Mehul Motani

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Research Interests

Digital Health & AI in Healthcare, Biomedical & Health Informatics, Artificial Intelligence & Machine Learning, Information & Coding Theory, Wireless Ad-hoc & Sensor Networks, Internet-of-Things, and 5G.

Education

Ph.D. in Electrical Engineering, 2000, Cornell University, Ithaca, NY USA
M.S. in Electrical Engineering, 1995, GPA: 3.9/4.0, Syracuse University, Syracuse, NY USA
B.E. in Electrical Engineering, 1992, GPA in major: 3.9/4.0, The Cooper Union, New York, NY USA

Personal Information

U.S. Citizen, Married

Professional Experience

Associate Professor (2010-Present), Assistant Professor (2003-2009)
National University of Singapore, Singapore, Department of Electrical & Computer Engineering
Joint Appt: Institute for Digital Medicine (WisDM) (2022-present), N.1 Institute for Health (2018-Present), Institute of Data Science (2019-Present), Smart Systems Institute (2018-2021)
Designed and taught undergraduate and graduate courses on Data Science, Communication Systems, Computer Networks, Information Theory, and Embedded Systems.

Visiting Research Collaborator (10/2011-present), Visiting Fellow (12/2010-09/2011), Department of Electrical Engineering, School of Engineering & Applied Science, Princeton University, Princeton, NJ, USA

Research Scientist (2000-2003), Institute for Infocomm Research, Singapore
R&D in wireless communications. Joint faculty appointment at the National University of Singapore.

Graduate Research (1996-2000), Cornell University, Ithaca, NY USA
Dissertation: *Information Theory and Coding for Spread Spectrum Communication Systems*
Advisors: Chris Heegard & Venugopal Veeravalli

Unix System Administrator (1996), Cornell University, Ithaca, NY USA
System administration to support a 300+ node network of Unix/Linux, Windows, & Macintosh computers.

Systems & Hardware Design Engineer (1992-1996), Lockheed Martin Corporation, Syracuse, NY USA
Designed hardware & software simulators for submarine sonar arrays and acoustic receivers. Digital circuit board design, FPGA and custom ASIC design. VHDL coding, synthesis with Synopsis, and simulation via Verilog.

Undergraduate Research Internship (Summer 1991), Polytechnic University, Brooklyn, NY USA
Designed and implemented algorithms for image registration.

Honors and Awards

Fellow, IEEE, 2018; Fellow AAIA, 2021
NUS College Teaching Excellence Award, 2023
NUS Annual Teaching Excellence Award, 2014
NUS Engineering Innovative Teaching Award & Honours List, 2011, 2013, 2014, 2015, 2016.
Awarded the 2010 Singapore-MIT Alliance for Research & Technology Ignition Grant, $74,500
Winner of the 2009 National Research Foundation Proof-of-Concept grant award, $250,000 (6% award rate)
Advanced into the Semifinals at Startup@Singapore, 2005 & 2009
Telecom Italia Mobile Prize ($10000 Euro & Trophy) at SIMagine 2003 (Undergraduate student project)
Intel Foundation Fellowship (1999-2000)
Lockheed Martin Advanced Course in Engineering (1995), Outstanding Work Assignment Prize (1993)
Cooper Union - Four Year Tuition Scholarship (1988-1992), Engineering Dean's List (1991,1992)

Skills & Interests

Programming Languages: Python, C, C++, Java, HTML, Javascript, LaTeX, PHP, Perl, Linux scripting, MATLAB & Simulink, Octave, some experience with Android & iOS development
Tools & Frameworks: TensorFlow, Keras, PyTorch, SKLearn, Numpy, Pandas, SQL, Jupyter, Colab
Platforms: Linux, MacOS, Windows, Google Cloud Platform, Amazon Web Services
Human Languages: English, Hindi, Gujarati, Brief encounters with Spanish and German, Learning Mandarin and Exposure to ASL
Interests: Squash, Tennis, Bicycling, Traveling, Watching figure skating and Entrepreneurship.

Current Sponsored Research Projects

R45. "JARVIS-DHL: Transforming Chronic Care for Diabetes, Hypertension and hyperLipidemia with AI (Stage 2B)", co-PI, $5,999,988, AI Singapore & NRF, 5/2024-4/2025
R44. "PREdiction and PAThophysiology of Cognitive Health in Spontaneous IntraCerebral Hemorrhage (The PREPATCH-SICH Study)", NUHS Clinicial Scientist Program, co-PI, $400,000, 4/2023-3/2025.
R43. "JARVIS-DHL: Transforming Chronic Care for Diabetes, Hypertension and hyperLipidemia with AI (Stage 2)", co-PI, $13,999,932, AI Singapore & NRF, 11/2021-4/2024
R42. "Design and testing of a novel respiratory dialysis system to reduce lung injury during mechanical ventilation, a safety and physiology study in a large animal model of hypercapnia", co-PI, $1,710,000, from National Medical Research Council (NMRC), Singapore, 2021–2024.
R41. "Cisco-NUS Accelerated Digital Economy Corporate Laboratory", PI (Healthcare Work Package), $17,996,610, from A*STAR Industry Alignment Fund – Industry Collaboration Projects, Singapore, 7/2021–6/2026.
R40. "AI-Assisted Long-Range Wireless Communications with Precise Localization for Logistics and Asset Tracking", PI, $395,376, from NOL Fellowship Program, Singapore, 7/2021– 6/2024.
R39. "Artificial Intelligence Guided Personalized Medicine in Patients with Hypertension and Diabetes", co-PI, $602,705, from NUS-NUHS Health Innovation Program, 10/2019-10/2024.

