

IEEE ROBOTICS & AUTOMATION

MAGAZINE

Vol. 23, No. 2 June 2016

ISSN 1070-9932

<http://www.ieee-ras.org/publications/ram>



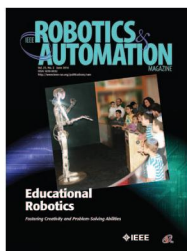
Educational Robotics

Fostering Creativity and Problem-Solving Abilities



FEATURES

- 16 Pedagogical Uses of Thymio II**
How Do Teachers Perceive Educational Robots in Formal Education?
By Morgane Chevalier, Fanny Riedo, and Francesco Mondada
- 24 The Game of Science**
An Experiment in Synthetic Roboethology with Primary School Children
By Edoardo Datteri and Luisa Zecca
- 30 Teacher's Kit**
Development, Usability, and Communities of Modular Robotic Kits for Classroom Education
By Árpád Takács, György Eigner, Levente Kovács, Imre J. Rudas, and Tamás Haidegger
- 40 Robotics for All Ages**
A Standard Robotics Curriculum for K–16
By Carlotta A. Berry, Sekou L. Remy, and Tamara E. Rogers



ON THE COVER

Theoretical and experimental studies about the pedagogical and psychological effectiveness of educational robotics can provide evidence on how and to what extent robots can improve future education.

PHOTO CREDITS: FOREGROUND IMAGE ©TECHNION CENTER FOR ROBOTICS AND DIGITAL TECHNOLOGY EDUCATION. BACKGROUND IMAGE LICENSED BY INGRAM PUBLISHING



If you like an article, click this icon to record your opinion. This capability is available for online Web browsers and offline PDF reading on a connected device.



DOOR AND IMAGES OF MEN LICENSED BY INGRAM PUBLISHING

- 47 STORMLab for STEM Education**
An Affordable Modular Robotic Kit for Integrated Science, Technology, Engineering, and Math Education
By Ekawahyu Susilo, Jianing Liu, Yasmin Alvarado Rayo, Ashley Melissa Peck, Justin Montenegro, Mark Gonyea, and Pietro Valdastrì
- 56 Learning by Teaching a Robot**
The Case of Handwriting
By Séverin Lemaignan, Alexis Jacq, Deanna Hood, Fernando Garcia, Ana Paiva, and Pierre Dillenbourg
- 67 Teaching Introductory Robotics Programming**
Learning to Program with National Instruments' LabVIEW
By Timothy Bower
- 74 Science Class with RoboThespian**
Using a Robot Teacher to Make Science Fun and Engage Students
By Igor M. Verner, Alex Polishuk, and Niv Krayner
- 81 An Innovative Educational Change**
Massive Open Online Courses in Robotics and Robotic Vision
By Peter Corke, Elizabeth Greener, and Robyn Philip



IEEE ROBOTICS & AUTOMATION MAGAZINE

A Publication of the IEEE ROBOTICS AND AUTOMATION SOCIETY
Vol. 22, No. 2 June 2016 ISSN 1070-9932 <http://www.ieee-ras.org/publications/ram>

COLUMNS & DEPARTMENTS

- 4 FROM THE EDITOR'S DESK
- 6 PRESIDENT'S MESSAGE
- 8 INDUSTRIAL ACTIVITIES
- 12 FROM THE GUEST EDITORS
- 90 STUDENT'S CORNER
- 94 SOCIETY NEWS
- 102 WOMEN IN ENGINEERING
- 105 CALENDAR

EDITORIAL BOARD

Editor-in-Chief
Eugenio Guglielmelli
(ram-eic@ieee.org)
Campus Bio-Medico
University, Roma (Italy)

Associate Editors

Fabio Bonsignorio
Sant'Anna School of Advanced
Studies (Italy)

Antonio Franchi
Centre National de la Recherche
Scientifique, CNRS (France)

Yi Guo
Stevens Institute of Technology (USA)

