

# **2014 UKACC International Conference on Control (CONTROL 2014)**

**Loughborough, United Kingdom  
9-11 July 2014**



**IEEE Catalog Number: CFP1470S-POD  
ISBN: 978-1-4799-4348-7**

# Conference Programme

## Wednesday, 9th July

### ***Session 2A: Aerospace Control***

- 1 Efficient Aeroservoelastic Modeling and Control using Trailing-Edge Flaps of Wind Turbines  
*Bing Feng Ng, Henrik Hesse, Rafael Palacios, Eric C. Kerrigan and J. Michael R. Graham*
- 7 Robust Model Following Control Design for Missile Roll Autopilot  
*Rustu Berk Gezer and Ali Turker Kutay*
- 13 A Class of Nonlinear Unknown Input Observer for Fault Diagnosis: Application to Fault Tolerant Control of an Autonomous Spacecraft  
*Robert Fonod, David Henry, Catherine Charbonnel and Eric Bornschlegl*
- 19  $H_\infty$  Control for Quadrotor Attitude Stabilization  
*Wesam Jasim and Dongbing Gu*
- 25 Quadrotor Control for Trajectory Tracking in Presence of Wind Disturbances  
*Oualid Araar and Nabil Aouf*

### ***Session 2B: Mobile Robotics***

- 31 Stabilisation and Manoeuvre of electrically powered pedestrian controlled Uniaxial Vehicles for Goods Transport  
*Matthias Brüning, Werner Schönewolf and Jörg Krüger*
- 39 Design and Implementation of Networked Real-time Control System with Image Processing Capability  
*Jun Zhao and Guoping Liu*
- 44 Noncausal Finite Time Interval Iterative Learning Control Law Design  
*Xuan Wang and Eric Rogers*
- 50 Neural Network based Reinforcement Learning Control of Autonomous Underwater Vehicles with Control Input Saturation  
*Rongxin Cui, Chenguang Yang, Yang Li and Sanjay Sharma*
- 56 Inverse kinematics for a redundant robotic manipulator used for nuclear decommissioning  
*Pierre Besset and C. James Taylor*
- 62 Skid Steering Mobile Robot Modeling and Control  
*Osama Elshazly, Hossam S. Abbass, Zakarya Zyada and Ahmed Abo-Ismael*

### ***Session 2C: Adaptive, Nonlinear & Time Varying Control***

- 68 LPV Gain-Scheduling Control with Time-Varying Sampling Time for Rejecting Nonstationary Harmonically Related Multisine Disturbances  
*Xinyu Shu, Pablo Ballesteros and Christian Bohn*
- 74 Adaptive unknown input reconstruction scheme for Hammerstein-Wiener systems  
*Malgorzata Sumslawska and Keith Burnham*
- 80 Improving Lateral Stability of a Motorcycle via Assistive Control of a Reaction Wheel  
*Aristeidis Tanos, George Mavros and Thomas Steffen*
- 86 Online identification of piecewise affine systems  
*Stefan Kersting and Martin Buss*
- 92 A Generalized Barbalat Lemma Based on a Persistently Exciting Condition  
*Ti-Chung Lee index*
- 98 Adaptive Tracking Control for a New Mobile Manipulator Model  
*Wei Sun and Kang Wu*

### ***Session 3A: Flight Control, Guidance & Operations***

- 104 Accounting for the Effect of Ground Delay on Commercial Formation Flight  
*Thomas Kent and Arthur Richards*
- 110 Switched Control for a Fighter Aircraft  
*Emre Kemer and Emmanuel Prempain*

- 115 Real-time Obstacle Collision Avoidance for Fixed Wing Aircraft Using B-splines  
*Hamid Alturbeh and James Whidborne*
- 121 Longitudinal guidance of UAVs using sliding mode approach  
*M. Zamurad Shah, M. Kemal Ozgoren and Raza Samar*
- 127 Low Order  $H_\infty$  Controllers for a Quadrotor UAV  
*Hasan Basak and Emmanuel Prempain*
- 133 Full Linear Control of a Quadrotor UAV,  $L_2$  vs  $L_\infty$  Norm  
*Oualid Araar and Nabil Aouf*

