Editor: Ahmad Ibrahim

Volume 25 Number 1

Contributions in: Thermodynamics, Mechanical Engineering, Aerospace Engineering, Civil Engineering, Structural Dynamics, Electrical Engineering, Education Research

The International Journal of ENGINEERING EDUCATION

FOUNDER AND FIRST EDITOR-IN-CHIEF MICHAEL S. WALD (1932–2008)

EDITOR

Ahmad Ibrahim, PhD, PEng Toronto, Ontario, Canada E-mail: ijee.editor@gmail.com

ASSOCIATE EDITORS

Thomas R. Kurfess, Ph.D., P.E. Professor and BMW Chair of Manufacturing, Dept. of Mech. Engineering; Director, Carroll A. Campbell Jr. Graduate Engineering Center, International Center for Automotive Research, Clemson University, Clemson SC 29634-0921, USA. E-mail: kurfess@clemson.edu

C. Kuo, University of Strathclyde, 100 Montrose Street, Glasgow G4 0LZ, Scotland. Tel.: +44 41 5524400 E-mail: mailto:clhs22@strath.ac.uk

D. McCarthy, Dublin Institute of Technology, Bolton Street, Dublin 1, Ireland E-mail: dmccart@dit.ie

J. Turner, Dublin Institute of Technology, Bolton Street, Dublin 1, Ireland E-mail: jturner@dit.ie

BOARD OF EDITORS

C. Y. Lam, School of Mechanical and Aerospace Engineering, Nanyang Technological, Singapore 639798.

R. Natarajan, Chairman, All India Council for Technical Education, New Delhi, India.

C. S. Slater, Rowan University, Department of Chemical Engineering, Glassboro, NJ, USA.

EDITORIAL ADVISORY BOARD

Alice Agogino, Mechanical Engineering, University of California, Berkeley, 94720-1740, USA

Caroline Baillie, Integrated Learning Centre, Queens University, Kingston, Ontario, Canada K7L 3N6.

Stuart Burgess, Department of Mechanical Engineering, University of Bristol, UK.

Clive Dym, Fletcher Jones Chair of Engineering Design, Harvey-Mudd College, Claremont CA 91711, USA.

E. Eder, Royal Military College of Canada, Kingston, Ontario, Canada K7K 5LO.

Nesimi Ertugrul, Dept. of Electrical and Electronic Engineering, University of Adelaide, Adelaide 5005, Australia.

R. Felder, North Carolina State University, Raleigh NC 27695, USA.

Lawrence Genalo, Department of materials Science and Engineering, Iowa State University, Ames IA 50011, USA

Denis Gillet, EPFL, Swiss Federal Institute of Technology, CH-1015, Switzerland.

J. Jawitz, Centre for Higher Education Development, University of Cape Town, South Africa.

Russel C. Jones, Managing Partner, World Expertise LLC, Falls Church VA, USA.

Kok Kiong Tan, Department of Electrical and Computer Engineering, National University of Singapore, Singapore.

Paul King, Department of Biomedical Engineering, Vanderbilt University, Nashville TN 37253, USA.

J. F. Marchman, virginia Polytechnic Institute and State University, Blacksburg VA 24061, USA.

Tom Owens, Department of Electrical Engineering & Electronics, Brunel University, Uxbridge, UK.

Shirley Pomeranz, Associate Professor, Department of Mathematical and Computer Sciences, The University of Tulsa, Tulsa, OK 74104-3189, USA.

Z. J. Pudlowski, Faculty of Engineering, Monash University, Clayton, Melbourne, Vic 3168, Australia.

Nicholas Salamon, Engineering Science & Mechanics, Penn State University, University Park, PA 16802, USA.

D. Schaefer, Georgia Institute of Technology, Savannah, GA 31407, USA.

Sheri D. Sheppard, Department of Mechanical Engineering, Stanford University, Stanford, CA 94305, USA.

P. Shiue, Christian Brothers University, Memphis TN 38104, USA.

I.Verner, Department of Education in Technology & Science, Israel Institute of Technology, Haifa 32000, Israel

B.Wagner, Center for Didactics of Technology, University of Hannover, Germany.

Levent Yilmaz, Computer Science and Software Engineering, Auburn University, Auburn AL 36849, USA

Subscription Rates

For complete price information, please contact ijee@eircom.net

International Journal of Engineering Education, CIO John Turner, Dublin Institute of Technology, Bolton St., Dublin 1, Ireland.

Copyright © 2009 TEMPUS Publications Published 6 per annum

It is a condition of publication that manuscripts submitted to this journal have not been published and will not to be simultaneously submitted or published elsewhere. By submitting a manuscript, the authors agree that the copyright for their article is transferred to the publisher, if and when the article is accepted for publication. However, assignment of copying is not required from authors who work for organizations which do not permit such assignment. The copyright covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microform or any other reproductions of similar nature and transactions. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, electrostatic, magnetic tape, mechanical, photocopying, recording or otherwise, without permission in writing from the copyright holder.

Photocopying Information for Users in the U.S.A.

The Item-free Code for this publication indicates that authorization to photocopy items for internal or personal use is granted by the copyright holder for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service provided by the stated fee for copying beyond that permitted by Section 107 or 108 of the United States Copyright Law, is paid. The appropriate remittance of \$3.00 per copy per article is paid directly to the Copyright Clearance Center Inc., 27 Congress Street, Salem, MA 01970.

