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RECENT ADVANCES IN APPLIED INFORMATICS AND COMMUNICATIONS

Proceedings of the 9th WSEAS International Conference on APPLIED INFORMATICS AND COMMUNICATIONS (AIC'09)

Moscow, Russia, August 20-22, 2009

INFO

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Preface

This year the 9th IASME / WSEAS International Conference on APPLIED INFORMATICS AND COMMUNICATIONS (AIC '09) was held in Moscow, Russia, in August 20-22, 2009. The Conference remains faithful to its original idea of providing a platform to discuss system architecture, performance analysis and prediction, system interconnects, information theory, operating systems, software engineering, microcomputers, cad design for microwave systems, antennas and radars, reflectors and lens antennas etc. with participants from all over the world, both from academia and from industry.

Its success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of this conference are published in this Book that will be indexed by ISI. Please, check it: www.worldses.org/indexes as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

A Conference such as this can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

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Plenary Lecture 1

Qualitative Judgment Dynamics for Trust Management in Pervasive Computing Environments

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SLOVENIA
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Abstract: Trust management is turning out to be essential for further and wider acceptance of contemporary IT solutions. In IT world it was first addressed some ten years ago when the suggested approaches were actually tackling security and not trust directly. Later, more advanced methodologies emerged that were based on Bayesian statistics. These were followed by Dempster-Shafer theory of evidence and its derivative, subjective logic (algebra). In addition, some attempts were made that were based on game theory.
However, trust is a manifestation of reasoning and judgment processes. It has to be treated in line with this fact and has to be adequately supported from technological point of view. Therefore, on the basis of our experiments, a new methodology called qualitative judgment dynamics (QJD) has been developed, which addresses the core of trust phenomenon. It complements existing methodologies and, together with the appropriate conceptual model, enables technological solutions for trust management in pervasive computing environments.

Brief Biography of the Speaker:

-PhD in the field of communications security, received in 1995 from University of Ljubljana, Slovenia / EU.
-Associate Professor of computer and information science, gives courses on e-business at Faculty of Computer and Information Sciences, University of Ljubljana, and courses on computer communications and IS security at the University of Primorska.
-Almost 20 years involved in computer communications, IT and IS, computer communications, security, e-business.
-Author of scientific monograph Managing IS Security and Privacy, published by renowned publisher Springer in 2006.
-Invited speaker at PKI Invitational Workshop, organized by US Security Information Program Management Office, NIST and MITRE Corp., September 1995, Washington D.C.
-Involved in EU projects (also as a national coordinator) COST 225, COST 330, COST 263, NetLINK CEE.
-Establishment of the first IP connection and its management in 1991. One of the key persons that contributed to establishment of the Slovene Academic Research Network ARNES.
-Project leader for user security policy for internet banking services of the biggest Slovene bank NLB, project leader for IS implementation for the Slovene National Gallery, consultant for security architecture of a nationwide project of smart-card based health care information infrastructure (the first nation-wide implemented project of that kind in the world).
-100+ items in bibliography (including journals with SCI JCR impact factor / WoS).
-30 published communications (scientific conferences like IEEE, IFIP, Internet Society, US National Information Systems Security Conference...).
-Contributor to 3 scientific books, published by Springer Verlag, John Willey and Idea Group Publishers Inc., author of 2 university textbooks.
-Inventor of a crypto-protocol for hash functions based authentication and key exchange (patent granted in 2005).
-Editorial board member of International Journal of Computers and Applications, ACTA Press, 2004 - 2005.
-Member of program committees of IASTED Software Engineering 05, 06 and 07, Complex Systems in e-Business / CSeB 04 & 05, Workshop on Applications of Wireless Communications - WAWC04 (scientific conferences).
-Regular reviewer for high ranking scientific journals published by Elsevier, IEEE, etc.
.

Plenary Lecture 2

Intrusion and Countermeasures in Secure Advanced Optical Networks

Professor Stamatios Kartalopoulos
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Abstract: Optical networks are considered to be intrusion-resistant by virtue of the fiber medium. The common belief is that the optical fiber is difficult to tap, as compared to copper wire and to wireless media. In fact, this is a simplistic view because stripping a cable and tapping a fiber with tools that are commercially available is a relatively simple task to the sophisticated intruder. Moreover, because the fiber link is many kilometers long, the fiber cannot be guarded; this presents a tremendous opportunity and flexibility to the intruder to select the point of intrusion unnoticed. Therefore, it is important that the network is sophisticated enough to monitor and detect intrusions, differentiate from possible component failure and degradation, and upon detection of fiber attacks, it executes automatic countermeasures, outsmarting the intruder. In this talk, we describe automatic intrusion detection methods and countermeasure strategies in modern optical networks.

Brief Biography of the Speaker: Stamatios V. Kartalopoulos, PhD, is currently the Williams Professor in Telecommunications Networking with the University of Oklahoma. His research emphasis is on optical communication networks (long haul, FSO, and FTTH), optical technology including signal performance sensors, optical metamaterials, as well as chaotic processes, optical network security, including quantum networks and chaotic quantum cryptography. Prior to this, he was with Bell Laboratories where he defined, led and managed research and development teams in the areas of DWDM networks, SONET/SDH and ATM, Cross-connects, Switching, Transmission and Access systems. He has received the President's Award and many awards of Excellence.
Dr Kartalopoulos holds nineteen patents related to communications networks and technology, and he has published more than hundred fifty scientific papers, nine reference textbooks, and has also contributed chapters to other books.
He has been an IEEE and a Lucent Technologies Distinguished Lecturer and has lectured at international Universities, at NASA and conferences,. He has been keynote speaker of major international conferences, has moderated executive forums, has been a panelist of interdisciplinary panels, and has organized symposia, workshops and sessions at major international communications conferences.
Dr Kartalopoulos is an IEEE Fellow, chair and founder of the IEEE ComSoc Communications & Information Security Technical Committee, member at large of IEEE New Technologies Directions Committee, and he has served as editor-in-chief of IEEE Press, chair of ComSoc Emerging Technologies and of SPCE Technical Committees, Area-editor of IEEE Communications Magazine/Optical Communications, member of IEEE PSPB, and VP of IEEE Computational Intelligence Society.

