

ABHINAV SINHA




 <https://sinha-abhinav.github.io/>  abhinav.sinha@utsa.edu
 [linkedin.com/in/drabhinavsinha](https://www.linkedin.com/in/drabhinavsinha)  github.com/sinha-abhinav



WORK EXPERIENCE

Dec 2021- Present	THE UNIVERSITY OF TEXAS AT SAN ANTONIO , SAN ANTONIO, USA <i>Postdoctoral Fellow</i> , Host : Dr. Yongcan Cao
May 2021- Nov 2021	INDIAN INSTITUTE OF TECHNOLOGY BOMBAY , MUMBAI, INDIA <i>Postdoctoral Fellow</i> , Host : Dr. Shashi Ranjan Kumar
Jan 2019- May 2021	INDIAN INSTITUTE OF TECHNOLOGY BOMBAY , MUMBAI, INDIA <i>Teaching Assistant</i> <ul style="list-style-type: none">> 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, 2020, and 2021> AE 641 : Introduction to Navigation and Guidance, Fall 2019, 2020, and 2021
Jun 2019- May 2018	CENTRAL SCIENTIFIC INSTRUMENTS ORGANISATION , CHANDIGARH, INDIA <i>Research Student</i>
Sep 2014- Jul 2016	TATA CONSULTANCY SERVICES LIMITED , PUNE, INDIA <i>Assistant System Engineer, Consulting in Manufacturing, Automation and Control Systems</i>
Nov 2015	TATA CONSULTANCY SERVICES LIMITED , TRIVANDRUM, INDIA <i>Visiting faculty at TCS Global Learning Center</i>
Jun 2011- May 2014	KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY , BHUBANESWAR, INDIA <i>Instructor and Coordinator, KIIT Robotics Society</i>

EDUCATION

 INDIAN INSTITUTE OF TECHNOLOGY BOMBAY Doctor of Philosophy (Ph.D.), Aerospace Engineering <i>Advisor : Dr. Shashi Ranjan Kumar</i>	2018 - 2020
 INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY Master of Technology (M.Tech.), Mechatronics <i>Advisor : Dr. Ritesh Kumar (CSIR-CSIO), Dr. Rishemjit Kaur (CSIR-CSIO)</i>	2016 - 2018
 KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY Bachelor of Technology (B.Tech.), Electronics and Instrumentation	2010 - 2014

PUBLICATIONS

REFEREED JOURNALS– PUBLISHED/IN PRESS

- [J18] **Abhinav Sinha**, and Y. Cao, “Nonlinear Guidance Law for Target Enclosing with Arbitrary Smooth Shapes”, *AIAA Journal of Guidance, Control, and Dynamics*, 2022, in press.

- [J17] **Abhinav Sinha**, and S. R. Kumar, "Cooperative target capture using predefined-time consensus over fixed and switching networks", *Aerospace Science and Technology*, vol. 127, pp. 107686, 2022. [Preprint available at arXiv:2109.01338]
- [J16] **Abhinav Sinha**, S. R. Kumar, and D. Mukherjee, "Three-agent Time-constrained Cooperative Pursuit-Evasion", *Journal of Intelligent & Robotic Systems*, vol. 104, no. 28, pp. 1–27, 2022. [Preprint available at arXiv:2106.01895]
- [J15] **Abhinav Sinha**, S. R. Kumar, and D. Mukherjee, "Cooperative integrated guidance and control design for simultaneous interception", *Aerospace Science and Technology*, vol. 120, pp. 107262, 2022.
- [J14] **Abhinav Sinha**, S. R. Kumar, and D. Mukherjee, "Impact time constrained integrated guidance and control design", *Aerospace Science and Technology*, vol. 115, pp. 106824, 2021.
- [J13] **Abhinav Sinha**, S. R. Kumar, and D. Mukherjee, "Nonsingular impact time guidance and control using deviated pursuit", *Aerospace Science and Technology*, vol. 115, pp. 106776, 2021.
- [J12] **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. 1573–1578, 2021 (also accepted for presentation at 2021 American Control Conference, New Orleans, Louisiana, USA).
- [J11] **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.
- [J10] **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.
- [J9] **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.
- [J8] **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.
- [J7] **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.
- [J6] **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.
- [J5] 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.
- [J4] 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.
- [J3] **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.
- [J2] 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.
- [J1] **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/PREPARATION**