### **Session 3B: Robust and Optimal Control**

- 139 Synthesis of Biquadratic Impedances with a Specific Seven-Element Network  
*Jason Zheng Jiang and Sara Ying Zhang*
- 145 Robust fault detection for switched systems with time-varying delay using delta operator approach  
*Chen Qin, Zhengrong Xiang and Hamid Reza Karimi*
- 151 Guaranteed cost control of uncertain impulsive switched systems with nonlinear disturbances  
*Jian Chen, Qingdong Li, Cunjia Liu, Zhang Ren and Chen Bai*
- 157 Output Feedback Stabilization of an Inertia Wheel Pendulum Using Sliding Mode Control  
*Nasir Khalid and Attaullah Memon*
- 163 Robust and Optimal Stabilization of Uncertain Linear Systems using LQR Methods  
*Salman Zaffar and Attaullah Memon*
- 168 Mixed  $H_2/H_\infty$  Feedback Control of Multivariable Dynamically Substructured Systems  
*Chi-Lun Wang and Jia-Ying Tu*

### **Session 3C: Modelling, Identification and Estimation**

- 174 Adaptive Neuro-Fuzzy Method to Estimate Virtual SI Engine Fuel Composition using Residual Gas Parameters  
*Kinyip Chan, Andrzej Ordys, Olga Duran, Konstantin Volkov and Jiamei Deng*
- 180 Operating point adjustment procedure for a class of continuous-time bilinear models  
*Ivan Zajic and Keith Burnham*
- 186 A 2-Dimensional Hammerstein model for Heating and Ventilation Control of Conceptual Thermal Zones  
*Ioannis Tsitsimpelis and C. James Taylor*
- 192 Efficient Gaussian Process modelling of section weights in polymer stretch blow moulding  
*Juan Yan, Kang Li and Jing Deng*
- 198 Output observer design for fault detection  
*Krishna Busawon, Pep Canyelles-Pericas, Lekramshing Latchooman, Mondher Farza, Mohamed MSaad*
- 203 Fuzzy Universal Model Approximator for Distributed Collector Solar Field Control  
*Shahrazed Elmetennani and Taous Meriem Laleg-Kirati*

### **Session 3D: Invited Session - Flow Control**

- 209 Wall-transpiration feedback control of laminar streaks using an adjoint approach  
*João Da Rocha Pinto, Pierre Ricco and George Papadakis*
- 214 Optimal state feedback control of streaks and Gortler vortices induced by free-stream vortical disturbances  
*Liang Lu, Lionel Agostini, Pierre Ricco and George Papadakis*
- 220 Feedback control for reducing the pressure drag of bluff bodies terminated by a backward-facing step  
*Aimee Morgans, Jeremy Dahan and Thibault Flinois*
- 226 Passivity-Based Feedback Control of a Channel Flow For Drag Reduction  
*Peter Heins, Bryn Jones and Ati Sharma*
- 232 Energy Amplification of Poiseuille Flow in a Pipe Lined with Riblets  
*Shi Zhao and Stephen Duncan*

### **Session 4A: Poster Session 1**

- 238 Implementations of Predictive Controller for NMAS Consensus with Neighbour's Agents Delay  
*Nurul Adilla Mohd Subha and Guoping Liu*