Completed Sponsored Research Projects

R38. "Artificial Intelligence Solutions for Prognostication and Development of a Clinician-Decision Support System in Spontaneous Intracerebral Hemorrhage (AI-SICH)", co-PI, $100,000, from NUHS Clinician Scientist Academy & NUS Faculty of Engineering, Singapore, 2021–2023.
R37. "Non-Asymptotic Coding Strategies for Power and Delay Constrained Communications", PI, $432,108, from Ministry of Education, Singapore, 8/2020 – 7/2023.
R36. "Medium-Range High-Rate Underwater Communications System Using Single-Photon Avalanche Diode (SPAD) Array", PI, $65,000, from DSO National Laboratories, Singapore 09/2021– 10/2022.
R35. "Improving prescription adherence in chronic disease patients: Development of a 'nudge' behavior change programme", co-I, $47,309.66, from National University Health System (NUHS), Singapore 10/2020-9/2022.
R34. "Quality of life, cognition and employment in spontaneous intracerebral haemorrhage", Co-I, $50,000, from National University Health System (NUHS), Singapore 3/2021– 2/2023.
R33. "Electronic Health Records: Better Prediction, Precision, and Privacy", PI, $450,000, from Ministry of Education, Singapore, 3/2019-8/2022.
R32. "A Proof-of-Concept Study to Apply Artificial Intelligence to Improve Maternal Health Outcomes", PI, $50,000, from N.1 Institute for Health, Singapore, 4/2020– 3/2022.
R31. "Exploratory Framework for Efficient and Secure Tactical Information Dispersal", PI, $280K, from U.S. Army Research Labs, 4/2019-3/2022.
R30. "Explainable AI as a Service for Community Healthcare", co-PI, $4,999,520, AI Singapore & NRF, 5/2019 – 10/2021.
R29. "Development of Signal Detection Algorithm Using Single-photon Avalanche Diode (Spad) Array", PI, $50,000, from DSO National Laboratories, Singapore, 4/2021– 8/2021.
R28. "Multi-Level Information Processing", PI, $497,400, from DSO National Laboratories, Singapore 4/2018-4/2021.
R27. "Prediction of hospital length of stay following discharge from intensive care unit by machine learning algorithm", co-PI, $49,925.50, from National University Health System (NUHS) AI Seed Fund, Singapore, 3/2019-3/2021.

R26. "Protocol Architecture and Critical Technologies of the Underwater Acoustic Networks based on Large Propagation Delays", Collaborator, $270,000 RMB, National Natural Science Foundation of China, 1/2018-12/2020.

R25. "Machine Learning for Health Data with Missing Observations", PI, $60,000, from Ministry of Education, Singapore, 10/2018-3/2020.

R24. "Dealing with healthcare data using machine learning techniques", PI, $60,000, from Ministry of Education, Singapore, 10/2017-9/2018.

R23. "Network Communication with Synchronization Errors: Fundamental Limits and Codes", co-PI, $486,474, from Ministry of Education, Singapore, 8/2015-8/2018.

R22. "A Smart Hospital Bed For the Ward of the Future", PI, $200,000, from Ministry of Education, Singapore, 3/2015-2/2018.

R21. "Self Powered Body Sensor Network for Disease Management and Prevention-Oriented Healthcare ", co-PI, $9.93 Million, from National Research Foundation, Singapore, 10/2012-9/2017.

R20. "Developing & Running an Internal Blended Learning Online Course (iBLOC) on Emerging Technologies in ECE (EE1001X)", PI, $35,000, from Provost's office, NUS, Singapore, 2013-2016.

R19. "Enhancing Student Learning in Communication Systems using Software Radio", PI, $7,000, Teaching Enhancement Grant from Center for Development of Teaching & Learning (CDTL), NUS, Singapore, 12/2014-8/2016.

R18. "NUS Living Lab", co-PI, $2.3 Million, from National University of Singapore, 11/2011-4/2014.

R17. "Liberating the Radio Spectrum with Cooperative Cognition in Spectrum Sharing", Co-PI, $1,145,020, from Ministry of Education, Singapore , 4/2010-3/2014.

R16. "Design of Advanced Communication Strategies for the Asynchronous Multiple Access Channel via Multi-user Network Information Theory", PI, $127,000, from Ministry of Education, Singapore, 3/2010-2/2013.

R15. "Intelligent Sensing and Networking for Smart Urban Mobility Applications", PI, $170,000, from Ministry of Education, Singapore, 3/2010-2/2013.

R14. "Study of a Demand Management Scheme to Promote Off Peak Travel", PI, $238,600, Land Transport Authority, Singapore, 12/2011-12/2012.

R13. "Dynamic Spectrum Cooperative Mesh (DySCO-Mesh): An Enterprise Wi-Fi Solution for High Data Rate Requirements", PI, $74,500, from Singapore-MIT Alliance for Research & Technology (SMART), 1/2011-12/2012.

R12. "Live Spaces for Interactive & Digital Media", Co-PI, $5.46 Million, from National Research Foundation, Singapore, 11/2007-10/2011.

R11. "DISH: Enabling Cooperative Multi-Channel Communication for Wireless Ad Hoc Networks", PI, $250,000, from National Research Foundation, Singapore, 4/2009-6/2010.

R10. "Swarming the Battlefield", PI, $220,000, from Temasek Defense Science Institute, Singapore (funding agency similar to DARPA), 8/2006 - 7/2009.

R9. "Wireless Body Area Networks", Co-PI, $656,396, from A*Star, Singapore (funding agency similar to NSF) , 3/2006-5/2009.

R8. "SUN: Smart Underwater Networking", Co-PI, $122,000, from National University of Singapore, 4/2006-9/2008.

R7. "Cross-layer Design in Wireless Ad-hoc and Sensor Networks", PI, $74,400, from National University of Singapore, 3/2004-2/2008.

