



Faculty of Technology and Environment

School of Computing and Mathematical Sciences

**POST-GRADUATE
RESEARCH CONFERENCE**

**ABSTRACTS
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Humayan Bakht

Email: h.bakht@2003.ljmu.ac.uk

Mobile Ad-hoc On Demand Data Delivery Protocol

Abstract

Mobile Ad-hoc On Demand Data Delivery Protocol is an on-demand protocol. It is one of the only protocol that follows an intermediate approach and deal several issues along side routing. The protocol has its own power saving and security mechanism and provides reliable bandwidth efficient routing for mobile ad-hoc network. MAODDP was developed in Java and evaluated under SWANS. Evaluation showed that MAODDP is capable of data delivery of up to 79.07 %cnt. Seperate set of experiements were carried out to measure MAODDP power aware operation. Result shows that MAODDP can deliver 5%cnt more data packets under power saving mode.

Kashif Kifayat

Email: k.kifayat@2004.ljmu.ac.uk

Structure and Density Independent Group Based Key Management Protocol for Large-Scale Wireless Sensor Networks

Abstract

Achieving security in resource-constrained wireless sensor networks is a big research challenge. Many key management schemes have been developed recently to provide secure communication between a source and a destination in wireless sensor networks. A serious threat highlighted in all of these schemes is that of node capture attacks, where an adversary gains full control over a sensor node through direct physical access. Node capture attacks (NCA) can help an adversary to compromise the communication of the entire sensor network. This task is made especially challenging due to the limited resources of sensor nodes. Many proposed key management schemes provide some resilience against node capture attacks but still suffer some attack effects. Our earlier work on Dynamic Group-Based Key Establishment (DGKE) highlighted the three main factors that allow node capture attacks to damage other parts of the sensor network. These factors include network structure (topology), sensor node density, and key sharing between neighbouring nodes used for encryption and decryption.

In this paper we therefore propose a new, novel and improved version of DGKE, the Structure and Density Independent Group Based Key Management Protocol. This protocol not only provides resilience against node capture attacks but also replication attacks. We have evaluated our proposed protocol using different topologies both with and without group structures and we compare it against DGKE and existing key management schemes. Evaluation results show a significant improvement in resilience against node capture attacks, memory overhead and connectivity. Since the structure and density of every sensor node changes continually in mobile sensor networks, our solution can be useful in such applications due to its structure and density independent features.

Sudath Indrasinghe

Email: m.p.indrasinghe:2004.ljmu.ac.uk

Conflict Free Address Allocation Mechanism for Mobile Ad Hoc Networks

Abstract

A Mobile Ad-hoc Network (MANET) can be implemented anywhere where there is little or no communication infrastructure, or the existing infrastructure is inconvenient to use. A number of people with mobile devices may connect together to form one large group. Later on, they may split into smaller separate groups and partitions may merge if necessary. Network partitions and merges are potentially frequent occurrences in MANETs, hence address auto-configuration is an important requirement. We propose a mechanism for address autoconfiguration in MANETs, which is capable of assigning conflict-free addresses in a dynamic and distributed manner. Also we propose novel mechanisms to address MANET partition and merging.

One or a few groups of hosts can depart the MANET to participate in some other session separately. This means that a network may split into multiple partitions gracefully. When a MANET splits into a few partitions, the MANET ID of these partitions will initially be the same. These partitions may merge if they wish to participate for a different session. Therefore, partitions need to act as an independent network. To achieve this requirement each partitioned network has to change their MANET ID. More challenging is abrupt network partitioning. When a network is partitioned abruptly, hosts in partitions initially are not aware of the partition. Before initiating communication among existing hosts, partitioned networks have to clarify about reachable hosts in the new network environment.

MANET merging may involve previously partitioned or independent networks. Prior to merging, each partition will have independently configured addresses. After merging, two hosts in the merged network may have the same address, thereby creating an address conflict. It is necessary to resolve this situation immediately and efficiently for correct MANET communications. Our research has identified the importance of an alternative approach to redress this situation. Consider the case when two merging MANETs have the same MANET ID. Even though this unlikely, there is nevertheless a probability that this may occur. When they merge, routing protocols are likely to fail, due to repeated IP addresses. The source to destination route may not be established and routes are misdirected to different destinations specifically due to the presence of repeated IP addresses.

