Recent Advances on Electroscience and Computers

- Proceedings of the International Conference on Systems, Control, Signal Processing and Informatics (SCSI 2015)
- Proceedings of the International Conference on Electronics and Communication Systems (ECS 2015)

Barcelona, Spain, April 7-9, 2015

Edited by

Nikos E. Mastorakis
Imre Rudas
Marina V. Shitikova
Yuriy S. Shmaliy

Recent Advances in Electrical Engineering Series | 46

Recent Advances on Electroscience and Computers

RECENT ADVANCES on ELECTROSCIENCE and COMPUTERS

Proceedings of the International Conference on Systems, Control, Signal Processing and Informatics (SCSI 2015)

Proceedings of the International Conference on Electronics and Communication Systems (ECS 2015)

Barcelona, Spain
April 7-9, 2015

RECENT ADVANCES on ELECTROSCIENCE and COMPUTERS

Proceedings of the International Conference on Systems, Control, Signal Processing and Informatics (SCSI 2015)

Proceedings of the International Conference on Electronics and Communication Systems (ECS 2015)

Barcelona, Spain
April 7-9, 2015

All papers of the present volume were peer reviewed by no less than two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.

Series: Recent Advances in Electrical Engineering Series | 46

ISSN: 1790-5117
ISBN: 978-1-61804-290-3

RECENT ADVANCES on ELECTROSCIENCE and COMPUTERS

Proceedings of the International Conference on Systems, Control, Signal Processing and Informatics (SCSI 2015)

Proceedings of the International Conference on Electronics and Communication Systems (ECS 2015)

Barcelona, Spain
April 7-9, 2015

Organizing Committee

Editors:
Professor Nikos E. Mastorakis, Technical University of Sofia, Bulgaria
Professor Imre Rudas, Obuda University, Budapest, Hungary
Professor Marina V. Shitikova, Voronezh State University of Architecture and Civil Engineering, Russia
Professor Yuriy S. Shmaliy, Universidad de Guanajuato, Salamanca, Mexico

Program Committee:
Prof. Sonia Tarragona (Univerdidad de Le?n, Spain)
Prof. Lotfi Zadeh (IEEE Fellow,University of Berkeley, USA)
Prof. Leon Chua (IEEE Fellow,University of Berkeley, USA)
Prof. Michio Sugeno (RIKEN Brain Science Institute (RIKEN BSI), Japan)
Prof. Dimitri Bertsekas (IEEE Fellow, MIT, USA)
Prof. Demetri Terzopoulos (IEEE Fellow, ACM Fellow, UCLA, USA)
Prof. Georgios B. Giannakis (IEEE Fellow, University of Minnesota, USA)
Prof. George Vachtsevanos (Georgia Institute of Technology, USA)
Prof. Abraham Bers (IEEE Fellow, MIT, USA)
Prof. Brian Barsky (IEEE Fellow, University of Berkeley, USA)
Prof. Aggelos Katsaggelos (IEEE Fellow, Northwestern University, USA)
Prof. Josef Sifakis (Turing Award 2007, CNRS/Verimag, France)
Prof. Hisashi Kobayashi (Princeton University, USA)
Prof. Kinshuk (Fellow IEEE, Massey Univ. New Zeland),
Prof. Leonid Kazovsky (Stanford University, USA)
Prof. Narsingh Deo (IEEE Fellow, ACM Fellow, University of Central Florida, USA)
Prof. Kamisetty Rao (Fellow IEEE, Univ. of Texas at Arlington,USA)
Prof. Anastassios Venetsanopoulos (Fellow IEEE, University of Toronto, Canada)
Prof. Steven Collicott (Purdue University, West Lafayette, IN, USA)
Prof. Nikolaos Paragios (Ecole Centrale Paris, France)
Prof. Nikolaos G. Bourbakis (IEEE Fellow, Wright State University, USA)
Prof. Stamatios Kartalopoulos (IEEE Fellow, University of Oklahoma, USA)
Prof. Irwin Sandberg (IEEE Fellow, University of Texas at Austin, USA),
Prof. Michael Sebek (IEEE Fellow, Czech Technical University in Prague, Czech Republic)
Prof. Hashem Akbari (University of California, Berkeley, USA)
Prof. Yuriy S. Shmaliy, (IEEE Fellow, The University of Guanajuato, Mexico)
Prof. Lei Xu (IEEE Fellow, Chinese University of Hong Kong, Hong Kong)
Prof. Paul E. Dimotakis (California Institute of Technology Pasadena, USA)
Prof. Martin Pelikan (UMSL, USA)
Prof. Patrick Wang (MIT, USA)
Prof. Wasfy B Mikhael (IEEE Fellow, University of Central Florida Orlando,USA)
Prof. Sunil Das (IEEE Fellow, University of Ottawa, Canada)
Prof. Panos Pardalos (University of Florida, USA)
Prof. Nikolaos D. Katopodes (University of Michigan, USA)
Prof. Bimal K. Bose (Life Fellow of IEEE, University of Tennessee, Knoxville, USA)
Prof. Janusz Kacprzyk (IEEE Fellow, Polish Academy of Sciences, Poland)
Prof. Sidney Burrus (IEEE Fellow, Rice University, USA)
Prof. Biswa N. Datta (IEEE Fellow, Northern Illinois University, USA)
Prof. Mihai Putinar (University of California at Santa Barbara, USA)
Prof. Wlodzislaw Duch (Nicolaus Copernicus University, Poland)
Prof. Tadeusz Kaczorek (IEEE Fellow, Warsaw University of Tehcnology, Poland)
Prof. Michael N. Katehakis (Rutgers, The State University of New Jersey, USA)
Prof. Pan Agathoklis (Univ. of Victoria, Canada)
Dr. Subhas C. Misra (Harvard University, USA)
Prof. Martin van den Toorn (Delft University of Technology, The Netherlands)