R6. "PeopleNet: Design and Analysis of a Wireless Virtual Social Network", PI, $122,000, from National University of Singapore, 4/2005-9/2007.

R5. "Comprehensive Anytime Anywhere Healthcare", Collaborator, $39,000, from A*Star Pervasive Computing Pilot Program, 10/2004-3/2005.

R4. "Efficient Decoding Algorithms for Error Control Codes", PI, $76,822, from National University of Singaapore, 1/2002-5/2005.

R3. "Umbrella: End-to-end Quality of Service in Wireless Networks", Co-PI, $55,950, from Institute for Infocom Research, 6/2001-6/2003.

R2. "Bluetooth Application Development", PI, $12,000, from National University of Singapore, 7/2002-5/2003.

R1. "Design of Bluetooth Lan Access Points", PI, $30,000, from Gigawave Tech. Pte. Ltd., 7/2001-5/2002.

Professional Activities

IEEE Fellows Evaluation Committee, 2022-2024, Vice Chair 2023-2024
Mentoring session, ISIT 2023, ISIT 2021.
Fellow, Institute of Electrical and Electronics Engineers (IEEE), 2018
Fellow, Asia Pacific Association for Artificial Intelligence (AAIA), 2021
Advisory Board, Biomedical Informatics, 2023-present
Editorial Board, Entropy, 2021-present
Organizer, Information Theory in Singapore, Online Seminar Series, 2020-2021
General Co-chair, Int'l Symp. on Information Theory and Its Applications, 2018
Editor, IEEE Transactions on Communications, 2010-2014
Associate Editor, IEEE Transactions on Information Theory, 2009-2013
Member of A*STAR HOME 2015 Review Panel, 2009-2011.
IEEE Information Theory Society Online Committee, 2007-2012
IEEE Information Theory Society Online Editor, 2004-2006
Secretary of IEEE Information Theory Society Board of Governors, 2003-2006
Member, IEEE, IEEE-HKN, IEEE Information Theory Society, IEEE Communications Society
Organizing Committee, Croucher Summer Course in Information Theory, 2015
Recent Results Chair for IEEE Int'l Symp. on Information Theory 2015
International Advisory Committee: ISITA 2024, ISITA 2016, ISITA 2014, ISITA 2012
Program Co-Chair, IEEE Int'l Workshop on Wireless Network Coding (at SECON 2008)
Publicity chair for IEEE Int'l Symp. on Information Theory 2007
Tutorial chair for IEEE Int'l Symp. on Information Theory 2006
Technical Program Co-chair, Int'l Conf. on Communication Systems, 2004, 2006
Organizing Co-chair, Int'l Conf. on Communication Systems, 2002
Session Chair: ITA 2017, ISIT 2016, ISIT 2015, ISIT 2014, ISIT 2012, ISIT 2007, WCNC 2003
Program Committees: ISIT 2024, CHIL 2024, ICML 2024, AISTATS 2024, ICLR 2024, AAAI-2024, NeurIPS 2023, ACM CHIL 2023, ICML 2023, ISIT 2023, AAAI-2023, NeurIPS 2022, ACM CHIL 2022, ISIT 2019, ICC 2019, COMSNETS 2019, INFOCOM 2019 IOTAE Workshop, ISIT 2018, ICC 2018, ICCS 2018, COMSNETS 2018, ISIT 2017, ICC 2017, ICCS 2016, WiOpt 2016, ITW 2015, ISIT 2015, ICC 2015, ITW 2014, ISIT 2014, Globecom 2014, ICC 2014, ICCS 2014, COMSNETS 2014, DCoSS 2014, ICC 2013, WCNC 2013, DCoSS 2013, ICC 2012, ComNet-IoT 2012, ICCS 2012, UrbaNe 2012, ICC 2011, COMSNETS 2011, ICC 2010, COMSNET 2010, WUWNet 2010 WiNC 2009, ICDCS 2009, SECON 2009, ACM WUWNet 2008, MobilityModels 2008, MASS 2008, ICDCS 2008, SECON 2008, VTC 2008, Infocom 2008, MobiCom 2007, WNC^3 WiOpt Workshop 2007, ACM WUWNet MobiCom Workshop 2006, ACM MSWIM 2006, IWWANN 2006, NGMN 2006, MSWIM 2005, ISSNIP 2004
Reviewer for various IEEE/ACM Transactions and Conferences
Reviewer, Singapore-Israeli Industrial R&D Fund, Economic Development Board, Singapore, 2002-2003
Reviewer for Patent applications and Invention Disclosures, NUS and I2R, Singapore, 2000-present
Technical consultant, Cellonics Pte Ltd, Singapore, 2002-2003

University Service

Chair, Data Engineering Minor Committee, NUS, 2018-present
ECE Department Academic Committee, NUS, 2012-present
PhD Defense Chairperson, NUS/ECE Dept. Rep, 2019-present
Faculty of Engineering Technology-Enhanced Learning Committee, NUS, 2015-2020
Mentor to NUS junior faculty, 2014-2020
Chair, ECE Department Taskforce to evaluate teaching annual review process, 2014-2016.
ECE Department Industry Relations Committee, NUS, 2014-2015
Faculty Research Proposal Evaluation Panel, NUS, 2012-2015
NUS IT in Education Subcommittee, NUS, 2012-2013
ECE Department Management Committee Secretary, NUS, 2011-2014
ECE Department Research Task Force, NUS, 2009-2010
Supervisor of Linear Electronics Laboratory, NUS, 2007-2010
Engineering Accreditation Board (EAB) Committee, National University of Singapore, 2003-2004
IEE & ABET Accreditation Task Force, National University of Singapore, 2001-2003
Faculty of Engineering T62 Task Force, National University of Singapore, 2003-2004
NUS/ECE/CIE Task Force to review the communications modules, National University of Singapore, 2001-2002
Cornell University Graduate Professional Student Assembly (EE Rep.), 1999-2000
Cornell University Engineering Graduate Student Association, 1998-2000