Adnan Sultan

Wireless Sensor Networks An Overview

Email: a.sultan@2006.ljmu.ac.uk

Abstract

The recent advancements in wireless communications and electronics leverage the concept of development of low-cost and low power and small size multifunctional sensor nodes that leverage the concept of wireless sensor networks.

Each sensor node is capable of sensing, data processing and transmission. There applications consisting of Military applications, Environmental applications, Health application, Home applications and many other commercial applications.

There are many limitations for the sensor network to be design that are fault tolerance, scalability, production cost, hardware limitations, topologies, environment and transmission media,

This survey also describes the technical issues of the wireless sensor networks that are Data security issues, protocols, energy, medium of access, toologies,

In Details.

- WHAT IS SENSOR
- WHAT IS WIRELESS SENSOR NETWORK
- APPLICATIONS
- LIMITATIONS OF SENSOR NETWORKS
- RESEARCH ISSUES

Ali Obied

Email: a.obied@2004.ljmu.ac.uk

Practical Reasoning Models in Situated Autonomic and Deliberative Regulation Systems

Abstract

Situated Autonomic software can be envisaged as a system which acts and/or reacts autonomously to external stimuli, generated from sensing its environment, which is achieved independently of external human intervention. This research focuses on the theoretical development of regulatory mechanisms for deliberative autonomic software under partially observable worlds. In First hand, The work details progress achieved, towards the design and implementation of a proposed partially observable regulation mechanism, which integrates an Extensible Beliefs, Desire and Intention (EBDI) model deliberation with decision theoretical approaches. Unlike other approaches, the proposed mechanism enables an autonomic system to regulate its reaction not only via logic and deontics based reasoning but also via anticipated risk or benefits (effects) of a given reaction plan. In other hand, this research produces interesting development of EBDI-POMDP agent by integrating among knowledge base models, decision theory and Self-Organizing system. This research clear distinguishes between sensing policy and sensing cost, since; it described experiments examining the efficacy of dynamic sensing policy when the time cost of processing sensor information is significant. It is demonstrates that several expected features of sensing cost and planning cost do arise in empirical tests. In particular, it is trying to answer the question is how would scalability of agent improve? The observations that for a given sensing cost and degree of world dynamism, an optimal sensing rate exists and, it is shows how this optimal rate is affected by changes in these parameters.

Amjad Shaheed

Email: A.Shaheed@2006.ljmu.ac.uk

Integration of physical devices into virtual world

Abstract

On-line gaming coupled with virtual world development and social networking are at the forefront of next generation entertainment. In parallel, there is an unprecedented push to equip every device with networking capabilities. However, there is little evidence to suggest that these distinct technological trends will converge rather than just co-exist. There are obvious benefits to support interoperation between real world and virtual world objects. It can be beneficial in at least two ways: first improving possibilities for device interactions and improving the functionality that is available within virtual worlds. Second, it also allows the physical constraints associated with real objects to be removed, enabling them to enjoy the freedom offered by virtual world.

To promote this vision, we propose an integration architecture that blurs the gap between real and virtual objects. This supports both conventional and unconventional usage of devices visually connected to digital avatars, thus freeing users to decide how they wish to operate devices. Although much work has been done in both networked appliances and interactive entertainment, there is a need to converge these disciplines to harness the power afforded by new and emerging digital worlds. This will make it easier to interact with devices through the obvious benefits which physical disembodiment brings. We present a new approach demonstrating a working prototype to implement a virtual world capable of operating a remote appliance, either via the device or via its digital avatar.

Mohamed R. Ahmed Alzawi

m.r.ahmed-al-zawi@2005.ljmu.ac.uk

Self – Healing aspects and technologies

Abstract

One of the main objectives of autonomic computing is self – healing; it is the ability of a system to detect, diagnose, and repair (recover) errors automatically. Two different approaches are used in self – healing; internal adaptation where the solution is written within the original code of a system and it is hard to reuse or change; another alternative approach is the external adaptation which gives more flexibility in terms of analyzing and reusability of the purposed solution. However, from systems engineering perspective externalized adaptation raises different research problems; such as monitoring, interpretation, resolution, and adaptation.

