Programme for NEW2AN/ruSMART

September 3 – 5, 2008

WEDNESDAY, SEPTEMBER 03

9:00 - 9:10 NEW2AN opening and welcome

9:10 - 10:00 Invited talk

10:00 - 10:30 Coffee Break

10:30 - 13:00 Wireless Networks I

- *Decentralized Synchronization/Estimation in Wireless Networks*, Nikolai Nefedov (Nokia Research Center, Switzerland)
- *SICTA: Modifications with Single Memory Location and Resistant to Cancellation Errors*, Sergey Andreev, Eugeny Pustovalov, Andrey Tiurlikov (State University of Aerospace Instrumentation (SUAI), Russia)
- *An Improved OCDMA/OCDMA Overloading Scheme for Cellular DS-CDMA*, Preetam Kumar (IIT Kharagpur, India)
- *Placement algorithms for WiMAX Mesh Network*, Salim Nahle, Naceur Malouch (University of Paris 6, France)
- *On-line wireless channel modeling for performance control purposes*, Dmitri Moltchanov (Tampere University of Technology, Finland)

13:00 - 14:00 Lunch

14:00 – 16:00 Wireless Networks II

- *Multi-Source Video Transmission with Optimum Perceptual Quality over Wireless Ad Hoc Networks*, Pejman Goudarzi (Iran Telecomm Research Center, Iran)
- *Interference Aware Construction of Multi- and Convergecast Trees in Wireless Sensor Networks*, Tomas Johansson, Evgeny Osipov, Lenka Carr-Motyckova, (Luleå University of Technology, Sweden)
- *Optimum Resource Allocation for Amplify-and-Forward Cooperative Networks with Differential Modulation*, Mohammadreza Rahmatpour, Vahid TabaTaba Vakili, (Iran uninivesity of science and technology, Iran)
- *LBS position estimation by adaptive selection of positioning sensors based on requested QoS*, Renato Filjar, Lidija Busic, Darko Huljenic, Sasa Desic (Ericsson Nikola Tesla, Croatia)

16:00 - 16:30 Coffee Break

16:30 - 17:30 Cross-Layer design

- *Low Latency Cross Layer Handover Scheme in Proxy Mobile IPv6 domain*, Geun-Hyung Kim (Dong Eui University, Korea)
- *Effects of Interaction between Transport and Application layers on SIP Signaling Performance*, Masataka Ohta (Kanagawa University, Japan)

19:00 – 22:00 St.Petersburg Bus Excursion

THURSDAY, SEPTEMBER 04

09:30 – 11:00 Teletraffic III

- *Modeling Long-Range Dependent VBR Traffic Using Synthetic Markov-Gaussian TES Models*, I-Hui Li (Ling Tung University, Taiwan)
- *Performance of multi-service system with retrials due to blocking and called-party-busy*, Sergey Stepanov (Intellect Telecom, Russia)
- *The impact of self-similarity on traffic shaping in wireless LAN, Joanna Domanska* (IITiS PAN Polish Academy of Sciences, Poland), Adam Domanski (Silesian University of Technology, Poland), Tadeusz Czachorski (Institute of Theoretical and Applied Informatics of Polish Academy of Sciences, Poland)

11:00 - 11:30 Coffee Break

11:30 – 13:30 Multimedia Communications

- *Service Concentration Node in IMS*, Didem Gozupek (Bogazici University, Turkey)
- *Observing the Impact of QoS Negotiation on the Signaling Load of the IMS*, Juan Miguel Espinosa Carlin (RWTH Aachen University, Germany)
- *A Novel Approach to Optimize Information Dissemination in IMS Presence System*, Rongheng Lin (Beijing University of Posts and Telecommunications, China)
- *Separation of Responsibilities Between Application Servers and Media Servers in NGNs: a Practical Approach*, Simon Pietro Romano, Alessandro Amirante, Tobia Castaldi, Lorenzo Miniero, (University of Napoli Federico II, Italy)

