Personal Data:

Name: Subhrakanti Dey
Current position: Professor
Signals & Systems
P O Box 534
Uppsala University
SE-75121 Sweden

Contact details: Phone: +46 18 471 7059 Fax: +46 18 471 7244
e-mail: Subhra.Dey@signal.uu.se
Homepage: http://www.signal.uu.se/Staff/sd/sd.html
Date of Birth: September 19, 1968
Citizenship: Australian
Home Address: Ringgatan 12A, LGH 1301, Uppsala, SE-75217, Sweden
Home contact number: +46701679521

***Employment History*:**

2013 - Professor in Wireless Sensor Networks, Uppsala University, Sweden
2007- 2013 Full Professor, Dept. of Electrical & Electronic Engineering, The University of Melbourne
2004-2007 Associate Professor & Reader, Dept. of Electrical & Electronic Engineering, The University of Melbourne
2001-2003 Senior Lecturer, Dept. of Electrical & Electronic Engineering, The University of Melbourne
2000-2001 Lecturer, Dept. of Electrical & Electronic Engineering, The University of Melbourne
1998-2000 Research Fellow, Dept. of Systems Eng. Research School of Information Sciences and Engineering (RSISE), The Australian National University, Canberra
1997-1998 Research Associate, Institute for Systems Research, University of Maryland, College Park, USA
1995-1997 Research Fellow, Dept. of Systems Eng. RSISE, The Australian National University, Canberra

Academic History:

1996 PhD, Dept. of Systems Eng. RSISE, The Australian National University (A.N.U), Canberra
1993 Master of Technology, Telecommunication Systems Engineering, Indian Institute of Technology, Kharagpur, INDIA
1991 Bachelor of Technology (Hons), Electronics & Electrical Communication Engineering, Indian Institute of Technology, Kharagpur, INDIA

Supervision of Postdoctoral Researchers

2014- Dr Amirpasha Shirazina (PhD, KTH, Sweden)
2014- Dr Steffi Knorn (PhD, University of Newcastle, Australia)
2012 -2014: Dr Mojtaba Nourian (PhD, McGill University, Canada)
2011-2013: Dr Yuan Yuan He (PhD, University of Melbourne)
2011 Dr Randa Zakhour (PhD, Eurecom, France)
2008- 2013: Dr Alex Leong (PhD, University of Melbourne, Australia)
2009-2011: Dr Hazer Inaltekin (PhD, Cornell University, USA)
2009-2010: Dr Vasanthan Raghavan (PhD, Univ of Wisconsin-Madison, USA)
2008-2009: Dr James Li (PhD, University of Melbourne, Australia)
2004-2006: Dr Minyi Huang (PhD, McGill University, Canada)

Supervision of PhD students

Sweden (current):

Mr Sinchan Biswas, 2014- *Energy Harvesting Applications in Signal Processing for Sensor Networks*

Australia (graduated):

Dr Ehsan Nekouei, 2013, *Throughput Scaling Laws in Cognitive Multiple Access Networks*

Dr Athipat Limmanee, 2013, *Resource Allocation in Cognitive Radio Networks*
Dr Chih-Hong Wang, 2011, *Power Allocation for Distortion Outage Minimization in Wireless Sensor Networks*
Dr Yuan Yuan He, 2011, *Topics in Resource Optimization in Wireless Networks with Limited Feedback*
Dr Nader Ghasemi, 2011, *Networked Estimation of Hidden Markov Models under Resource Constraints*
Dr Feng Li, 2009, *Distributed Detection and Tracking in Wireless Sensor Networks*
Dr Alex Leong, 2008, *Performance of Estimation and Detection Algorithms in Wireless Networks*
Dr James (Chao-feng) Li, 2008, *Topics in Resource Allocation in Wireless Sensor Networks*
Dr John Papadriopoulos, 2007, *Resource Optimization in Multiuser Communication Networks*
Dr Antonio Galati, 2005, *Statistical Signal Processing in Sensor Networks with Applications to Fault Detection in Helicopter Transmissions*
Dr Louis Shue, 1999, *On performance analysis of state estimators for hidden Markov models*

Publications: Authored and co-authored 2 book chapters, 68 peer reviewed journal publications (90% of which are in the IEEE Transactions, Automatica and SIAM journals) and 100 peer reviewed conference papers, and currently 4 further IEEE transactions papers under review. Prof Dey has an h-index of 22 (Google Scholar). A full publications list is attached separately.