Arshad Muhammad

Email: a.muhammad@2003.ljmu.ac.uk

Ad Hoc Gateway Service for Automatic Package Delivery using Networked Appliances

Abstract

Current Networked Appliance technologies enable devices to communicate seamlessly with one another; for example, the refrigerator at your home might communicate with your mobile phone when you are visiting the supermarket to prompt you about a shortage of food. The devices can communicate with each other irrespective of their location. A great deal of work has been done in Networked Appliances, but most of this has been undertaken in the field of multimedia. In this paper we used Networked Appliance technology in a home automation system, to avoid the problems associated with the delivery of packages while the homeowner is away. We use a peer-to-peer distributed gateway service to allow Networked Appliances to reach beyond the household boundary, thereby providing location independence. The use of the Ad Hoc Gateway allows the utilisation of existing networked appliance services, which would not otherwise be possible. Users can interact with the postman and allow him access while they themselves are absent; functionality that would not otherwise be possible. We demonstrate the viability of our Package Delivery framework using case studies and a prototype implementation.

Azizan Ismail

Email : A.B.Ismail1@2006.ljmu.ac.uk

Managing Human Life Memories

Abstract

While the technology in computer peripherals rapidly changes and becomes cheaper, storage for huge databases has now become affordable to keep a digital record of an individual's life. People need to store, retrieve and update many different types of data (text, audio, visual, speech, photographs etc.) over a very long period of time (a lifetime and beyond). We propose a new framework and database system as a solution for storing and retrieving large amounts of complex data over decades and indeed centuries.

There are three major areas that will form the core for this research. These are: the way in which multimedia data can be retrieved, the manner in which multimedia data can be accessed through P2P networks and the privacy and security of such data. Several problems were identified from earlier work which related to methods for the automatic annotation of images for retrieval, and the limitations of audio and video file formats. Therefore, our aim is to combine several data retrieval techniques and improve on the current automatic annotation schemes through the use of text ontologies. Data privacy and security is vulnerable in the P2P network environment therefore good privacy and security access control policies need to be integrated together into one system. Consequently, we need to develop a personal multimedia database management system with high security access control by using a combination of appropriate Object Oriented programming languages, privacy and security access control techniques.

Ruth Thompson

Email: r.j.thompson-hughes@2005.ljmu.ac.uk

A Set-Theory Construction of System Four of Stafford Beer's Viable System Model; Aspirant of Viable Computing Systems

Abstract

Presented is innovative research examining the Autonomic Computing genus, instituting a set-theory oriented, atomically-derived, emergent model. Incorporating a complete, yet first-stage, functional, decomposition of Beer's recursive, multi-agent Viable System Model, holistic management of the parts promotes each sub-system unitary within a currently closed meta-boundary. Endorsing autonomy versus governance the resultant design grammar is analogous to self-aware systems. Compliance with Ashby and Aulin's respective Laws of Requisite Variety and Knowledge is expected to reduce complexity, via application of stochastic and deterministic rule acquisition and lossy summarization concepts. Seeking inherent learning and control through communicative system-environment interplay, work facilitates symbiosis between Autonomic Computing development and historic bases of cybernetic enquiry. Future research foci will surround System Four of the Beerian model, obviating cybernetic, mathematical and biological metaphors. Investigations ultimately aspire to a software demonstrator, fostering subsumation of the Autonomic Computing state of the art into the novel arena of Viable Computing Systems.

Bo Zhou

Email: B.Zhou@2004.ljmu.ac.uk

Resource-efficient intrusion detection in ubiquitous computing

Abstract

In our previous work we proposed a service-oriented and user-centric intrusion detection system (SUIDS) for ubiquitous/pervasive computing. The inherent features of ubiquitous computing request an IDS to give special concerns about resource-efficiency. This paper presents a comprehensive analysis of energy consumed in SUIDS and proposes a profile splitting technique in order to reduce the energy consumptions. The energy consumed in SUIDS is categorized into two parts: computing-related and communication-related. The computing-related part can be reduced by taking advantage of the head nodes' unlimited power supplies; and the communication-related part can be reduced by splitting the user profiles and implementing the detection modules locally. To balance these two, we proposed a profile splitting technique and a novel hybrid metric. Instead of sending the event records to a fixed node for processing, a proxy node is selected based on the calculation of hybrid metric. The hybrid metric balances the transmission power, residual energy, and energy consumption rate of a network node. In this way, SUIDS achieves better performance in terms of energy-efficiency. The network lifetime is beneficially extended.