Prof. Malcolm J. Crocker (Distinguished University Prof., Auburn University,USA)
Prof. Urszula Ledzewicz, Southern Illinois University , USA.
Prof. Dimitri Kazakos, Dean, (Texas Southern University, USA)
Prof. Ronald Yager (Iona College, USA)
Prof. Athanassios Manikas (Imperial College, London, UK)
Prof. Keith L. Clark (Imperial College, London, UK)
Prof. Argyris Varonides (Univ. of Scranton, USA)
Prof. S. Furfari (Direction Generale Energie et Transports, Brussels, EU)
Prof. Constantin Udriste, University Politehnica of Bucharest , ROMANIA
Dr. Michelle Luke (Univ. Berkeley, USA)
Prof. Patrice Brault (Univ. Paris-sud, France)
Prof. Jim Cunningham (Imperial College London, UK)
Prof. Philippe Ben-Abdallah (Ecole Polytechnique de l'Universite de Nantes, France)
Prof. Photios Anninos (Medical School of Thrace, Greece)
Prof. Ichiro Hagiwara, (Tokyo Institute of Technology, Japan)
Prof. Andris Buikis (Latvian Academy of Science. Latvia)
Prof. Akshai Aggarwal (University of Windsor, Canada)
Prof. George Vachtsevanos (Georgia Institute of Technology, USA)
Prof. Ulrich Albrecht (Auburn University, USA)
Prof. Imre J. Rudas (Obuda University, Hungary)
Prof. Alexey L Sadovski (IEEE Fellow, Texas A&M University, USA)
Prof. Amedeo Andreotti (University of Naples, Italy)
Prof. Ryszard S. Choras (University of Technology and Life Sciences Bydgoszcz, Poland)
Prof. Remi Leandre (Universite de Bourgogne, Dijon, France)
Prof. Moustapha Diaby (University of Connecticut, USA)
Prof. Brian McCartin (New York University, USA)
Prof. Elias C. Aifantis (Aristotle Univ. of Thessaloniki, Greece)
Prof. Anastasios Lyrintzis (Purdue University, USA)
Prof. Charles Long (Prof. Emeritus University of Wisconsin, USA)
Prof. Marvin Goldstein (NASA Glenn Research Center, USA)
Prof. Costin Cepisca (University POLITEHNICA of Bucharest, Romania)
Prof. Kleanthis Psarris (University of Texas at San Antonio, USA)
Prof. Ron Goldman (Rice University, USA)
Prof. Ioannis A. Kakadiaris (University of Houston, USA)
Prof. Richard Tapia (Rice University, USA)
Prof. Milivoje M. Kostic (Northern Illinois University, USA)
Prof. Helmut Jaberg (University of Technology Graz, Austria)
Prof. Ardeshir Anjomani (The University of Texas at Arlington, USA)
Prof. Heinz Ulbrich (Technical University Munich, Germany)
Prof. Reinhard Leithner (Technical University Braunschweig, Germany)
Prof. Elbrous M. Jafarov (Istanbul Technical University, Turkey)
Prof. M. Ehsani (Texas A&M University, USA)
Prof. Sesh Commuri (University of Oklahoma, USA)
Prof. Nicolas Galanis (Universite de Sherbrooke, Canada)
Prof. S. H. Sohrab (Northwestern University, USA)
Prof. Rui J. P. de Figueiredo (University of California, USA)
Prof. Valeri Mladenov (Technical University of Sofia, Bulgaria)
Prof. Hiroshi Sakaki (Meisei University, Tokyo, Japan)
Prof. Zoran S. Bojkovic (Technical University of Belgrade, Serbia)
Prof. K. D. Klaes, (Head of the EPS Support Science Team in the MET Division at EUMETSAT, France)
Prof. Emira Maljevic (Technical University of Belgrade, Serbia)
Prof. Kazuhiko Tsuda (University of Tsukuba, Tokyo, Japan)
Prof. Milan Stork (University of West Bohemia , Czech Republic)
Prof. C. G. Helmis (University of Athens, Greece)
Prof. Lajos Barna (Budapest University of Technology and Economics, Hungary)

