

# **24th International Conference on Computers and Their Applications in Industry and Engineering 2011**

## **(CAINE-2011)**

**Including SNA-2011 Symposium**

**Honolulu, Hawaii, USA  
16-18 November 2011**

**Editors:**

**S. Aljahdali**

**ISBN: 978-1-61839-322-7**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2011) by the International Society for Computers and Their Applications  
All rights reserved. Reproduction in any form without the written consent of ISCA is prohibited.

Original ISBN: 978-1-880843-83-3 (Out of Print)  
Reprint ISBN: 978-1-61839-322-7

Printed by Curran Associates, Inc. (2011)

For permission requests, please contact the International Society for Computers and Their Applications  
at the address below.

International Society for Computers and Their Applications  
975 Walnut Street, Suite 132  
Cary, NC 27511-4216

Phone: (919) 467-5559  
Fax: (919) 467-3430

[isca@ipass.net](mailto:isca@ipass.net)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## INFORMATICS AND APPLICATIONS

<b>A Bayesian Approach to Intelligent Tutoring Systems for Logic Circuit Design Problem Solving.....</b>	1
<i>Hossam Meshref, Sultan Aljahdali</i>	
<b>Distributed Medical Decision Support Systems .....</b>	6
<i>Donna L. Hudson, Maurice E. Cohen</i>	
<b>WinDAM: Earthen Embankment Erosion Analysis.....</b>	12
<i>Mitchell L. Neilsen, Darrel M. Temple, Gregory J. Hanson</i>	
<b>Data Preparation for a Digital Humanities Document: Challenges and Observations.....</b>	18
<i>Katia P. Mayfield, Emmanuel Grant, Crystal Alberts</i>	

## NETWORKING AND DISTRIBUTED COMPUTING

<b>An Efficient Recovery Scheme for Cluster Federations .....</b>	24
<i>Bidyut Gupta, Ziping Liu, Sindoora Koneru</i>	
<b>Secure Multicasting for Wide Area Networks.....</b>	30
<i>Sindoora Koneru, Arun Nagarajan, Bidyut Gupta, Ziping Liu</i>	
<b>A Comprehensive Study of Node Replication Attack in Wireless Sensor Networks.....</b>	36
<i>Wazir Zada Khan, Yang Xiang, Mohammed Y. Aalsalem, Quratulain Arshad</i>	
<b>Two Automated Techniques for Analyzing and Debugging MPI-Based Programs.....</b>	44
<i>Sultan Aljahdali, Mosaid Al Sadhan, Alaa Ismail Elnashar</i>	

## NEURAL NETWORKS

<b>Gas/Oil Separator Optimization.....</b>	50
<i>Moustafa Elshafei, Mahmoud A. Doklah</i>	
<b>A Neural Network Model for Magnetic Declination.....</b>	56
<i>Muhammad Sabih, Moustafa Elshafei, Anwar Sheikh</i>	
<b>Autonomous Mobile Robot Localization Based on RSSI Measurements Using an RFID Sensor and Neural Network BPANN .....</b>	62
<i>Khalid Al-Mutib, Nossabia Sabtio</i>	
<b>On-Line Individual Verification using Typing Velocity .....</b>	70
<i>Abdullah I. Al-Shoshan</i>	

## DATA MINING AND MACHINE LEARNING

<b>Supervised Learning Algorithms to Enhance DDoS Prediction in Network Forensics .....</b>	75
<i>Carol M. Jim, Ahmed Salem, Aijuan Dong, James Devilbiss</i>	
<b>Search Web Page Classification Using Form Structural Characteristics .....</b>	83
<i>Myungsook Klassen, Chenxiao Wang</i>	
<b>Randomization, Transformation, and Virtual Knowledge Bases .....</b>	89
<i>Stuart Rubin, Gongzhu Hu</i>	
<b>A Density-Based Approach with VSM and Weighted N-Grams for Detecting Web Document Outliers .....</b>	97
<i>Ayman H. Tanira, Ahmed A. Rafea, Hesham A. Hassan</i>	