Farooq Alam

Email: f.alam@2004.ljmu.ac.uk

A Robust Frame Work for TCP in Mobile Ad-hoc Network

Abstract

Most technologies used for wireless networks are adopted from wired networks. TCP was designed for wired networks and is the most reliable transport layer protocol for Internet. In practice, most TCP deployments have been carefully designed in the context of wired networks. However, it raises a number of issues when required to work in a wireless environment. Especially, in the context of mobile ad-hoc network, where changes can happen some what quickly and unpredictably, it has to deal with new tough challenges such as high probability of both network partition and route failures due to mobility. Ignoring the properties of wireless ad-hoc network leads to TCP implementations with poor performance. Several protocols based on different techniques have been proposed for MANET, but none of these protocols provide complete solution for congestion control. Most of these protocols are single layer; from different simulations it is being proved that TCP performance increases with cross layer design.

We have proposed a robust frame work to make TCP adaptable for mobile ad-hoc network environment. Our frame work collects all the minor and major issues which can be seen as an obstacle in achieving the main objective and addresses them separately. These individual solutions will later be combined together to deliver the final solution. Some of those tasks are Distinguish between network congestion and non-relevant events; Error Detection Strategies; Consecutive Timeouts Heuristic; Investigating maximum possible retransmission; Multipath routing; Path Asymmetry; Power Management; Interoperation; Security and Response Mechanisms. Details of each of these tasks and their proposed solution are covered inside section 'Robust Frame Work for TCP in Mobile Ad-hoc Network'. We believe successful deployment of our frame work will yield a robust and cost effective model of TCP which will be able to offer reliable routing over mobile ad-hoc network.

Faycal Bouhafs

Email: F.Bouhafs@2004.ljmu.ac.uk

A Semantic Clustering Architecture For Routing In Wireless Sensor Networks

Abstract

In the past few years, advances in wireless technology and energy efficient devices have enabled a new kind of wireless networks called wireless sensor networks. Applications using these networks span a wide range, including patient health monitoring, environment observation, and building intrusion surveillance. However, these networks suffer from resource constraints that do not appear in more traditional wire networks. In particular, nodes are battery-operated, often limiting available energy, and wireless spectrum is scarce, often limiting the bandwidth available to applications. Therefore, there is a real need to design communication techniques that could minimize the amount and range of communication as much as possible, in order to prolong the life time of the sensor network. To tackle these resources constraints and adapt to the harsh environment new communication protocols need to be designed rather than the traditional layered approach protocols and new techniques like clustering and data aggregation need to be implemented. At the other hand, users of wireless sensor networks are, usually, interested in monitoring physical events that occur in the monitored environment. Therefore, besides the resource constraints imposed by the network, routing protocols need to respect the user interest and consider the semantic properties provided by each node in the network.

This dissertation addresses these issues by proposing a semantic clustering architecture for communication in wireless sensor networks. The proposed architecture is composed of four novel communication schemes: a semantic clustering routing protocol, an energy efficient routing clustering for mobile event monitoring, a node recovery scheme for data dissemination, and coordination framework for single actor model in wireless sensor and actor networks.

Our new semantic clustering protocol allows to group sensor nodes in a cluster according to their relevancy to user queries and data interest. Nodes inside the same cluster are organized like a tree where the cluster-head is the root. This semantic clustering protocol allows a layered data aggregation, avoids the cluster head overload and offers more energy saving, while satisfying the user query.

In the area of mobile events monitoring we proposed a new clustering protocol that allows gathering information about a mobile event in an energy efficient way. In this protocol sensor nodes within the event area are, firstly, grouped in a cluster with a tree organization where the nearest sensor node to the event source is the root of the tree and the cluster head at the same time. The cluster is maintained, when the observed event is moving, using a cluster membership update scheme, that allows sensor nodes to join or leave the cluster, and cluster head re-election, according to their sensed signal. Moreover, as event may split in two or more new sub-events, we proposed a cluster split scheme that allows the user to monitor the event split and the resulting new events.

Our third contribution is a node recovery scheme that maintains a single data dissemination path between sensor nodes and the user, by replacing energy exhausted nodes by new neighbouring nodes. The proposed recovery scheme exploits the network density and the broadcasting nature of the wireless medium to replace the energy depleted nodes in the communication path, and thus maintains the network connectivity and extends its lifetime.

