

# **6th IFAC Workshop on Distributed Estimation and Control in Networked Systems (NECSYS 2016)**

IFAC PapersOnline Volume 49, Issue 22

Tokyo, Japan  
8-9 September 2016

**Editor:**

**Shun-ichi Azuma**

ISBN: 978-1-5108-3233-6

**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© (2016) by Elsevier Limited  
All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact the publisher, Elsevier Limited  
at the address below.

Elsevier Limited  
360 Park Ave South  
New York, NY 10010

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

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

<b>OPTIMAL INFORMATION CONTROL IN CYBER-PHYSICAL SYSTEMS .....</b>	<b>1</b>
<i>Touraj Soleymani, Sandra Hirche, John S. Baras</i>	
<b>REMOTE-STATE ESTIMATION WITH PACKET DROP .....</b>	<b>7</b>
<i>Jhelum Chakravorty, Aditya Mahajan</i>	
<b>EFFICIENT CRITERIA FOR STABILITY OF LARGE-SCALE NETWORKED CONTROL SYSTEMS* .....</b>	<b>13</b>
<i>Masaki Ogura, Ahmet Cetinkaya, Tomohisa Hayakawa, Victor M. Preciado</i>	
<b>ADAPTIVE MAX PRESSURE CONTROL OF NETWORK OF SIGNALIZED INTERSECTIONS .....</b>	<b>19</b>
<i>Jennie Lioris, Alex Kurzhanskiy, Pravin Varaiya</i>	
<b>A LYAPUNOV FUNCTION APPROACH TO THE EVENT-TRIGGERED STABILIZATION OF THE MINIMAL ROBUST POSITIVELY INVARIANT SET* .....</b>	<b>25</b>
<i>Florian D. Brunner, Frank Allgöwer</i>	
<b>EVENT-TRIGGERED SCHEDULING FOR INFRASTRUCTURE-SUPPORTED COLLABORATIVE VEHICLE CONTROL* .....</b>	<b>31</b>
<i>Adam Molin, Hasan Esen, Karl H. Johansson</i>	
<b>INPUT AND STATE OBSERVABILITY OF NETWORK SYSTEMS WITH A SINGLE UNKNOWN INPUT .....</b>	<b>37</b>
<i>Alain Y. Kibangou, Federica Garin, Sebin Gracy</i>	
<b>PRIVACY-CONSTRAINED COMMUNICATION* .....</b>	<b>43</b>
<i>Farhad Farokhi, Girish Nair</i>	
<b>RANDOM AND MALICIOUS PACKET TRANSMISSION FAILURES ON MULTI-HOP CHANNELS IN NETWORKED CONTROL SYSTEMS* .....</b>	<b>49</b>
<i>Ahmet Cetinkaya, Hideaki Ishii, Tomohisa Hayakawa</i>	
