CIES 2016, IEEE Symposium on Computational Intelligence for Engineering Solutions

Developments in Engineering are characterized by a growing complexity, which is balanced by an extensive utilization of computational resources. This complexity is not only a feature of engineering systems, processes and products, it is primarily a key attribute of the respective algorithms for analysis, control and decision-making to develop those engineering solutions. To cope with complexity in this broad spectrum of demands, Computational Intelligence is implemented increasingly in virtually all engineering disciplines. This emerging approach provides a basis for developments of a new quality.

This Symposium is focused on the utilization of Computational Intelligence in this context in the entire field of engineering. Examples concern the control of processes of various kinds and for various purposes, monitoring with sensors, smart sensing, system identification, decision-support and assistance systems, visualization methods, prediction schemes, the solution of classification problems, response surface approximations, the formulation of surrogate models, etc. The engineering application fields may comprise, for example, bioengineering with prostheses design and control, civil and mechanical engineering processes, systems and structures concerned with vehicles, aircraft or bridges, industrial and systems engineering with design and control of power systems, electrical and computer engineering with developments in robotics, etc. All kinds of approaches from the field of Computational Intelligence are welcome.

As a part of the Symposium special attention is paid to sustainable engineering solutions to address current and future challenges of environmental changes and uncertainty. This includes developments dealing with climate change, environmental processes, disaster warning and management, infrastructure security, lifecycle analysis and design, etc. Events, disasters and issues under consideration may be natural such as earthquakes or tsunamis, man-made such as human failure or terrorist attacks, or a combination thereof including secondary effects such as failures in nuclear power plants, which may be critical for systems, the environment and the society. Developments which include a comprehensive consideration of uncertainty and techniques of reliable computing are explicitly invited. These may involve probabilistic including Bayesian approaches, interval methods, fuzzy methods, imprecise probabilities and further concepts. In this context robust design is of particular interest with all its facets as a basic concept to develop sustainable engineering solutions.

Topics

The symposium topics include, but are not limited to:

- Complex engineering systems, structures and processes
- Intelligent analysis, control and decision-making
- Management and processing of uncertainties
- Problem solution in uncertain and noisy environments
- Reliable computing
- Sustainable solutions
- Infrastructure security

- Climate change
- Environmental processes
- Disaster warning and management
- Lifecycle analysis and design
- Automotive systems
- Monitoring
- Smart sensing
- System identification
- Decision-support and assistance systems
- Visualization methods
- Prediction schemes
- Classification methods, cluster analysis
- Response surface approximations and surrogate models
- Sensitivity analysis
- Robust design, reliability-based design, performance-based design
- Risk analysis, hazard analysis, risk and hazard mitigation
- Optimization methods, evolutionary concepts
- Probabilistic and statistical methods
- Simulation methods, Monte-Carlo and quasi Monte-Carlo
- Bayesian approaches / networks
- Artificial Neural Networks
- Imprecise probabilities
- Evidence theory
- p-box approach
- Fuzzy probability theory
- Interval methods
- Fuzzy methods
- Convex modeling
- Information gap theory

Symposium Co-Chairs

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