Faycal Bouhafs (Continued)

In the area of wireless sensor and actor networks we proposed a coordination framework for the single actor model. In this framework, the network is organized initially in a Voronoi diagram, in which each

Voronoi region contains an actor and its nearest sensor nodes. We used our semantic clustering protocol to group nodes detecting the same event in a cluster, and the nearest node to the event source is elected as cluster head. Nodes within the cluster are organized in form of tree, where the cluster head is the root. The role of the cluster head in this framework is to inform the nearest actor to event source about the detected event.

We have analyzed the proposed protocols and schemes and evaluated their performances using analytical study and simulations. The evaluation was based on the most important metrics in wireless sensor networks, such as: energy consumption, time delay and data quality. The evaluation shows that our architecture achieves efficient energy consumption, good data quality and acceptable time delay. A comparison with existing communication protocols reveals that our solution is more energy efficient, extends the network lifetime much longer, and provides more accurate data to the user.

Ijaz Khan

Email: i.m.khan@2006.ljmu.ac.uk

Boundary Recognition in Wireless Sensor Networks-Different Views

Abstract

A wireless Sensor Network (WSN) is a group of densely deployed-sensing, computing and wireless communication capable- sensors, which are capable of collecting and reporting data from the physical phenomenon under their scrutiny to a collection point called Sink. There are different technical issues the researchers are currently work to resolve. One of them is to recognize the boundary of the sensor field. This boundary information may be then used for different purposes. Some solutions for the boundary recognition have been proposed in image processing, but these solutions are very limited and doesn't suit for large networks. This issue has been resolved through different techniques such as statistical methods, geometrical methods or topological methods. This presentation briefly highlights the problem of boundary recognition, its need and different attempts made to solve this problem. It briefly describes the main research issues related to boundary recognition.

Muhammad Jasim Saeed

Email: j.saeed@2004.ljmu.ac.uk

MAC protocol Interference Cancellation and Pre-emptive Routing

Abstract

A lot of research has taken place in the field of MANETs but it still has a lot of issues that need to be addressed for its proper and multi-purpose utilization. Design of MAC protocols is a very important element in solving some of the issues. A well designed MAC protocol should be able to maintain the fairness among nodes and deal with issues related with interference and also be able to maximise the throughput of the network. This presentation will explain the basics of the Ad-Hoc networks, how my solution for interference cancellation will work and a general background that explains how IEEE 802.11 deals with these issues. Also this presentation will explain the ideas about a new routing protocol that should be able to work with my new MAC protocol and also be able to pre-empt the connection loss which is one of the major reasons for low good-put.

Martin Randles

Email: m.j.randles@2004.ljmu.ac.uk

A Propositional Account of Self-Governance for Large Scale Complex Systems

Abstract

There are very many issues needed to be taken into account when seeking to enable computing systems with, what have been termed, self-* properties. The general method of achieving a level of computational self-control (the computer system as a controller of itself) is through monitoring and control feedback loops. These, however, do not scale to large complex systems and very rapidly run up against conflicts within the associated rule-sets: Eventually, the size of these systems exceeds the capabilities of the meta-systems to maintain a sufficiently agile and efficiently organized rule set. When so many rules are defined within a system, there is likely to be many conflicts, amongst the rules. Additionally their interactions, in general, are very difficult to analyse. For instance, the execution of one rule may cause an event, which triggers another rule or set of rules. These rules may in turn trigger further rules and there is a potential for an infinite cascade of rule firings to occur. Additionally these rules are static, in nature, in that there is usually no provision for rule refinement or analysis. If a system rule needs to be altered then the system, or system part, needs to be taken offline, reprogrammed and deployed back into the system. Thus there is a need for techniques and tools for the meta-systems to analyse rule behaviour and its impact on the system: Cognitive systems are required; to deliberate on the effect of rule enactment on the system, to refine or delete the rules in the light of new data and to determine new rules arising from the systems evolutionary operation. In short, rather than the meta-systems blindly reacting to pre-defined stimuli, the cognitive systems provide the meta-system with knowledge of the intrinsic meaning of perceived events and the likely outcomes of its actions. Based on the Knowledge Representation Hypothesis it is observed that a propositional account of these domains gives the best possible representational model. The first/second order logic of a refined Situation Calculus is used as a formal setting for the implementation of a cognitive observer system to influence, through bounds on individual component autonomy, and assess, through known signals and signatures for emergent self-organisation, large-scale system behaviour.