Prof. Nobuoki Mano (Meisei University, Tokyo, Japan)
Prof. Nobuo Nakajima (The University of Electro-Communications, Tokyo, Japan)
Prof. Victor-Emil Neagoe (Polytechnic University of Bucharest, Romania)
Prof. P. Vanderstraeten (Brussels Institute for Environmental Management, Belgium)
Prof. Annaliese Bischoff (University of Massachusetts, Amherst, USA)
Prof. Virgil Tiponut (Politehnica University of Timisoara, Romania)
Prof. Andrei Kolyshkin (Riga Technical University, Latvia)
Prof. Fumiaki Imado (Shinshu University, Japan)
Prof. Sotirios G. Ziavras (New Jersey Institute of Technology, USA)
Prof. Constantin Volosencu (Politehnica University of Timisoara, Romania)
Prof. Marc A. Rosen (University of Ontario Institute of Technology, Canada)
Prof. Thomas M. Gatton (National University, San Diego, USA)
Prof. Leonardo Pagnotta (University of Calabria, Italy)
Prof. Yan Wu (Georgia Southern University, USA)
Prof. Daniel N. Riahi (University of Texas-Pan American, USA)
Prof. Alexander Grebennikov (Autonomous University of Puebla, Mexico)
Prof. Bennie F. L. Ward (Baylor University, TX, USA)
Prof. Guennadi A. Kouzaev (Norwegian University of Science and Technology, Norway)
Prof. Eugene Kindler (University of Ostrava, Czech Republic)
Prof. Geoff Skinner (The University of Newcastle, Australia)
Prof. Hamido Fujita (Iwate Prefectural University(IPU), Japan)
Prof. Francesco Muzi (University of L'Aquila, Italy)
Prof. Claudio Rossi (University of Siena, Italy)
Prof. Sergey B. Leonov (Joint Institute for High Temperature Russian Academy of Science, Russia)
Prof. Arpad A. Fay (University of Miskolc, Hungary)
Prof. Lili He (San Jose State University, USA)
Prof. M. Nasseh Tabrizi (East Carolina University, USA)
Prof. Alaa Eldin Fahmy (University Of Calgary, Canada)
Prof. Gh. Pascovici (University of Koeln, Germany)
Prof. Pier Paolo Delsanto (Politecnico of Torino, Italy)
Prof. Radu Munteanu (Rector of the Technical University of Cluj-Napoca, Romania)
Prof. Ioan Dumitrache (Politehnica University of Bucharest, Romania)
Prof. Corneliu Lazar (Technical University Gh.Asachi Iasi, Romania)
Prof. Nicola Pitrone (Universita degli Studi Catania, Italia)
Prof. Miquel Salgot (University of Barcelona, Spain)
Prof. Amaury A. Caballero (Florida International University, USA)
Prof. Petar Popivanov (Bulgarian Academy of Sciences, Bulgaria)
Prof. Alexander Gegov (University of Portsmouth, UK)
Prof. Lin Feng (Nanyang Technological University, Singapore)
Prof. Colin Fyfe (University of the West of Scotland, UK)
Prof. Zhaohui Luo (Univ of London, UK)
Prof. Wolfgang Wenzel (Institute for Nanotechnology, Germany)
Prof. Weilian Su (Naval Postgraduate School, USA)
Prof. Phillip G. Bradford (The University of Alabama, USA)
Prof. Ray Hefferlin (Southern Adventist University, TN, USA)
Prof. Gabriella Bognar (University of Miskolc, Hungary)
Prof. Hamid Abachi (Monash University, Australia)
Prof. Karlheinz Spindler (Fachhochschule Wiesbaden, Germany)
Prof. Josef Boercsoek (Universitat Kassel, Germany)
Prof. Eyad H. Abed (University of Maryland, Maryland, USA)
Prof. F. Castanie (TeSA, Toulouse, France)
Prof. Robert K. L. Gay (Nanyang Technological University, Singapore)
Prof. Andrzej Ordys (Kingston University, UK)
Prof. Harris Catrakis (Univ of California Irvine, USA)
Prof. T Bott (The University of Birmingham, UK)