13:30 - 14:30 Lunch

14:30 – 16:00 Heterogeneous networks

- *Systematic QoS Class Mapping Framework over Multiple Heterogeneous Networks*, Mi-Sun Ryu, Young Min Kim, Hong-Shik Park (Information and Communications University, Korea)
- *A Fair Utility Function for Incentive Mechanism against Free-Riding in Peer-to-Peer Networks*, Yuhua Liu (Central China Normal University, China)
- *Algorithm for Selecting either an Overlay or Flat Route Based on the Amount of the Delay Measurement Load on the Home Agent in a Hierarchical Mobile IPv6 Network*, Kazumasa Takami (Soka University, Japan)

16:00 - 16:30 Coffee Break

16:30 – 17:00 Network Security

- *Application of Wavelet Packet Transform to Network Anomaly Detection, Christian Callegari*, Stefano Giordano, Michele Pagano (University of Pisa, Italy)

17:30 - 22:00 Get together party. Joint venue of NEW2AN and ruSMART. Starts 17:30 at the lobby of Hotel Neptun (venue place)

FRIDAY, SEPTEMBER 5

8:45 - 9:00 ruSMART opening and welcome

9:00 - 9:50 Keynote Talk

- *Towards the Dynamic Semantic Web*, Ian Oliver (Nokia Research Center, Finland)

9:50 - 10:00 Coffee Break

10:00 - 10:50 Keynote Talk

- *Designing Smart Environments: Challenges, Solutions and Future Directions*, Sajal K. Das (University Texas at Arlington, USA)

10:50 - 11:00 Coffee Break

11:00 - 11:50 Keynote Talk

- *From Smart Homes to Smart Cities: Opportunities and Challenges from an Industrial Perspective*, Cornel Klein, Gerald Kaefer (Siemens, Germany)

11:50 - 12:40 Keynote Talk

- *Smartness of Pervasive Computing Systems Through Context-Awareness*, Arkady Zaslavsky (Lulea University of Technology, Sweden)

12:40 - 13:40 Lunch

13:40 - 15:00 Session I

- *Home Automation with ZigBee*, Maxim Osipov (OOO Siemens Corporate Technologies, Russia)
- *The Smartest Space of All: A Global Space of (Machine-Understandable) Knowledge*, Reto Krummenacher (University of Innsbruck, Austria)

15:00 - 16:00 Session II

- *A Definition Approach to Smart Logistics*, Dieter Uckelmann (LogDynamics Lab, Bremer Institut für Produktion und Logistik GmbH, Germany)
- *A Method of Constructing Personal Network for Ubiquitous Personal Services*, Kazumasa Takami (Soka University, Japan)

16:00 - 16:30 Coffee Break

16:30 - 18:00 Session III

- *Conductive Inkjet-Printed Wireless Sensor Nodes on Flexible Low-Cost Paper-Based Substrates*, Manos M. Tentzeris (Georgia Institute of Technology, USA)
- *Smart Sensing and Sensor Data Collection on the move for Modelling Intelligent Environments*, Prem Prakash Jayaraman (Monash University, Australia), Arkady Zaslavsky and Jerker Delsing (Lulea University of Technology, Sweden)
- *Ubi-Board: a smart information diffusion system,* Paul Couderc (INRIA, France)

Keynote “Towards the Dynamic Semantic Web”, Ian Oliver (Nokia Research Center, Finland)