## ALGORITHM, SYSTEM AND PERFORMANCE ANALYSIS

<b>Performance Analysis for Truncated ARQ based DSFBC-CO-OFDM Communication Scheme.....</b>	103
<i>Irfan Ahmed, Sultan Aljahdali, Nisar Hundewale, Amr Mohamed, Syed Ismail Shah</i>	
<b>An Automated Theorem Prover Using Term-Functor Logic.....</b>	110
<i>Jon Greenlee, James Hearne</i>	
<b>Reducing 9-Intersection to 4-Intersection for Identifying Relations in Region Connection Calculus .....</b>	118
<i>Chaman L. Sabharwal, Jennifer L. Leopold</i>	
<b>D* Lite based Real-Time Multi-Agent Path Planning in Dynamic Environments.....</b>	124
<i>Khalid Al-Mutib, Mansour AlSulaiman, Muhammad Emaduddin, Hedjar Ramdane</i>	

## **SENSOR NETWORKS AND APPLICATIONS**

<b>A Web-Based Mobile Robotic System for Control and Sensor Fusion Studies .....</b>	129
<i>Christopher Paolini, Gerold Huber, Quentin Collier, Gordon K. Lee</i>	
<b>Unconstrained Bed Monitoring System for Scratching Motion.....</b>	135
<i>Toshihiro Shino, Yosuke Kurihara, Shoko Nukaya, Kajiro Watanabe, Hiroshi Tanaka</i>	
<b>Sequential Hybrid Map Learning through Human-Robot Interaction.....</b>	141
<i>Gang Li, Qi Cheng, Weihua Sheng</i>	
<b>S.E.N.S.O.R. – Applying Modern Software and Data Management Practices to Climate Research.....</b>	147
<i>Michael J. McMahon Jr., Sergiu M. Dascalescu, Frederick C. Harris Jr., Scotty Strachan</i>	
<b>Secure Communications for Event-Driven Wireless Sensor Networks.....</b>	154
<i>Norman Dzieniel, Nicolai Schmitberger, Jochen Schiller, Mesut Günes</i>	
<b>Transformative Reasoning about Sensor Information using Heuristic Calculus .....</b>	161
<i>Stuart Rubin, Gordon K. Lee</i>	
<b>Sink Driven Axes based Data Aggregation in Wireless Sensor Network .....</b>	166
<i>Ashok V. Sutagundar, Sunilkumar S. Manvi, Narayan C. Debnath</i>	
<b>Modeling Unreliable Data and Sensors: Analyzing False Alarm Rates using Training Weighted Ranking .....</b>	171
<i>Vasanth Iyer, S. Sitharama Iyengar, Garmiela Rama Murthy, Mandalika B. Srinivas</i>	

## **INFORMATION SYSTEMS AND APPLICATIONS**

<b>An Empirical Approach for Annotating Web Services .....</b>	177
<i>Djelloul Bouchiba, Mimoun Malki, Abdullah Alghandi, Khalid Alnafjan</i>	
<b>Variant Logic Automatic Update for MDA Based Enterprise Information Systems.....</b>	183
<i>Jon Davis, Elizabeth Chang</i>	
<b>Reassuring Tourism Information Systems .....</b>	189
<i>Tokuro Matsuo, Koki Murakata</i>	
<b>Intelligent System Supported Evidence Based Management .....</b>	195
<i>Peter Kokol, Gregor Stiglic</i>	

## **SPECIAL SESSION on SOFTWARE AND APPLICATIONS**

<b>User-friendly Model Checking Integration in Model-based Development .....</b>	199
<i>Alarico Campetelli, Florian Hödl, Philipp Neubeck</i>	
<b>Optimization in DP Detection Using ARG.....</b>	205
<i>Chunky Gupta, Mohita Menon, Narayan C. Debnath</i>	
<b>Analysis of Some of the Root Causes of Bugs in a Mobile Phone Software Development Environment.....</b>	210
<i>S.R. Subramanya</i>	
<b>Software Metrics Validation: A Preliminary Approach.....</b>	216
<i>Narayan C. Debnath, Shaker Elsabbagh, Haesun K. Lee, Ilhun Lee</i>	

## **SPEECH AND AUDIO RECOGNITION, VISUALIZATION**

<b>Automatic Segmentation Algorithm of Vowels in Arabic CVC Words .....</b>	222
<i>Yousef A. Alotaibi, Ali H. Meftah</i>	
<b>Virtual Reality Based Visualization Environment for Structural Health Monitoring Analysis .....</b>	227
<i>Asmah Muallem, Sachin Shetty, S. Keith Hargrove</i>	
<b>Speech Recognition for Medically Disordered Voice .....</b>	233
<i>Mansour Alsulaiman</i>	
<b>Environment Sound Recognition for Digital Audio Forensics using ZC, MFCC, MPEG-7 and LPC Features .....</b>	238
<i>Mubarak Obaid AlQahtani, Abdulaziz S. Almazyad</i>	

