# ABHINAV SINHA

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## **EDUCATION**

## **m** Indian Institute of Technology Bombay

2018 - 2020

Doctor of Philosophy (Ph.D.), Aerospace Engineering

Advisor : Dr. Shashi Ranjan Kumar

## INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY

2016 - 2018

Master of Technology (M.Tech.), Mechatronics

Advisor: Dr. Ritesh Kumar (CSIR-CSIO), Dr. Rishemjit Kaur (CSIR-CSIO)

## **M** KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY

2010 - 2014

Bachelor of Technology (B.Tech.), Electronics and Instrumentation



## EXPERIENCE

## Jan 2019- | Indian Institute of Technology Bombay, Mumbai, India

Present Teachina Assistant

- > AE 305 : Flight Mechanics II, Spring 2019, 2020, and 2021
- > AE 717: Aircraft Flight Dynamics, Spring 2019, 2020, and 2021
- > AE 410: Navigation and Guidance, Fall 2019 and 2020
- > AE 641: Introduction to Navigation and Guidance, Fall 2019 and 2020

## Jun 2019- | Central Scientific Instruments Organisation, Chandigarh, India

May 2018 | Research Student

## Sep 2014- TATA Consultancy Services Limited, Pune, India

Jul 2016 | Assistant System Engineer, Consulting in Manufacturing, Automation and Control Systems

#### Nov 2015 | TATA Consultancy Services Limited, Trivandrum, India

Visiting faculty at TCS Global Learning Center

## Jun 2011- Kalinga Institute of Industrial Technology, Bhubaneswar, India

May 2014 | Instructor and Coordinator, KIIT Robotics Society



## Publications

## REFEREED JOURNALS- PUBLISHED/IN PRESS

- [J1] Abhinav Sinha, S. R. Kumar, and D. Mukherjee, "Cooperative Salvo Based Active Aircraft Defense Using Impact Time Guidance", IEEE Control Systems Letters, vol. 5, no. 5, pp. 1573–157, 2021 (also accepted for presentation at 2021 American Control Conference, New Orleans, Louisiana, USA).
- [J2] Abhinav Sinha, S. R. Kumar, and D. Mukherjee "Three-Dimensional Nonlinear Cooperative Salvo Using Event-Triggered Strategy", AIAA Journal of Guidance, Control, and Dynamics, vol. 44, no. 2, pp. 328–342, 2021.

- [J3] Abhinav Sinha, S. R. Kumar, and D. Mukherjee, "Three-Dimensional Guidance With Terminal Time Constraints for Wide Launch Envelops", *AIAA Journal of Guidance, Control, and Dynamics*, vol. 44, no. 2, pp. 343–359, 2021.
- [J4] Abhinav Sinha, and S. R. Kumar, "Super-Twisting Control Based Cooperative Salvo Guidance Using Leader-Follower Approach", *IEEE Transactions on Aerospace and Electronic Systems*, vol. 56, no. 5, pp. 3556–3565, 2020.
- [J5] 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*, vol. 93, no. 4, pp. 858–871, 2020.
- [J6] Abhinav Sinha, R. Kumar, R. Kaur and R. K. Mishra, "Consensus-Based Odor Source Localization by Multiagent Systems Under Resource Constraints", *IEEE Transactions on Cybernetics*, vol. 50, no. 7, pp. 3254–3263, 2020.
- [J7] Abhinav Sinha, R. Kumar, R. Kaur and A. P. Bhondekar, "Consensus-Based Odor Source Localization by Multiagent Systems", *IEEE Transactions on Cybernetics*, vol. 49, no. 12, pp. 4450–4459, 2019.
- [J8] 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*, vol. 45, pp. 30–44, 2019.
- [J9] T. Majumder, R. K. Mishra, Abhinav Sinha, S. S. Singh, and P. K. Sahu, "Robust congestion control in cognitive radio network using dynamic event-triggered sliding mode", *International Journal of Communication Systems*, vol. 33, no. 10, pp. e4206, 2019.
- [J10] 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.
- [J11] 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.
- [J12] 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.