Teaching Activities

Data Science for IoT (Graduate, Masters Program), Spring 2019-2022.
Data Science for IoT (Undergraduate, 100+ students), Fall 2018-2023.
Communication Systems (Undergraduate, 50-70 students), Spring 2012-2023.
Computer Networks (Undergraduate, 100+ students), Fall 2007-2023, Spring 2017-2023
Emerging Technologies in EE (internal MOOC, 15-20 students), Spring 2014-2016
Emerging Technologies in EE (Undergraduate, 200+ students), Fall 2010-2016.
Information Theory for Communication Systems (Graduate, 50+ students), Fall 2011-2013.
Analytical Methods in ECE (Undergraduate Tutorial, 40-50 students), Spring 2012.
Computer Communication Networks (Graduate, 20-30 students), Fall 2006-2009.
Advanced Topics in Wireless Communications (Graduate, 25 students), Fall 2004.
HW/SW Embedded Systems Design Project (Undergraduate, 200+ students), Fall/Spring 2003-2010.
Spread Spectrum Communications (Undergraduate, 30-40 students), Spring 2001-2008.
Communications Principles (Undergraduate, 400+ students), Fall 2003.

Ph.D. Research Students Advised († denotes as Main Advisor)

27. Wenshan Qu (with Feng Mengling), AI and Healthcare, Ph.D., Current.
26. †Kei Sen FONG, Symbolic Regresson and Machine Learning, Ph.D., Current.
25. †John Chong Min TAN, Machine Learning, Ph.D., Current.
24. †Shelvia WONG, Complex Networks and Machine Learning, Ph.D., Current.
23. †Danliang HO, Machine Learning for Healthcare, Ph.D., Current.
22. †Lih Wei CHIA, Visible Light Communications, Embedded Systems, Machine Learning, Ph.D., Current.
21. †Cheuk Ting LEUNG, Machine Learning for Communication Systems, Ph.D., Current.
20. †Shiyu LIU, "Less Is More: Improving The Performance Of Learning Models With Fewer Features Or Fewer Parameters", Ph.D., Dec. 2022.
19. †Rajsehkhar BHAT (with TJ Lim), "Resource Allocation in Energy Harvesting Internet-of-Things Devices", Ph.D., Mar. 2019.
18. †Zhengwei NI, "Performance Analysis and Optimization of Communication Systems With Energy Harvesting Constraints", Ph.D., Mar. 2019.
17. Lin ZHOU (with V. Tan), "On Multiterminal Source Coding: Refined Asymptotics, Mismatch and Streaming", Ph.D., Aug. 2018.
16. Chongyu ZHOU (with CK Tham), "Graph-based Learning and Decision Making in Information Networks", Ph.D., Nov. 2017.
15. †Anshoo TANDON, "Performance Limits for Energy-Constrained Communication Systems", Ph.D., Sep. 2016.
14. †Chaojun GU, "Modeling and analysis of cyber-security and reliability of energy delivery for resilient smart grid systems", Ph.D., Jan. 2016.
13. †Neda EDALAT, "Modeling, Methodology and Applications for Resource Management in Energy Harvesting Systems", Ph.D., Jul. 2015.
12. Yu WANG (with HK Garg), "Design of Medium Access Control Techniques for Cooperative Wireless Networks", Ph.D., Jan. 2015.
11. †Sy Quoc LE (with V. Tan),"Approximation Techniques in Network Information Theory", Ph.D., Dec. 2014.
10. †Shiraz SHAHBUDEEN (with M. Chitre), Time Domain Medium Access Control Protocols For Underwater Acoustic Networks, Ph.D., Dec. 2012.
9. Hai Heng NG (with WS Soh), "Design, Analysis, and Performance Evaluation for Handshaking Based MAC Protocols in Underwater Acoustic Networks", Ph.D., Oct. 2012.
8. Yu LU (with L. Wong), "User-context Module and its Supporting Framework: Introducing Context Information into Internet", Ph.D., Aug. 2012.
7. Qian CHEN (with L. Wong), "Phy Layer and Mac Layer Protocol Design and Performance Analysis for Opportunistic Spectrum Access in Cognitive Radio Networks", Ph.D., Jan. 2012.
6. †Tie LUO (with V. Srinivasan), "Dish networks: Protocols, strategies, analysis, and implementation", Ph.D., Jun. 2009.
5. Hon Fah CHONG (with HK Garg), "An information theoretic approach to non-centralized multi-user communication systems", Ph.D., Nov. 2008.
4. †Lawrence ONG, "Cooperative coding and routing in multiple-terminal wireless networks", Ph.D., Jul. 2008.

3. Tianyu MAO (with CC Ko), "Space-time Coding for MIMO Rayleigh Fading Systems", Ph.D., Sep. 2007.
2. †Anh Tuan HOANG, "Cross-layer Scheduling and Transmission Strategies for Energy Constrained Wireless Networks", Ph.D., Sep. 2006.
1. Minh Hoang PHUNG (with KC Chua), "Algorithms for Quality of Service Provisioning and Enhancement in Optical Burst Switched Networks", Ph.D., Jul. 2006.