- 244 Formal Verification of Control System Properties with Theorem Proving  
*Dejanira Araiza-Illan, Kerstin Eder and Arthur Richards*
- 250 Fault Detection and Isolation for an Inertial Navigation System using a bank of Unscented  $H_\infty$  filters  
*Ivan Vitanov and Nabil Aouf*
- 256 Multivariable Control of a Lighter than Air System  
*Jonathan Samson and Reza Katebi*
- 262 High Gain Observer with Algorithm Transformation to Extended Jordan Observable Form for Chaos Synchronization Applications  
*Pep Canyelles-Pericas and Krishna Busawon*
- 268 Model Based Hysteresis Compensation for IPMC Sensors  
*Yonghong Tan and Hong He*
- 273 Jitter sensitivity of a self-tuning input-constrained predictive controller  
*Fathi Abugchem, Michael Short and Donglai Xu*
- 279 A MATLAB GUI FOR LEARNING CONTROLLER DESIGN IN THE FREQUENCY DOMAIN  
*Richard Mitchell*
- 285 A Behavioural Control Strategy of Human-Human Interaction in an Object Transfer Task  
*Paramin Neranon and Robert Bicker*
- 290 Point localisation of a subsea cable using particle filters  
*Tomasz Szyrowski, Sanjay Sharma, Robert Sutton and Gareth A. Kennedy*

#### **Session 4B: Poster Session 2**

- 296 A Review of Driver Modelling  
*Thomas Levermore, Andrzej Ordys and Jiamei Deng*
- 301 Hybrid (DEBBO) Fuzzy Logic Controller for Quarter Car Model  
*Rajagopal Kalaivani, Ponnusamy Lakshmi and K. Sudhagar*
- 307 SI Engine Combustion Wall Thermal Management Potential without the Present of Control Limitation  
*Rifqi Irzuan Abdul Jalal, Thomas Steffen and Andrew Williams*
- 313 A Fuzzy Logic Approach for Vehicle Collision Energy Distribution  
*James Trollope, Keith Burnham, Leszek Koszalka and Iwona Poznaniak-Koszalka*
- 319 Non linear optimization of a sport motorcycle's suspension interconnection system.  
*Ciro Moreno Ramirez and Maria Tomas-Rodriguez*
- 325 Improving the Velocity Obstacle Approach for Obstacle Avoidance in Indoor Environments  
*Ahmad Alsaab and Robert Bicker*
- 331 Friction Compensation for a Force Controlled Electric Actuator with Unknown Sinusoidal Disturbance Motion  
*Pooh Eamcharoenying, Andy Hillis and Jos Darling*
- 337 Research & Design on a control system for a disk-type flying robot with multiple rotors  
*Ikuo Yamamoto, Rui Zhu, James Whidborne and Aryeh Marks*
- 343 Control and Energy Management for Quadrotor  
*Adilson S. Candido, Roberto K. H. Galvão and Takashi Yoneyama*

#### **Session 4C: Poster Session 3**

- 349 Wind Turbine Gust Estimation Using Remote Sensing Data  
*Paul Towers and Bryn Jones*
- 355 Active Control of Fluid-borne Noise in Hydraulic Systems Using In-series and By-pass Structures  
*Min Pan, Andrew Hillis and Nigel Johnston*
- 361 Comparison of RBF and Local Linear Model Networks for Nonlinear Identification of a pH Process  
*Ahmed Abdelhadi, Barry Gomm, Dingli Yu and Kumaran Rajarathinam*
- 367 A LabVIEW-based PI controller for controlling CE 105 coupled Tank System  
*Hawre Hussein and Rakesh Mishra*
- 373 Enumerative Nonlinear Model Predictive Control for Linear Induction Motor using Load Observer  
*Jean Thomas and Anders Hansson*

- 378 Diagnosis of bearing fault of brushless DC motor based on dynamic neural network and orthogonal fuzzy neighborhood discriminant analysis  
*Wathiq Abed, Sanjay Sharma and Robert Sutton*
- 384 Modelling and Building of Experimental Rig for High Redundancy Actuator  
*Hasmawati Antong, Roger Dixon and Christopher Ward*
- 389 A New Approach to Design Optimal Excitation Trajectories for Parameter Estimation of Robot Dynamics  
*Zhenyu Du, M. Necip Sahinkaya and Pejman Iravani*
- 395 ANFIS Based Jacobian for a Parallel Manipulator Mobility Assistive Device  
*Ahmed Asker, Omar Salah, Ahmed Fath El-Bab, Ahmed Ramadan, Samy Assal, Salvatore Sessa and Ahmed Abo-Ismai*