<b>RESILIENCE AND PERFORMANCE ANALYSIS FOR STATE ESTIMATION AGAINST INTEGRITY ATTACKS .....</b>	<b>55</b>
<i>Duo Han, Yilin Mo, Lihua Xie</i>	
<b>ON THE STEADY-STATE BEHAVIOR OF A NONLINEAR POWER NETWORK MODEL* .....</b>	<b>61</b>
<i>Catalin Arghir, Dominic Groß, Florian Dörfler</i>	
<b>DISSIPATIVITY REINFORCEMENT IN NETWORK SYSTEM: A DESIGN PRINCIPLE OF LARGE-SCALE DYNAMICAL SYSTEM* .....</b>	<b>67</b>
<i>Kengo Urata, Masaki Inoue</i>	
<b>DISTRIBUTED TEMPERATURE REGULATOR DESIGN FOR AN AIR CONDITIONING SYSTEM .....</b>	<b>73</b>
<i>Takumi Ido, Takayuki Ishizaki, Jun-Ichi Imura, Yuki Katsuyama, Masahiko Murai, Katsuya Yokokawa</i>	
<b>DISTRIBUTED COOPERATIVE ON/OFF CONTROL OF PHOTOVOLTAIC GENERATION SYSTEMS* .....</b>	<b>79</b>
<i>Yuki Minami, Yushi Shimizu, Kenji Sugimoto</i>	
<b>EXPLOITATION OF UNCERTAIN WEATHER FORECAST DATA IN POWER NETWORK MANAGEMENT* .....</b>	<b>85</b>
<i>Y. Tomisawa, K. Ohki, H. Sugihara, K. Kashima, Y. Ohta</i>	
<b>SCALING OF H-INFINITY NORM IN SYMMETRIC BIDIRECTIONAL PLATOONS* .....</b>	<b>91</b>
<i>Ivo Herman, Michael Sebek</i>	
<b>ON SEMIDEFINITENESS OF SIGNED LAPLACIANS WITH APPLICATION TO MICROGRIDS* .....</b>	<b>97</b>
<i>Wei Chen, Dan Wang, Ji Liu, Tamer Basar, Karl H. Johansson, Li Qiu</i>	
<b>ON CONSENSUS OF NONLINEAR MULTI-AGENT SYSTEMS WITH OUTPUT CONSTRAINTS .....</b>	<b>103</b>
<i>Dinh Hoa Nguyen, Tatsuo Narikiyo, Michihiro Kawanishi</i>	
<b>STATE ESTIMATION OF INTERCONNECTED ENSEMBLES WITH ANONYMIZED OUTPUTS .....</b>	<b>109</b>
<i>Shen Zeng, Hideaki Ishii, Frank Allgöwer</i>	
<b>MULTI-AGENT COORDINATION WITH LAGRANGIAN MEASUREMENTS* .....</b>	<b>115</b>
<i>Victoria Grushkovskaya, Christian Ebenbauer</i>	
<b>STABILIZABILITY OF DYNAMIC COALITIONAL GAMES WITH TRANSFERABLE UTILITY* .....</b>	<b>121</b>
<i>Michalis Smyrnakis, Dario Bauso, Sandor Veres</i>	
<b>OPTIMAL REMOTE ESTIMATION OVER USE-DEPENDENT PACKET-DROP CHANNELS .....</b>	<b>127</b>
<i>David Ward, Nuno C. Martins</i>	

