was used for experimental design and testing of results.

**A New Self-Detection Scheme for Sensor Network Boundary
Recognition
Abstract**

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Sensor networks comprises of a huge number of sensor nodes randomly deployed in an area to monitor some specific phenomena and gather information. One of the exigent problems in wireless sensor networks is the detection of holes inside the network and recognizing the nodes which reside on the boundaries of network. We have proposed an algorithm in which every node in the network self-detects whether it is a boundary node or an interior node by utilizing its direct neighbours. Our algorithm does not involve flooding; it neither needs the use of any location awareness devices nor does it involve complex mathematical or statistical computations. The simulation results shows that our algorithm works better for networks with lower degrees.

Denial of Service (DoS) Attacks in IEEE 802.11 Wireless Networks

Abstract

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Due to the widespread use of wireless networking, wireless security has been the focus of many researchers over the past few years. A great deal of this research has focused on confidentiality, integrity and availability of wireless networks. Many security problems in IEEE 802.11 networks have been solved by the development of protocols such as IEEE 802.11i, 802.1X and WPA2. However, DoS attacks are still apparent in these networks. The security protocols mentioned above only become effective once wireless clients connect to an access point. However, DoS attacks can be easily launched using control frames, before the client associates with an access point. DoS attacks have been analysed by various researchers who have explored various ways to deploy DoS attacks in wireless networks and studied their affects. Some researchers have recommended upgrades to an access point's firmware in order to tackle such attacks.

Ease of MAC address spoofing also helps attackers to launch different attack scenarios in wireless networks. There could be two common purposes of DoS attacks. The first is to only disrupt wireless network communication by resource depletion attacks. The second is to launch more serious follow up attacks such as introducing a rogue access point after compromising the legitimate access point.

Attackers can easily forge their MAC addresses to launch DoS attacks, however they have very little control over the signal prints they produce. Some researchers have used signal print techniques to prevent identity based attacks. However, those solutions require more administrators' time and knowledge and will also become more complex as the network grows. To solve this problem, we recommend a solution that couples signal print techniques with visualisation. Visualising the wireless network topology can help security professionals to identify attacks and also establish the location of malicious nodes with very little effort. In this talk I will discuss how visualisation can help to solve this problem.

Using adaptive neural network in self – healing System

Abstract

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Although previous research on using standard off-line artificial neural network showed successful simulation results in monitoring, predicting and controlling self – healing system which is one of the main characteristics of Autonomic Computing, the challenge is how to manage self-healing system in real time since it requires online learning so that the system is tuned and adapted automatically based on the current real time situation.

A novel technique is implemented using a pipelined neural network with some modification of the original algorithm in order to meet self – healing problem requirements. This method enables us to deal with several independent signals instead of one input.

In this presentation the new suggested algorithm is demonstrated with a back ground of the original pipelined technique, and then some experimental results for evaluation will be shown.

A Composition Security Service for Network Appliances in Peer-To-Peer Networks

Abstract

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Security is a basic need for all networks as they are under constant threat from attack. The term peer-to-peer (P2P) refers to the concept that in a network of equals (peers) using appropriate information and communication systems, two or more individuals are able to spontaneously collaborate without necessarily needing central coordination. A growing area of application for peer-to-peer networks is that of networked appliances, whereby common household appliances are connected together to form a network in order to improve their capabilities. Peer-to-peer networked appliance systems have become one of the most widely discussed terms in information technology in recent years. For peer-to-peer networked appliance systems to be widely accepted and adopted, they must be secure. Unfortunately, securing applications in a P2P networked appliance environment is much more challenging than the already hard problem of securing client-server or traditional distributed applications. This follows from the openness and autonomous nature of a P2P networked appliance. For P2P networked appliance systems, we need a suitable solution to ensure the correct configuration of devices and provide protection from anonymous attacks. In order to minimize the threats, we propose a security service for use in such P2P networks. This approach uses a service that has been designed primarily to allow testing of secure component composition analysis techniques, and which we are able to apply to a peer P2P networked appliance framework.

This talk will consider issues including peer-to-peer networks as they apply to different home appliances such as PCs, TVs, fridges and so on. We will look at how these appliances work together, the impact this has on the security of these appliances over P2P networks, and how we can apply component composition analysis.