Master's Research Students Advised († denotes as Main Advisor)

21. †Samuel Quah, AI and Internet of Things, M.Eng., Current.
20. †Ming Lun ONG, "Developing a Holistic Explainable Machine Learning Framework: Data Science Applications In Healthcare", M.Eng., Nov. 2021.
19. †Jia YAO, "Dealing with Heterogeneous Patient Data using Neural Networks for Predictive Diagnosis", M.S., May 2020.
18. †Vintu Jose ALAPPAT, "Channel Detection and Decoding Algorithms", M.Eng, June 2016.
17. †Cheng HUANG,"ECG Monitoring on Mobile Platform and Data Analysis" , M.Eng., June 2016.
16. †Aidi HUANG, "Towards the Internet of Vehicles: A Geographical Segment Architecture for VANET", M.Eng., Jan. 2015.
15. Pang Jin TAN (with V. Srinivasan), M.Sc., Jun. 2010.
14. †TAN Bien Aik (with J Potter), "Multichannel communication based on adaptive equalization in very shallow water acoustic channels", M.Eng., May 2007.
13. Sebastien Andre Yves HEUGUET (with KC Chua), "Empty cell management for grid based resource discoveryprotocols in ad hoc networks", M.Eng., Apr. 2007.
12. †Kok Kiong YAP, "MAX: Human-centric Searching of the Physical World", M.Eng., Jan. 2007.
11. Trung Kien NGUYEN (with KC Chua), "A prioritized MAC protocol for multihop, event-driven wireless sensor network", M.Eng., Aug. 2006.
10. †Vineet SRIVATSAVA, "Cross Layer Design for Communication Systems", M.Eng., Sep. 2005.
9. Wenguang HU (with MA Armand), "Iterative chase decoding of algebraic geometric codes", M.Eng., Jun. 2006.
8. Bruno LOW (with MA Armand), "Adaptive Multi-Code Assignment for a DS-CDMA Ad-Hoc Network", M.Eng., Jul. 2005.
7. Feng CAI (with MA Armand), "Adaptive & Iterative List Decoding", M.Eng., Jun. 2005.
6. †Ming HE, "Performance of Space-Time Codes with Imperfect System State", M.Eng., May 2004.
5. Govindan SARAVANAN (with KC Chua), "Strategies for TCP in end-to-end communications", M.Eng., Mar. 2004.
4. Na WEI (with HK Garg), "Concatenated Coding for Magnetic Recording Channels with Colored Noise", M.Eng., Jun. 2003.
3. †Kai LI, "On the Distribution of the Residual Errors of Iterative Decoding of Turbo Codes", M.Eng., Jun. 2003.
2. Jinbin ZHANG (with CC Ko), "Adaptive Blind Source Separation and Equalization", M.Eng., Oct. 2002.
1. †Tao ZHU, "Adaptive Multiuser Detection for Coded CDMA", M.Eng., Feb. 2002.

Selected Conference Publications

A61. K.S. Fong and M. Motani, "MetaSR: A Meta-Learning Approach to Fitness Formulation for Frequency-Aware Symbolic Regression", Genetic & Evolutionary Computation Conf. (GECCO), Melbourne, Australia, July 2024. [Link]

A60. K.S. Fong and M. Motani, "Enhancing Prediction, Explainability, Inference and Robustness of Decision Trees via Symbolic Regression-Discovered Splits", Hot Off the Press Track, GECCO 2024, Melbourne, Australia, July 2024. [Link]

A59. S. Wongso, C.T. Leung, R. Ghosh, and M. Motani, "V-Fair Classifier: Analyzing Adversarially Fair Classifier from V-Information Perspective", IEEE ISIT 2024 Workshop on Information-Theoretic Methods for Trustworthy Machine Learning, Athens, Greece, Jul. 2024. [Link]

A58. K.S. Fong and M. Motani, "Explainable and Privacy-Preserving Machine Learning via Domain-Aware Symbolic Regression", ACM Conference on Health, Inference, and Learning (ACM-CHIL 2024), New York, NY, Jun. 2024. [Link] [Link]

A57. K.S. Fong and M. Motani, "Symbolic Regression for Discovery of Medical Equations: A Case Study on Glomerular Filtration Rate Estimation Equations", IEEE Conference on Artificial Intelligence (IEEE CAI 2024), Singapore, June 2024. [Link] [Link]

A56. J.C.M. Tan and M. Motani, "Large Language Model (LLM) as a System of Multiple Expert Agents: An Approach to solve the Abstraction and Reasoning Corpus (ARC) Challenge", IEEE Conference on Artificial Intelligence (IEEE CAI 2024), Singapore, June 2024. [Link] [Link]

A55. K.S. Fong and M. Motani, "Multi-Level Symbolic Regression: Function Structure Learning for Multi-Level Data" International Conference on Artificial Intelligence and Statistics (AISTATS), Valencia, Spain, May 2024. [Link]

A54. K.S. Fong and M. Motani, "Symbolic Regression Enhanced Decision Trees for Classification Tasks" Annual AAAI Conference on Artificial Intelligence (AAAI), Vancouver, Canada, Feb. 2024. [Link]

A53. J.C.M. Tan and M. Motani, "Learning, Fast and Slow: A Goal-Directed Memory-Based Approach for Dynamic Environments", IEEE International Conference on Development and Learning (ICDL), Macau, China, Nov. 2023. [Link] [Arxiv]

A52. D. Ho and M. Motani, "Multi-view Modelling of Longitudinal Health Data for Improved Prognostication of Colorectal Cancer Recurrence", Machine Learning for Healthcare (MLHC), New York, NY, USA, Aug. 2023. [Link]

A51. K.S. Fong and M. Motani, "Evolutionary Symbolic Regression: Mechanisms from the Perspectives of Morphology and Adaptability", Hot Off the Press Track, GECCO 2023, Lisbon, Portugal, July 2023. [Link]

A50. K.S. Fong and M. Motani, "DistilSR: A Distilled Version of Gene Expression Programming Symbolic Regression", Genetic & Evolutionary Computation Conf. (GECCO), Lisbon, Portugal, July 2023. [Link]

A49. S. Wongso, R. Ghosh, and M. Motani, "Pointwise Sliced Mutual Information for Neural Network Explainability" ISIT 2023, Taipei, Taiwan, June 2023. [Link]

