

# **2015 21st International Conference on Automation and Computing (ICAC 2015)**

**Glasgow, United Kingdom  
11 – 12 September 2015**



**IEEE Catalog Number: CFP1560R-POD  
ISBN: 978-1-4799-8656-9**

# TABLE OF CONTENTS

---

## Keynote Speech

- 1 *Prof. William Edward Leithead, University of Strathclyde*  
Optimal Operation of Large Wind Turbine Arrays through Farm-level Control
  - 2 *Prof. Kai Cheng, Brunel University*  
Smart tooling, smart machines and smart manufacturing: working towards the Industry 4.0 and beyond
- 

## Paralell Sessions (*A – 1, A – 2, A – 3, A – 4, A – 5*)

---

### *A – 1 Control Applications 1* *Chair: Octavian Stefan & Wenhua Chen*

- 3 *Ashraf Khalil, Jihong Wang*  
Stabilization of Load Frequency Control System Under Networked Environment
  - 9 *Octavian Stefan, Toma-Leonida Dragomir, Alexandru Codrean*  
Observer-based Delay Compensation for Networked Control Systems – analysis and synthesis
  - 15 *Aiping Wang, Hong Wang, Ning Sheng, Xin Yin*  
Performance Analysis for Operational Optimal Control for Complex Industrial Processes – the Square Impact Principle
  - 21 *Qichun Zhang, Zhuo Wang, Hong Wang*  
Parametric Covariance Assignment using Reduced-order Closed-form Covariance Model
  - 27 *Adegboyega Ehinmowo, Yi Cao*  
Stabilizing slug flow at large valve opening using active feedback control
- 

### *A – 2 System Diagnosis & Condition monitoring 1* *Chair: Xiandong Ma & Yanmeng Xu*

- 33 *Long Zhang, Ziqiang Lang, Wen-Xian Yang*  
Transmissibility Damage Indicator for Wind Turbine Blade Condition Monitoring
  - 37 *Peng Qian, Xiandong Ma, Yifei Wang*  
Condition monitoring of wind turbines based on extreme learning machine
  - 43 *Abdulkarim Shaeboubm, Samieh Abusaad, Niaoqing Hu, Fengshou Gu, Andrew D. Ball*  
Detection and Diagnosis of Motor Stator Faults using Electric Signals from Variable Speed Drives
  - 49 *Mark Lane, Djoni Ashari, Fengshou Gu, Andrew D. Ball*  
Investigation of Motor Current Signature Analysis to Detect Motor Resistance Imbalances
  - 53 *Wuqiao Luo, Yun Li, Zhong Tian, Bo Gao, Ling Tong, Houjun Wang, Baoqing Zeng*  
Survey of Greener Ignition and Combustion Systems for Internal Combustion Engines
- 

### *A – 3 Information systems 1* *Chair: Hui Yu & Lili Yang*

- 59 *Sicong Ma, Siyan Li, Hongji Yang*  
Creative Computing for Personalised Meta-Search Engine Based on Semantic Web
  - 65 *Xuan Wang, Hongji Yang*  
Applying Semantic Web Technology to Poem Analysis
  - 71 *Lin Zou, Hongji Yang*  
Creative Computing for Decision Making: Combining Game Theory and Lateral Thinking
  - 77 *Pree Thiengburanathum, Shuang Cang, Hongnian Yu*  
A Decision Tree based Recommendation System for Tourists
  - 84 *Mohammad S. Hasan, Hongnian Yu*  
Innovative Developments in HCI and Future Trends
- 

### *A – 4 Information systems 2* *Chair: Qingde Li & Shuanghua Yang*

- 90 *Elias Eze, Sijing Zhang, Enjie Liu*  
Message Dissemination Reliability in Vehicular Networks