## **Thursday, 10th July**

### ***Session 6C: Special Session - Automotive Control***

- 401 Information fusion for vehicular systems parameter estimation using an extended regressor in a finite time estimation algorithm  
*Robert Wragge-Morley, Guido Herrmann, Phil Barber and Stuart Burgess*
- 407 Sensor Configurations and Testbed for Vehicle State Estimation  
*Varun Krishna Balakrishnan, Stefano Longo, Efsthatis Velenis and Phil Barber*
- 413 Equivalent Circuit Model Estimation of Induction Machines under Elevated Temperature Conditions  
*Malgorzata Sumislawska, Oluwaleke Agbaje, Darren Kavanagh and Keith Burnham*
- 419 A Gamma-Z -source Based Hybrid Power Converter for Battery-Fuel Cell Hybrid Electric Vehicle  
*Jun Cai, Qing-Chang Zhong and David Stone*

### ***Session 6D: Invited Session - Integrated Operation in Large Scale Industrial Sites, Results from the Energy-Smartops Consortium***

- 425 A BENCHMARK APPLICATION OF CANONICAL VARIATE ANALYSIS FOR FAULT DETECTION AND DIAGNOSIS  
*Cristobal Ruiz Carcel, Yi Cao and David Mba*
- 432 Fault Detection in Electric Motors by means of the Extended Kalman Filter as Disturbance Estimator  
*Alejandro Fernandez, Victor Jaramillo and James Ottewill*
- 438 Preprocessing of Raw Data for Developing Steady-State Data-Driven Models for Optimizing Compressor Stations  
*Dionysios P. Xenos, Nina F. Thornhill, Matteo Ciccotti and Ala E. F. Bouaswaig*
- 444 An integrated control technique for compressor operation  
*Sara Budinis and Nina F. Thornhill*
- 450 Multicriteria diagnosis of synchronous machines: rotor-mounted sensing system  
*Jose Gregorio Ferreira and Tadeusz Sobczyk*

### ***Session 8C: Invited Session - Sustainable Control of Off-shore Wind Turbines***

- 456 Fault Reconstruction using a Takagi-Sugeno Sliding Mode Observer for the Wind Turbine Benchmark  
*Florian Pöschke, Sören Georg and Horst Schulte*
- 462 Trajectory-based fault accommodation in Wind Turbine Systems  
*Tushar Jain, Joseph Yamé and Dominique Sauter*
- 468 A Robust Adaptive Approach to Wind Turbine Pitch Actuator Component Fault Estimation  
*Fengming Shi and Ronald Patton*
- 474 Wind Speed Estimation in Wind Turbines using EKF: Application to Experimental Data  
*Jordi Hernández, Marc Guadayol and Vicenç Puig*
- 480 Sensor Fault Tolerant Control of a Wind Turbine via Takagi-Sugeno Fuzzy Observer and Model Predictive Control  
*Xiaoran Feng, Ron Patton and Zhihuo Wang*

- 486 Fault Tolerant Control of an Offshore Wind Turbine Model via Identified Fuzzy Prototypes  
*Silvio Simani, Saverio Farsoni and Paolo Castaldi*