A48. K.S. Fong, S. Wongso and M. Motani, "Rethinking Symbolic Regression: Morphology and Adaptability in the Context of Evolutionary Algorithms", International Conference on Learning Representations (ICLR), Kigali, Rwanda, May 2023. [Link]

A47. S. Wongso, R. Ghosh and M. Motani, "Using Sliced Mutual Information to Study Memorization and Generalization in Deep Neural Networks", International Conference on Artificial Intelligence and Statistics (AISTATS), Valencia, Spain, Apr. 2023. [Link]

A46. R. Ghosh and M. Motani, "Local Intrinsic Dimensional Entropy", AAAI Conference on Artificial Intelligence, Washington, DC, USA, Feb. 2023. [Link] [Arxiv]

A45. J.C.M. Tan and M. Motani, "Using Hippocampal Replay to Consolidate Experiences in Memory-Augmented Reinforcement Learning", Workshop on Memory in Artificial and Real Intelligence (MemARI) at NeurIPS 2022, New Orleans, USA, Dec. 2022. [Link]

A44. D. Ho and M. Motani, "Machine and Deep Learning methods for Predicting Immune Checkpoint Blockade Response", Machine Learning for Health (ML4H 2022), New Orleans, USA, Nov. 2022. [Link]

A43. A. Li, M. L. Ong, C. W. Oei, W. Lian, H. P. Phua, L. H. Htet, W. Y. Lim, and M. Motani, "Unified Auto Clinical Scoring (Uni-ACS) with Interpretable ML models", Machine Learning for Healthcare (MLHC 2022), Durham, NC, USA, Aug. 2022. [Link]

A42. S. Wongso, R. Ghosh and M. Motani, "Understanding Deep Neural Networks Using Sliced Mutual Information", IEEE ISIT 2022, Aalto, Finland, June 2022 [Link]

A41. R. Ghosh and M. Motani, "Network-to-Network Regularization: Enforcing Occam's Razor to Improve Generalization", 35th Conf. on Neural Information Processing Systems (NeurIPS 2021), Dec. 2021. [Link]

A40. V. Malik, R. Ghosh and M. Motani, "Achieving Low Complexity Neural Decoders via Iterative Pruning", Workshop on ML for Systems at NeurIPS 2021, Dec. 2021. [Link]

A39. D. Ho, I.B.H. Tan, and M. Motani, "Prognosticating Colorectal Cancer Recurrence using an Interpretable Deep Multi-view Network", Machine Learning for Health 2021 (ML4H), Proceedings for Machine Learning Research (PMLR), Dec. 2021. [Link]

A38. D. Ho, I.B.H. Tan, and M. Motani, "Predictive models for colorectal cancer recurrence using multi-modal healthcare data", ACM Conference on Health, Inference, and Learning (ACM-CHIL 2021), Virtual Conference, Apr. 2021. [Link]

A37. J.C.M. Tan and M. Motani, "DropNet: Reducing Neural Network Complexity via Iterative Pruning", International Conference on Machine Learning (ICML) 2020, Virtual Conference, July 2020. [Link]

A36. R. Bhat, R. Vaze, and M. Motani, "Age of Information Minimization in Fading Multiple Access Channels", IEEE INFOCOM Age of Information Workshop, Virtual Conference, July 2020. [Link] [Link]

A35. C.T. Leung, R. Bhat, and M. Motani, "Multi-Label and Concatenated Neural Block Decoders", IEEE ISIT 2020, Virtual Conference, June 2020. [Link]

A34. S. Liu and M. Motani, "Exploring Unique Relevance for Mutual Information based Feature Selection", NeurIPS 2019 Workshop on Information Theory & Machine Learning (ITML), Vancouver, Canada, Dec. 2019. [Link]

A33. S. Liu and M. Motani, "Long-range Prediction of Vital Signs Using Generative Boosting via LSTM Networks", NeurIPS 2019 Workshop on Machine Learning for Health (ML4H), Vancouver, Canada, Dec. 2019. [Link]

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C75. W. Wang, L. Ong and M. Motani, "Transmission Schedule Optimization for Half Duplex Multiple-Relay Networks", in WiOpt 2009, Seoul, Korea, June 2009.

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C49. L. Ong and M. Motani, "The Capacity of the Single Source Multiple Relay Single Destination Mesh Network", ISIT 2006, July 2006.

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C40. A.T. Hoang and M. Motani, "Exploiting Wireless Broadcast in Spatially Correlated Sensor Networks", ICC 2005, May 2005.

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C31. A.T. Hoang and M. Motani, "Decoupling Multiuser Cross-Layer Adaptive Transmission", ICC 2004, May 2004.

C30. T. Mao, M. Motani, and C.C. Ko, "Space-time Coding for Narrowband Mutiuser Composite Fading Systems", VTC 2004, May 2004.

C29. W.W. Ng and M. Motani, "Performance Evaluation of the Unified Linear Multiuser Receiver", VTC 2004, May 2004.

C28. A.T. Hoang and M. Motani, "Adaptive Sensing and Transmitting for Increasing Lifetime of Energy Constrained Sensor Networks", 38th Annual Conference on Information Sciences and Systems, Mar. 2004.

C27. M. He and M. Motani, "A Unified Approach for The Performance Analysis of Unitary Space-Time Block Codes", 38th Annual Conference on Information Sciences and Systems, Mar. 2004.

C26. V. Srivatsava and M. Motani, "Combining communication and queuing with delay constraints in wireless ad-hoc networks", In Proceedings of Int'l Conference on Information, Communications and Signal Processing and IEEE Pacific-Rim Conference On Multimedia, Dec. 2003.

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C23. M. Motani and A.T. Hoang, "An Instance of Multiuser Diversity in Wireless Networks", ISIT 2003, June 2003.