- 96 *Kapil Kanwal, Ghazanfar Safdar, Shyqyri Haxha*  
Joint Resource Blocks Switching Off and Bandwidth Expansion for Energy Saving in LTE Networks
- 102 *Zivorad Mihajlovic, Ana Joza, Vladimir Milosavljevic, Vladimir Rajcs, Milos Zivanov*  
Energy Harvesting Wireless Sensor Node for Monitoring of Surface Water
- 108 *Nebrase Elmrabbit, Shuang Hua Yang, Lili Yang*  
Insider Threats in Information Security Categories and Approaches
- 114 *Naila Naheed, Munam Ali Shah, Sijing Zhang*  
Energy Efficiency in Smartphones: A Survey on Modern Tools and Techniques

---

## A – 5 *Manufacture Systems I*

*Chair: Zhijie Xu & Xun Chen*

- 120 *Peiran Jiang, Liquan Wang, Xichun Luo*  
Dynamic Analysis of An Underwater Leveling-Gripping System of An Jacket Platform Under Offshore Environmental Loads
- 124 *Guangbo Hao, Ronan Hand, Xianwen Kong, Wenlong Chang*  
Design of compliant parallel grippers using the position space concept for manipulating sub-millimeter objects
- 130 *Xavier Herpe, Ross Walker, Xianwen Kong, Matthew Dunnigan*  
Analysis and Characterisation of a Kinematically Decoupled Compliant XY Stage
- 136 *Khaldoun F. Brethee, Jingwei Gao, Andrew D. Ball*  
Analysis of Frictional Effects on the Dynamic Response of Gear Systems and the Implications for Diagnostics
- 145 *Nasha Wei, Fengshou Gu, Tie Wang, Guoxing Li, Yuandong Xu, Longjie Yang, Andrew D. Ball*  
Characterisation of Acoustic Emissions for the Frictional Effect in Engines using Wavelets based Multi-resolution Analysis

---

## Parallel Sessions (*P1 – 1, P1 – 2, P1 – 3, P1 – 4, P1 – 5*)

---

### *P1 – 1 Control Applications 2*

*Chair: Parikshit Singh & Hong Yue*

- 151 *Vildan V. Abdullin, Dmitry A. Shnayder*  
Implementation of an Advanced Heating Control System at the University Academic Building
- 155 *Parikshit Singh, Surekha Bhanot, Harekrishna Mohanta*  
Self-Tuned Fuzzy Logic Control of a pH Neutralization Process  
*Lanxiang Zhu, Feng Yu, Dingwen Yu, Dingli Yu*  
Decentralised PI Controller Design and Tuning Approaches
- 167 *Mengling Wang, Hong Yue, Jie Bao, William E. Leithead*  
LIDAR-based Wind Speed Modelling and Control System Design
- 173 *Jan Chalupa, Robert Grepl, Václav Sova*  
Design of Configurable DC Motor Power-Hardware-In-the-Loop Emulator for Electronic-Control-Unit Testing
- 179 *Paolo Righettini, Roberto Strada, Ehsan KhademOlama, Sirin Valilou*  
Symbolic Kinematic and Dynamic Modelling toolbox for Multi-DOF Robotic Manipulators

---

### *P1 – 2 System Diagnosis & Condition Monitoring 2*

*Chair: Yi Cao & Dingli Yu*

- 185 *Alessandro Mariani, Kary Thanapalan, Peter Stevenson, Thomas Stockley, Jonathan Williams*  
Techniques for Monitoring and Predicting the OCV for VRLA Battery systems
- 191 *Ruirong Zhang, Yanmeng Xu, David Harrison, John Fyson, Darren Southee, Anan Tanwilaisiri*  
A Study of the Performance of the Combination of Energy Storage Fibres
- 194 *Qing Tao, Wenlei Sun, Jianxing Zhou, Jinsheng Kang*  
Study on the Inherent Characteristics of Planetary Gear Transmissions
- 199 *Adel Jaber, Pavlos Lazaridis, Yong Zhang, David Upton, Hamed Ahmed, Umar Khan, Bakhtiar Saeed, Peter Mather, Robert Atkinson, Martin Judd, Ian Glover, Maria Fatima Queiroz Vieira*  
Comparison of Contact Measurement and Free-Space Radiation Measurement of Partial Discharge Signals