Plenary Lecture 3

Network Infrastructure Security

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Abstract: Unlike network information security which is concerned with data confidentiality and integrity by using techniques like cryptograph, network infrastructure security is concerned with the protection of the network infrastructure itself, that is, to focus on how to detect and prevent routers or other network devices from being attacked or compromised.
Since the Internet, in the beginning, was assumed to work in a trustworthy environment, it was designed without much concern of security. As a result, the infrastructure is vulnerable to a variety of security threats and attacks, such as packet spoofing, routing table poisoning and routing loops.
One of the reasons of why network infrastructure security is important and has drawn much concern in recent years is that attacks to the infrastructure would affect a large portion of the Internet and create a large amount of service disruption. Since our daily operations highly depend on the availability and reliability of the Internet, the security of its infrastructure has become a high priority issue.
This seminar covers comprehensive topics of network infrastructure security -- from lower to higher layer, and from basic concept of network infrastructure security to the research solution to future network device design.

Brief Biography of the Speaker: Angus Wong obtained his BSc and PhD degrees from City University of Hong Kong, and is currently an associate professor at Macao Polytechnic Institute. Dr. Wong is active in research activities, and has served as a reviewer and a technical program committee member in various journals and conferences. He has successfully obtained grants from universities and governments, and published tens of technical papers.
Dr Wong is devoted to teaching. In the past, he has taught 11 different courses, range from the first year to forth years, and developed five new network related courses to keep students abreast of cutting-edge network technologies. He has devoted his time and energy in establishing a quality Internet systems laboratory environment for student use. Students' learning has proven to be enhanced significantly through their hand-on experience on networking devices. Dr. Wong was awarded for his teaching contributions and received the Best Teacher Awards in 2005 and 2007.

Plenary Lecture 4

Maximum Entropy Method and Underdetermined Systems Applied to Computer Network Topology and Routing

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Abstract: The maximum entropy method (MEM) is a relatively new technique for solving underdetermined systems. It has been successfully applied in many different areas. All methods for solving underdetermined systems introduce some additional, artificial constraints. The advantage of the maximum entropy method is that it uses the most natural additional constraint: one that does not introduce any new, arbitrary and unwarranted information. One important property of entropy maximization is that it favors uniform distribution.
Network design and analysis almost always involve underdetermined systems, especially when routing policy has to be determined. The number of possible routings grows with the factorial of the number of the nodes in the network and the number of possible topologies is exponential in the number of links. The number of constraints is typically polynomial in the number of nodes in the network. That makes the network design problem a good candidate for the maximum entropy method application. It is intuitively clear that an optimal network should not have overloaded or underutilized links. The hope is that the maximum entropy constraint will give a starting topology and routing with smoothly distributed traffic that would lead to the solution that is closer to the optimal. The problem is computationally feasible and with proper identification and selection of certain parameters the method gives reasonable topology and routing.
It is possible to apply MEM if we start our analysis with totally interconnected network of n nodes. Some lines will be dropped later in the process of improving utilization or reducing the cost. To apply the maximum entropy method we have to decide what will be the variables of the system. Some combination of required traffic values can be used for that if we remember that for MEM application we do not need to start with probabilities, but an arbitrary set of numbers which can be normalized. Additional parameters are introduced which allow the control of optimization process.
Philosophical discussions about the real meaning of the maximum entropy method are interesting, but since the method was successfully applied in many areas, for any new area the most important criterion is not how well can we explain the relation between the MEM and that area, but how useful are the results we get by applying the method.

Brief Biography of the Speaker: Milan Tuba received B. S. in Mathematics, M. S. in Mathematics, M. S. in Computer Science, M. Ph. in Computer Science, Ph. D. in Computer Science from University of Belgrade and New York University. From 1983 to 1987 he was a graduate student and teaching and research assistant at Vanderbilt University in Nashville and Courant Institute of Mathematical Sciences, New York University. From 1987 to 1993. he was Assistant Professor of Electrical Engineering at Cooper Union Graduate School of Engineering, New York. During that time he was the founder and director of Microprocessor Lab and VLSI Lab, leader of scientific projects and supervisor of many theses. From 1994 he was Associate professor of Computer Science and Director of Computer Center at University of Belgrade, Faculty of Mathematics, and from 2004 also Professor of Computer Science and Dean of the College of Computer Science, Megatrend University Belgrade. He was teaching about 20 graduate and undergraduate courses, from VLSI Design and Computer Architecture to Computer Networks, Image Processing, Calculus and Queuing Theory. His research interest include mathematical, queuing theory and algorithmic optimizations applied in computer networks, image processing and combinatorial problems. He is the author of more than 60 scientific papers and a monograph. He was coeditor or member of the board of editors of number of scientific journals and conferences. Member ACM 1983, IEEE 1984, AMS 1995, New York Academy of Sciences 1987.

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