ABHINAV SINHA

Indian Institute of Technology • Bombay (Mumbai), India
https://sinha-abhinav.github.io/ • sinha.abhinav@iitb.ac.in

EDUCATION

Indian Institute of Technology, Bombay *July 2018 - Present*
Doctor of Philosophy (Ph.D.)
Specialization: *Aerospace engineering (Dynamics & Control)*

Indian Institute of Engineering Science and Technology, Shibpur *July 2016 - May 2018*
Master of Technology (M.Tech) Overall GPA: 9.28/10
Specialization: *Mechatronics*
Thesis: *Event-based cooperative control of multi-agent systems for odor source localization in an unknown environment*

Kalinga Institute of Industrial Technology, Bhubaneswar, India *July 2010 - May 2014*
Bachelor of Technology (B.Tech) Overall GPA: 8.46/10
Major: *Electronics & Instrumentation engineering*
Thesis: *Automated PID tuning of line follower robot*

WORK EXPERIENCE

Indian Institute of Technology, Bombay (Mumbai), India July 2018 - Present
Teaching Assistant

- Teaching assistant for navigation, guidance and control courses at undergraduate and graduate level

Central Scientific Instruments Organisation, India June 2017 - May 2018
Research work at master's level

- Designed robust cooperative control protocols for multi-agent systems tasked to locate source of an odor in an unknown environment characterized by heavy turbulence

TATA Consultancy Services Limited September 2014 - July 2016
Consultant, Automation and Control Systems

- Worked on tools like WinCC SCADA, Kepware, Step7, Prosoft, etc. for Control System Integration (CSI); GE IP Proficy Suite, SAP ME, etc. for Manufacturing Execution Systems (MES); and SAP MII for Enterprise Manufacturing Intelligence (EMI)
- Integrated data from factory floor machines with business layers for various productivity applications like reporting, dashboarding, monitoring, etc.
- Configured multi master and sensor data integration directly to cloud. Provided plant network security and segmentation for several new manufacturing units
- Worked towards enhancing efficiency in Manufacturing Operations Management (MOM)

TATA Consultancy Services Limited November 2015
Visiting faculty at TCS Global Learning Center

- Visited TCS Global Learning Centre at Trivandrum, India to impart hands on training on Manufacturing Operations Management (MOM) and the role of web technologies such as HTML, CSS, JavaScript, etc. in it

- Introduced concepts of flow of data from factory floor to managerial layer and cloud; machine logic and business logic; and other aspects of role of engineering and IT in manufacturing

PUBLICATIONS

Refereed Journals

[J1] Abhinav Sinha, R. Kumar, R. Kaur and R. K. Mishra, "Consensus based odour source localisation by multiagent systems under resource constraints", *IEEE Transactions on Cybernetics* (under review)

[J2] R. K. Mishra and Abhinav Sinha, "Event-triggered sliding mode based consensus tracking in second order heterogeneous nonlinear multi-agent systems", *European Journal of Control* (accepted, 2018)

[J3] Abhinav Sinha and R. K. Mishra, "Consensus in first order nonlinear heterogeneous multi-agent systems with event-based sliding mode control", *International Journal of Control* (accepted, 2018)

[J4] Abhinav Sinha, R. Kumar, R. Kaur and A. P. Bhondekar, "Consensus based odour source localisation by multiagent systems", *IEEE Transactions on Cybernetics* (early access, 2018)

[J5] Abhinav Sinha and R. K. Mishra, "Control of a nonlinear continuous stirred tank reactor via event triggered sliding modes", *Chemical Engineering Science*, vol. 187, pp. 52–59, 2018

[J6] T. Majumder, R. K. Mishra, Abhinav Sinha, S. S. Singh and P. K. Sahu, "Congestion Control in Cognitive Radio Networks with Event-triggered Sliding Mode", *AEU– International Journal of Electronics and Communication*, vol. 90, pp. 155–162, 2018

[J7] Abhinav Sinha and R. K. Mishra, "Nonlinear autonomous altitude control of miniature helicopter UAV based on sliding mode methodology", *International Journal of Electronics and Communication Technology, vol. 61, spl.- 1, Jan- Mar 2015*

Peer Reviewed Conference Proceedings

[C1] Abhinav Sinha, R. Kumar and R. Kaur, "Resource efficient control strategy for consensus based odour source localisation by multiagent systems", *accepted, 2018 IEEE Symposium Series on Computational Intelligence, 18^{th}-21^{st} November 2018*

[C2] Abhinav Sinha and R. K. Mishra, "Convergence of multi-agent systems to unknown source of an odor", *accepted, 2018 IEEE 3^{rd} International Conference for Convergence in Technology, 7^{th}-8^{th} April 2018*

[C3] Abhinav Sinha and R. K. Mishra, "Distributed cooperative control of multi agent systems for odor source localization", *accepted, Third International Conference on Advances in Control and Optimization Of Dynamical Systems (ACODS 2018), 18^{th}-22^{nd} February, 2018*