- 203 *Xiange Tian, Gaballa M. Abdallaa, Ibrahim Rehab, Fengshou Gu, Tie Wang, Andrew D. Ball*  
Diagnosis of Combination Faults in a Planetary Gearbox using a Modulation Signal Bispectrum based Sideband Estimator
- 209 *Ibrahim Rehab, Xiange Tian, Fengshou Gu, Andrew D. Ball*  
A Study of Diagnostic Signatures of a Deep Groove Ball Bearing Based on Nonlinear Dynamic Model

---

**P1 – 3 Computer Vision**

**Chair: Shengfeng Qin & Yang Dai**

- 216 *Jianjun Gui, Dongbing Gu, Huosheng Hu*  
Pose Estimation Using Visual Entropy
- 222 *Cheng Zhao, Huosheng Hu, Dongbing Gu*  
Building a grid-point cloud-semantic map based on graph for the navigation of intelligent wheelchair
- 229 *Rodrigo D. C. Silva, George A. P. Thé, Fátima N. S. de Medeiros*  
Geometrical and statistical feature extraction of images for rotation invariant classification systems based on industrial devices
- 235 *Nicolas S. Pereira, Cinthya R. Carvalho, George A. P. Thé*  
Point cloud partitioning approach for ICP improvement
- 240 *Shengfeng Qin, Huaiwen Tian*  
On the Algorithm For Reconstruction of Polyhedral Objects From a Single Line Drawing
- 246 *Ye Zhang, Huanzhi Lou, Hui Yu*  
Morphology Elements Research on Chinese Small-Sized Liquor Bottle Design

---

**P1 – 4 Special Session: Industry 4.0**

**Chair: Yun Li & Hongnian Yu**

- Paulino Rocher*  
Invited Talk: Towards Industry 4.0
- Joo Hock Ang*  
Forum Discussion: Design Knowledge Capture, Optimisation and Automation to Advance Industry 4.0
- 254 *Milan Gregor, Jozef Herčko, Patrik Grznár*  
The Factory of the Future Production System Research
- 260 *Alfredo Alan Flores Saldivar, Yun Li, Wei-neng Chen, Zhi-hui Zhan, Jun Zhang, Leo Yi Chen*  
Industry 4.0 with Cyber-Physical Integration: A Design and Manufacture Perspective
- Richard Martin*  
Invited Talk: Supercomputing for Industry 4.0

---

**P1 – 5 Manufacture Systems 2**

**Chair: Jinsheng Kang & Tai Yang**

- 267 *Javier Zamorano Igual, Qiang Xu*  
Determination of the material constants of creep damage constitutive equations using Matlab optimisation procedure
- 273 *Xin Yang, Zhongyu Lu, Qiang Xu*  
The Interpretation of Experimental Observation Data for the Development of Mechanisms based Creep Damage Constitutive Equations for High Chromium Steel
- 279 *Xiangyu Teng, Dehong Huo, Wai Leong Eugene Wong, Manoj Gupta*  
Experiment based investigation into micro machinability of Mg based metal matrix composites (MMCs) with nano-sized reinforcements
- 285 *Jianfeng Huang, Zhonglai Wang, Yuanxin Luo, Yun Li, Erfu Yang, Yi Chen*  
Computational Investigation of Superalloy Persistent Slip Bands Formation
- 291 *Amir Mir, Xichun Luo, Amir Siddiq*  
Numerical Simulation of Triaxial Tests to Determine the Drucker-Prager Parameters of Silicon
- 295 *Wenlei Sun, Li Cao, Qing Tao, Yuanhua Tan*  
The Design and Simulation of Beam Pumping Unit
-