#### REFEREED JOURNALS- UNDER REVIEW

- [J13] Abhinav Sinha, S. R. Kumar, and D. Mukherjee, "Nonsingular Impact Time Guidance and Control Using Deviated Pursuit", *Aerospace Science and Technology*, revision submitted.
- [J14] Abhinav Sinha, S. R. Kumar, and D. Mukherjee "Time-constrained Integrated Guidance and Control For Various Target Motions", under review.
- [J15] Abhinav Sinha, S. R. Kumar, and D. Mukherjee, "Cooperative Integrated Guidance and Control Design for Simultaneous Interception", under review.

#### REFEREED JOURNALS- TO BE SUBMITTED

[J16] Abhinav Sinha, S. R. Kumar, and D. Mukherjee, "Consensus-based Simultaneous Interception of Moving Targets using Deviated Pursuit", to be submitted.

## **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*, Taylor and Francis, 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*, Taylor and Francis, 2016.

## Peer Reviewed Conference Proceedings

- [C1] Abhinav Sinha, S. R. Kumar, and D. Mukherjee, "Integrated Guidance and Control For Dual Control Interceptors Under Impact Time Constraint", *in Proc., Guidance, Navigation, and Control Conference (AIAA SciTech Forum)*, Virtual Event, 11<sup>th</sup>-15<sup>th</sup> and 19<sup>th</sup>-21<sup>st</sup> Jan 2021.
- [C2] Abhinav Sinha, S. R. Kumar, and D. Mukherjee, "Three-Dimensional Nonlinear Interception Time Guidance for Stationary Targets", *in Proc., American Control Conference (ACC)*, Denver, USA, 1<sup>st</sup>-3<sup>rd</sup> Jul 2020.
- [C3] Abhinav Sinha, D. Mukherjee, and S. R. Kumar, "Deviated Pursuit based Cooperative Simultaneous Interception against Moving Targets", *in Proc., American Control Conference (ACC)*, Denver, USA, 1<sup>st</sup>-3<sup>rd</sup> Jul 2020.
- [C4] H. Bishwash, Abhinav Sinha, and S. R. Kumar, "Deviated Pursuit Based Nonlinear Impact-Time Guidance with Finite-Time Convergence", *IFAC PapersOnLine*, vol. 53, no. 1, pp. 93–98, 2020, Awarded Best Paper.
- [C5] Abhinav Sinha, and S. R. Kumar, "Super-Twisting Control Based Impact Time Constrained Guidance", in Proc., Guidance, Navigation, and Control Conference (AIAA SciTech Forum), Orlando, USA, 6<sup>th</sup>-10<sup>th</sup> Jan 2020.
- [C6] Abhinav Sinha, S. R. Kumar, and D. Mukherjee, "Consensus Based Nonlinear Guidance for Cooperative Salvo", *in Proc.*, 6<sup>th</sup> Indian Control Conference (ICC), Hyderabad, India, 18<sup>th</sup>-20<sup>th</sup> Dec 2019.
- [C7] 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, Bengaluru, India, 18<sup>th</sup>-21<sup>st</sup> Nov 2018.
- [C8] Abhinav Sinha, and R. K. Mishra, "Convergence of multi-agent systems to unknown source of an odor", in Proc., 2018 IEEE 3<sup>rd</sup> International Conference for Convergence in Technology, Pune, India, 7<sup>th</sup>-8<sup>th</sup> Apr 2018.
- [C9] 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.
- [C10] 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<sup>th</sup>-17<sup>th</sup> Oct 2015.
- [C11] 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<sup>th</sup>-20<sup>th</sup> Mar 2015.
- [C12] 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, 19<sup>th</sup>-20<sup>th</sup> Mar 2015.
- [C13] 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, 19<sup>th</sup>-20<sup>th</sup> Mar 2015.
- [C14] 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, 26<sup>th</sup>-27<sup>th</sup> Feb 2015, Awarded Best Paper.