### ***Session 8D: Invited Session - Real-time Adaptive Networked Control of Rescue Robots 1***

- 492 The stability performances improvement through kinematic and dynamic modeling of the hopping robots  
*Adrian Bruja, Luige Vladareanu, Ionel-Alexandru Gal, Hongbo Wang, Hongnian Yu and Jingjing Liu*
- 498 Haptic interfaces for the rescue walking robots motion in the disaster areas  
*Luige Vladareanu, Octavian Melinte, Adrian Bruja, Shuang Cang, Hongnian Yu, Hongbo Wang, Zeng-Guang Hou and Xiao-Liang Xie*
- 504 Dynamic Analysis for the Leg Mechanism of a Wheel-Leg Hybrid Rescue Robot  
*Xiaojie Wang, Xiaoyun Wang, Hongnian Yu, Hongbo Wang, Ling Lu, Luige Vladareanu and Daniel Octavian Melinte*
- 509 Fault-Tolerant Gait for a Quadruped Robot with Partially Fault Legs  
*Xianbao Chen, Chenkun Qi, Feng Gao, Xinghua Tian and Hongnian Yu*
- 515 The Study of NAO Robot Arm Based on Direct Kinematics by Using D-H Method  
*Shuhui Wen, Zhiyuan Ma, Shuhuan Wen, Yongsheng Zhao and Jiantao Yao*
- 519 Robust Nonlinear Control Design for Ionic Polymer Metal Composite based on Sliding Mode Approach  
*Dongyun Wang, Qiang Zhang and Aihui Wang*

### ***Session 9A: Control Education and Future Prospects***

- 525 Exploring future directions of Control  
*Tai Yang, Argyrios Zolotas, Timothy Wren and Hong Yu*
- 531 Fuzzy Logic-based Gain Scheduling of Exact FeedForward Linearization Controller for Magnetic Ball Levitation System  
*Abdullah Elgammal, Ahmed Abouelsoud and Samy Assal*
- 537 A Survey of Techniques and Opportunities in Power System Automatic Generation Control  
*Eyefujirin Ejegi, Anthony Rossiter and Paul Trodden*
- 543 Using clickers in lectures to help identify and teach the control topics students find difficult  
*Anthony Rossiter*

### ***Session 9B: Rail Applications of Control***

- 549 A Model of a Reprint Track Switch for Control  
*Nick Wright, Samuel Bemment, Christopher Ward and Roger Dixon*
- 555 Applications of the inerter in railway vehicle suspensions  
*Alejandra Z. Matamoros-Sanchez and Roger M. Goodall*
- 561 Detection and isolation of actuator failure for actively controlled railway wheelsets  
*Mohammad Mirzapour and T.X. Mei*
- 567 Towards Self-powered Lateral Active Suspension for Railway Vehicles  
*Peng Wang, T.X. Mei and Jiye Zhang*

### ***Session 9C: Medical Applications of Control***

- 573 Modelling the Self-Tolerance Mechanisms of T Cells: An Adaptive Sliding Mode Control Approach  
*Anet J. N. Anelone, Yury Orlov and Sarah K. Spurgeon*
- 579 Model of the Glucose-Insulin System of Type-1 Diabetics and Optimization-based Bolus Calculation  
*Tilman Utz, Matthias Braun, Knut Graichen and Guido Freckmann*
- 585 Repetitive Control Based Tremor Suppression using Electrical Stimulation  
*Engin Hasan Copur, Chris T. Freeman, Bing Chu and Dina S. Laila*
- 591 Phase-lead ILC based electrode array stimulation using reduced input subspace  
*Christopher Freeman*

### ***Session 9D: Applied Control***

- 597 Sliding-Mode Control of an Underactuated Oilwell Drill-String with Parametric Uncertainty  
*Yang Liu*
- 603 Real-time measurement of ring-rolling geometry using low-cost hardware  
*Matthew Arthington, Christopher Cleaver, Julian Allwood and Stephen Duncan*
- 609 Exact Linearization by Feedback of State Dependent Parameter Models Applied to a Mechatronics Demonstrator  
*Essam M. Shaban, Ayman A. Nada and C. James Taylor*
- 615 Kinetic Modelling of an Industrial Semi-batch Alkoxylation Reactor for Control Studies  
*Marcus Nohr, Tilman Utz and Graichen Knut*