## Parallel Sessions ( $P2 - 1, P2 - 2, P2 - 3, P2 - 4$ )

---

### ***P2 – 1 Control Applications 3***

***Chair: Ehsan Khadem Olama & Luis Rubio***

- 299 *Yaser Alothman, Wesam Jasim, Dongbing Gu*  
Quad-rotor Lifting-Transporting Cable-Suspended Payloads Control
- 305 *Paolo Righettini, Roberto Strada, Shirin Valilou, Ehsan Khadem Olama*  
Output Feedback Sliding Mode Controller with H-2 Performance for Robot Manipulator
- 311 *Pengcheng Liu, Hongnian Yu, Shuang Cang*  
On Periodically Pendulum-Diven Systems for Underactuated Locomotion: a Viscoelastic Jointed Model
- 317 *Václav Sova, Jan Chalupa, Robert Grepl*  
Fault Tolerant BLDC Motor Control for Hall Sensors Failure
- 323 *Robert Grepl, Michal Matejasko, Bastl M., Zouhar F.*  
Design of a Fault Tolerant Redundant Control for Electro Mechanical Drive System

---

### ***P2 – 2 System Diagnosis & Condition Monitoring 3***

***Chair: Robert Grepl & Qiang Xu***

- 329 *Sulaiman A. Lawal, Jie Zhang*  
Actuator Fault Monitoring and Fault Tolerant Control in Distillation Columns  
*Ning Sheng, Hong Wang*  
Fault Detection and Diagnosis for Operational Control Systems
- 341 *Raphael Samuel, Yi Cao*  
Improved Kernel Canonical Variate Analysis for Process Monitoring  
*Lanxiang Zhu, Feng Yu, Dingwen Yu, A.M.S. Ertiame, Dingli Yu*  
Solution to Failure Detection of Closed-loop Systems and Application to IC Engines
- 353 *Dianwei Wang, Jing Wang, Ying Liu, Zhijie Xu*  
An Adaptive Time-frequency Filtering Algorithm for Multi-component LFM Signals based on Generalized S-transform

---

### ***P2 – 3 Information Systems 3***

***Chair: Dianwei Wang & Erfu Yang***

- 359 *Tai Yang, Zhong Li, Yu Shu*  
Applying Feedback to Stock Trading: Exploring A New Field of Research
- 365 *Chinedu Eze, Tai Yang, Chris Chatwin, Dong Yue, Hong Yu*  
Research into Big Data for Smart Grids
- 371 *Yang Pang, Kwaku Opong, Luiz Moutinho, Yun Li*  
Cash Flow Prediction Using a Grey-Box Model
- 377 *Muhammad Bilal Shahid, Munam Ali Shah, Sijing Zhang, Safi Mustafa, Mushahid Hussain*  
Organization Based Intelligent Process Scheduling Algorithm (OIPSA)
- 383 *Kumaran Rajarathinam, J. Barry Gomm, Dingli Yu, Ahmed Saad Abdelhadi*  
An Improved Search Space Resizing Method for Model Identification by Standard Genetic Algorithm

---

### ***P2 – 4 Information Systems 4***

***Chair: Vildan Abdullin & Leo Chen***

- 389 *Wenbin Zhong, Wenlong Chang, Luis Rubio, Xichun Luo*  
Reconfigurable software architecture for a hybrid micro machine tool
- 393 *Zhenying Xu, Baozhong Wu, Meng Zhang, Feng Zou, Yuehui Yan*  
Measurement Station Planning of Single Laser Tracker based on PSO
- 399 *Naji Al-Messabi, Cindy Goh, Yun Li*  
Grey-box Identification for Photovoltaic Power Systems via Particle-Swarm Algorithm
- 406 *Joo Hock Ang, Cindy Goh, Yun Li*  
Key Challenges and Opportunities in Hull Form Design Optimization for Marine and Offshore Applications

### **413 Author Index**