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EDITORIAL

Special issue on emerging trends in ubiquitous computing systems

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The success of all-IP networking and wireless technology has changed the ways of living for the people around the world. The progress of electronic integration and wireless communications is going to pave the way to offer people the access to the wireless networks on the fly, based on which all electronic devices will be able to exchange the information with each other whenever necessary.

Ubiquitous computing is an emerging field of research for computing paradigms in the twenty first century. This emergence is the natural result of research and technological advances mainly in wireless communications, mobile computing, embedded computing, autonomic computing, and agent technologies. The goal of ubiquitous computing is to enable the fabrics of everyday life with seamless and intelligent computers, devices, technologies and services.

The aim of this Special Issue (SI) is to present the innovative researches, and technologies as well as developments related to ubiquitous computing. This SI was organized with papers from IEEE AINA-2009 International Conference, which was held in Bradford, UK from May 26 to May 29, 2009. AINA-2009 received 430 papers and only 130 papers were accepted for publication. We encouraged the authors of AINA-2009 to extend their papers and submit to this SI. Based on the quality and the relevance with the SI, we selected seven papers.

In the first paper by Bajaber and Awan, the authors propose an Energy Efficient Clustering Protocol (EECPL) to Enhance Lifetime of Wireless Sensor Networks. The main goal of EECPL is to distribute the energy load among all sensor nodes to minimize the energy consumption and maximize the network lifetime of wireless sensor networks. EECPL organizes sensor nodes into clusters and uses ring topology to send data packets so that each sensor node receives data from a previous neighbor and transmits data to a next neighbor. Upon receiving the aggregated data from previous neighbors, cluster senders transmit the aggregated data to the base station. The authors show that EECPL achieves a significant energy savings, balance the energy consumption among sensor nodes and reduce communication overhead.

In the second paper by Shibata et al., the authors present selective transmission control method in Cognitive Wireless Networks (CWN) considering end-to-end QoS based on user policies. The proposed method consists of three stages. First, at the observation stage, the physical and network data such as electric field strength, bit error rate, jitter, latency, packet error rate, and throughput are observed during communication. Then, at the decision stage, AHP (Analytic Hierarchy Process) with user policy is applied for decision making process for link selection using the observed data. Finally, at the action stage, the suitable link which is best satisfied with the user policy is chosen and activated. Also, the authors propose a new route selecting method by extending AODV protocol. They evaluate the proposed methods using ns2 simulator and verify the effectiveness of the proposed methods for CWN.

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In the third paper, Nose et al. propose a route construction method based on the measured characteristics of radio propagation in a real environment. Their method measures the characteristics of radio propagation for all radio links. Then, the transmission power of each node and a communication route from the node to the sink are determined based on the measured characteristics. The authors conduct many experiments and show that the proposed method can construct efficient communication routes in terms of energy consumption and quality of communication.

In the forth paper by Xhafa et al., the authors propose and evaluate Genetic Algorithms (GAs) for placement of mesh router nodes which is crucial for Wireless Mesh Networks (WMNs). In their approach, the authors seek a twofold optimization, namely, the maximization of the size of the giant component in the network and that of user coverage. The size of the giant component is considered as criteria for measuring network connectivity. GAs explore the solution space by means of a population of individuals, which are evaluated, selected, crossed and mutated to reproduce new individuals of better quality. The fitness of individuals is measured with respect to network connectivity and the user coverage. Several genetic operators have been considered for implementing GAs in order to find the configuration that works best for the problem. The authors experimentally evaluated the proposed GAs using a benchmark of generated instances varying from small to large size. The experimental results showed the efficiency of the GAs for computing high quality solutions of mesh router nodes placement in WMNs.

In the fifth paper by Hiyama et al., the authors present the performance analysis of two link state routing protocols: the Optimized Link State Routing (OLSR) and Better Approach To Mobile Ad-hoc Networking (B.A.T.M.A.N.). They investigate the effect of mobility and topology changing in the throughput of a wireless multi-hop networks and study the impact of best-effort traffic for these routing protocols. The authors also discuss the impact of multi-flow traffic in the network performance. They consider three experimental models and assess the performance of the implemented testbed in terms of throughput, round trip time and packet loss. From the experimental results they found that B.A.T.M.A.N. protocol has better goodput than OLSR protocol for static nodes. However, for mobile nodes, OLSR protocol has better goodput than B.A.T.M.A.N. protocol.

In the sixth paper by Iwan and Safar, the authors focus on mining patterns from mobile user movement data. Two new algorithms are proposed, namely: location link and user link pattern mining algorithms. Both proposed algorithms are able to mine a pattern from another pattern instead of mining a pattern directly from a data source. Specifically, both algorithms discover the location link and the user link pattern from a daily mobile user movement pattern set. Therefore, the pattern will be more concise and the processing time of both algorithms will be faster. Both algorithms have been evaluated from two perspectives: pattern mining generation and time processing. From the first aspect, the considered parameter values threshold influenced the generated pattern size. The experiment results from the processing time aspect indicate that larger datasets and lower values of user-defined thresholds lead to a longer processing time for both algorithms.

