EDITORIAL PREFACE

White Spaces:
Making Use of Defunct Broadcasting Frequencies

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White spaces are what we term the frequencies allocated to a broadcasting service but not used locally. Countries allocate different frequencies for different uses, and license the rights to broadcast over these frequencies. This frequency allocation process creates a band plan, which for technical reasons assigns white space between used bands or channels to avoid interference. This guard band is created to stop higher frequencies in one band from interfering with lower frequencies in another - and vice versa. Basically, the band is to prevent destructive interference between channels. The switchover to digital TV occurring around the world actually frees up large areas between about 50 MHz and 700 MHz as the digital transmissions can be packed into adjacent channels as opposed to analog ones which cannot. The amount of white space up for grabs varies according to its location, the time of day and the power level of devices. This saves precious bandwidth. It turns out that more than 60 percent of spectrum in the TV band alone goes unused. In the US, the FCC approved unlicensed access to white space spectrum in 2010. In the US, the frequencies are mainly in the upper UHF and in other places, mainly in the VHF band. Ultimately by making use of these gaps in the spectrum used for digital TV, we can hopefully tackle constraints on spectrum availability.

Special white spaces interest groups are advocating using these white spaces freed up by the eradication of analogue TV to provide wireless broadband Internet access. This can be done through white space devices (akin to 3G dongles) which detect the presence of existing but unused areas of airwaves for Internet connectivity. This potentially can dramatically increase the reach of broadband to rural areas and also help connect remote sensors helping bring forth the Internet of Things (IoT).In fact, at this time trials are beginning to examine white spaces in a 'smart city' trial in Glasgow where a network of sensors is being used to collect data on things like air temperature and humidity linked to a publicly accessible live map. White spaces is ideal for outdoor sensor data gathering. In fact, the Cambridge-based wireless firm Neul produce the Iceni chip which operates over the entire TV white space frequency range,

from 470MHz to 790MHz, and supports both 6 MHz and 8 MHz channel bandwidths while conforming to the strict white space regulatory requirements. Using this spectrum, Neul is able to deliver reliable, secure, long range wireless connectivity for machine-to-machine (M2M) applications using the 'Weightless' wireless standard.

There are fears from groups such as theatrical producers and various broadcasters that the white space transmissions will interfere with their television signals or wireless microphones which are used in live music performances. Believe it or not, wireless mics in concerts have a dedicated frequency.

In the UK, white space Wi-Fi was tested in Cambridge. The trial was led by Microsoft using technology developed by Adaptrum and backed by a group of ISP's and tech companies including Nokia, BSkyB, the BBC, and BT. The network hardware was provided by Neul who are a leader in this field. Many from this group including Microsoft and BT are now joining a European pilot of 'white space' broadband. Microsoft's involvement will test the viability of white space spectrum with free Wi-Fi in Glasgow. One research group active in this area which is helping out with this trial is the University of Strathclyde's Centre for White Space Communications. Finally, some Internet service providers such as Click4Internet, KTS and SineCom are also looking to see if white spaces can be used to deliver broadband services to remote rural areas. I just say – watch this space….albeit it white space….. So now, onto the contents of Vol 5, no 3 issue of IJACI.

In the first article *"Artificial Immune Systems for Anomaly Detection in Ambient Assisted Living Applications"* by Bersch, Azzi, Khusainov and Achumba they make a case for the use of Artificial Immune Systems (AIS) in the area of Ambient Assisted Living (AAL) for anomaly detection and long term monitoring. They highlight some of the solutions developed for AAL and the use of AIS in other fields of research. They advocate the use of AIS in AAL based on their unique features and their ability to address problems specific to the long term monitoring of people. An improved method for the optimisation of detector generation for AIS, which uses a novel intelligent seeding technique, is presented. The new seeding technique is compared with two other detector seeding methods and simulation results are presented showing an improvement in the classification accuracy.