[C4] Abhinav Sinha and R. K. Mishra, "Temperature regulation in a Continuous Stirred Tank Reactor using event triggered sliding mode control", *IFAC PapersOnLine*, vol. 51, no. 1, pp. 401–406, 2018

[C5] T. Majumder, Abhinav Sinha, R. K. Mishra, S. S. Singh and P. K. Sahu, "Robust nonlinear congestion controller for time delayed and uncertain cognitive radio based wireless network", *in Proc., 2015 IEEE Power, Communication and Information Technology Conference (PCITC), Bhubaneswar, India, 15^{th}-17^{th} October, 2015*

[C6] Abhinav Sinha and R. K. Mishra, "Sliding mode controller design for high performance of permanent magnet stepper motor", *in Proc., 2015 IEEE International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), Coimbatore, India, 19^{th}-20^{th} March, 2015*

[C7] Abhinav Sinha and R. K. Mishra, "Robust altitude tracking of a miniature helicopter UAV based on sliding mode", *in Proc., 2015 IEEE International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), Coimbatore, India, 19th-20th March, 2015*

[C8] T. Majumder, Abhinav Sinha, R. K. Mishra, S. S. Singh and P. K. Sahu, "Robust nonlinear congestion controller for cognitive radio based wireless network", *in Proc., 2015 IEEE International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), Coimbatore, India, 19th-20th March, 2015*

[C9] Abhinav Sinha, R. K. Mishra and S. Jaiswal, "Robust and Smooth Nonlinear Control of an Industrial Robot for Automated Pick and Place", *in Proc., 2015 IEEE International Conference on Computing Communication Control and Automation (ICCUBEA), Pune, India, 26th-27th February, 2015*

[C10] Abhinav Sinha, P. Prasoon, P. K. Bharadwaj and A. C. Ranasinghe , "Nonlinear Autonomous Control of a Two-Wheeled Inverted Pendulum Mobile Robot Based on Sliding Mode", *in Proc., 2015 IEEE International Conference on Computational Intelligence and Networks (CINE), Bhubaneswar, India, 12th-13th January, 2015*

[C11] A. C. Ranasinghe, K. Rasnayake, Abhinav Sinha and K. K. Rasnayake, "Perturbing effect compensation technique for smart sensors", *in Proc., 7th IEEE International Conference on Information and Automation for Sustainability (ICIAfS), Colombo, Sri Lanka, 22nd-24th December, 2014*

[C12] Abhinav Sinha and R. K. Mishra, "Smooth sliding mode controller design for robotic arm", *in Proc., 2013 International Conference on Control, Automation, Robotics and Embedded Systems (CARE), Jabalpur, India, 16th-18th December, 2013*

Book Chapters

[BC1] Abhinav Sinha and R. K. Mishra, "Smooth sliding mode control of a nonlinear CSTR using an inverse hyperbolic function-based law, *Foundations and Frontiers in Computer, Communication and Electrical Engineering: Proceedings of 3rd International Conference C2E2, Mankundu, West Bengal, India, 15th-16th January, 2016*

[BC2] T. Majumder, Abhinav Sinha, R. K. Mishra, S. S. Singh and P. K. Sahu, "Congestion control in Cognitive Radio Networks using fractional order rate reaching law based sliding modes, *Foundations and Frontiers in Computer, Communication and Electrical Engineering: Proceedings of 3rd International Conference C2E2, Mankundu, West Bengal, India, 15th-16th January, 2016*

Articles of archival quality

[A1] Abhinav Sinha, R. Kaur, R. Kumar and A. P. Bhondekar, "Cooperative control of multi-agent systems to locate source of an odor", *ArXiV e-prints, November 2017*

INTERNSHIPS

TATA Steel May 2013 - June 2013

- Learnt how TATA Steel manages everything from science and technology to management, planning to execution and conception of idea to product development
- Carried out applied study of functioning of one of the largest synchronous motors in Asia commissioned at TATA Steel which uses Siemens Sinamics drive system to operate, and triggers the blower which is connected to blast furnaces
- Carried out a case study of architecture of computer controlled systems in manufacturing

Bharat Sanchar Nigam Limited May 2012 - June 2012

- Learnt the functioning of telecom system and was able to do a thorough study of the functioning and behavior of telecom system and exchanges and other networks

- Attended theoretical courses on transmission of signals and telecom operations, WiMax technologies, multimedia, internet and voice services, broadband, etc.
- Carried out field study of Base Transceiver Stations in the local telecom circle

POSITIONS OF RESPONSIBILITY

Reviewer of Refereed Journals

- IET Generation, Transmission and Distribution
- Nonlinear Dynamics, Springer
- IEEE Transactions on System, Man and Cybernetics: Systems
- IEEE Access
- Information Sciences, Elsevier
- Asia Pacific Journal of Chemical Engineering, John Wiley & Sons

