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Editorial

Recent advances and applications in neural networks and intelligent control

Intelligent control and neural networks have dramatically changed the face of control engineering. This special issue of Neurocomputing presents several recent methods in how to design intelligent identifiers and controllers via neural networks, neural fuzzy systems, and advanced control techniques. A variety of applications, in the areas of robotics, mechatronics, and others process control are also included.

This special issue presents 11 original articles, which are extended versions of selected papers from the 12th International Conference on Electrical Engineering, Computing Science and Automatic Control (CCE 2015), October 26–30, 2015, Mexico City, Mexico.

The conference has received 146 submissions. Each submission is reviewed by at least 2 independent reviewers. 110 papers are accepted by the conference. 13 of them are suggested by the program committee for this special issue. The extended versions of these papers are reviewed by the other two rounds. At least 60% extra materials over the original versions are mandatory.

Finally, the 11 articles presented in this issue were accepted for publication.

1. The paper “Implementing robust neuromodulation in neuromorphic circuits” by F. Castaños and A. Franci, introduces a methodology to implement the physiological transition between distinct neuronal spiking modes in electronic circuits composed of resistors, capacitors and transistors.
2. The paper “An LQR controller in the obstacle avoidance of a two-wires hammerhead crane” by I. Gutierrez and J. Collado, proposes a novel control which uses a virtual one-wired crane that is equivalent to the new two-wired one in two different trajectories, the first one over the obstacle, and the other one surrounding the obstacle.
3. The paper “Non destructive detection of Zea mays' critical periods: a parameter identification based approach” by M. Bonilla, J.C. Martinez-Garcia, C. Antonio, and R. Arteaga, proposes a non-destructive detection procedure, which is based on two concatenated recursive constrained least square with orthogonal projections, and applies it to the crop growth process of the maize
4. The paper “Path Planning of Multi-Agent Systems in Unknown Environment with Neural Kernel Smoothing and Reinforcement Learning” by D. Luviano and W. Yu, modifies the classical multi-agent reinforcement learning algorithm such that it does not need the unvisited state. The neural networks and kernel smoothing techniques are applied to approximate greedy actions by estimating the unknown environment.
5. The paper “Orientation of Radio-Telescope Secondary Mirror via Adaptive Sliding Mode Control” by S. Keshtkara, E. Hernandez, A. Oropeza, and A. Poznyak, presents a parallel manipulator (Stewart platform) to align and maintain the position of the secondary mirror of a radio-telescope. The near-singularity condition of the platform is analyzed and is handled by implementation of a new control law based on sliding mode with inner regularization procedure.
6. The paper “Generalized Multi-Synchronization: A Leader-following Consensus Problem of Multi-Agent Systems” by C. D. Cruz-Ancona, R. Martínez-Guerra, and C. A. Pérez-Pinacho, treats a multi-agent system as a network of interconnected systems with strictly different dynamics of same dimension, fixed and not strongly connected topology, explicitly gives the synchronization algebraic manifold and designs a dynamic consensus protocol able to asymptotically achieve consensus for all agents in the network.
7. The paper “Second Order Sliding Mode Controllers for Altitude Control of a Quadrotor UAS: Real-Time Implementation at Outdoors Environments” by F. Muñoz, I.González-Hernández, S.Salazar, E.S. Espinoza and R.Lozano, deals with the design and real-time implementation of three second order sliding mode controllers for the altitude tracking of a quadrotor aircraft. A comparative study based on the analysis of the error dynamics was performed in order to determine the controller presenting the best performance in a real-time application at outdoors environments.
8. The paper “Efficient Mechanical Design and Limit Cycle Stability for a Humanoid Robot: An application of Genetic Algorithms” by R. Stanley, N. Cruza, and J. M. Ibarra Zannatha, uses the genetic algorithms for designing a humanoid robot. The restrictions of the problem are based on the Limit CycleWalking stability criterion. The mechanical design of the prototype and its walking trajectories are inspired on passive dynamic walkers.
9. The paper “Risk map generation for keyhole neurosurgery using fuzzy logic for trajectory evaluation” by A. De León-Cuevas, S. Tovar-Arriaga, A. González-Gutiérrez, and M. A. Aceves-Fernández, presents risk maps of two targets and visualize the less risky trajectories by using fuzzy rules to take into account other qualities such as length.
10. The paper “Inverse Models and Robust Parametric-Step Neuro-Control of a Humanoid Robot” by A. J. Malo, P. V. Bustamante, J. J. Maldonado, and A. E. Cobo, presents derivations of the inverse geometric models for the AH1N2 humanoid robot, the singularities of the arms and legs, the movement constraints, which allow the controller design of the motion and specify complex movements.

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11. The paper “Complex-valued neural network topology and learning applied for identification and control of nonlinear systems” by I. S. Baruch, V. A. Quintana, and E. P. Reynaud, presents a complex-valued recurrent neural network, trained with a recursive Levenberg-Marquardt learning algorithm in the complex domain, applying it to the problem of dynamic system identification, and to an adaptive neural control scheme of a nonlinear oscillatory plant.

The guest editors wish to thank the referees who have critically evaluated the papers within the short time. We hope the reader will share our joy and find this special issue very useful.

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