Abstract

The Semantic Web is emerging as the future platform for computation. The ability to represent information, its structure and some of its semantics in a canonical form that is readable and understandable by machine forms the key infrastructure for truly ubiquitous computing. On top of this structure we are seeing the development of more sophisticated services, reasoning and applications and a re-emergence of machine intelligence in the mainstream environment. The Semantic Web in its current form is expanding from its current static focus: that of a method of representing all information world- (universe-) wide. Coupled with its ability to grow and link any piece of information with any other piece of information, this forms a true web of information that can be queried, modified, added-to, searched and reasoned about by any number of ‘agents’. This then brings us to the point to where we must start considering how this information is conceptually perceived in terms of its dynamicity, locality, persistence, access and interpretation. It is true to say that the current information sets presented to the users are relatively static in form and this is typically true for ‘web-wide’ structures. As smaller, more local and personal structures such as personal information evolve the dynamicity increases with the non-monotonicity and volatility of information and meaning. One problem with the Semantic Web is ironically the notion of semantics, which in the static case is ‘easily’ defined - everyone can agree on the semantics and thus interpretation of a given structure that conforms to a given ontology. As more users or agents have access to the web-wide information both from static and dynamic sources, interpretation will vary and deeper representations of the semantics and the grounding of the semantics of the information will be required. The semantics of a given ontology or structure for the more static web-wide structures will be (and is already) generally accepted either by standardisation or by de-facto standard. As ontologies are used by a greater number of agents or users the ontologies’ semantics becomes more fixed and less open to interpretation. When applied to the personal and localised information structures adherence to any given ontology and its semantics becomes less and ad hoc in nature. Logics for processing and reasoning about this information will need to develop from the strict, monotonic, ontology-conformant processing to those which can deal with variable interpretation, non-monotonicity, incomplete- ness, incorrectness, inconsistency etc. Sophisticated conflict resolution, truth and belief revision and search strategies will be required in order to success- fully reason, interpret, gather and search this information. The almost ubiquitous nature of mobile computing provided through high- computing power mobile devices (mobile phones, mobile tablets, sensors etc) and high-speed data connections (UMTS/3G, WLAN etc) means that it is possible to perform complex computations locally and distribute the results rather than centralised via some service through some light-weight interface. This leads to the situation where the multiplicity of devices can interact with each other to form very dynamic, ad hoc and distributed

computation platforms - a semantic web ‘social’ network. The nature of applications in this dynamic, web-wide environment will change dramatically from the current monolithic-style applications to more highly distributed, mobile and agent-like entities. This leads us to how in- formation should be made available: we believe that tuple-space structures, distributed computation and ubiquitous communication facilities provide a solution or platform to this. The nature of the application however still requires development and investigation. The Semantic Web future is arriving, however, it will be more dynamic and more ubiquitous encompassing everything from the World- and Universe- wide structures to local and personal structures more than anyone has envisaged.

Keynote "Designing Smart Environments: Challenges, Solutions and Future Directions", Sajal K. Das (University Texas at Arlington, USA)

Abstract

We define a `smart environment' as one that is able to autonomously acquire and apply knowledge about an environment and its inhabitants, and adaptive to the inhabitants' activities and preferences to improve their experience in a pro-active manner without explicit awareness. Interest in smart environments has existed for decades, however, recent advances in wireless and sensor networks, RFID, mobile and pervasive computing, ambient intelligence, human-centered computing, and middleware technologies are now making such dream a reality. Sensors play a vital role in the design and modeling of smart environments because sensors enable us to observe, monitor and interact with the physical world, and also allow us to take appropriate decisions and actions. Indeed, automation in a smart environment can be viewed as a cycle of perceiving the state of the environment with the help of physical components (e.g., sensors and smart devices), reasoning about the state together with task goals and outcomes of possible actions, and acting upon the environment (via actuators or device controllers) to change the state and trigger new perceptions. In this talk, we will first describe the fundamental issues and challenges in the design and modeling of smart environments. Next, we will examine how to optimally track the inhabitants' contexts (such as location and activity) by building profiles from sensory data as the inhabitants interact with the environment on a daily basis, efficiently learn from such profiles and finally predict future contexts. Successful context predictions lead to task automation, adaptive control of device operations and pro-active context-aware services such as resource management. The underlying algorithms will be based on information theory, game theory, online learning, text compression and optimization techniques among others. The proposed models will be validated with the help of a prototype smart home that we built at the University of Texas at Arlington. We will also demonstrate the applicability of our design approach to other critical applications like smart health care and pervasive security. The talk will be concluded with open research problems and summary of ongoing projects.

