IEEE TRANSACTIONS ON NEURAL NETWORKS

IEEE TRANSACTIONS ON NEURAL NETWORKS is published by the IEEE Computational Intelligence Society. Members may subscribe to this TRANSACTIONS for \$22.00 per year. IEEE student members may subscribe for \$11.00 per year. Nonmembers may subscribe for \$1,750.00. For additional subscription information visit http://www.ieee.org/nns/pubs. For information on receiving this TRANSACTIONS, write to the IEEE Service Center at the address below. Member copies of Transactions/Journals are for personal use only. For more information about this TRANSACTIONS see http://www.ieee-cis/org/pubs/tnn.

Editor-in-Chief

DERONG LIU
Institute of Automation
Chinese Academy of Sciences
Beijing 100190, China
Dept. of Electrical and Computer Engineering
University of Illinois

Chicago, IL 60607 USA Email: ieeetnn@gmail.com

Associate Editors

HOJJAT ADELI Ohio State Univ., USA

CESARE ALIPPI Politecnico di Milano, Italy

MARCO BAGLIETTO DIST-Univ. of Genova, Italy

LUBICA BENUSKOVA Univ. of Otago, New Zealand

AMIT BHAYA Federal Univ. of Rio de Janeiro, Brazil

IVO BUKOVSKY Czech Technical Univ. in Prague,

Czech Technical Univ. in Prague Czech Republic

SHENG CHEN Univ. of Southampton, U.K.

Fudan Univ., China
PAU-CHOO (JULIA) CHUNG

PAU-CHOO (JULIA) CHUNG National Cheng Kung Univ., Taiwan

MING DONG Wayne State Univ., USA

TIANPING CHEN

EL-SAYED EL-ALFY King Fahd Univ. of Petroleum & Minerals, Saudi Arabia PABLO A. ESTEVEZ Univ. of Chile, Chile

HAIBO HE Univ. of Rhode Island, USA

TOM HESKES Radboud Univ. Nijmegen, The Netherlands

AKIRA HIROSE Univ. of Tokyo, Japan

ZENG-GUANG HOU The Chinese Acad. Sci., China

SANQING HU Hangzhou Dianzi Univ. , China

AMIR HUSSAIN Univ. of Stirling, U.K.

KAZUSHI IKEDA Nara Inst. of Sci. & Technol., Japan

HOSSEIN JAVAHERIAN General Motors R&D Center, USA

YAOCHU JIN

University of Surrey, U.K.

FAKHRI KARRAY University of Waterloo, Canada RHEE MAN KIL Korea Advanced Inst. of Science and Technology, Korea

IRWIN KING Chinese Univ. of Hong Kong

LI-WEI (LEO) KO

National Chiao-Tung Univ., Taiwan

JAMES KWOK Hong Kong Univ. of Sci. & Technol.

ROBERT LEGENSTEIN
Graz Univ. of Technology, Austria

FRANK L. LEWIS Univ. of Texas at Arlington, USA

ARISTIDIS LIKAS Univ. of Ioannina, Greece

GUO-PING LIU Univ. of Glamorgan, U.K.

JINHU LU

The Chinese Acad. Sci., China

YUNQIAN MA Honeywell International Inc.,

MALIK MAGDON-ISMAIL Rensselaer Polytechnic Institute, DANILO P. MANDIC Imperial College London, U.K.

SEIICHI OZAWA Kobe Univ., Japan

MIKE PAULIN

Univ. of Otago, New Zealand ROBI POLIKAR

Rowan Univ., USA

DANIL PROKHOROV

Toyota Research Institute NA, USA

V. SREE HARI RAO Jawaharlal Nehru Technol. Univ.,

India

MARCELLO SANGUINETI Univ. of Genoa, Italy

ALESSANDRO SPERDUTI Univ. of Padova, Italy

STEFANO SQUARTINI Univ. Politecnica delle Marche,

Italy

DIPTI SRINIVASAN National Univ. of Singapore

SERGIOS THEODORIDIS Univ. of Athens, Greece MARC M. VAN HULLE Katholieke Univ. Leuven,