Research Grants: (as Principal Investigator (PI) (in Sweden) or Chief Investigator (CI) (in Australia))
Sweden:
2014-2016 "*Networked Stochastic Estimation & Control under Communication and Resource Constraints*", VR Project Grant, 2.91 Million SEK, (with co-PI Prof Anders Ahlen)
Australia:
2014-2016 "*Easing the Squeeze: Dynamic and Distributed Resource Allocation with Cognitive Radio*," ARC Discovery Grant, $395,000 (with Prof J.S. Evans, Dr T. Alpcan and Dr H. Inaltekin)
2012-2014 "*Networked System Identification, Estimation and Control: Performance Optimization under Resource Constraints*", ARC Discovery Grant, $300,000 (with A/Prof Girish Nair and A/Prof Erik Weyer)
2009-2011 "*Resource aware Signal Processing and Control Algorithms for Networked Systems*", ARC Discovery Grant, $330,000 (with A/Prof Girish Nair and Dr Alex Leong (ARC APD)
2009-2012 "*Closing the Gap: Fundamental Capacity Limits for Interfering Wireless Networks and Practical Methods to Get There",* ARC Discovery Grant, $615,000 (with A/Prof S.V. Hanly, A/Prof J.S. Evans and Prof D.N.C. Tse)
2008-2013 "*Gigabit Wireless: Setting the Standard for Tomorrow's Broadband*", ARC Linkage Grant, $860,000 (with A/Prof JS Evans, A/Prof S. Hanly and Dr B Krongold) with NEC Australia
2008 "*BigNet – A Distributed Wireless Sensor Network Testbed*", ARC Linkage, Infrastructure, Equipment and Facilities Grant, $200,000 (with A/Prof M. Palaniswami et al.)
2008-2010 "*Robust Optimal Asset Liability Management via Stochastic Control Theory*", ARC Linkage Grant, $153,762 (with Dr B.La Scala, Prof I.M.Y. Mareels, Dr L. Irlicht et al) with Victorian Funds Management Corporation (VFMC), Australia
2006-2008 "*Distributed Estimation and Control under Communication Constraints",* ARC Discovery Grant, $336,000 (with A/Prof J.S. Evans and Dr G. Nair)
2003-2005 "*Fast Signal Processing and Control Algorithms for Complex Hierarchical Systems*", ARC Discovery Grant, $180,075 (with Dr J.S. Evans)
2003-2005 "*Towards an Information Theory for Communication-Limited Control Systems*", ARC Discovery Grant, $157,213 (with Dr G. Nair and Prof R.J. Evans)
Additional Information on Research Grants: Prof Dey was a Full Professor at the University of Melbourne, Australia before joining Uppsala University, Sweden, as a Professor in 2013. During his time at University of Melbourne, Prof Dey obtained (as a *Chief Investigator*) a total of approximately 3.6 million AUD in research grants from the Australian Research Council (ARC) in 7 Discovery Projects, and 2 Linkage projects (involving industry partners such as NEC Australia and Victorian Funds Management Corporation, Australia), during 2002-2012. He has also been a Research project leader in the *ARC funded Special Research Centre on Ultra-Broadband Information Networks* during 2002-2008, which enjoyed a total funding of 5.2 million AUD in 9 years. He also made significant contributions towards *National ICT*

Australia (NICTA) Victoria Research Labs during 2003-2005 and the *Cooperative Research Centre on Robust and Adaptive Systems* at Canberra, A.N.U. during 1994-1996. He has been involved with several industry related projects in Australia and USA.

