

CAMBRIDGE

JOURNALS

Robotica

An Official Journal of the International Federation of Robotics

Editor-in-Chief

G. S. Chirikjian, *Johns Hopkins University, USA*

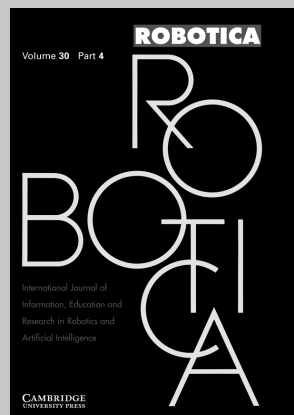
Robotica provides an international forum for the multidisciplinary subject of robotics and encourages developments in this important field of automation with regard to industry, education and research. It covers the many aspects of robotics, including sensory perception, software, kinematics and dynamics involved in robot design, robot task planning and description, intelligibility of skilled motion, applications of robots in the service industries, world model representation, artificial intelligence, development of relevant educational courses, training methods, economic and cost problems and other items of theoretical and practical interest.

Price information

is available at: <http://journals.cambridge.org/rob>

Free email alerts

Keep up-to-date with new material – sign up at
<http://journals.cambridge.org/rob-alerts>



Robotica

is available online at:

<http://journals.cambridge.org/rob>

To subscribe contact Customer Services

in Cambridge:

Phone +44 (0)1223 326070

Fax +44 (0)1223 325150

Email journals@cambridge.org

in New York:

Phone +1 (845) 353 7500

Fax +1 (845) 353 4141

Email

subscriptions_newyork@cambridge.org

For free online content visit:
<http://journals.cambridge.org/rob>



CAMBRIDGE
UNIVERSITY PRESS

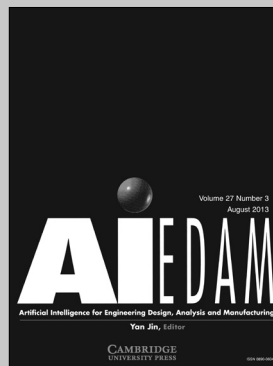
AI EDAM

Artificial Intelligence for Engineering Design, Analysis and Manufacturing

Editor

Yan Jin, *University of Southern California, USA*

AI EDAM is a journal for engineers and designers who see AI technologies as powerful means for solving difficult engineering problems; and for researchers in AI and computer science who are interested in applications of AI and in the theoretical issues that arise from such applications. The journal publishes original articles about significant theory and applications based on the most up-to-date research in all branches and phases of engineering. Suitable topics include: analysis and evaluation; selection; configuration and design; manufacturing and assembly; and concurrent engineering.



AI EDAM

is available online at:

<http://journals.cambridge.org/aie>

To subscribe contact Customer Services

in Cambridge:

Phone +44 (0)1223 326070

Fax +44 (0)1223 325150

Email journals@cambridge.org

in New York:

Phone +1 (845) 353 7500

Fax +1 (845) 353 4141

Email

subscriptions_newyork@cambridge.org

Free email alerts

Keep up-to-date with new material – sign up at

journals.cambridge.org/register

For free online content visit:
<http://journals.cambridge.org/aie>



CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE

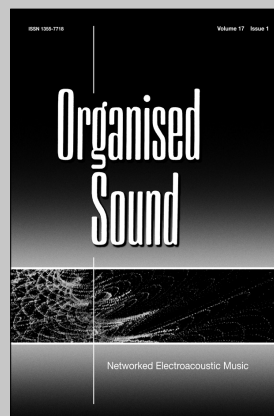
JOURNALS

Organised Sound

Editor

Leigh Landy, *De Montfort University, Leicester, UK*

Organised Sound is an international peer-reviewed journal which focuses on the rapidly developing methods and issues arising from the use of technology in music today. It concentrates upon the impact which the application of technology is having upon music in a variety of genres, including multimedia, performance art, sound sculpture and music ranging from popular idioms to experimental electroacoustic composition. It provides a unique forum for anyone interested in electroacoustic music studies, its creation and related developments to share the results of their research as they affect musical issues. An accompanying DVD is sent to subscribers annually.