- [C15] 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, 12<sup>th</sup>-13<sup>th</sup> Jan 2015.
- [C16] 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, 22<sup>nd</sup>-24<sup>th</sup> Dec 2014.
- [C17] 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, 16<sup>th</sup>-18<sup>th</sup> Dec 2013.

## ARTICLES OF ARCHIVAL QUALITY

- [A1] Abhinav Sinha, S. R. Kumar, and D. Mukherjee, "Integrated Guidance and Control Design For Time-Constrained Interception", *IEEE TechRxiv*, 2020.
- [A2] 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*, 2017.

# PROFESSIONAL SERVICES

## REVIEWER OF REFEREED JOURNALS

- > IEEE Transactions on Automatic Control
- > International Journal of Control
- > IEEE Transactions on Control Systems Technology
- > International Journal of Robust and Nonlinear Control
- > IEEE Transactions on System, Man and Cybernetics: Systems
- > IEEE Transactions on Cybernetics
- > Journal of The Franklin Institute
- > European Journal of Control
- > IET Control Theory and Applications
- > AIAA Journal of Guidance, Control, and Dynamics
- > IEEE Control Systems Letters
- > IEEE Transactions on Fuzzy Systems
- > IEEE Transactions on Aerospace and Electronic Systems
- > IEEE Transactions on Neural Networks and Learning Systems
- > Asian Journal of Control
- > Information Sciences
- > IEEE Transactions on Industrial Informatics
- > ISA Transactions
- > Journal of Process Control
- > IEEE Access
- > IEEE Sensors Letters
- > Nonlinear Dynamics
- > Advances in Space Research
- > IET Generation, Transmission and Distribution
- > Asia Pacific Journal of Chemical Engineering
- > Journal of Computational Science
- > Neurocomputing
- > Swarm Intelligence
- > IET Power Electronics
- > Journal of Aerospace Engineering
- > IEEE Journal of Emerging and Selected Topics in Industrial Electronics

## REVIEWER OF PEER REVIEWED CONFERENCES (SELECTED)

- > Americal Control Conference (ACC)
- > Control and Decision Conference (CDC)
- > Indian Control Conference (ICC)
- > European Control Conference (ECC)
- > IFAC World Congress
- > International Conference on Control, Decision and Information Technologies (CoDIT)
- > International Conference on Control and Automation (ICCA)
- > Mediterranean Conference on Control and Automation (MED)
- > IFAC Advances in Control and Optimization of Dynamical Systems (ACODS)
- > International Conference on Advances in Computing, Communications and Informatics (ICACCI)



## PROFESSIONAL MEMBERSHIPS

- > Institute of Electrical and Electronics Engineers (IEEE)
- > International Federation of Automatic Control (IFAC)
- > American Institute of Aeronautics and Astronautics (AIAA)
- > Asian Control Association



## Awards, Achievements and Honorable Mentions

#### > ACC STUDENT TRAVEL GRANT

JUN 2020

American Automatic Control Council, USA

#### > ICC STUDENT SUPPORT

**DEC 2019** 

Indian Control Conference and IEEE-CSS

## > MHRD POSTGRADUATE GATE FELLOWSHIP

JUL 2016 - PRESENT

Ministry of Human Resource Development, India

#### > CHAMPIONS OF INITIAL LEARNING PROGRAMME (ILP)

**DEC 2015** 

TATA Consultancy Services Limited

## > On The Spot Award

**JUL 2015** 

TATA Consultancy Services Limited

#### > OUTSTANDING CONTRIBUTION AWARD

AUG 2013

KIIT Robotics Society, Kalinga Institute of Industrial Technology



# 66 REFERENCES

## Dr. Shashi Ranjan Kumar

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## Dr. Dwaipayan Mukherjee

**Assistant Professor** 

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