**Frameworks for Development, Deployment & Management of Cloud
Computing Solutions
Abstract**

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Cloud Computing and its associated principles and techniques are mature concepts. However their uptake within the modern computing industry has been slow due to various technological and human restrictions imposed by software, infrastructure, autonomies, trust and economics. This paper analyses these restrictions, raises questions regarding their perception and suggests frameworks and work flows that might handle them.

A Real Life Inspired Community-Based Social P2P Model

Abstract

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The development of technology has produced high quality data capturing and huge data storage devices at a low cost. Human life is filled with many events which people try to capture and store to their digital memories. These digital events which capture the most memorable minutes of life are not only to be stored, but also to be shared with other people. Sharing of data among people has to some extent been facilitated by Web-based networks. These constitute examples of Online Social Networks. They usually provide user identification, a limited amount of centrally controlled storage space and time consuming procedures for saving and retrieving data. These limited facilities cannot capture every perspective of a member's life and hence cannot represent a person's personality in full. Moreover the main way to share accumulated data with friends and family – to buy extra storage space on a Web-based network – is somewhat limited and may be insufficient for a user's data. A better option is for a person to use their own resources that are under their own control with no extra cost, via peer-to-peer technology.

We therefore consider how peer-to-peer technology can be used for the purposes of storing and sharing of digital memories in an efficient manner. In order to achieve efficient sharing, we consider how real world communities can inform the structure of the peer-to-peer network. Existing community-based social peer-to-peer networks provide the facility to share data but they do not describe the nature of the people because peers in communities are kept restricted based on their interests. The efficiency of existing models is based on hubs and these hubs or super-peers increase network connectivity. However, they also create a single point of failure in the network. In case a single node is compromised, the performance of the whole network degrades.

In contrast the structure of our proposed model is inspired by the social relationships and hierarchy of information sharing of the human community. In our social lives, people have relationships beyond their interests. A social network not only represents the data of interest of the person but also the role or activities of the person in their community or network. Our social peer-to-peer model will handle the sharing of data in a similar way to how we share data in our social lives. In this way people from different social backgrounds having different interests can come together to make different communities and share their data with people based on their social interests and trust relationships.

State Synchronisation System for Distributed Peer-to-Peer Networked Multiplayer Games

Abstract

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This project aims to develop a generic state synchronisation system for massively multiplayer online game. It will take the form of a state-oriented network synchronisation framework [1] developed for use with web-based 3D online multiplayer Java-based games. The framework is intended to pave an easy route to multiplayer game creation, allowing the developer to concentrate on developing the game experience rather than dealing with the intricacies of networking. The system has been inspired by the tried and tested classical server-pool model which is used in MMORPG games, will be applied to a wider range of different computer applications.

Developing the network code in multiplayer games is often a complicated affair, with each game having its own system of networking which is deeply integrated into the game code. Although this sometimes produces quite good networking code in commercial games due to the flexible approach, lesser game developers often find it challenging due to the complexity of code required to introduce multiplayer capabilities. One of the major challenges is that the style of coding in multiplayer games is often very different from that for single player games, as single player games often do not have an engine which can scale up to the challenge. Many assumptions are made in the game code to allow the developer to write less code, and to speed up the game development in general.

The goal has always been to find the optimal style of coding structure or framework for game development which can accommodate single player games as well as multiplayer games. A good structure can also accommodate future changes more easily, and make development easier in the long-term.

A particular paradigm that has been heavily emphasised in recent years is Area of Interest Management, which applies to every area of computing. In networking, the concept refers to the inspection of a client's area of interest to find out what data the client requires at a particular point in time. This approach attempts to lessen the amount of data transmitted between machines in networked games by only sending required information, rather than sending unnecessary information which a client will never use.

Another paradigm which is increasing in use is peer-to-peer networking, which attempts to spread the load over a network topology by connecting individual clients together, rather than directly to a server. In this type of network topology, there could be more than one central server (used also as a lobby), or no server at all. Efficient management of a peer-to-peer network allows data sent to the server to be routed through optimal paths, compressed, or collated into a more efficient format before it reaches the server. The server could be negated entirely in some cases, but

this relies on the type of the data, as well as the security and integrity context in which it is used.

In this presentation, I will give an overview of the project, demonstrate the work which I have done so far in the areas of multiplayer online development, the simulation framework and support for AOIM, and I will discuss future work.

Reference

[1] C. Dennett, A. El Rhalibi, M. Merabti, Marc Price, "Koku: State Synchronization System for Networked Multiplayer Games". 6th International Conference in Computer Game Design and Technology (GDTW), 2008, Holiday Inn, Liverpool, UK, 12th - 13th November. ISBN: 978-1-902560-21-2.