<b>OPTIMAL BLOCK LENGTH FOR DATA-RATE MINIMIZATION IN NETWORKED LQG CONTROL</b> .....	133
<i>Takashi Tanaka, Karl Henrik Johansson, Mikael Skoglund</i>	
<b>A NEW ADAPTIVE MODULATION AND CODING METHOD FOR COMMUNICATION-BASED TRAIN CONTROL SYSTEMS USING WLAN*</b> .....	139
<i>Q. Dong, K. Hayashi, M. Kaneko</i>	
<b>OUTPUT FEEDBACK MPC WITH SEND-ON-DELTA MEASUREMENTS FOR UNCERTAIN SYSTEMS</b> .....	145
<i>Markus Kögel, Rolf Findeisen</i>	
<b>NUMERICAL EVALUATION OF A ROBUST SELF-TRIGGERED MPC ALGORITHM*</b> .....	151
<i>Florian D. Brunner, W. P. M. H. Heemels, Frank Allgöwer</i>	
<b>OPTIMAL ESTIMATION ALGORITHM DESIGN UNDER EVENT-BASED SENSOR DATA SCHEDULING*</b> .....	157
<i>Lidong He, Yifei Qi, Jiming Chen</i>	
<b>SECURE AND PRIVATE CLOUD-BASED CONTROL USING SEMI-HOMOMORPHIC ENCRYPTION*</b> .....	163
<i>Farhad Farokhi, Iman Shames, Nathan Batterham</i>	
<b>DECEPTION-BASED SENSOR SCHEDULING FOR REMOTE ESTIMATION UNDER DOS ATTACKS</b> .....	169
<i>Kemi Ding, Xiaoqiang Ren, Ling Shi</i>	
<b>ENCRYPTING CONTROLLER USING FULLY HOMOMORPHIC ENCRYPTION FOR SECURITY OF CYBER-PHYSICAL SYSTEMS*</b> .....	175
<i>Junsoo Kim, Chanhwa Lee, Hyungbo Shim, Jung Hee Cheon, Andrey Kim, Miran Kim, Yongsoo Song</i>	
<b>A FAULT TOLERANT PROTOCOL FOR CLOCK SYNCHRONIZATION IN SENSOR NETWORKS</b> .....	181
<i>Yuhei Kikuya, Hideaki Ishii</i>	
<b>STABILITY ANALYSIS OF MOBILE ROBOT FORMATIONS BASED ON SYNCHRONIZATION OF COUPLED OSCILLATORS</b> .....	187
<i>Tadashi Nakamura, Miyuki Tsukiji, Naoyuki Hara, Keiji Konishi</i>	
<b>GRID-FRIENDLY MATCHING OF SYNCHRONOUS MACHINES BY TAPPING INTO THE DC STORAGE*</b> .....	192
<i>Taouba Jouini, Catalin Arghir, Florian Dörfler</i>	
<b>MULTI-ROBOT FORMATION CONTROL OVER DISTANCE SENSOR NETWORK</b> .....	198
<i>Kazunori Sakurama</i>	
<b>CONSENSUS SEEKING IN SECOND-ORDER MULTI-AGENT SYSTEMS WITH RELATIVE-STATE-DEPENDENT NOISES*</b> .....	204
<i>B. Wang, Y-P. Tian</i>	
<b>DISTRIBUTED VISUAL 3-D LOCALIZATION OF A HUMAN USING PEDESTRIAN DETECTION ALGORITHM: A PASSIVITY-BASED APPROACH</b> .....	210
<i>Takeshi Hatanaka, Riku Funada, Gülsüm Gezer, Masayuki Fujita</i>	
<b>COORDINATED NON-COOPERATIVE DISTRIBUTED MODEL PREDICTIVE CONTROL FOR DECOUPLED SYSTEMS USING GRAPHS*</b> .....	216
<i>Bassam Alrifaae, Frank-Josef Heßeler, Dirk Abel</i>	
<b>STOCHASTICALLY STABLE EQUILIBRIA FOR EVOLUTIONARY SNOWDRIFT GAMES ON GRAPHS*</b> .....	222
<i>Haili Liang, Tao Li</i>	
<b>COMPLEXITIES AND PERFORMANCE LIMITATIONS IN GROWING TIME-DELAY NOISY LINEAR CONSENSUS NETWORKS</b> .....	228
<i>Yaser Ghaedsharaf, Nader Motee</i>	
<b>DISTRIBUTED CONSTRAINED CONSENSUS WITH DISTANCE-DEPENDENT MEASUREMENT NOISES</b> .....	234
<i>Zhirong Qiu, Shuai Liu, Lihua Xie</i>	
<b>SCALED CONSENSUS TRACKING UNDER CONSTANT TIME DELAY</b> .....	240
<i>Hassan Dehghani Aghbolagh, Elham Ebrahimkhani, Farzad Hashemzadeh</i>	
<b>LOWER BOUNDS ON THE BEST-CASE COMPLEXITY OF SOLVING A CLASS OF NON-COOPERATIVE GAMES*</b> .....	244
<i>Ehsan Nekouei, Tansu Alpcan, Girish N. Nair, Robin J. Evans</i>	
<b>ROBUST DISTRIBUTED ESTIMATION FOR LOCALIZATION IN LOSSY SENSOR NETWORKS</b> .....	250
<i>N. Bof, M. Todescato, R. Carli, L. Schenato</i>	