## **Friday, 11th July**

### ***Session 10A: Autonomous Systems***

- 621 Development of a Network Enabled System for Generic Autonomous Vehicles  
*Matthew Coombes, Will Eaton, Owen McAree and Wen-Hua Chen*
- 628 Cooperative Source Seeking via Gradient Estimation and Formation Control (Part 1)  
*Esteban Rosero and Herbert Werner*
- 634 Cooperative Source Seeking via Gradient Estimation and Formation Control (Part 2)  
*Esteban Rosero and Herbert Werner*
- 640 Cooperative Conflict Resolution by Velocity Obstacle Method  
*Fatemeh Asadi and Arthur Richards*
- 646 Estimation Of Time To Point Of Closest Approach For Collision Avoidance And Separation Systems  
*James Dunthorne, Wen-Hua Chen and Sarah Dunnett*
- 652 Ant Colony Optimization for Routing and Tasking Problems for Teams of UAVs  
*Theopisti Zaza and Arthur Richards*

### ***Session 10B: Model Predictive Control***

- 656 Efficient State Constraint Handling for MPC of the Heat Equation  
*Sönke Rhein, Tilman Utz and Knut Graichen*
- 662 A Synthesis Strategy for Nonlinear Model Predictive Controller on FPGA  
*Bartosz Käpernick, Sebastian Süß, Endric Schubert and Knut Graichen*
- 668 Networked predictive control for linear systems with unknown communication delay  
*Jian Sun, Jie Chen and Lihua Dou*
- 673 Review of MPC Applications in Wind Turbines  
*Wai Hou Lio, Anthony Rossiter and Bryn Jones*
- 679 Gradient Filter Methods for Predictive Control with Simple Constraints  
*Ross Drummond, Eric Kerrigan and Juan Jerez*
- 685 The Effect of Model and Objective Function Mismatch in Model Predictive Control (MPC) for a Solar Heating System with a Heat Pump  
*Muhammad Waseem Ahmad, Mahroo Eftekhari, Thomas Steffen and Paul Rowley*

### ***Session 10C: Invited Session - Advanced Robotics and Brain Computer Interface***

- 691 Design and Implementation of Serious Games for Training and Education  
*Masakazu Furuichi, Megumi Aibara and Kazuki Yanagisawa*
- 696 Calculation Algorithm for Motion Control Target for the Platooning of Autonomous Heavy Vehicles  
*Tetsuya Kaneko, Yukiyo Kuriyagawa and Ichiro Kageyama*
- 702 Development of Portable Brain-Computer Interface Using NIRS  
*Kazuki Yanagisawa and Hitoshi Tsunashima*
- 708 Classification of functional near-infrared spectroscopy signals applying reduction of scalp hemodynamic artifact  
*Takanori Sato, Kyoko Sugai, Isao Nambu and Yasuhiro Wada*

***Session 10D: Invited Session - Real-time Adaptive Networked Control of Rescue Robots 2***

- 714 The development of an smart chair to assist sit-to-stand transferring process  
*Hang Lu and Dayou Li*
- 720 Design of a new solution for the wheeled hopping robot  
*Jingjing Liu, Hongbo Wang, Hongnian Yu, Lili Zhang, Luige Vladareanu, Adrian Bruja and Ionel-Alexandru Gal*
- 725 Enhanced Extenics Controller for Real Time Control of Rescue Robot Actuators  
*Victor Vladareanu, Paul Schiopu, Shuang Cang, Hongnian Yu and Mingcong Deng*
- 731 Human Skill Performance to Control an Underactuated Pendulum-Driven Capsule System  
*Keattikorn Samarngoon, Shuang Cang, Hongnian Yu, Mohammad Hasan and Tobias Flämig*
- 737 Mechanism Topology Design for Novel Parallel-Parallel Hexapod Robot  
*Yang Pan and Feng Gao*
- 743 **Index of Authors**