The International Journal of
Robotics Research
Volume 27, Number 1, January 2008

**CONTENTS**

3 Editorial
J. Hollerbach

5 Comparing the Power of Robots
J. M. O'Kane and S. M. LaValle

25 Ultrasound Image-Based Visual Servoing of a Surgical Instrument Through Nonlinear Model Predictive Control
M. Sauvée, P. Poignet, and E. Dormée

41 Image-based Visual Servoing with Central Catadioptric Cameras
G. L. Mariottini and D. Prattichizzo

57 Transparent Rate Mode Bilateral Teleoperation Control
F. Mohamm and K. Hashtrudi-Zaad

73 A Novel Measure of Uncertainty for Mobile Robot SLAM with Rao-Blackwellized Particle Filters
J. L. Blanco, J. A. Fernández-Madrigal, and J. González

91 Bayesian Estimation of Follower and Leader Vehicle Poses with a Virtual Trailer Link Model
T. C. Ng, M. Adams, and J. Ibañez-Quemán

107 Formation Control and Collision Avoidance for Multi-agent Non-holonomic Systems: Theory and Experiments

127 Cooperative Cleaners: A Study in Ant Robotics
J. A. Wagoner, Y. Altshuler, V. Yanowski, and A. M. Bruckstein

*M* denotes that a paper includes multimedia material and can be viewed at www.ifr.org.
AMERICA'S ROBOT ARMY
NEXT-GEN FIGHTING MACHINES ARE SMART, TOUGH AND ARMED TO THE TREADS
YOUR GREEN HOME
16 Products and Projects
WILL SCIENCE ADD 50 YEARS TO YOUR LIFE?
THE PERFECT MOTORCYCLE TRIP
DIY
SAWHORSE PLANS
POLISHING HEADLIGHTS
3 BATHROOM UPGRADES
Nutrient Vectors and Riparian Processing: A Review with Special Reference to African Semi-arid Savanna Ecosystems

Seasonal and Spatial Controls over Nutrient Cycling in a Pacific Northwest Prairie
Laurel Pfeifer-Meister and Scott D. Bridgham

The Effects of Spatial Legacies following Shifting Management Practices and Fire on Boreal Forest Age Structure
Patrick M. A. James, Marie-Josée Fortin, Andrew Fell, Dan Kneeslaw, and Christian Messier

Does Atmospheric NO3- Deposition Alter the Abundance and Activity of Ligninolytic Fungi in Forest Soils?
Kirsten S. Hofmockel, Donald R. Zak, and Christopher B. Blackwood

Persistence of Dispersal-limited Species in Structured Dynamic Landscapes
Glenn R. Matlack and Nicolae A. Leu

The Contrasting Effects of Aspen and Jack Pine on Soil Nutritional Properties Depend on Parent Material
Catherine Ste-Marie, David Paré, and Daniel Gagnon

Positive Feedbacks in Seagrass Ecosystems: Implications for Success in Conservation and Restoration
Tjisse van der Heide, Egbert H. van Nes, Gertjan W. Geerling, Alfons J. P. Smolders, Tjeerd J. Bouma, and Marieke M. van Katwijk

Dissolved Organic Carbon in Alaskan Boreal Forest: Sources, Chemical Characteristics, and Biodegradability
Kimberly P. Wickland, Jason C. Neff, and George R. Aiken

High Metabolic Rates in Beach Cast Communities
Grey T. Coupland, Carlos M. Duarte, and Diana I. Walker
Software in South America

Inside Visual Studio 2008
Text Mining & Visual Studio Tools for Office
Visual Studio 2008 & LINQ
Virtualization & Software Builds
STATIC TESTING C++ CODE

Scott W. Ambler:
The Agile Edge
Herb Sutter:
Effective Concurrency
FEATURES

16 South American Software Development
Using Brazil to take the temperature of the South American software climate.
by Michael Swaine

30 BibPort: Creating Bibliographic References
by Matthew Curry and Jeffrey G. Gray

55 Continuous LINQ
Continuous LINQ is just one expansion made possible through language extensions and LINQ on the .NET Framework 3.5.
by Kevin Hoffman

60 The ZK Framework
ZK is a framework that introduces event-handling programming—tackled by an AJAX engine—to web applications.
by Andrzej Sekula

66 Static Testing C++ Code
The C++ utility Carlo presents here implements static testing automation that retrieves from the command line the paths of the files containing the static testing programs.
by Carlo Milanesi

DEPARTMENTS

6 Hmmm
A caffeine-starved editor does his best to stay on track.
by Jonathan Erickson

10 Aila Vox
If you are not yet using virtualization in your build environment, then it’s time to get moving.
by John Graham-Cumming