Tarag Fahad

T.M.Fahad@2006.ljmu.ac.uk

**On Detecting Packet Droppers in MANET:
A Novel Low Cost Approach**

Abstract

Mobile ad hoc networks are not only vulnerable to most of the well known security attacks that the existing wired and wireless network suffered, but also a large number of additional attacks. One of the most common attacks is Packet Dropping which is caused by selfish nodes. There is a strong motivation for a node to deny packet forwarding to others and being selfish in MANET. Recently, some solutions have been proposed, but almost all of these solutions rely on the watchdog technique, which suffers from many drawbacks, particularly when using the power control technique. To overcome this problem with a moderate communication overhead, we introduce a new approach for detecting misbehaving nodes that drop data packets in MANET. It consists of two stages: i) the monitoring stage in which each node monitors its direct neighbours with respect to forwarding data packets of a traffic session in the network, and ii) the decision stage, in which direct neighbouring nodes decide whether the monitored node misbehaves or not. Our new approach is able to detect the misbehaviour in case of power control employment, with a low communication overhead compared to the existing approaches.

David Lamb

Email: D.Lamb@2005.ljmu.ac.uk

The Basis of an Adaptive Observation Framework for Large-Scale Systems

Abstract

Software systems are continually increasing in size and complexity, largely due to the extending role of collections of software components in multi-user, globally distributed systems. The reliability of these systems depends on a high standard of monitoring and management. However, due to the complexity of systems' organisational structures, exhaustive monitoring is not a viable solution. Therefore, a form of partial system observation is required that can appropriately deploy observers; concentrated about the important parts of the system. In a software system, this may mean often-used software components, or those that handle large and/or important data.

However, complex software can often self-organise, and re-organise and evolve its structure to suit the operating environment and tasks. This type of emerging structural behaviour can make it difficult to understand and select observer targets beforehand; and as such, traditional model-based approaches that make assumptions about the deployment structure are unsuitable. Therefore, the challenge is to deploy observers appropriately, at targets correctly identified at runtime.

The main focus of this research, as a software engineering solution, is the basis of an observer framework. The framework is designed in order that it can identify suitable deployment structures according to their characteristics, specified in signatures, and deploy observers appropriately throughout the system's topology.

This talk will explore existing concepts from large-scale and complex systems research, along with more traditional Software Engineering practice, and describe how their joint application has led to the creation of a large-scale observer framework. This framework is tested in a simulated network software environment to demonstrate the use of adaptable observers that can determine their deployment targets, and observe the underlying structure in an appropriate and efficient manner. The first adaptive observers are being developed to recognise the topology of the deployment target and identify an appropriate observer pattern. Present experiments are leading toward the recognition of a scale-free (versus a random) network type and the deployment of an Acquaintance Observation pattern accordingly.

The ultimate aim of the research is to develop the aforementioned software approach in its entirety and evaluate its performance and applicability as a model for the analysis, design and implementation of extremely large-scale observation systems. However, the present work is centred on the implementation of topological observers, their signatures, and the experimental deployment in simulated networks, in order to allow the preliminary evaluation of the approach. It is hoped that in this way, systems can be adequately monitored and managed with a scaleable set of observers.

Inigo Zubizarreta Nafarrate

Email: I.Z.Nafarrate@2006.ljmu.ac.uk

**Bayesian Networks for Knowledge Discovery
and Collaborative Filtering**

Abstract

Personalised recommender systems algorithms are widely used in computational marketing, for making people-like-you recommendations. This presentation is about their implementation with Bayesian graphical models. Due to the large size and sparseness of the training data, there is a need to use approximations for efficient structure finding and rapid inference. This will be based on Variational methods. The basic theory of graphical models will be presented, together with elements of Variational methods currently being developed as part of the first year of the research.