Prof. T.-W. Lee (Arizona State University, AZ, USA)
Prof. Le Yi Wang (Wayne State University, Detroit, USA)
Prof. Oleksander Markovskyy (National Technical University of Ukraine, Ukraine)
Prof. Suresh P. Sethi (University of Texas at Dallas, USA)
Prof. Hartmut Hillmer(University of Kassel, Germany)
Prof. Bram Van Putten (Wageningen University, The Netherlands)
Prof. Alexander Iomin (Technion - Israel Institute of Technology, Israel)
Prof. Roberto San Jose (Technical University of Madrid, Spain)
Prof. Minvydas Ragulskis (Kaunas University of Technology, Lithuania)
Prof. Arun Kulkarni (The University of Texas at Tyler, USA)
Prof. Joydeep Mitra (New Mexico State University, USA)
Prof. Vincenzo Niola (University of Naples Federico II, Italy)
Prof. Ion Chryssoverghi (National Technical University of Athens, Greece)
Prof. Dr. Aydin Akan (Istanbul University, Turkey)
Prof. Sarka Necasova (Academy of Sciences, Prague, Czech Republic)
Prof. C. D. Memos (National Technical University of Athens, Greece)
Prof. S. Y. Chen, (Zhejiang University of Technology, China and University of Hamburg, Germany)
Prof. Duc Nguyen (Old Dominion University, Norfolk, USA)
Prof. Tuan Pham (James Cook University, Townsville, Australia)
Prof. Jiri Klima (Technical Faculty of CZU in Prague, Czech Republic)
Prof. Rossella Cancelliere (University of Torino, Italy)
Prof. Dr-Eng. Christian Bouquegneau (Faculty Polytechnique de Mons, Belgium)
Prof. Wladyslaw Mielczarski (Technical University of Lodz, Poland)
Prof. Ibrahim Hassan (Concordia University, Montreal, Quebec, Canada)
Prof. Stavros J.Baloyannis (Medical School, Aristotle University of Thessaloniki, Greece)
Prof. James F. Frenzel (University of Idaho, USA)
Prof. Vilem Srovnal,(Technical University of Ostrava, Czech Republic)
Prof. J. M. Giron-Sierra (Universidad Complutense de Madrid, Spain)
Prof. Walter Dosch (University of Luebeck, Germany)
Prof. Rudolf Freund (Vienna University of Technology, Austria)
Prof. Erich Schmidt (Vienna University of Technology, Austria)
Prof. Alessandro Genco (University of Palermo, Italy)
Prof. Martin Lopez Morales (Technical University of Monterey, Mexico)
Prof. Ralph W. Oberste-Vorth (Marshall University, USA)
Prof. Vladimir Damgov (Bulgarian Academy of Sciences, Bulgaria)
Prof. P.Borne (Ecole Central de Lille, France)