Improvement in Authentication Scheme of WiMAX/ IEEE 802.16 Networks ABSTRACT

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WiMAX (Worldwide Interoperability for Microwave Access) is an emerging technology that can provide wireless broadband access at the data rates of multiple Mbps over long distances to both home and business customers. WiMAX is cost effective and offers high data rates than other wireless networks. It supports both fixed and mobile applications. WiMAX is easy to deploy than other networks and has flexible network architectures. But security is a critical concern in the success of WiMAX. Transmitting data through some wireless system rather than more secure wired medium brings along with some inherent security vulnerabilities e.g. eavesdropping. If a wireless network is not properly secure than it can cause damage in many ways.

Security in WiMAX is implemented as a privacy sub-layer of MAC protocol and that is used to provide users authentication and confidentiality. But there are still concerns about WiMAX security. A robust security framework is needed to protect user personal data and network from malicious attacks. The subscriber station (SS) and base station (BS) exchange management messages with each other for authentication and then proceed to key management before transmitting data, so authentication plays an important role in securing connection and transmission across WiMAX system.

Our research analyzes different threats to physical layer and MAC layer of WiMAX. We describe the security requirements of a WiMAX network. We analyzed different techniques used for the authentication scheme such as RSA, X.509, HMAC, and EAP and suggest improvements in authentication scheme of WiMAX system. The proposed authentication mechanism strengthens the security of WiMAX and protects it from different attacks such as DoS.

**Disjointed Conflict Free Address Auto-Configuration
for Mobile Ad Hoc Networks
Abstract**

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Abstract - Recent years have seen a great amount of research in wireless networks, especially *ad-hoc* wireless networks due to their potential applications in various situations such as conferences, sensor application, battle field, emergency relief, and so on. Address configuration in *ad-hoc* wireless networks is a highly prioritized subject matter as mobile hosts would not be able to initiate network communications until it acquires a unique IP address. Also address configuration in a Mobile Ad-hoc Network (MANET) is a primary and essential question to be solved in advance, and the solution must be an automated system due to hosts' mobility, unavailability of a central server, and hosts leaving & entering the network at will. Hence hosts in MANETs are considered as highly capable of acquainting themselves with wireless mobile network environments. Address auto-configuration is a necessary requirement with these kinds of behavioural natures of mobile hosts in MANETs. To overcome the unique identifier allocation predicament, we present a new address auto-configuration protocol. This novel solution generates purely conflict-free addresses for hosts entering the *ad-hoc* environment.

Neural Network based nonlinear predi ABSTRACT

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The vast volume of digital images produced by scanners, digital cameras, mobile phones and other digital devices that need to be stored and/or transmitted via the Internet (usually) has promoted researchers for image coding systems that can achieve even higher compression ratios without noticeable loss in the image quality. In our research project we use a nonlinear predictor as part of a multistage image compression system.

In this paper we present a novel neural network based nonlinear predictor that is used to produce very small prediction errors. The proposed nonlinear predictor uses a type of higher order ridge polynomial neural network architecture.

Experimental results have shown that the proposed architecture outperforms that standard MatLab linear predictor (lpc). The results also compare well with some of the published architectures for neural networked based nonlinear predictors.

The novel neural network architecture will continue to be refined until the stated target is achieved (that is 80% of the prediction errors to be in the range of -7 to +7 for most of the test images). The MatLab linear predictor has given 58% of the prediction errors in the range of -7 to +7 for the same test images.

**Determination of the effectiveness of project management in
serving the progress of transformational eGovernment
Abstract**

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Many of the failures in the implementation of large information technology systems (ITS) projects around the world have been attributed to inadequate project management action. This criticism encompasses e-Government project initiatives which have attempted ambitious program change, major innovations, large transformations, enterprise wide solutions, collaboration across organizations, governments and private sectors, and the implementation of unprecedented (or ambitious) solutions.

This paper is ongoing progress which forms part of a PhD research to describe, critically evaluate and examine the underlying barriers and challenges in e-Government initiatives. The paper invites technology to be incorporated and inculcated into the art and science of project management, and be part of the solution as opposed to being distinct and separate from it. The tools used have to increase the novelty (art and science) of project management through human interaction, and empower the project manager and increase his capacity to deliver results.