Hesuan Hu
Xidian University (PR China)

Ferdinando Rodriguez Y Baena
Imperial College (UK)

Qining Wang
Peking University (China)

Past Editor-in-Chief
Peter Corke
Queensland University of Technology
(Australia)

*RAM Editorial
Assistant and Column Manager*
Amy Reeder (USA)

COLUMNS

Competitions: Minoru Asada (Japan) and
Sven Behnke (Germany)

Education: M. Ani Hsieh (USA) and
Angelika Peer (United Kingdom)

From the Editor's Desk: Eugenio
Guglielmelli (Italy)

*Industry News
Humanitarian Technology, and Standards:*
Tamas Haidegger (Hungary)

On the Shelf: Alex Simpkins
(USA)

President's Message: Satoshi Tadokoro
(Japan)

Regional Spotlight: Kenji Suzuki (Japan)
and Xiaorui Zhu (China)

ROS Topics: Steve Cousins (USA)

Student's Corner: Megan Emmons (USA)

TC Spotlight: Fumihito Arai (Japan) and
Atsushi Yamashita (Japan)

Turning Point: Eugenio Guglielmelli (Italy)

Women In Engineering:
Laura Margheri (Italy)

**IEEE RAS Vice-President
of Publication Activities**
Eugenio Guglielmelli
Universita Campus Bio-Medico (Italy)

RAM home page:
<http://www.ieee-ras.org/publications/ram>

**Robotics and Automation
Society Project Specialists**
Kathy Colabaugh
Amy Reeder
ras@ieee.org

Advertising Sales
Mark David
Sr. Manager Advertising and Business
Development
Tel: +1 732 465 6473
Fax: +1 732 981 1855
m.david@ieee.org

IEEE Periodicals Magazines Department

Debbly Nowicki
Managing Editor
d.nowicki@ieee.org

Janet Dudar
Senior Art Director

Gail A. Schnitzer, Mark Morrissey
Associate Art Director

Theresa L. Smith
Production Coordinator

Felicia Spagnoli
Advertising Production Manager

Peter M. Tuohy
Production Director

Dawn M. Melley
Editorial Director

Fran Zappulla
*Staff Director,
Publishing Operations*

**IEEE-RAS Membership
and Subscription Information:**
+1 800 678 IEEE (4333)
Fax: +1 732 463 3657
http://www.ieee.org/membership_services/membership/societies/ras.html

Digital Object Identifier 10.1109/MRA.2016.2558283

IEEE Robotics & Automation Magazine (ISSN 1070-9932) (IRAMEB) is published quarterly by the Institute of Electrical and Electronics Engineers, Inc. Headquarters: 3 Park Avenue, 17th Floor, New York, NY 10016-5997 USA, Telephone: +1 212 419 7900. Responsibility for the content rests upon the authors and not upon the IEEE, the Society or its members. IEEE Service Center (for orders, subscriptions, address changes): 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855 USA. Telephone: +1 732 981 0060. Individual copies: IEEE members US\$20.00 (first copy only), non-members US\$120.00 per copy. Subscription rates: Annual subscription rates included in IEEE Robotics and Automation Society member dues. Subscription rates available on request. Copyright and reprint permission: Abstracting is permitted with credit to the source. Libraries are permitted to

photocopy beyond the limits of U.S. Copyright law for the private use of patrons 1) those post-1977 articles that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923 USA; 2) pre-1978 articles without a fee. For other copying, reprint, or republication permission, write Copyrights and Permissions Department, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. Copyright © 2016 by the Institute of Electrical and Electronics Engineers Inc. All rights reserved. Periodicals postage paid at New York and additional mailing offices. Postmaster: Send address changes to IEEE Robotics & Automation Magazine, IEEE, 445 Hoes Lane, Piscataway, NJ 08854 USA. Canadian GST #125634188

IEEE prohibits discrimination, harassment, and bullying. For more information, visit <http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html>.