Bio

Dr. Sajal K. Das is a University Distinguished Scholar Professor of Computer Science and Engineering and the Founding Director of the Center for Research in Wireless Mobility and Networking (CReWMaN) at the University of Texas at Arlington (UTA). He is also E.T.S. Walton Professor of Ireland; Visiting Professor at the Indian Institute of Technology (IIT) at Kanpur and IIT Guwahati; Honorary Professor of Fudan University in Shanghai and Advisory Professor of Beijing Jiaotong University, China; and Visiting Scientist at the Institute of Infocomm Research (I2R), Singapore. He is frequently invited as a keynote speaker at international conferences and symposia. Dr. Das' current research interests include wireless sensor networks, design and modeling of smart environments, mobile and pervasive computing, resource and mobility management in wireless networks, security, mobile grid computing, biological networking, applied graph theory and game theory. He has published over 400 technical papers and over 35 invited book chapters in these areas. He holds five US patents in wireless networks and mobile Internet. Dr. Das coauthored two books - "Smart Environments: Technology, Protocols, and Applications" (Wiley, 2005) and "Mobile Agents in Distributed Computing and Networking (Wiley, 2008). he is a recipient of Best Paper Awards in such conferences as EWSN'08, MUBICA'07, IEEE PerCom'06, ACM MSWiM'00, ACM MobiCom'99, and IEEE PADS'97. Dr. Das is also a recipient of the IEEE Engineer of the Year Award (2007), UTA Academy of Distinguished Scholars Award (2006), University Award for Distinguished Record of Research (2005), College of Engineering Research Excellence Award (2003), and Outstanding Faculty Research Award in Computer Science (2001 and 2003). Dr. Das serves as the Founding Editor-in-Chief of Pervasive and Mobile Computing (PMC) journal, and Associate Editor of IEEE Transactions on Mobile Computing, ACM/Springer Wireless Networks, IEEE Transactions on Parallel and Distributed Systems, and Journal of Peer-to-Peer Networking. He is the founder of IEEE WoWMoM and co-founder of IEEE PerCom conference. He has served as General or Technical Program Chair as well as TPC member of numerous IEEE and ACM conferences. He serves on IEEE TCCC and TCPP Executive Committees, and on the Advisory Board of several cutting-edge companies.

Keynote “From Smart Homes to Smart Cities: Opportunities and Challenges from an Industrial Perspective”, Cornel Klein, Gerald Kaefer (Siemens, Germany)

Abstract

Driven by the advances in hardware technologies, smart environments (or “pervasive computing”) already penetrate many spaces of our daily live. Smart Homes, Smart Buildings and larger ensembles like airports, hospitals or university campuses are already equipped with a multitude of mobile terminals, embedded devices as well as connected sensors and actuators. Some activities already envision the “Smart City” which uses the opportunities provided by

pervasive computing technologies to the benefits of their inhabitants. In such a setting, smart environments are expected to play a crucial role for coping with the challenges of urbanization and demographic chance e.g. regarding sustainability, energy distribution, mobility, health or public safety/security. While “smartness” is often centered on a user perspective, we give the business perspective of a large industrial supplier of infrastructures and solutions. This includes application scenarios for smart cities and an outline of the involved business- and research challenges. A particular focus will be the setup and energy efficient operation of smart infrastructures and data centers. While “autonomic computing principles” like self-configuration, self-healing, self-protection, and self-optimization are well understood for enterprise IT infrastructures, their application to highly-distributed, heterogeneous pervasive computing systems is less straightforward. A particular concern is the incorporation of energy efficiency in such settings. This involves a reduction of the rapidly raising IT energy costs and concepts for making software applications and services more aware of their energy consumption. It is therefore the basis for the identification of IT energy hotspots in software and IT system architecture and therefore for a sustainable development and operation of smart environments.