12 Developer Diaries
Profiles of programmers, descriptions of developers.
edited by Michael Swaine

14 Developer’s Notebook
New development products and new releases of existing ones.
compiled by the DDJ Staff

20 Conversations
Microsoft’s S. Somasegar discusses some of the new and unique features that Visual Studio 2008 offers developers.
by Deirdre Blake

80 Swaine’s Flames
Michael goes through the mail.
by Michael Swaine

COLUMNS

71 The Agile Edge
Test-driven development is an important agile software development technique that lets you specify and validate functionality at a finely detailed level.
by Scott W. Ambler

74 Effective Concurrency
Herb talks the low-Amdahl’s Law, that is—and Herb rephr.
by Herb Sutter
Journal for Research in Mathematics Education

EDITORIAL
106 A Commentary on Research Commentaries
Jeremy Kilpatrick

RESEARCH COMMITTEE
108 Connecting Research and Practice at NCTM
NCTM Research Committee

RESEARCH COMMENTARY
115 An Alternative Reconceptualization of Procedural and Conceptual Knowledge
Arthur J. Baroody, Yingying Fei, and Amanda R. Johnson
132 Research Commentary: A Rejoinder
Foregrounding Procedural Knowledge
Jon R. Star

ARTICLES
136 Effects of a Preschool Mathematics Curriculum: Summative Research on the Building Blocks Project
Douglas H. Clements and Julie Sarama
164 The Role of a Dynamic Software Program for Geometry in the Strategies High School Mathematics Students Employ
Karen F. Hollebrands

BIBLIOTECA CENTRAL
Universidad Autónoma de Ciudad Juárez

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS
Journal of Structural Engineering

171 Editor's Note
Sashi K. Kunnath

Technical Papers

Metal Structures
173 Numerical Study of Stiffened Socket Connections for Highway Signs, Traffic Signals, and Luminaire Structures
Diya Mahmoud Azzam and Craig C. Menzemer

Assessment of Subzero Fracture of Welded Tubular K-Joint
T. Björk, S. Heiniät, and G. Marquis

189 Compression Strength of Unstiffened Elements in Cold-Reduced High Strength Steel
J. Ye and K. J. R. Rasmussen

198 Experimental and Numerical Investigation of the Tensile Behavior of Blind-Bolted T-Stub Connections to Concrete-Filled Circular Columns
Huang Yao, Helen Goldsworthy, and Emad Gad

Concrete and Masonry Structures

209 Continuum Model for In-Plane Anisotropic Inelastic Behavior of Masonry
Chiara Calderini and Sergio Lagomarsino

221 Suggested Empirical Models for Corrosion-Induced Bond Degradation in Reinforced Concrete
Kapilesh Bhargava, A. K. Ghosh, Yasuhiro Mori, and S. Ramanujam

contents continue on back cover
231 Design of Optimally Reinforced RC Beam, Column, and Wall Sections
Mark Aschheim, Enrique Hernández-Montes, and Luisa Maria Gil-Martín

Wood Structures
240 Performance-Based Seismic Design of Wood Frame Buildings Using a Probabilistic System Identification Concept
John W. van de Lindt, Shiling Pei, and Hongyan Liu
248 FRP Z-Spike Repairing of Wood Railroad Crossies
R. M. Gulkowski, TJ T. Schilling, J. Balogh, and D. W. Radford
258 Dynamic Servicability in Lightweight Engineered Timber Floors
Erik Stefan Bernard

Vibratory and Seismic Effects
269 Design Formulas for Damping of a Stay Cable with a Damper
Yozo Fujino and Nam Hoang
279 Seismic Performance Evaluation of a Large-Scale Composite MRF Using Pseudodynamic Testing
Ricardo A. Herrera, James M. Ricles, and Richard Sause
289 Seismic Performance of Pre-Northridge Welded Steel Moment Connections to Built-Up Box Columns
Taejin Kim, Božidar Stojadinović, and Andrew S. Whittaker

Structural Control
300 Vibration Controller Design for Confined Masonry Walls by Distributed Genetic Algorithms
Abdolreza Joghafera and Mohtasham Mohebbi Astmarz
310 Bang-Bang and Semiactive Control with Variable Stiffness TMDs
Ruth Collins, Biswajit Basu, and Brian M. Brodenick

System Identification
318 Nonlinear Model-Based System Identification of Lead–Rubber Bearings
Il-Sang Ahn and Stuart S. Chen

Analysis and Computation
329 Behavior of Integrated Crosstie Trackwork System
Colin MacDougall, T. Ivan Campbell, David Swanson, Yali J. Kim, and Henry R. Skoblenick

Structural Safety and Reliability
337 Strength and Reliability of Steel Frames with Random Properties
Stephen G. Buonopane