Mengjie Yu

Email: cmsmyu@livjm.ac.uk

A Self-Organized Network Management Architecture for Wireless Sensor Networks

Abstract

Wireless Sensor Networks (WSNs) have emerged as one of the key growth areas for the pervasive computing in 21st century. Recent advanced in WSN technologies have made the development of new wireless monitoring and controlling environmental applications possible by deploying a large amount of lightweight and low-cost sensor nodes into the physical world. The wireless environmental monitoring applications usually include military sensing, infrastructure security and counterterrorism applications, traffic surveillance, environment and habitat monitoring and many others. However, the nature of these applications and crucial environment created significant challenges for sensor networks to maintain the high quality of network service in harsh environments such as: sensor nodes are prone to fail. Moreover, the ultimate vision for WSNs demands more smart and autonomous management to continuously support sensor applications without much human's intervention. Therefore, efficient management performance and robust management architecture become extremely essential for WSNs. So far, most existing researches in WSNs examine such issues by proposing different distributed communication protocols, energy-efficient routing algorithms, or cluster formation technologies etc, which specifically focus on challenges such as group management, or power management in WSNs. Some of those are relevant to WSN management architecture design; the others are only the subsets which specifically support sensing applications to efficiently utilize the network resources. There is still no comprehensive solution of network management for WSNs. Therefore, our research proposes a self-organized hierarchical management model for WSNs. We offer a layer-based lightweight middleware system, which provides various integrated functionality to handle the real-time network management. This middleware hides away the details of management operation from sensor applications. Thus, sensor application can utilize network management services without direct interaction with underlying operating systems and network infrastructure. We also use a dynamic management structure configuration to accommodate the network changes and node real-time capability. In addition, our approach proposes an efficient solution to address the energy efficiency of sensor network via controlling the management performance of a sensor node. This approach causes less impact on the management structure of sensor network without frequent reconfiguring node management roles. In order to justify such design, we first apply it into the fault management in WSNs.

Muhammad Shazad

Email: m.t.shazad@2006.ljmu.ac.uk

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

Abstract

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 performe 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 in nature 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 abort is implemented to minimize the communication overhead.

Philip L. Miseldine

Email: p.l.miseldine@2004.ljmu.ac.uk

nCQL – Neptune Code Querying Language

Abstract

In traditional querying languages, the ability to both inspect and adapt a data store yields a powerful, high-level language for data manipulation. SQL, for example, is a popular method of querying relational databases. Viewing code as a data store suitable for querying is not a novel concept; CQL (code querying languages) were first envisaged in 1988. These languages however, are often limited to inspection only, and thus do not contain the constructs to allow adaptation to source code. Where such ability exists, the code base can only be manipulated at design-time; changes are not implemented until the source is re-compiled or re-interpreted, and inspection may only occur given a raw source code, rather than in a compiled, machine-oriented semantic form.

In previous work by the author, the language Neptune was developed that provided an open, extensible compilation format based on an XML AST that allows for a complete code base to be exposed for machine computation at runtime. Further, as the complete form of each Neptune encoded instruction is exposed, rather than a traditional reflection interface based on a class schematic as is common in modern OO frameworks, rich forms of analysis can take place. It is therefore eminently feasible to both inspect and adapt the compiled form of a Neptune-based code base at runtime via query.

This presentation outlines the exposition techniques employed by Neptune that allow for the definition of an inspection and adaptation based query language, nCQL, to be formed that can actively manipulate the execution basis of a running application. An example is shown, with the talk concluding with discussion of future directions for the technology.

Rozaida Ghazali

Email: R.Ghazali@2004.ljmu.ac.uk

**Application of Dynamic Ridge Polynomial Neural Networks
in Exchange Rates Time Series Forecasting**

Abstract

A novel application of a dynamic system which utilizes Ridge Polynomial Neural Networks to capture the upcoming trends of financial signals is presented. We performed a set of simulations covering three uni-variate exchange rate signals which are; the JP/EU, JP/UK, and JP/US time series. The forecasting performance of the novel Dynamic Ridge Polynomial Neural Network is compared with the performance of the Multilayer Perceptron and the feedforward Ridge Polynomial Neural Network. The simulation results indicated that the proposed network demonstrated advantages in capturing noisy movement in the exchange rate signals with a higher profit return.

Sareer Badshah

Email: s.badshah@2002.ljmu.ac.uk

**The Effect of Geo-Demographics, Maternal Health and
Pregnancy History on Low Apgar-Scores in Peshawar,
NWFP-Pakistan**

Abstract

Objective: This study investigates the association of low Apgar scores (<7 points) with a range of geo-demographics, maternal health and pregnancy history including mode of delivery in public-hospitals at Peshawar.