Börnera, Kalzb and Spechtc in the article *"Closer to you: reviewing the application, design, and evaluation of ambient displays"* present results from a recent literature review on ambient displays. While the main background of the authors is education and technology-enhanced learning, the review starts more generic with a broader view on ambient displays and their interactional, instructional, and informational characteristics. In addition to depicting characteristics and classifying prototypical designs, the review also sheds light on the actual use of the covered ambient displays, their application context and addressed domains as well as the type of studies conducted, including the used methodologies and evaluation approaches to measure their effectiveness and impact. The authors conclude with a discussion of the presented results emphasising the derived implications for the user when interacting with ambient displays.

In "*Establishing a Just-in-time and Ubiquitous Output System",* Chen and Huang begin by introducing the area of *Just-in-time (JIT)* which is an important topic of lean manufacturing and services, focusing on the reduction of the waiting time. In this study, a JIT ubiquitous output system is established based on the application of a hand-held intelligent device. The system can be regarded as a location aware service (LAS). The JIT ubiquitous output system starts from the detection of the user's location and speed using the global positioning system (GPS) on the hand-held intelligent device. The detection results and the document to be printed are sent to the server with a reasoning module that searches for the nearby service locations to determine the output location, so that the document can be printed out just before the user reaches the output location, i.e. just in time. To this end, the fuzzy Dijkstra's algorithm is proposed.

Finally in *"Securing Ambient Agents Groups"* Bouchemal, Maamri and Chihoub we learn that ubiquitous computing and ambient intelligence (or AmI) models raise the need for secured systems, due to increased heterogeneity, intelligence and dynamism. It turns out that information in such environments is managed by systems formed mostly of devices with limited capabilities. Indeed, AmI characteristics, difficult to handle by traditional computing concepts, are making the agent paradigm to gain impetus and increasing the interest of researchers and industry in this concept. However, the inherent complexity of information security is bigger in agent-based AmI systems built by gathering distributed information and services that are not under the control of a single entity, and introduce new security and privacy concerns. In fact, securing these systems requires protecting any element from every other. The authors here propose a mechanism for enhancing security and privacy while using agents in AmI environments, based on three main building blocks: verification, judgment and surveillance. Furthermore, the key idea is based on cooperation and collective decision.

Enjoy!

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Kevin Curran BSc (Hons), PhD, SMIEEE, FBCS CITP, SMACM, FHEA is a Reader in Computer Science at the University of Ulster and group leader for the Ambient Intelligence Research Group. His achievements include winning and managing UK & European Framework projects and Technology Transfer Schemes. Dr Curran has made significant contributions to advancing the knowledge and understanding of computer networking and systems, evidenced by over 700 published works. He is perhaps most well-known for his work on location positioning within indoor environments, pervasive computing and internet security. His expertise has been acknowledged by invitations to present his work at international conferences, overseas universities and research laboratories. He is a regular contributor to BBC radio & TV news in the UK and is currently the recipient of an Engineering and Technology Board Visiting Lectureship for Exceptional Engineers and is an IEEE Technical Expert for Internet/Security matters. He is listed in the Dictionary of International Biography, Marquis Who's Who in Science and Engineering *and by* Who's Who in the World. *Dr Curran was awarded the Certificate of Excellence for Research in 2004 by Science Publications and was named Irish Digital Media Newcomer of the Year Award in 2006. Dr Curran has performed external panel duties for various Irish Higher Education Institutions. He is a fellow of the British Computer Society (FBCS), a senior member of the Association for Computing Machinery (SMACM), a senior member of the Institute of Electrical and Electronics Engineers (SMIEEE) and a fellow of the higher education academy (FHEA). Dr. Curran's stature and authority in the international community is demonstrated by his influence, particularly in relation to the direction of research in computer science. He has chaired sessions and participated in the organising committees for many highly-respected international conferences and workshops. He is the Editor in Chief of the* International Journal of Ambient Computing and Intelligence *and is also a member of numerous Journal Editorial Committees and numerous international conference organising committees. He has served as an advisor to the British Computer Society in regard to the computer industry standards and is a member of BCS and IEEE Technology Specialist Groups and various other professional bodies.*