In the seventh paper by Guan et al., in order to coordinate the conflict between the QoS of video transmission and the bandwidth utilization ratio in wireless IP networks, the authors propose a new channel adaptive FEC algorithm. The proposed algorithm is able to modify the suboptimal amount of FEC redundant packets to cater to the time-varying wireless channel. Aiming at obtaining the suboptimal amount of FEC redundant packets, the authors derive two analytical models which are playable frame rate in MPEG video stream and effective utilization ratio of FEC. Based on these analytical models, the suboptimal value of redundant packets, which makes both the quality of video stream and the effective utilization ratio of FEC approximate their maximum, is calculated by predicting the quality of video stream and effective utilization ratio of FEC under different network conditions. The simulation results indicate that the performance of the QoS of wireless video transmission and the utilization of bandwidth are improved by employing the proposed algorithm.

As we conclude this overview, we would like to thank all the authors for submitting their papers and the reviewers for their good work to make it possible to publish this SI.

This SI started by Dr. Mieso Denko one of our great AINA friend and very talented researcher, who passed away on the end of April 2010. Mieso will remain always with us. We never will forget his kind support and help to AINA. We send our condolences to his family and friends.

In particular, we would like to address our special thanks to Editors-in-Chief of Journal of Ambient Intelligence and Humanized Computing Prof. Vincenzo Loia for his strong encouragement and support.

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Author Biographies

Leonard Barolli received BE and PhD degrees from Tirana University and Yamagata University in 1989 and 1997, respectively. From April 1997 to March 1999, he was a JSPS Post Doctor Fellow Researcher at Department of Electrical and Information Engineering, Yamagata University. From April 1999 to March 2002, he worked as a Research Associate at the Department of Public Policy and Social Studies, Yamagata University. From April 2002 to March 2003, he was an Assistant Professor at Department of Computer Science, Saitama Institute of Technology (SIT). From April 2003 to March 2005, he was an Associate Professor and presently is a Full Professor, at Department of Information and Communication Engineering, Fukuoka Institute of Technology (FIT). Dr. Barolli has published about 300 papers in referred Journals, Books and International Conference proceedings. He was an Editor of the *IPSJ Journal* and has served as a Guest Editor for many International Journals. Dr. Barolli has been a PC Member of many International Conferences and was the PC Chair of IEEE AINA-2004 and IEEE ICPADS-2005. He was General Co-Chair of IEEE AINA-2006, AINA-2008, AINA-2010, CISIS-2010, Workshops Chair of iiWAS-2006/MoMM-2006 and iiWAS-2007/MoMM-2007, Workshop Co-Chair of ARES-2007, ARES-2008, IEEE AINA-2007 and ICPP-2009. Presently, he is General Co-Chair of BWCCA-2010 and 3PGCIC-2010 International Conferences. Dr. Barolli is the Steering Committee Chair of CISIS and BWCCA International Conferences and Steering Committee Co-Chair of AINA, NBiS and 3PGCIC. He is serving as Steering Committee Member in many International Conferences. He is organizers of many International Workshops. Dr. Barolli has won many Awards for his scientific work and has received many research funds. He got the "Doctor Honoris Causa" Award from Polytechnic University of Tirana in 2009. His research interests include network traffic control, fuzzy control, genetic algorithms, agent-based systems, ad-hoc networks and sensor networks. He is a member of SOFT, IPSJ, and IEEE.

Makoto Takizawa received his B.E., M.E. in Applied Physics and D.E. in Computer Science from Tohoku University, Japan, in 1973, 1975, and 1983, respectively. He is currently a professor in the Department of Computer and Information Science, Seikei University since April of 2008. He was a visiting professor at GMD-IPSI (currently Fraunhofer), Germany (1989–1990) and at Keele University, England (1990). He is also a visiting professor of Xidian University, X'ian, China since 2004. He joined JIPDEC (Japan Information Processing Center) in 1975 and developed a heterogeneous distributed system called JDDBS. He joined Tokyo Denki University in 1986. He was a Board of Governors (BOG) from 2003 to 2008 and a Golden Core member of IEEE Computer Society (CS). He is a member of advisory member of TCDP of IEEE CS. He is a fellow of Information Processing Society of Japan (IPSJ). He was a member of executive board of IPSJ from 1999 to 2001 and chair of SIGDPS of IPSJ from 1997 to 2000. Prof. Takizawa is the founder and Steering Committee Chair of IEEE International Conference on Advanced Information Networking and Applications (AINA). He is also the Steering Committee Co-Chair of International Conference on Network-Based Information Systems (NBiS). He was a general co-chair and a program co-chair of IEEE ICDCS (International Conference on Distributed Computing Systems) in 2002 and 1998, respectively. He also chairs many international conferences like IEEE ISORC, ICPADS, and DEXA. He won the best paper awards at ICOIN-9 (1994), ICOIN-18 (1998), ICPADS (1996), DMS (2001), ICPADS (2005), BWCCA (2007), and CISIS (2008), and excellent paper award at AINA-2004. He also won the JNTO (http://www.jnto.go.jp/) Best International Convention Awards 2008 for contribution to the community development. His research interests include distributed systems, group communications, distributed objects, fault-tolerant systems, and information security.