Additional Reviewers

Francesco Zirilli	Sapienza Universita di Roma, Italy
Sorinel Oprisan	College of Charleston, CA, USA
Xiang Bai	Huazhong University of Science and Technology, China
Philippe Dondon	Institut polytechnique de Bordeaux, France
Yamagishi Hiromitsu	Ehime University, Japan
Frederic Kuznik	National Institute of Applied Sciences, Lyon, France
George Barreto	Pontificia Universidad Javeriana, Colombia
Takuya Yamano	Kanagawa University, Japan
Imre Rudas	Obuda University, Budapest, Hungary
Tetsuya Shimamura	Saitama University, Japan
M. Javed Khan	Tuskegee University, AL, USA
Eleazar Jimenez Serrano	Kyushu University, Japan
Valeri Mladenov	Technical University of Sofia, Bulgaria
Jon Burley	Michigan State University, MI, USA
Andrey Dmitriev	Russian Academy of Sciences, Russia
Moran Wang	Tsinghua University, China
Jose Flores	The University of South Dakota, SD, USA
Hessam Ghasemnejad	Kingston University London, UK
Santoso Wibowo	CQ University, Australia
Kazuhiko Natori	Toho University, Japan
Konstantin Volkov	Kingston University London, UK
Kei Eguchi	Fukuoka Institute of Technology, Japan
Abelha Antonio	Universidade do Minho, Portugal
Tetsuya Yoshida	Hokkaido University, Japan
Matthias Buyle	Artesis Hogeschool Antwerpen, Belgium
Deolinda Rasteiro	Coimbra Institute of Engineering, Portugal
Masaji Tanaka	Okayama University of Science, Japan
Bazil Taha Ahmed	Universidad Autonoma de Madrid, Spain
Zhong-Jie Han	Tianjin University, China
James Vance	The University of Virginia's College at Wise, VA, USA
Angel F. Tenorio	Universidad Pablo de Olavide, Spain
Genqi Xu	Tianjin University, China
João Bastos	Instituto Superior de Engenharia do Porto, Portugal
Miguel Carriegos	Universidad de Leon, Spain
Shinji Osada	Gifu University School of Medicine, Japan
Ole Christian Boe	Norwegian Military Academy, Norway
Lesley Farmer	California State University Long Beach, CA, USA
Dmitrijs Serdjuks	Riga Technical University, Latvia
Alejandro Fuentes-Penna	Universidad Autónoma del Estado de Hidalgo, Mexico
Francesco Rotondo	Polytechnic of Bari University, Italy
Stavros Ponis	National Technical University of Athens, Greece
José Carlos Metrôlho	Instituto Politecnico de Castelo Branco, Portugal
Minhui Yan	Shanghai Maritime University, China

Table of Contents

Plenary Lecture 1

Extended Unbiased FIR Filtering for Indoor Robot Self-Localization

Professor Yuriy S. Shmaliy
Department of Electronics Engineering
DICIS, Universidad de Guanajuato,
Salamanca, 36885, Mexico
E-mail: shmaliy@ugto.mx

Abstract: Mobil robot self-localization in diverse environments is a key problem for many industrial applications. We consider a novel estimation technique called extended unbiased finite impulse response (EFIR) filtering which has several advantages against the traditional extended Kalman filter (EKF): better robustness against uncertainties, lower sensitivity to noise, and smaller round-off errors. A fast iterative EFIR localization algorithm utilizing recursions is discussed as a rival to the EKF. Unlike the EKF, the EFIR filter completely ignores the noise statistics. Instead, it requires an optimal horizon of N_{opt} points in order for the localization performance to be acceptably suboptimal. It is shown that N_{opt} can be specialized via measurements with much smaller efforts and cost than for the noise statistics required by the EKF. Overall, EFIR filtering is more successful in accuracy than the EKF under the uncertain conditions. Extensive investigations of the approach are conducted in applications to indoor mobile robot self-localization via triangulation and in radio frequency identification (RFID) tag grid environments. Better performance of the EFIR filter is demonstrated when the noise statistics are not known exactly. As a special inference, it is shows that the EKF diverges not only due to large nonlinearities and large noise as was previously known from the Kalman filter theory, but also due to errors in the imprecisely defined noise statistics. In contrast, the EFIR filter does not demonstrate divergence in this case.

Brief Biography of the Speaker:

Dr. Yuriy S. Shmaliy has been a full professor in Electrical Engineering of the Universidad de Guanajuato, Mexico, since 1999. He received the B.S., M.S., and Ph.D. degrees in 1974, 1976 and 1982, respectively, from the Kharkiv Aviation Institute, Ukraine. In 1992 he received the Dr.Sc. (technical) degree from the Soviet Union Government. In March 1985, he joined the Kharkiv Military University. He serves as full professor beginning in 1986 and has a Certificate of Professor from the Ukrainian Government in 1993. In 1993, he founded and, by 2001, had been a director of the Scientific Center “Sichron” (Kharkiv, Ukraine) working in the field of precise time and frequency. His books *Continuous-Time Signals* (2006) and *Continuous-Time Systems* (2007) were published by Springer, New York. His book *GPS-based Optimal FIR Filtering of Clock Models* (2009) was published by Nova Science Publ., New York. He also edited a book *Probability: Interpretation, Theory and Applications* (Nova Science Publ., New York, 2012) and contributed to several books with invited chapters. Dr. Shmaliy has authored more than 300 Journal and Conference papers and 80 patents. He is IEEE Fellow; was rewarded a title, Honorary Radio Engineer of the USSR, in 1991; and was listed in Outstanding People of the 20th Century, Cambridge, England in 1999. He currently serves on the Editorial Boards of several International Journals and is a member of the Program Committees of various Int. Symposia. His current interests include statistical signal processing, optimal estimation, and stochastic system theory.