## **IMAGE PROCESSING, VISION**

<b>Interactive Smart TV Control System using Hand Gesture Recognition .....</b>	243
<i>Myoung-Kyu Sohn, Sang-Heon Lee, Byungmin Kim, Jangwoo Lee</i>	
<b>Improved Face Detection Method Using Edge Histogram Feature in the Infrared Images.....</b>	248
<i>Sang-Heon Lee, Myoung-Kyu Sohn, Byungmin Kim, Jangwoo Lee, Chiho Park, Chul-Ho Won</i>	

<b>(KSU-IMR) An Intelligent Mobile Robotics System: Active Stereo Vision Path Planning Navigation For Unstructured Environments</b>	251
<i>Khalid Al Mutib, Mansour Al Sulaiman, Hassan Mathkour, Ebrahim A. Mattar, Hedjar Ramdane</i>	
<b>High Availability Using Virtualization</b>	257
<i>Amartya Dasgupta, Syed Eqbal Alam, Arijit Mitra, Salone Gupta, Sneha Joseph, Shrisha Rao</i>	

## **SYSTEMS DESIGN, ANALYSIS, AND TOOLS**

<b>On Distributions of Error and Non-Error Changes in the Eclipse Project</b>	263
<i>Pitamber Tiwari, Wei Li, M. Neale Currie</i>	
<b>Application Development for Improving Requirements Specification Writing</b>	268
<i>Yun-Sung Kang, Ju-Ik Kim, San-Yoon Min</i>	
<b>Modeling of a Non-Stationary Process Corrupted by a Symmetrically Distributed Noise using the Evolutionary Bispectrum</b>	272
<i>Abdullah I. Al-Shoshan</i>	
<b>A Visual Modeling Tool for SystemC Functional MPSoC Design</b>	278
<i>Nabil Berrehouma, El-bay Bourennane, Allaoua Chaoui, Ouassila Labbani</i>	

## **SECURITY AND HIGH PERFORMANCE COMPUTING**

<b>Optimized I/O Operations for Checkpoint Creation in BLCR</b>	284
<i>Jason Cornwell, Angkul Kongmunvattana</i>	
<b>Increasing the Reliability of the Collected Data in Wireless Sensor Networks</b>	290
<i>Yaqoob J.Y. Al-Raisi, Nazar Alfadil, Sultan Aljahdali</i>	
<b>Mapping Water Sector Cyber-Security Vulnerabilities</b>	298
<i>James H. Graham, Jeffrey L. Hieb, J. Chris Foreman</i>	
<b>A Water System Simulation for Testing Security Enhancements to SCADA Field Devices</b>	305
<i>Justin R. Adams, Jeffrey L. Hieb, James H. Graham, Rammohan K. Ragade</i>	

## **SOFTWARE ENGINEERING**

<b>Evaluation of Automated Static Analysis Tools</b>	311
<i>Chang-Shyh Peng, Cathleen L. Blackmon, Daisy F. Sang</i>	
<b>TrueRefactor: An Automated Refactoring Tool to Improve Legacy System and Application Comprehensibility</b>	316
<i>Isaac Griffith, Scott Wahl, Clemente Izurieta</i>	
<b>An Automated Software Tool for Validating Design Patterns</b>	322
<i>Shane Strasser, Colt Frederickson, Kevin Fenger, Clemente Izurieta</i>	
<b>Goal Oriented Requirements Engineering - A Review</b>	328
<i>Sultan Aljahdali, Jameela Bano, Nisar Hundewale</i>	
<b>DSS: A Software Tool to Extract Object-Oriented Design State Space</b>	334
<i>Raouf Alomainy, Wei Li, M. Neale Currie</i>	
<b>An Analysis of Aircraft Arrival Procedure using Vienna Development Method</b>	339
<i>Shahid Yousaf, Khalid A. Buragga, Nazir Ahmad Zafar, Sher Afzal Khan</i>	
<b>Author Index</b>	