<b>PERFORMANCE ANALYSIS OF FEEDBACK LOOPS WITH ASYNCHRONOUS SAMPLING IN THE FORWARD AND RETURN PATHS*</b> .....	256
<i>Mark A. Fabbro, Michael Cantoni, Chung-Yao Kao</i>	
<b>H8-CONSTRAINED INCENTIVE STACKELBERG GAME FOR DISCRETE-TIME SYSTEMS WITH MULTIPLE NON-COOPERATIVE FOLLOWERS*</b> .....	262
<i>Mostak Ahmed, Hiroaki Mukaidani</i>	
<b>UNILATERAL CONTROL STRUCTURE UNDER COMMUNICATION RATE CONSTRAINT</b> .....	268
<i>H. Okajima, Y. Minami, N. Matsunaga</i>	
<b>SWITCHING DATA-PROCESSING METHODS IN A CONTROL LOOP: TRADE-OFF BETWEEN DELAY AND PROBABILITY OF DATA ACQUISITION</b> .....	274
<i>E. P. Van Horssen, D. Antunes, W. P. M. H. Heemels</i>	
<b>SELF-TRIGGERED CONTROL FOR COMMUNICATION REDUCTION IN NETWORKED SYSTEMS</b> .....	280
<i>Shigeru Akashi, Hideaki Ishii, Ahmet Cetinkaya</i>	
<b>EVENT-BASED DISTRIBUTED STATE ESTIMATION OVER A WSN WITH FALSE DATA INJECTION ATTACK*</b> .....	286
<i>Li Lei, Wen Yang, Chao Yang</i>	
<b>A STEALTHY GPS SPOOFING STRATEGY FOR MANIPULATING THE TRAJECTORY OF AN UNMANNED AERIAL VEHICLE*</b> .....	291
<i>Jie Su, Jianping He, Peng Cheng, Jiming Chen</i>	
<b>STABILITY ANALYSIS AND SYNTHESIS FOR NONLINEAR NETWORKED CONTROL SYSTEMS</b> .....	297
<i>Jun Yoneyama, Kenta Hoshino</i>	
<b>MULTI-ROBOT SLAM VIA INFORMATION FUSION EXTENDED KALMAN FILTERS</b> .....	303
<i>Toshiki Sasaoka, Isao Kimoto, Yosuke Kishimoto, Kiyotsugu Takaba, Haya Nakashima</i>	
<b>DISTRIBUTED FEEDBACK CONTROL OF QUANTUM NETWORKS*</b> .....	309
<i>Reiji Takeuchi, Koji Tsumura</i>	
<b>KALMAN FILTERING WITH UNKNOWN SENSOR MEASUREMENT LOSSES*</b> .....	315
<i>Jiaqi Zhang, Keyou You</i>	
<b>CONSENSUS-BASED DISTRIBUTED KALMAN-BUCY FILTER FOR CONTINUOUS-TIME SYSTEMS</b> .....	321
<i>Jingbo Wu, Anja Elser, Shen Zeng, Frank Allgöwer</i>	
<b>OPTIMAL CONSENSUS OF EULER-LAGRANGIAN SYSTEMS WITH KINEMATIC CONSTRAINTS</b> .....	327
<i>Zhirong Qiu, Yiguang Hong, Lihua Xie</i>	
<b>INTERPLAYS BETWEEN SYSTEMIC RISK AND NETWORK TOPOLOGY IN CONSENSUS NETWORKS*</b> .....	333
<i>Christoforos Somarakis, Milad Siami, Nader Motee</i>	
<b>TRANSIENT STABILITY ANALYSIS OF MICROGRIDS WITH NETWORK-PRESERVING STRUCTURE</b> .....	339
<i>Lijun Zhu, David J. Hill</i>	
<b>STRUCTURAL ANALYSIS OF SPREADING PROCESSES FROM EGO-NETS*</b> .....	345
<i>Victor M. Preciado, Masaki Ogura</i>	
<b>CONSENSUS DYNAMICS IN SWITCHING NETWORKS FOR DISTRIBUTING POWER PACKETS*</b> .....	351
<i>Hiroyasu Ando, Shun-Ichi Azuma, Ryo Takahashi</i>	
<b>DISTRIBUTED ADAPTIVE CONSENSUS PROTOCOL WITH DECAYING GAINS ON DIRECTED GRAPHS*</b> .....	355
<i>Štefan Knotek, Kristian Hengster-Movric, Michael Šebek</i>	
<b>DISTRIBUTED ESTIMATION, GUIDANCE, AND CONTROL OF FORMATION FLYING SPACECRAFT</b> .....	361
<i>Thanh T. Vu, Amir R. Rahmani</i>	
<b>Author Index</b>	