Organised Sound

is available online at:
<http://journals.cambridge.org/oso>

To subscribe contact Customer Services

in Cambridge:

Phone +44 (0)1223 326070
Fax +44 (0)1223 325150
Email journals@cambridge.org

in New York:

Phone (845) 353 7500
Fax (845) 353 4141
Email
subscriptions_newyork@cambridge.org

Free email alerts

Keep up-to-date with new
material – sign up at

journals.cambridge.org/register

For free online content visit:
<http://journals.cambridge.org/oso>



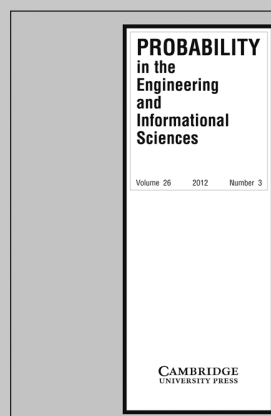
CAMBRIDGE
UNIVERSITY PRESS

Probability in the Engineering and Informational Sciences

Editor

Sheldon M. Ross, *University of Southern California, USA*

The primary focus of the journal is on stochastic modelling in the physical and engineering sciences, with particular emphasis on queueing theory, reliability theory, inventory theory, simulation, mathematical finance and probabilistic networks and graphs. Papers on analytic properties and related disciplines are also considered, as well as more general papers on applied and computational probability, if appropriate. Readers include academics working in statistics, operations research, computer science, engineering, management science and physical sciences as well as industrial practitioners engaged in telecommunications, computer science, financial engineering, operations research and management science.

**Probability in the Engineering
and Informational Sciences**

is available online at:
<http://journals.cambridge.org/pes>

**To subscribe contact
Customer Services****in Cambridge:**

Phone +44 (0)1223 326070
Fax +44 (0)1223 325150
Email journals@cambridge.org

in New York:

Phone +1 (845) 353 7500
Fax +1 (845) 353 4141
Email
subscriptions_newyork@cambridge.org

Free email alerts

Keep up-to-date with new
material – sign up at

journals.cambridge.org/register

For free online content visit:
<http://journals.cambridge.org/pes>



CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE

JOURNALS

Theory and Practice of Logic Programming

Published for the Association for Logic programming

Editor-in-Chief

I Niemelä, *Aalto University School of Science, Finland*

Theory and Practice of Logic Programming emphasises both the theory and practice of logic programming. Logic programming applies to all areas of artificial intelligence and computer science and is fundamental to them.

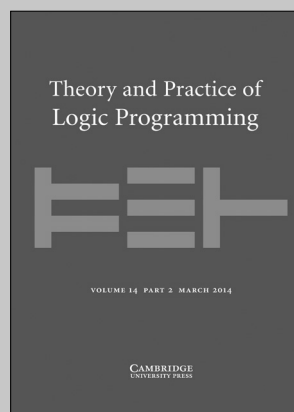
Among the topics covered are AI applications that use logic programming, logic programming methodologies, specification, analysis and verification of systems, inductive logic programming, multi-relational data mining, natural language processing, knowledge representation, non-monotonic reasoning, semantic web reasoning, databases, implementations and architectures and constraint logic programming.

Price information

is available at: <http://journals.cambridge.org/tlp>

Free email alerts

Keep up-to-date with new material – sign up at <http://journals.cambridge.org/tlp-alerts>



Theory and Practice of Logic Programming is available online at: <http://journals.cambridge.org/tlp>

To subscribe contact Customer Services

Americas:

Phone +1 (845) 353 7500

Fax +1 (845) 353 4141

Email

subscriptions_newyork@cambridge.org

Rest of world:

Phone +44 (0)1223 326070

Fax +44 (0)1223 325150

Email journals@cambridge.org

For free online content visit:
<http://journals.cambridge.org/tlp>



CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE

JOURNALS

Combinatorics, Probability & Computing

Editor-in-Chief

Béla Bollobás, *DPMMS, Cambridge, UK; University of Memphis, USA*

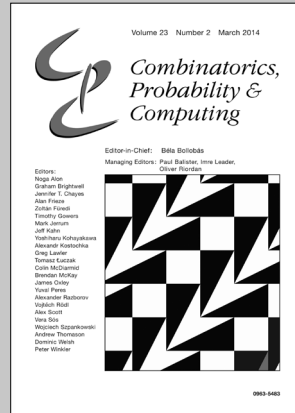
Published bimonthly, *Combinatorics, Probability & Computing* is devoted to the three areas of combinatorics, probability theory and theoretical computer science. Topics covered include classical and algebraic graph theory, extremal set theory, matroid theory, probabilistic methods and random combinatorial structures; combinatorial probability and limit theorems for random combinatorial structures; the theory of algorithms (including complexity theory), randomised algorithms, probabilistic analysis of algorithms, computational learning theory and optimisation.