Belgium

Draguna Vrabie

United Technologies Research Center, USA

ZIDONG WANG Brunel Univ., U.K. MARCO WIERING Univ. of Groningen, The Netherlands ZHANG YI

Sichuan Univ., China VICENTE ZARZOSO

University of Nice-Sophia Antipolis, France

ZHIGANG ZENG

Huazhong Univ. of Sci. & Technol.,

China
G. Peter Zhang

Georgia State Univ., USA HUAGUANG ZHANG Northeastern Univ., China

NIAN ZHANG

Univ. of District of Columbia, USA

LIANG ZHAO Univ. of Sao Paulo, Brazil NANNING ZHENG

Xi'an Jiaotong Univ., China

IEEE Officers

MOSHE KAM, President
GORDON W. DAY, President-Elect
ROGER D. POLLARD, Secretary
HAROLD FLESCHER, Treasurer
PEDRO A. RAY, Past President
TARIQ S. DURRANI, Vice President, Educational Activities

DAVID A. HODGES, Vice President, Publication Services and Products HOWARD E. MICHEL, Vice President, Member and Geographic Activities STEVE M. MILLS, President, Standards Association DONNA L. HUDSON, Vice President, Technical Activities RONALD G. JENSEN, President, IEEE-USA

VINCENZO PIURI, Director, Division X

IEEE Executive Staff

DR. E. JAMES PRENDERGAST, Executive Director & Chief Operating Officer

THOMAS SIEGERT, Business Administration MATTHEW LOEB, Corporate Activities DOUGLAS GORHAM, Educational Activities BETSY DAVIS, SPHR, Human Resources CHRIS BRANTLEY, IEEE-USA
ALEXANDER PASIK, Information Technology

PATRICK MAHONEY, Marketing
CECELIA JANKOWSKI, Member and Geographic Activities
ANTHONY DURNIAK, Publications Activities
JUDITH GORMAN, Standards Activities
MARY WARD-CALLAN, Technical Activities

IEEE Periodicals Transactions/Journals Department

Staff Director: Fran Zappulla

Editorial Director: DAWN MELLEY
Managing Editor: JEFFREY E. CICHOCKI

Production Director: PETER M. TUOHY
Journals Coordinator: MICHAEL J. HELLRIGEL

IEEE TRANSACTIONS ON NEURAL NETWORKS (ISSN 1045-9227) is published monthly by The Institute of Electrical and Electronics Engineers, Inc. Responsibility for the contents rests upon the authors and not upon the IEEE, the Society/Council, or its members. IEEE Corporate Office: 3 Park Avenue, 17th Floor, New York, NY 10016-5997. IEEE Operations Center: 445 Hoes Lane, Piscataway, NJ 08854-4141. NJ Telephone: +1 732 981 0060. Price/Publication Information: Individual copies: IEEE Members \$20.00 (first copy only), nonmembers \$146.00 per copy. (Note: Postage and handling charge not included.) Member and nonmember subscription prices available upon request. Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy for private use of patrons, provided the per-copy fee indicated in the code at the bottom of the first page is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. For all other copying, reprint, or republication permission, write to Copyrights and Permissions Department, IEEE Publications Administration, 445 Hoes Lane, Piscataway, NJ 08854-4141. Copyright © 2011 by The IEEE, Inc. All rights reserved. Periodicals Postage Paid at New York, NY and at additional mailing offices. Postmaster: Send address changes to IEEE Transactions on Neural Networks, IEEE, 445 Hoes Lane, Piscataway, NJ 08854-4141. GST Registration No. 125634188. CPC Sales Agreement #40013087. Return undeliverable Canada addresses to: Pitney Bowes IMEX, P.O. Box 4332, Stanton Rd., Toronto, ON M5W 3J4, Canada. IEEE prohibits discrimination, harassment and bullying. For more information visit http://www.ieee.org/nondiscrimination Printed in U.S.A.