Reviewer of Peer Reviewed Conferences

- Indian Control Conference, American Control Conference, 14th IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications, IEEE International Conference on Advances in Computing, Communications and Informatics, IEEE 5th International Conference on Control, Decision and Information Technologies, International Symposium on Intelligent Systems Technologies and Applications, International Conference on Applied Soft Computing and Communication Networks (ACN), 3rd IEEE International Conference on Electronic Design, IEEE 1st International Conference on Power Electronics, Intelligent Control and Energy Systems, 2016 2ndAdvanced Research in Material Sciences, Manufacturing, Mechanical and Mechatronic Engineering Technology International Conference, 1st Environmental and Civil Engineering Technology International Conference, 12th IEEE India International Conference on Electronics, Energy, Environment, Communication, Computer and Control, 2015 IEEE International Conference on Signal Processing & Data Mining, Mechanical and Manufacturing Engineering Conference, Springer International Conference on Computing in Mechanical Engineering, 2015 Global Summit on Computer and Information Technology, 2015 World Symposium on Mechatronics Engineering & Applied Physics, 2015 IEEE International Conference on Engineering and Computational Innovative Sciences, IEEE 1st International Conference on Signal Processing, Informatics, Communication and Energy Systems, 2014 IEEE International Conference on Control Automation & Applied Mechanics, 2014 IEEE International Conference on Computer Applications & Aided Diagnosis, 2014 IEEE International Conference on Computer Vision & Image Analysis.

KIIT Robotics Society June 2011- May 2014
Student Instructor & Coordinator

- Managed students directly by teaching and training them about innovation in technology and science related to robotics and embedded systems. Control systems, automation and signal processing were integral parts of the course. From theory to applications, hobbyist electronics to complex machines, there were several other major areas of engineering which were explored and a forum of discussion over the same was created. Apart from academics, there were other things such as event management, competitions that were regularly organized to promote interest and developments in robotics and embedded systems.

PROFESSIONAL MEMBERSHIPS

International Federation of Automatic Control (IFAC) January 2018 - present
Member, Automatic Control and Dynamical Optimization Society (ACDOS)

Asian Control Association April 2018 - present
Member

AWARDS, ACHIEVEMENTS AND HONORABLE MENTIONS

MHRD Postgraduate GATE fellowship July 2016 - present
Ministry of Human Resource Development, India

- Awarded for qualifying Graduate Aptitude Test in Engineering (GATE) with 96 percentile, a computer based standardized test conducted jointly by Indian Institute of Science and Indian Institutes of Technology on behalf of the National Co-ordination Board– GATE, Department of Higher Education, Ministry of Human Resource Development, Government of India for post graduate education in engineering and graduate employments in various Public Sector Undertakings under Government of India

Champions of Initial Learning Program (ILP) December 2015
TATA Consultancy Services Limited

- Awarded for contribution towards Engineering and Industrial Services (EIS)- Talent Development in Manufacturing Operations Management domain
- Associated with the position of visiting faculty at TCS

On the spot award July 2015
TATA Consultancy Services Limited

- Awarded for the research work done in the field of Control Systems and allied areas, and for serving as research reviewer for many technical peer reviewed conferences in India and abroad

Best paper award February 2015
IEEE Computer Society/IEEE Pune Section

- Awarded Best Paper of the session track in Robotics at IEEE International Conference on Computing, Communication, Control and Automation, Pune, India

Outstanding contribution award August 2013
KIIT Robotics Society, KIIT University

- Awarded for technical contribution towards the robotics society

Top achiever award March 2012
National Institute of Technology Jamshedpur, India

- Awarded for achieving top score in the autonomous robotics event in Ojass 2012, an annual techno-management fest of NIT Jamshedpur, India

Other honorable mentions

- Outstanding organizer, independent autonomous robotic event, KIIT University (2013)
- Gold Medalist, Regional Mathematics Olympiad (2009)
- Prefect & Head Boy, High School (2008)
- Winner, Sanskrit couplets recitation competition (2006)
- Prefect & Head Boy, Middle School (2004)
- Winner of GK quiz competition (2004)
- Featured in local newspaper as young scientific talent (2003)
- Winner of calligraphy competition, Junior School (2000)

COMPUTER SKILLS

Basic	C++, JAVA, JAVAScript, VBscript, Microsoft .Net, Mathematica, Xilinx ISE, ARM cortex microcontrollers, LabView, Adobe Photoshop
Intermediate	C, AVR microcontrollers, HTML, CSS
Expert	MATLAB, Microsoft Office suite, Linux, Microsoft Windows family, LaTeX

RELEVANT COURSES TAKEN

Calculus & Linear Algebra, Ordinary Differential Equations, Probability and Statistics, Basic Optimization Techniques, Control Systems, Signals and Systems, Circuits & Networks, Digital Signal Processing, Digital Electronics, Microprocessors & Microcontrollers, Industrial Instrumentation & Control, Analog Electronics, Power Electronics, Digital Image Processing, Analytical Instrumentation, Biomedical Instrumentation, Fiber Optic Instrumentation, Telecommunication Switching & Network Protocols, Communication Engineering, Electrical Machines, Thermodynamics, Power Plant Instrumentation, Material Science, VLSI, Object Oriented Programming, Mechatronics System Design, Robotics, Smart Materials, MEMS, Navigation and Guidance.