Methods: Data on demographics, health indicators and outcome scores on newborn and their mothers ($n=1039$) were collected prospectively from August to November 2003 in a cross-sectional survey at four public-hospitals in Peshawar, NWFP-Pakistan. Crude and adjusted odds ratios (using logistic regression) were used to investigate the factors associated with low Apgar scores.

Results: The main geo-demographic risk factors for low Apgar-scores identified in this study were found to be maternal age and paternal education. In the maternal health and pregnancy history group, gestational age, maternal health conditions, pregnancy registration and mode of delivery were found to be significantly associated with low Apgar scores. The overall proportion of low Apgar scores was found to be 11.3%, and this was significantly higher for teenage (<20 years) and older mothers (>34 years), and non-educated fathers. Furthermore, paternal education was found to be one of the important factors that could reduce low Apgar scores through maternal health care in the case of any health conditions and delivery care.

Conclusion: These results suggest that a control on teenage marriages and older age pregnancies along with paternal education and awareness regarding pregnancy problems could reduce the high incidence of low Apgar scores. However, adequate antenatal care during pregnancy could reduce the effect of maternal health conditions and hence the adverse pregnancy outcomes.

Yousef Abuseta

Email: y.abuseta@2004.ljmu.ac.uk

An MDA based design method for autonomic systems

Abstract

The increasing complexity and cost of today software systems has made their management and maintenance task extremely difficult to achieve. This is due to the distributed, dynamic, open and heterogeneous nature of these systems in which applications are made up of different components written by different vendors and implemented in different platforms. In addition, the task of troubleshooting technical problems can tie up systems and information technology (IT) professionals for significant periods of time while affecting the business performance in a negative way. Estimates show that from 30-70% of resources are used by IT professionals, in medium to large companies, for troubleshooting problems and the outrage costs per hour on business critical systems can range from thousands to millions of dollars. To make the situation even worse, there is a shortage in the number of highly skilled people who can manage and handle the complexity of such computing environments. So, unless an appropriate solution is taken, the IT sector is heading for what it has been termed a *software crisis*.

To overcome such a crisis and address the software management complexity, a new paradigm was introduced and coined by IBM as *autonomic computing*. This was first introduced by IBM to the National Academy of Engineers at Harvard University in March 2001 [4]. In such a paradigm, software systems will have the responsibility for managing themselves, given only high-level policies, and therefore shielding the human user or the system administrator from handling and performing this rather difficult task. For a computing system to be a fully autonomous, four capabilities must be provided namely, *Self-healing*, *Self-configuring*, *Self-optimizing* and *Self-protecting*.

Although the autonomic systems are promising a lot 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 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 to address and guide the autonomic systems design, this important aspect has not been 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 framework is based on some well-established and widely accepted paradigms such as the Model-Driven Architecture (MDA), UML, Viable System Model (VSM) and Service Oriented Architecture (SOA).

Luke Okelo

Email: l.o.okelo@2005.ljmu.ac.uk

**Ambient Intelligence In Support Of Spatial Navigation for
the Visually Impaired:-
Developing an Ambient Intelligent Spatial Navigation System
for the Visually Impaired**

Abstract

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 can 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 environments in indoor environments e.g. a large buildings etc.

It is envisaged that such a system would integrate discreetly with the Information Services System of local computer networks operating inside of unfamiliar indoor building environments. It would do this via Ambient Intelligent computing principles, using a programming paradigm known as spatial programming to augment real-life interactions with data processing, thereby minimizing 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.

Ali Al-Fayadh

A.H.AL-Fayadh@2005.ljmu.ac.uk

**Hybrid Classified Vector Quantisation and Its Application
to Image Compression**

Abstract

A novel image compression technique using Classified Vector Quantiser and Singular Value Decomposition is presented for the efficient representation of still images. The proposed method is called Hybrid Classified Vector Quantisation. A simple but efficient classifier based gradient method which employs only one threshold to determine the class of the input image block that results in a good image quality was utilised. Singular value decomposition method was used for efficient generation of the classified codebooks. The proposed technique was benchmarked with a standard vector quantiser generated using the k-means algorithm, and JPEG-2000. Simulation results indicated that the proposed approach alleviates edge degradation and can reconstruct good visual quality images with higher Peak Signal-to Noise-Ratio than the benchmarked techniques.