Keynote "Smartness of Pervasive Computing Systems Through Context-Awareness", Arkady Zaslavsky (Lulea University of Technology, Sweden)

Abstract

Emerging pervasive computing and communications technologies evolved into ample pioneering initiatives, leading towards a world in which computing systems are distributed, mobile, intelligent, supportive, unobtrusive, invisible and cooperative. Central to the notion of a pervasive systems is context-awareness. Context-aware computing endeavours to make systems aware of specific, relevant circumstances in the computing environment, and enable them to adapt their behaviour accordingly. Context-aware systems can process (intelligently) the context information acquired by any type of a sensor (either physical, computational or virtual). This, in turn, enhances services provided to users (including service personalization), makes pervasive systems smart by reacting (and possibly pro-acting) to changing circumstances, and enables adaptability and autonomy of systems, freeing users from avoidable sometimes routine interactions. From stand-alone applications, which have demonstrated the benefits of using context, research community is now looking at modelling and reasoning about context in uncertain, distributed, open and heterogeneous computing environments. The inherent pervasiveness, heterogeneity and information uncertainty in such systems challenge computational methods and flexible implementable architectures that would support diverse clients, services, systems and applications. Realizing this vision requires suitable approaches in modelling, reasoning and architecting effective context-aware systems that can handle reasoning in uncertain and rapidly changing environments. In recent years, research efforts have focused on various aspects of context, including

context middleware and toolkits for context discovery and acquisition, ontologies that provide vocabularies to describe, interpret and share context information, different approaches to reason about context and a variety of context models. Of particular interest in dealing with complex and open pervasive systems are: (1) context models that represent context in a general way, including reasoning algorithms that can handle varying degrees of uncertainty, and (2) architectures that promote agility and autonomy of individual computing entities. We have developed the Context Spaces (CS) model to describe context and apply reasoning over modelled information under uncertainty. The Context Spaces model overcomes some of the shortcomings of logic-based modelling and lack of unifying properties of sensor data fusion approaches for context-awareness. Context Spaces aims towards a general context model to aid thinking and describing context, and to design operations for manipulating and utilizing context. The concepts use insights from geometrical spaces and the state-space model, hypothesizing that geometrical metaphors such as states within spaces are useful to support reasoning about context. The model provides a unifying way to represent context and enables effective reasoning to be applied over the modelled information. Context Spaces approach distinguishes between the concepts of context and situations. Context is the information used in a model for representing real world situations. Thus, situations are perceived as a meta-level concept over context and algorithms are designed to assess the association and mapping between context and situations (i.e., determining occurrences of situations based on information in a model). This relationship between context and situations is represented in a general way by the concepts of state and space. An application space, i.e., the universe of discourse in terms of available contextual information for an application, is determined by the types of information, deemed relevant and discoverable/inferrable by the system designers. It is a multi-dimensional space made up of domains of values for each relevant information type, in which context can be sensed. Within it we model subspaces (possibly defined in fewer dimensions), which reflect real-life situations. We call these subspaces situation spaces. Situation spaces are defined over regions of values in selected dimensions and represent collections of values that reflect real-life situations. For example, “fire in the building” situation can be modelled with fire alarm sensors, smoke detectors, human presence sensors, etc. The actual values of sensory originated information are defined by the context state, e.g., the collection of current sensor readings representing a specific context. The CS modelling approach is further extended with Context Spaces algebra, comprising operators that enable distributed context reasoning, including compositions of situations and reasoning about logically conditioned situations, in cooperative context-aware systems. The algebra facilitates merging between the perspectives of different entities in the pervasive computing environment, enhancing the reasoning outcome under uncertain conditions, enabling adaptive behaviour, and computing a numerical measure of confidence in the validity of situation expressions under uncertainty. A range of applications, including healthcare, intelligent transportation systems, etc demonstrates the usefulness, validity and practicality of the CS approach.