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# **CIRCUITS, SYSTEMS, ELECTRONICS, CONTROL and SIGNAL PROCESSING**

**Proceedings of the 7th WSEAS International Conference on  
CIRCUITS, SYSTEMS, ELECTRONICS, CONTROL  
and SIGNAL PROCESSING (CSECS'08)**

**Puerto De La Cruz, Tenerife, Canary Islands, Spain,  
December 15-17, 2008**

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## **Preface**

This book contains the proceedings of the The 7th WSEAS International Conference on CIRCUITS, SYSTEMS, ELECTRONICS, CONTROL and SIGNAL PROCESSING (CSECS'08) which was held in Puerto De La Cruz, Tenerife, Canary Islands, Spain, December 15-17, 2008. This conference aims to disseminate the latest research and applications in Modelling and Simulation, Semiconductors, Circuit Models, Electrical and Electronic Measurement, Systems Theory, Environmental Modeling, Sensors, Circuits and Electronics for Control Signal and System Modeling and other relevant topics and applications.

The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers. The WSEAS Conferences attract a large number of well-established and leading researchers in various areas of Science and Engineering as you can see from <http://www.wseas.org/reports>. Your feedback encourages the society to go ahead as you can see in <http://www.worldses.org/feedback.htm>

The contents of this Book are also published in the CD-ROM Proceedings of the Conference. Both will be sent to the WSEAS collaborating indices after the conference: [www.worldses.org/indexes](http://www.worldses.org/indexes)

In addition, papers of this book are permanently available to all the scientific community via the WSEAS E-Library.

Expanded and enhanced versions of papers published in this conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, ACM, Compendex, INSPEC, CSA .... see: [www.worldses.org/indexes](http://www.worldses.org/indexes)) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal). WSEAS has also collaboration with several other international publishers and all these excellent papers of this volume could be further improved, could be extended and could be enhanced for possible additional evaluation in one of the editions of these international publishers.

Finally, we cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.





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## Plenary Lecture I

### Chaos and its Applicability to Communications and Security



**Professor Stamatios Kartalopoulos**

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**Abstract:** The number of security breaches and network attacks increases as well as the sophistication of intruders and bad actors. To increase information integrity and network security, very complex processes are enlisted in cryptographic systems, such as chaos theory and quantum theory.

Chaos is based on the particular behavior of certain non-linear functions, which for a minute change of parameters produce a very large and unstable output, known as the chaotic regime. However, this chaos is reproducible, which makes it attractive to secure communications.

Quantum theory defines the non-classical qubit, which is a superposition of quantum states. In addition, it defines the no cloning or no copying (of qubit) theorem. Both, the qubit and the no-cloning theorem, along with the quantum-mechanical properties of photons, find applicability to a new breed of cryptography and secure optical communications known as quantum cryptography and quantum networks, respectively.

In this talk we explain chaos and chaotic processes with simple examples, as well as quantum cryptography. We then describe how chaos functions are used in quantum cryptography to increase efficiency and speed of the quantum key establishment.

**Brief Biography of the Speaker:** Stamatios V. Kartalopoulos, PhD, is currently the Williams Professor in Telecommunications Networking at the University of Oklahoma. His research emphasis is on optical communication networks (FSO, long haul and FTTH), optical technology including optical metamaterials, and optical communications security including quantum cryptography and key distribution. 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.

He holds nineteen patents in communications networks, and he has published more than hundred scientific papers, seven reference textbooks important in advanced fiber optic communications, 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 II

### Human-Integrated Supervisory Control of Remotely Piloted Vehicles



**Professor S. Narayanan**

Executive Director, Wright State Research Institute  
& Professor and Chair Department of Biomedical, Industrial, and Human Factors Engineering  
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USA

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**Abstract:** In many complex systems, such as applications in nuclear power plants; emergency response situations, such as search and rescue missions; and in military domains, human decision makers are required to make critical decisions in a time-pressured environment. Typically, most of these applications are dynamic and uncertain and require humans making supervisory control decisions through monitoring, re-planning, troubleshooting, and control. Due to the critical nature of decision making, human operators are responsible for the safe and efficient operation of these applications. Human supervisory controllers with computerized processes must work together in achieving overall system objectives. Research on human-centered automation in aviation, satellite ground control, and nuclear power plant control has resulted in broad guidelines on system design involving human and computerized processes in supervisory control. However, problems such as increased human error, lack of situational awareness, and opacity from poorly automated systems remain, particularly in scenarios where human operators must make decisions in time-pressured planning. This talk will use human interaction with multiple remotely piloted vehicles as the domain and outline a modeling and simulation architecture for analysis of these systems from a human-centered perspective. Included in this presentation are results from an empirical evaluation focusing on decision support systems design and development.

**Brief Biography of the Speaker:** Dr. Narayanan is Executive Director of the Wright State Research Institute and Professor and Chair in the Department of Biomedical, Industrial, and Human Factors Engineering at Wright State University. He holds a Ph.D. in Industrial and Systems Engineering from Georgia Tech. Dr. Narayanan has executed over \$7.5 million of collaborative research projects on interactive simulations, information analysis, systems analysis, and human computer interaction from a variety of sponsors including the Air Force Office of Scientific Research, the human effectiveness directorate of the Air Force Research Laboratory, Ohio Board of Regents, Intel, Lexis-Nexis, and other industries. His research interests are in the area of modeling human cognition in context and designing interactive systems to aid humans in performing cognitively complex tasks such as planning, information retrieval and synthesis, and troubleshooting. His research has an interdisciplinary thrust with the following themes: cognition, computational representation, interactivity, and application. He has published over 75 technical articles and is Associate Editor of IEEE Transactions on Systems, Man, and Cybernetics, the International Journal of Modeling and Simulation, and Transactions of the Society for Computer Simulation. He is a Fellow of the American Institute of Medicine and Biology in Engineering.

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