

SOUMYA BANERJEE

CONTACT INFORMATION

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EDUCATION

PhD in Computer Science, 2013, University of New Mexico, USA

Bachelor of Engineering (Computer Science) with Distinction, 2003, Nagpur University, India

RECENT EMPLOYMENT

Postdoctoral Researcher, University of Cambridge, UK, 2019 till present

Postdoctoral Researcher, University of Oxford, UK, 2016 till 2018

Researcher, Commonwealth Scientific and Industrial Research Organisation, Australia, 2015 to 2016

Post-doctoral research fellow, Harvard University, Harvard Medical School and Broad Institute of Harvard and MIT, USA, 2014 to 2015

Post-doctoral research fellow, Max Planck Institute for Molecular Physiology, Germany, 2013 to 2014

Research Intern, Los Alamos National Laboratories, Theoretical Biology and Biophysics Group, USA, 2009 to 2012

Research Assistant, University of New Mexico, Department of Computer Science, USA, 2007 to 2013

Senior Software Engineer and Technical Lead, Cognizant Technology Solutions Ltd., India, 2004 to 2007

Software Engineer, Automation Engineers, India, 2003 to 2004

PUBLICATIONS

Refereed Journal Papers

1) Optogenetic tuning reveals Rho amplification-dependent dynamics of a cell contraction signal network, D. Kamps, J. Koch, V. Juma, E. Campillo, M. Graessl, S. Banerjee, T. Mazel, X. Chen, Y. Wu, S. Portet, A. Madzvamuse, P. Nalbant, L. Dehmelt, *Cell Reports*, 33(9):108467, 2020 (Cell Press publishing group, Impact Factor = 8.1)

2) Deconvolution of monocyte responses in inflammatory bowel disease reveals an IL-1 cytokine network that regulates IL-23 in genetic and acquired IL-10 resistance, D. Aschenbrenner, M. Quaranta, S. Banerjee, et al. (in press) *Gut* 2020 (British Medical Journal publishing group, Impact Factor = 19.8)

3) Hydroxychloroquine: balancing the needs of LMICs during the COVID-19 pandemic, S. Banerjee, *Lancet Rheumatology*, 2(7):385-386, 2020

4) The early impact of COVID-19 on mental health and community physical health services and their patients' mortality in Cambridgeshire and Peterborough, UK, S. Chen, P. Jones, B. Underwood, A. Moore, E. Bullmore, S. Banerjee, et al., *Journal of Psychiatric Research*, 131, 244-254, 2020 (Impact factor = 4.4)

5) Predictive metabolomic profiling of microbial communities using amplicon or metagenomic sequences, H. Mallick, E. Franzosa, L. McIver, S. Banerjee, A. Sirota-Madi, A. Kostic, C. Clish, H. Vlamakis, R. Xavier, C. Huttenhower, *Nature Communications*, 10(1):3136, 2019

6) Influence of correlated antigen presentation on T cell negative selection in the thymus, S. Banerjee, S.J. Chapman, *Journal of the Royal Society Interface*, 15(148), 20180311, 2018 (Impact Factor = 4.3)

- 7) Modelling the effects of phylogeny and body size on within-host pathogen replication and immune response, S. Banerjee, A. Perelson, M. Moses, *Journal of the Royal Society Interface*, 14(136), 20170479, 2017 (Impact Factor = 4.3)
- 8) An excitable Rho GTPase signaling network generates dynamic subcellular contraction patterns, M. Graessl, J. Koch, A. Calderon, S. Banerjee, T. Mazel, N. Schulze, J. Jungkurth, A. Koseska, L. Dehmelt, P. Nalbant, *Journal of Cell Biology*, 216(12), 4271-4285, 2017 (Impact Factor = 9.7)
- 9) Towards a Quantitative Understanding of Within Host Dynamics of West Nile Virus Infection, S. Banerjee, J. Guedj, R. Ribeiro, M. Moses & A. Perelson, *Journal of the Royal Society Interface*, 13(117), 20160130, 2016 (Impact Factor = 4.3)
- 10) A spatial model of the efficiency of T cell search in the influenza infected lung, D. Levin, S. Forrest, S. Banerjee, M. Moses & F. Koster, *Journal of Theoretical Biology*, 398(7), 52-63, 2016 (Impact Factor = 2.2)
- 11) Competitive dynamics between criminals and law enforcement explains the super-linear scaling of crime in societies, S. Banerjee, Hentenryck, P.V. & Cebrian, M., *Palgrave Communications*, 1(1), 15022, 2015 (Nature Publishing Group)
- 12) A bioorthogonal small-molecule switch system for controlling protein function in cells, P. Liu, A. Calderon, G. Konstantinidis, J. Hou, S. Voss, X. Chen, F. Li, S. Banerjee, J. Hoffmann, C. Theiss, L. Dehmelt & Y. Wu, *Angewandte Chemie*, 53(38), 10049-10055, 2014 (Impact Factor = 13.7)
- 13) Science and technology consortia in US biomedical research: A paradigm shift in response to unsustainable academic growth, C. Balch, H. Arias-Pulido, S. Banerjee, A. Lancaster, K. Clark, M. Perilstein, B. Hawkins, J. Rhodes, P. Sliz, J. Wilkins and T. Chittenden, *BioEssays*, 37(2), 119-122, 2014 (Impact Factor = 5.4)
- 14) Scale Invariance of Immune System Response Rates and Times: Perspectives on Immune System Architecture and Implications for Artificial Immune Systems, S. Banerjee & M. Moses, *Swarm Intelligence*, 4(4), 301-308, 2010 (Impact Factor = 2.1)