Price information

is available at: <http://journals.cambridge.org/cpc>

Free email alerts

Keep up-to-date with new material – sign up at
<http://journals.cambridge.org/cpc-alerts>



Combinatorics, Probability & Computing

is available online at:
<http://journals.cambridge.org/cpc>

To subscribe contact Customer Services

in Cambridge:

Phone +44 (0)1223 326070
Fax +44 (0)1223 325150
Email journals@cambridge.org

in New York:

Phone +1 (845) 353 7500
Fax +1 (845) 353 4141
Email
subscriptions_newyork@cambridge.org

For free online content visit:
<http://journals.cambridge.org/cpc>



CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE

JOURNALS

Mathematical Structures in Computer Science

Editor-in-Chief

Giuseppe Longo, *CNRS and Ecole Normale Supérieure, Paris, France*

Mathematical Structures in Computer Science is a journal of theoretical computer science which focuses on the application of ideas from the structural side of mathematics and mathematical logic to computer science. The journal aims to bridge the gap between theoretical contributions and software design, publishing original papers of a high standard and broad surveys with original perspectives in all areas of computing, provided that ideas or results from logic, algebra, geometry, category theory or other areas of logic and mathematics form a basis for the work.

Price information

is available at: <http://journals.cambridge.org/msc>

Free email alerts

Keep up-to-date with new material – sign up at
<http://journals.cambridge.org/msc-alerts>



Mathematical Structures in Computer Science

is available online at:
<http://journals.cambridge.org/msc>

To subscribe contact Customer Services

in Cambridge:

Phone +44 (0)1223 326070
Fax +44 (0)1223 325150
Email journals@cambridge.org

in New York:

Phone +1 (845) 353 7500
Fax +1 (845) 353 4141
Email
subscriptions_newyork@cambridge.org

For free online content visit:
<http://journals.cambridge.org/msc>



CAMBRIDGE
UNIVERSITY PRESS

EDITORS-IN-CHIEF

Matthias Felleisen, College of Computer Science, Northeastern University, Boston, USA

Jeremy Gibbons, Computer Science, University of Oxford, Oxford, UK

EDITORS

Lennart Augustsson, Standard Chartered Bank, London, UK [Commercial Uses Editor]

Robert Harper, School of Computer Science, Carnegie Mellon University, Pittsburgh, USA [Theoretical Pearls Editor]

Fritz Henglein, Department of Computer Science (DIKU), University of Copenhagen, Copenhagen, Denmark

Dr Ralf Hinze, Computer Science, University of Oxford, Oxford, UK [Functional Pearls Editor]

Graham Hutton, University of Nottingham, Nottingham, UK, [Editor for Abstracts of PhDs in Functional Programming]

Shriram Krishnamurthi, Computer Science Department, Brown University, Providence, USA [Educational Editor]

Colin Runciman, Department of Computer Science, University of York, York, UK [Tools and Applications Editor]

Stephanie Weirich, University of Pennsylvania, Philadelphia, USA

BOOK REVIEW EDITOR

Simon Thompson, Computing Laboratory, University of Kent, Canterbury, UK.

EDITORIAL BOARD

Andrew Adams-Moran, Galois Connections Inc, Portland, USA

Nick Benton, Microsoft Research, Cambridge, UK

Lars Birkedal, IT University of Copenhagen, Copenhagen, Denmark

Derek Dreyer, MPI-SWS, Germany

Jean-Christophe Filliatre, LRI, CNRS, Orsay, France

Robert Findler, Northwestern University, Evanston, USA

Matthew Flatt, University of Utah, Salt Lake City, USA

Gabriel Keller, University of New South Wales, Sydney, Australia

Brigitte Pientka, McGill University, Montreal, Canada

Francois Pottier, INRIA, France

Norman Ramsey, Tufts University, Medford, USA

Eijiro Sumii, Tohoku University, Japan

Peter Thiemann, Institute for Informatics University of Freiburg, Freiburg, Germany

INTERNET ACCESS

The JFP web site contains details of all papers published to date, information for authors, and other supplementary material at journals.cambridge.org/jfp.

This journal issue has been printed on FSC-certified paper and cover board. FSC is an independent, non-governmental, not-for-profit organization established to promote the responsible management of the world's forests. Please see www.fsc.org for information.

JOURNAL OF
Functional Programming

VOLUME 24 PART 5 SEPTEMBER 2014

CONTENTS

ARTICLE	
F-ing modules	
ANDREAS ROSSBERG, CLAUDIO RUSSO AND DEREK DREYER	529
Book review	608

Cambridge Journals Online
For further information about this journal
please go to the journal website at:
journals.cambridge.org/jfp



MIX
Paper from
responsible sources
FSC® C007785

CAMBRIDGE
UNIVERSITY PRESS