TITLE:

Industry Oriented Research in Multi-User Systems and Wireless Sensor Networks

Abstract

We are entering the 21st century with demands for wideband wireless services that include a high-speed Internet access, video/image transmission and much more than that. In addition to this trend, a new technology, called wireless sensor networks, is considered to be one of the main technologies of this century.

This presentation includes some introductory words about the Faculty of Engineering and the University of Auckland, New Zealand, including research and teaching activities at the Department of Electrical and Computer Engineering. In particular, the presenter will address his approach to teaching and industry oriented research activities and benefits of his approach that was used in the last 7 years.

The presentation will be focused on the industry oriented research activities in the field of multiuser systems starting with general problems in the design and implementation of digital communication systems. In particular, some experience in using methods of artificial intelligence in coding and modulation theory and practice, primarily neural networks and support vector machines, will be presented and discussed from the practical application point of view. In this direction, some results obtained by theoretical analysis, simulation and design of CDMA systems will be presented. In particular, the advantages of these systems, which are based on application of non-binary signals like chaotic and random sequences, will be pointed out, and experience gained from theoretical analysis and practical design in DSP and FPGA technology will be presented.

The second part of the presentation will be focused on the presenter’s experience in the development of wireless sensor networks and their industrialization. This part will include design and development issues related to the networks prototyping and manufacturing. Example networks for environmental, medical and networks for building industry applications will be discussed. In addition, the main theoretical problems that are subject of presenter’s research activities will be addressed in detail. The concluding part of the presentation will include some observations related to the future development of multi-user systems and wireless sensor networks and their importance for the global development in wideband communications systems and networks.