Refereed Conference Papers

- 1) Analysis of a Planetary Scale Scientific Collaboration Dataset Reveals Novel Patterns, S. Banerjee, *Proceedings of the Complex Systems Digital Campus 2015 – World e-Conference, Conference on Complex Systems*, 2016 (peer-reviewed conference)
- 2) A Multi-Agent System Approach to Load-Balancing and Resource Allocation for Distributed Computing, S. Banerjee and J. Hecker, *Proceedings of the Complex Systems Digital Campus 2015 – World e-Conference, Conference on Complex Systems*, 2016 (peer-reviewed conference)
- 3) Computationally Simulating Intermodal Terminal Attractiveness and Demand, S. Banerjee et al., *Proceedings of the 23rd World Congress on Intelligent Transport Systems*, 2016
- 4) Analysis of Demand and Operations of Intermodal Terminals, R. Garcia-Flores, S. Banerjee et al., *Proceedings of the 24th National Conference of the Australian Society for Operations Research*, 2016
- 5) Forecasting in the era of Big Data: Lessons and Pitfalls, Y. Tyshetskiy, S. Banerjee et al., *Proceedings of the Annual Conference of the International Association of Maritime Economists*, 2016
- 6) The Value of Inflammatory Signals in Adaptive Immune Responses, S. Banerjee, D. Levin, M. Moses, F. Koster & S. Forrest, *The 10th International Conference on Artificial Immune Systems (ICARIS)*, Lecture Notes in Computer Science, Volume 6825/2011, 1-14, 2011
- 7) Biologically Inspired Design Principles for Scalable, Robust, Adaptive, Decentralized Search and Automated Response (RADAR), M. Moses & S. Banerjee, *Proceedings of the 2011 IEEE Conference on Artificial Life*, 30-37, 2011
- 8) Modular RADAR: An Immune System Inspired Search and Response Strategy for Distributed Systems, S. Banerjee & M. Moses, *The 9th International Conference on Artificial Immune Systems (ICARIS)*, Lecture Notes in Computer Science, Volume 6209/2010, 116-129, 2010

9) A Hybrid Agent Based and Differential Equation Model of Body Size Effects on Pathogen Replication and Immune System Response, S. Banerjee & M. Moses, *The 8th International Conference on Artificial Immune Systems (ICARIS)*, Volume 5666-014, 2009

Book Chapters

Using Optimisation and Machine Learning to Validate the Value of Infrastructure Investments, R. Garcia-Flores, S. Banerjee, G. Mathews (2016) Book chapter in *Infrastructure Investments: Politics, Barriers and Economic Consequences*

GRANTS AWARDED

- 1) SCAP (Student Conference Award Program) grant from the University of New Mexico to attend ICARIS 2009 (July 2009): \$ 600
- 2) Bursary from conference organizers to attend ICARIS 2009 (July 2009): \$300
- 3) RPT (Research Project Travel) grant from the University of New Mexico to attend ICARIS conference 2009 (June 2009): \$ 400
- 4) Travel grant from University of New Mexico, Department of Biology to attend ICARIS conference 2009 (May 2009): \$ 500
- 5) RPT (Research Project Travel) grant from the University of New Mexico to attend Yale University Summer School in Computational Immunology (July 2008): \$ 170
- 6) Travel grant from University of New Mexico, Department of Biology to attend Yale University Summer School in Computational Immunology (May 2008): \$ 500
- 7) Travel grant from University of New Mexico, Department of Biology to present research work at Gordon Research Conference, Maine (Jan 2008): \$ 500

INVITED TALKS

- 1) Computational Immunology, Microsoft Research, Cambridge, UK, March 2017
- 2) Modeling Emerging Pathogens under Uncertainty and Sparse Experimental Data, Harvard Medical School, Boston, USA, September 2014
- 3) Modeling Emerging Pathogens under Uncertainty and Sparse Experimental Data, IBM Research, India, August 2014
- 4) Computational Screens for Novel Gut Microbial Bioactive Compounds, Novartis Institutes for Biomedical Research, Boston, USA, July 2014
- 5) Scaling in the Immune System, Commonwealth Scientific and Industrial Research Organisation, Australia, March 2013
- 6) A Mathematical Model of Body Size Effects on Pathogen Replication and Immune System Response, International Network of Theoretical Immunology, Los Alamos National Laboratories, USA, August 2010
- 7) A Hybrid Agent Based and Differential Equation Model of Body Size Effects on Pathogen Replication and Immune System Response, School of Health Sciences, University of New Mexico, USA, April 2010

TEACHING EXPERIENCE

I am teaching machine learning at the University of Cambridge Bioinformatics Training Centre. I have also taught students in Uganda through the University of Cambridge Africa programme. I taught data science at the University of Oxford Complex Networks Summer School.

- 1) Cambridge-Africa Programme, University of Cambridge, 2020 (lectures)
- 2) Oxford Summer School in Economic Networks, Mathematical Institute, University of Oxford, 2017 (lectures and tutorials)
- 3) Trained in teaching at the University of Oxford Doctoral Training Center, 2017

4) Lectured at the Complex Adaptive Systems course in Department of Computer Science, University of New Mexico, USA, 2009-2012 (lectures and tutorials on complex systems and computer science)

5) Co-designed teaching resources with educators to make my teaching broadly accessible (sample of my teaching material available online <https://www.simiode.org/resources/3206> and <https://osf.io/25gnz/>)