This paper examines change in organizations due to the change in the global economy and global information society that new technology is changing the nature of work. It identifies and examines the current and foreseeing problems with large e-government projects and describe how a socio technical approach which takes into account, technical, business, citizen, economic needs in the creation of a socio technical ITS for future citizens. This research paper critically analyses and summarizes a list of e-Government challenges and barriers arising from an e-Government survey administered on behalf of the World Information Technology and Services Association (WITSA) representing the national technology associations in 70 countries. It compares these challenges to the Project Management Body of Knowledge (PMBOK), the North American standard in project management methodology. Also, it highlights the weaknesses in PMBOK to address these challenges and offers a technology-enabled enhancement to the Project Initiation Phase, the area identified as being particularly weak and inadequate in addressing e-Government initiatives and requirements.

An MDD based framework for autonomic systems engineering

Abstract

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The advances in networking and computing technology and software tools have led to the explosive growth seen today in distributed applications and information services that impact all aspects of our life. The nature of these applications and services is extremely complex, heterogeneous and dynamic. As these systems and applications continue to show a growth in terms of the complexity and scalability, existing tools and methodologies have failed to show the capability and support needed to manage such systems. Researchers, therefore, had to consider alternative approaches to address this problem. They have adopted a set of strategies employed by the biological systems and their effort has resulted in the emergence of the autonomic computing paradigm. This paradigm was first introduced by IBM to the National Academy of Engineers at Harvard University in March 2001. Such a paradigm is inspired by the functioning of the human nervous system and its fundamental objective is to design software systems that exhibit autonomic and self managing capabilities. In such systems, the management and configuration tasks which are used to be performed by the system administrators are delegated to the software itself, supplied only with high-level policies, and thus shielding the administrators from carrying out these notoriously difficult tasks.

Although the autonomic systems are very promising and their benefits and values for the software design industry are evident, the support and design process for such systems is still unclear. This is probably due to the nature and unique features, stated above, that distinguish these systems from the ordinary ones which make the already existing software development processes, such as the *waterfall process*, not suitable or appropriate for designing these systems. Therefore, there is required work and research to be conducted and undertaken to find a good candidate for an autonomic system design process.

Despite the well defined and valuable approaches proposed so far, including the IBM, to address and guide the autonomic systems design, this important aspect has not been fully addressed yet by any of these approaches. Therefore, the primary aim of this research is to design and develop a modelling framework for autonomic systems, which will guide and help designers develop such systems. This design method distinguishes itself from the existing ones by providing a complete lifecycle for the autonomic systems development where the designer is guided and supported from the very early stage of the design process (the requirement stage) and up to the last stage when a set of useful skeletons of code is generated. More importantly, unlike other approaches which also have adopted the model driven development, this design method has raised the abstraction level one level higher by not committing itself from the beginning to any specific technology. The other approaches tend to adopt a particular technology from the early stage of the development process, the object oriented technique for instance (UML class diagrams).

Ambient Intelligence in support of spatial navigation for the visually impaired: -
developing an Ambient Intelligent spatial navigation system for the blind and
partial sighted

Ambient Intelligence in support of spatial navigation for the visually impaired

Abstract

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Navigation, whether in real or electronic worlds, is a complex human activity. A lot of notable research has been carried out into developing navigation systems for the visually impaired. Though quite useful to blind or partial sighted persons, traditional navigation aids for the visually impaired have not been fully beneficial in that they have not fully promoted independence in the mobility of blind or partial sighted persons, nor have they facilitated their successful navigation within unfamiliar environments. Often, they have been inconvenient to port, and could only be customized manually and with difficulty. In addition to this, they cannot always indicate the user's location accurately.

In many cases, a person whose vision is impaired experiences difficulty in knowing their location and being able to move safely and independently even in familiar environments. This is even more difficult in unfamiliar places e.g. large, public buildings, airports, hotels, hospitals

Our research describes the progress made in the development of an ambient intelligent spatial navigation system for the visually impaired. The purpose of such a navigation system would be to enable blind and visually impaired individuals to navigate easily within familiar but particularly unfamiliar indoor environments e.g. a large buildings etc. It would do this via Ambient Intelligent computing principles, using a computing paradigm known as spatial programming to augment real-life interactions with data processing, thereby minimizing the requirement for explicit interactions from the user to the application.

Through ambient intelligence, spatial navigation for the visually impaired can become adaptable to the individual user, navigation technique and environment, and should be able to satisfy current user tasks, capabilities, information availability and location awareness