Current and Future Research Interests:

Current research:

Networked estimation and control for cyber-physical systems: Networked systems are ubiquitous. Examples include human engineered infrastructure and communication networks, social and economic networks, and naturally occurring biological networks such as bio-cellular networks or biological swarms. Most advanced engineered networked systems include both physical components as well as cyber components. The burgeoning research field of *cyber physical systems* (CPS) refers broadly to the next generation of engineered systems that requires efficient integration of computing, communication, and control technologies achieving stability, robustness, reliability and optimized performance in many important application domains. Wireless sensor and actuator networks (WSAN) will form an integral part of the future CPS and will play critical roles in grand endeavours such as building future intelligent highway systems with zero automotive related fatality and significantly reduced congestion and delays, providing location-independent access to world-class health care, and delivering blackout-free electricity generation and distribution through the future smart grid. An essential task in the "sense-process-communicate-decide-actuate" cycle in WSANs involves design and analysis of stochastic estimation and control algorithms that will provide efficient, secure, robust, reliable, and often safety-critical performances under such networking and resource related constraints and uncertainties. The convergence of feedback control, information processing and communication technologies has thus raised new challenging fundamental questions in the design and development of such estimation and control algorithms for networked systems. My research aims to address the following open research problems:

(i) *Derivation of novel information theoretic fundamental performance limits for networked estimation and control (NEC) algorithms over rate constrained lossy randomly time-varying wireless networks*,

(ii) *Design and analysis of distributed NEC algorithms based on consensus/gossip based strategies in large random wireless networks*, and

(iii) *Innovation of optimal energy-management based resource allocation algorithms for large wireless control networks using novel technologies such as energy harvesting and wireless power delivery.*

Stochastic and distributed optimization based resource allocation for next generation wireless networks: In almost all types of wireless (cellular, ad hoc and sensor networks), it has now been established (arguably) that cross-layer design is the most effective way to optimize their performance. My research interests lie in design and analysis of optimum resource allocation algorithms for wireless cellular, ad hoc and sensor networks through power control, data rate control, optimal scheduling and media access algorithms especially when only *partial channel information* is available, and lifetime maximization of sensor networks. These algorithms are based on applications of nonlinear convex optimization or convex approximations to problems that are inherently non-convex in nature. My research has also focused on wireless optical communication systems and their capacity analysis problems as well as emerging areas such as *cognitive radio networks*. Distributed optimization based resource allocation algorithms are designed via non-cooperative game-theoretic techniques and economic theory based techniques such as *mechanism design*.

In particular, my research in this area aims to address the following broad problems:

(i) *Optimum and distributed resource allocation in next generation wireless networks, such as cognitive radio networks and heterogeneous cellular networks,* an

(ii) *Optimizing the energy-efficiency versus spectrum-efficiency tradeoff in future generation wireless networks*

Future Research Interests:

In brief, my emerging and future research interests primarily include the following:

(i) *Information theoretic modeling and networked control of molecular communication networks involving nano-biomachines (applications in nano-sensor networks as well as biological molecular communications e.g. hormonal communications or biocellular communications)*

(ii) *Stochastic games and information theoretic security based algorithm design for securing cyber-physical systems*

(iii) *Distributed signal and information processing over large random networks under the presence of noise and interference, and random link failures as well as under privacy requirements*

Professional Activities:

2014- Associate Editor, *IEEE Transactions on Signal Processing*
2014- Chair, Stochastic Systems Technical Committee, IFAC
2012 Member of the Peer Review Committee, *Excellence in Research for Australia (ERA) initiative*
2012 Guest Editor, *EURASIP Journal of Wireless Communications and Networking Special Issue on Recent Advances in Optimization Techniques for Wireless Communication Networks*
2009- 2014 Vice Chair, Stochastic Systems Technical Committee, IFAC
2006-2010 Associate Editor, *IEEE Transactions on Signal Processing*
2004-2008 Associate Editor, *IEEE Transactions on Automatic Control*
2003 - present Associate Editor, *Systems & Control Letters* (Elsevier)
2000-2015 Technical Program Committee member for major IEEE conferences such as IEEE *Globecom 2007, 2008, 2009, 2010, 2014, WCNC 2008, 2009,2010,2011, 2012, 2013, 2014 and ICC 2011, and also IFAC World Congress 2011, 2014, IFAC NecSys Workshop 2012,2013, 2015, RAWNET 2012,2013,2014, 2015, and PIMRC 2012,2013, 2014, SSP 2014, VTC Spring 2014, GlobalSIP 2014,* to name a few.
2002 -2014 Assessor for ARC Grants & Fellowships
2006- Senior Member, IEEE