C22. K. Li and M. Motani, "The Error Distribution of Linear Block Codes", ISIT 2003, June 2003.

C21. M. Motani, T.J. Lim and R. Doostnejad, "Receiver Orthogonal Space-time Spreading for Downlink Multiuser Multi-antenna Communications", Canadian Workshop on Information Theory, May 2003.

C20. A.T. Hoang and M. Motani, "Buffer and Channel Adaptive Modulation for Transmission over Fading Channels", in *Proceedings of IEEE Int'l Conference on Communications (ICC)* (Alaska, USA), May 2003.

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C9. M. Motani and D.R. Brown, "On the Convergence of Linear Parallel Interference Cancellation", In *Int'l Symp. on Inform. Th.* (Washington, D.C. USA), June 2001.

C8. M. Motani, T.J. Lim, A.J. Grant, "Robustness of Low Complexity Optimal Multiuser Detection", In *Proc. Int'l Conf. Comm. Sys. (ICCS)* (Singapore), Nov. 2000.

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C6. M. Motani, V. Veeravalli and C. Heegard, "On Capacity and Spreading in CDMA Systems", In *Proceedings of Int'l Symp. on Information Theory* (Sorrento, Italy), June 2000.

C5. M. Motani and V.V. Veeravalli, "The coding-spreading tradeoff in CDMA systems using convolutional codes and direct sequence spreading", Invited Paper In *Proceedings of CISS 2000* (Princeton, NJ), Mar. 2000.

C4. M. Motani, V. Veeravalli, and C. Heegard, "The Capacity Loss due to Spreading in Multiple Access Systems", In *Proceedings of ICICS'99* (Singapore), Dec. 1999.

C3. M. Motani and C. Heegard, "Computing Weight Distributions of Convolutional Codes via Shift Register Synthesis", In *13th Applied Algebra and Error Correcting Codes Symp.* (Honolulu, HI), Nov. 1999.

C2. M. Motani, "Generalized Shift Register Synthesis", presented at the *New York Regional Graduate Mathematics Conference* (Syracuse, NY), Arpil 10, 1999.

C1. M. Motani and C. Heegard, "The Viterbi Algorithm Meets The Key Equation", In *Proceedings of Int'l Symp. on Information Theory* (Boston, MA), Aug. 1998.

Patents

P11. V. Srinivasan, M. Motani, and K.K. Yap, "System and method for searching physical objects", United States Patent, Patent No. US 8,749,378 B2, issued 10 Jun. 2014,

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P7. M. Motani and V. Srinivasan, "Matching queries in a network", United States Patent, Patent No. US 8,271,522 B2, issued 18 Sep. 2012.

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P5. "A System for Managing and Organizing Information By Social Groups", US Provisional Application No.: 61/427,014, Dec. 2010.
P4. M. Motani and V. Srinivasan, "A method for automatic contact tracing", US Provisional application filed, Jan. 2006.
P3. KK Yap, WL Yeow, M. Motani and CK Tham, "A method for employing directional antennas in networks", US Provisional application filed, Jan. 2006.
P2. M.H. Phung, K.C. Chua, M. Gurusamy, M. Motani, "Optical Burst Switching", PCT filed, Feb. 2005.
P1. M. Motani, S. Govindan, and P.Y. Kong, " A method for active queue management", PCT filed, Dec. 2002.

Invited Talks

T42. "Information Theoretic Perspectives on Generalization",
- *Seminar*, Princeton University, USA, Jul. 3, 2024.

T41. "Generative AI and Problem Solving",
- *TGIF@CDE Seminar*, National University of Singapore, Singapore, 26 Jan. 2024.

T40. "Sliced Mutual Information Measures for Studying Generalization & Explainability in Deep Neural Networks",
- *Seminar*, Princeton University, USA, Aug. 8, 2023.

T39. "Internet-Information-Intelligence: Unifying B5G/6G and AI",
- *Wireless World Research Forum Huddle 2023 Workshop*, Singapore, 8 May 2023.

T38. "Ethical AI in Healthcare Panel Discussion",
- *Duke-NUS Medical School/SingHealth Seminar on AI in Healthcare*, Singapore, 17 Apr 2023.

T37. "Studying Generalization in Deep Neural Networks",
- *Information Theory & Applications Workshop*, San Diego, CA, USA, Feb. 14, 2023.
- *Information Theory and Data Science Workshop*, Institute for Mathematical Sciences, National University of Singapore, Singapore, Jan. 18, 2023.

T36. "Some Thoughts on Generalization in Deep Learning",
- *CSML and ECE Seminar*, Princeton University, USA, Jun. 14, 2022.

T35. "Masterclass: Artificial Intelligence: Beginnings, Applications, and Limits"
- *NUS Engineering Learning Festival 2021*, National University of Singapore, Singapore, Feb. 23, 2021.

T34. "AI in the New Normal"
- *NUS SCALE 'Data and AI Among Us' Webinar*, National University of Singapore, Singapore, Feb. 4, 2021.

T33. "Towards Equivariant CNN Architectures"
- *US-SG Workshop on AI*, Organized by the Ministry of Defence, Singapore, Dec. 01, 2020.

T32. "TechChat: Big Data and AI in Engineering"
- *Institute for Engineering Leadership TechChat*, National University of Singapore, Singapore, Mar. 27, 2019.

T31. "On Skip-Sliding Window Codes"
- *Japan-Singapore Workshop on Coding and Information Theory*, Nanyang Technological University, Singapore, Mar. 6, 2018.

T30. "On Gaussian Mixture Noise Channels with Minimum and Peak Amplitude Constraints"
- *Conference on Information Sciences and Systems*, Princeton University, Princeton, NJ, Mar. 21, 2018.