Permission for Other Use

The copyright owner's consent does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific written permission must be obtained from the publisher for such copying.

The Item-fee Code for this publication is: 0949-149X/92 \$3.00 + 0.00

The International Journal of ENGINEERING EDUCATION

Aims and Scope

This journal serves as an international interdisciplinary forum of reference for engineering education.

A balance between papers on developments in educational methods technology, case studies, laboratory applications, new theoretical approaches, educational policy and survey papers is aimed for.

Comprehensive coverage of new education schemes and techniques makes the journal a unique source of ideas for engineering educators who are keen to keep abreast of latest developments in educational applications in all fields of engineering.

Some of the areas covered more extensively in recent issues are:

CAD, CAE, Computer applications in teaching thermodynamics, Material science, Electrical Engineering, New Courses and Curricula, Engineering Management, Control Engineering, Mechanical Engineering, Engineering Design, Student Evaluation, and Institutional Accreditation.

Notes for Contributors

Manuscripts are to be submitted to the editor, Dr. Ahmad Ibrahim by e-mail at ijee.editor@gmail.com

Only manuscripts not previously published will be considered. Once accepted for publication in the International Journal of Engineering Education (IJEE), manuscripts should not be published elsewhere.

Manuscripts should be submitted in English as MSWord documents (.doc).

Images and figures should be included in the document. PDF files can be submitted for review purposes only. No special text formatting is required as all accepted papers are formatted by IJEE production staff. However, the references need to be cited in the IJEE format.

All manuscripts should have an abstract, an introduction, presentation and discussion sections, conclusions and references.

Manuscripts should include information relevant to engineering education.

Authors are encouraged to include a concise literature survey that helps to point out the novel aspects of the manuscript. The keyword search on the home page can be used to find relevant literature previously published in the journal.

References to published literature within the text should be cited by numbers in square brackets on the line, and the references should be listed at the end of the manuscript in numerical order.

Journal references should be listed in the following format:

1. L. A. Pipes, Matrix analysis of heat transfer problems. J. Franklin Inst. 263, 195–206 (1957).

Book references should be given as:

2. P. H. Parkin and H. R. Humphreys, Acoustics, Noise and Buildings, p. 84. Faber, London (1961).

Captions for figures and tables should be given on a separate sheet and included at the end of the manuscript.

Authors are requested to submit a brief biographical sketch of up to 100 words for each author.

Biographical sketches will be published with the paper unless requested otherwise.

All Greek characters and unusual symbols should be defined the first time they appear in the manuscript.

Reviewers are asked to consider several aspects of the manuscript, including:

<u>Content:</u> clarity of objective, technical correctness, scope covered, conclusions drawn, and contribution to engineering education, etc.

Originality: presence of new ideas or innovative contribution.

Structure: logical layout, proper use and adequate number of figures/diagrams, etc.

Quality of text: correct grammar and spelling, clarity of expression, consistency, readability, appropriate quotations and references, etc.

Authors submitting a revised manuscript need to outline separately the response to the reviewers' comments including changes introduced to the manuscript.

Final accepted manuscripts will be text and copy edited, proofs in PDF format will be sent to the author for approval before publication.

Total page charges are calculated according to the number of pages to be published based on the proofs sent to the authors.

Vol. 25, No. 1, pp. 1–204 INT. J. ENGINEERING EDUCATION 2009

A selection of papers accepted for publication

Ramos et al.—A Simulator for Learning Symbolically About the Behavior of Motions in Bipedal Robots

García-Beltrán *et al.*—A Simulator of a Multi-Programming Environment for Computer Science Learning/Teaching

Coller and Shernoff—Video Game-Based Education in Mechanical Engineering: A Look at Student Engagement

Gunes and Baba—An Educational Tool for Design and Implementation of an Autonomous Mobile Robot

Antón et al.—Refrigerating cycle simulator: System modelling, educational implementation and assessment

Bautista Paz *et al.*—Simulink Model for Teaching the "Stick-Slip" Friction Phenomenon in the Subject "Machine Vibration and Noise"

Babich and Mavrommatis—Teaching of complex technological processes using simulations

Kamlaskar—Assessing Effectiveness of Interactive Electronics Lab Simulation: Learner's Perspective

Saenz and Cano—Experiential learning through simulation games: an empirical study

Chen—A Model for Assessing Web-based Simulations in Engineering Education

Fang et al.—Lean Lego Simulation for Improving Manufacturing Engineering Education

Vahidi and Tavakoli—Simulation of Synchronous Generator on MATLAB-SIMULINK for Teaching Its Performance Characteristics to Undergraduate Students

Yehezkel et al.—Easy CPU: Simulation-based Learning of Computer Architecture at the Introductory Level

Doulgeri and Zikos—Development, Integration and Evaluation of a web based Virtual Robot Task Simulator in the teaching of robotics.

Davidovitch *et al.*—The Impact of Functional Fidelity in Simulator-based Learning of Project Management

Green et al.—Design for Frontier Contexts: Classroom Assessment of a New Design Methodology with Humanitarian Applications

Wren et al.—Learning More with Demonstration Based Education

Pérez et al.—Classroom Simulation of Cooperative Engineering Design Practice in an Aeronautical Company

Serrano et al.—A Teaching Approach for Gas Turbines Using Spreadsheets