T29. "Skip-Sliding Window Codes"
- *Information Theory & Applications Workshop*, Catamaran Hotel & Resort, San Diego, CA, Feb. 12, 2018.

T28. "Performance of Energy-Harvesting Receivers with Batteries having Internal Resistance"
- *IEEE WCNC Workshop: Energy Harvesting and Remotely Powered Wireless Communication for the IoT*, San Francisco, CA, Mar. 19, 2017.

T27. "Asymptotic Rates for Subblock Constrained Codes"
- *Information Theory & Applications Workshop*, Catamaran Hotel & Resort, San Diego, CA, Feb. 14, 2017.

T26. "Coding for Constrained Communication Systems"
- *2016 Shannon Workshop*, Shanghai Jiao Tong University, Shanghai, China, Dec. 14, 2016.

T25. "What we can learn from a bit of information theory"
- *Shannon Centenary in Singapore*, National University of Singapore, Singapore, May 5, 2016.

T24. "Coding for constrained communication systems"
- *Information Theory & Applications Workshop*, Scripps Seaside Forum, La Jolla, CA, Feb. 2, 2016.
- *H.V. Poor Group Meeting Seminar*, Princeton University, NJ, Feb. 8, 2016.

T23. "On the capacity and applications of codes with subblock constraints"
- *Information Theory & Applications Workshop*, Scripps Seaside Forum, La Jolla, CA, Feb. 6, 2015.

T22. "On code design for simultaneous energy and information transfer"
- *Information Theory & Applications Workshop*, Catamaran Hotel & Resort, San Diego, CA, Feb. 11, 2014.

T21. "On the discrete memoryless interference channel in the finite blocklength regime"
- *Information Theory & Applications Workshop*, Catamaran Hotel & Resort, San Diego, CA, Feb. 12, 2013.

T20. "On linear deterministic interference channels with partial feedback "
- *Information Theory & Applications Workshop*, Catamaran Hotel & Resort, San Diego, CA, Feb. 6, 2012.

T19. "On Throughput and Delay Scaling with Cooperative Spectrum Sharing"
- *Information Theory & Applications Workshop*, UCSD/CALIT2, San Diego, CA, February 8, 2011.

T18. "Intelligent Wireless Sensing & Networking to Support Sustainable Development"
- *Plenary Talk at Wireless World Research Forum 2010*, Penang, Malaysia, April 14, 2010.

T17. "Cooperative Wireless Networking – Theoretical & Experimental Approaches"
- *Invited Talk at Working Group 4 Session, WWRF 2010*, Penang, Malaysia, April 14, 2010.

T16. "Transmitter optimization for distributed Gaussian MIMO channels"
- *Information Theory & Applications Workshop*, UCSD/CALIT2, San Diego, CA, February 2, 2010.

T15. "Link Layer Behavior of Body Area Networks at 2.4 GHz"
- *Invited Talk at WISARD 2010 Workshop at COMSNETS 2010*, Bangalore, India, Jan. 5, 2010.

T14. "On the symbol-asynchronous Gausian multiple access channel"
- *Information Theory & Applications Workshop*, UCSD/CALIT2, San Diego, CA, February 10, 2009.

T13. "Understanding User Interactions in Real and Virtual Worlds"
- *Plenary Talk at Mobility Models Workshop at MobiHoc 2008*, Hong Kong, SAR, China, May 27, 2008.

T12. "Cross-Layer Design and Cooperation in Future Wireless Networks"
- *Plenary Talk at Wireless World Research Forum*, Ottawa, Canada, April 22-24, 2008.

T11. "Explorations in Delay Tolerant Applications"
- *Toronto Networking Seminar*, University of Toronto, 10 September 2007.
- *CSI Seminar Series*, University of Southern California, 7 September 2007.

T10. "Cooperative Networking"
- *Telecommunications & Networking Seminar*, University of Pennsylvania, 13 April 2007.
- *Institute for System Sciences Seminar*, Princeton University, 13 February 2007.
- *Networking, Communications & DSP Seminar*, University of California Berkeley, 5 February 2007.
- *CSI Seminar Series*, University of Southern California, 25 January 2007.

T9. "On achievable rates for relay channels"
- *Information Theory & Applications Workshop*, UCSD/CALIT2, San Diego, CA, January 30, 2007.

T8. 'Backward Decoding Strategies for the Relay Channel'"
- *MSRI Workshop: Mathematics of Relaying & Cooperation in Commun. Netw.*, MSRI/UC Berkeley , Berkeley, CA, April 12, 2006.

T7. "A comparison of two achievable rate regions for the interference channel"
- *Information Theory & Applications Workshop*, UCSD/CALIT2, San Diego, CA, February 7, 2006.

T6. "Heterogeneous Wireless Ad-hoc Sensor Networks"
- *A*Star UWB & Pervasive Computing Workshop*, National University of Singapore, Mar. 11, 2005.

T5. "Research Directions in Wireless Ad-hoc and Sensor Networks"
- *NUS/NPS Joint Seminar*, Naval Postgraduate School, Monterrey, CA, USA, Nov. 5, 2004.

T4. "Myopic Coding for Wireless Sensor Networks"
- *Sensor Network Seminar Series*, University of Toronto, Toronto, ON, Canada, July 19, 2004.

T3. "Design Considerations in Multiuser Wireless Communication Networks"
- *Communications Seminar Series*, University of Toronto, Toronto, ON, Canada, December 2, 2002.

T2. "The pulse of modern wireless communications"
- *Centre for Wireless Communications Annual Seminar*, Suntec Singapore, Singapore, September 13, 2001.

T1. "The coding-spreading tradeoff in CDMA systems using convolutional codes and direct sequence spreading"
- *Conference on Information Sciences and Systems*, Princeton University, Princeton, NJ, March 16, 2000.