- [j6] **Abhinav Sinha** and Y. Cao, “Three-dimensional Guidance Law for Target Enclosing with Arbitrary Smooth Shapes”, under review.
- [j5] **Abhinav Sinha** and Y. Cao, “Three-dimensional Nonlinear Guidance Law for Target Circumnavigation”, under review.
- [j4] **Abhinav Sinha**, R. V. Nanavati, and S. R. Kumar, “Three-dimensional Nonlinear Impact Time Guidance using Predicted Interception Point”, under review.
- [j3] P. Ranjan, **Abhinav Sinha**, Y. Cao, D. Tran, D. Casbeer, and I. Weintraub, “Energy-efficient Ring Formation Control with Constrained Inputs”, under review.
- [j2] H. Bishwash, **Abhinav Sinha**, and S. R. Kumar, “Deviated Pursuit based Predefined-time Convergent Impact Time Guidance with Obstacle Avoidance”, under preparation.
- [j1] **Abhinav Sinha**, D. Mukherjee, and S. R. Kumar, “Consensus-based Simultaneous Interception of Moving Targets using Deviated Pursuit”, under review.

BOOK CHAPTERS

- [BC2] **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.
- [BC1] 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

- [C27] **Abhinav Sinha**, and Y. Cao, “A Nonlinear Guidance Law for Target Enclosing with Arbitrary Smooth Shapes”, in *Proc., Guidance, Navigation, and Control Conference (AIAA SciTech Forum)*, National Harbor, USA, 23rd-27th Jan 2023.
- [C26] P. K. Ranjan, **Abhinav Sinha**, Y. Cao, D. Tran, D. Casbeer, and I. Weintraub, “Energy-efficient Ring Formation Control with Constrained Inputs”, in *Proc., Guidance, Navigation, and Control Conference (AIAA SciTech Forum)*, National Harbor, USA, 23rd-27th Jan 2023.
- [C25] S. Kumar, S. R. Kumar, and **Abhinav Sinha**, “Robust Path-following Guidance for an Unmanned Vehicle”, in *Proc., Guidance, Navigation, and Control Conference (AIAA SciTech Forum)*, National Harbor, USA, 23rd-27th Jan 2023.
- [C24] **Abhinav Sinha**, and S. R. Kumar, “Nonsingular Impact Time Guidance and Control Co-design against a Stationary Target”, in *Proc., Guidance, Navigation, and Control Conference (AIAA SciTech Forum)*, National Harbor, USA, 23rd-27th Jan 2023.
- [C23] **Abhinav Sinha**, R. V. Nanavati, and S. R. Kumar, “Three-dimensional Nonlinear Impact Time Guidance using Predicted Interception Point”, in *Proc., Guidance, Navigation, and Control Conference (AIAA SciTech Forum)*, National Harbor, USA, 23rd-27th Jan 2023.
- [C22] S. K. Singh, **Abhinav Sinha**, and S. R. Kumar, “Nonlinear Control Design for an Unmanned Aerial Vehicle for Path Following”, *IFAC PapersOnLine*, vol. 55, no. 1, pp. 592–597, 2022.
- [C21] Iftisam, **Abhinav Sinha**, and S. R. Kumar, “Three-dimensional Nonlinear Impact Time Guidance Accounting for Autopilot Lag”, *IFAC PapersOnLine*, vol. 55, no. 1, pp. 26–31, 2022.
- [C20] **Abhinav Sinha**, R. V. Nanavati, and S. R. Kumar, “Impact Angle Constrained Integrated Guidance and Control for a Dual-controlled Interceptor”, in *Proc., 7th Indian Control Conference (ICC)*, Mumbai, India, 20th-22nd Dec 2021.
- [C19] **Abhinav Sinha**, and S. R. Kumar, “Cooperative Target Capture using Predefined-time Consensus”, in *Proc., 7th Indian Control Conference (ICC)*, Mumbai, India, 20th-22nd Dec 2021.

- [C18] **Abhinav Sinha**, S. R. Kumar, and D. Mukherjee, "Cooperative Salvo Based Active Aircraft Defense using Impact Time Guidance", in *Proc., American Control Conference (ACC)*, New Orleans, USA, 25th-28th May 2021.
- [C17] **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, 11th-15th and 19th-21st Jan 2021.
- [C16] **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, 1st-3rd Jul 2020.
- [C15] **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, 1st-3rd Jul 2020.
- [C14] 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**.
- [C13] **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, 6th-10th Jan 2020.
- [C12] **Abhinav Sinha**, S. R. Kumar, and D. Mukherjee, "Consensus Based Nonlinear Guidance for Cooperative Salvo", in *Proc., 6th Indian Control Conference (ICC)*, Hyderabad, India, 18th-20th Dec 2019.
- [C11] **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, 18th-21st Nov 2018.
- [C10] **Abhinav Sinha**, and R. K. Mishra, "Convergence of multi-agent systems to unknown source of an odor", in *Proc., 2018 IEEE 3rd International Conference for Convergence in Technology*, Pune, India, 7th-8th 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.
- [C8] 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, 15th-17th Oct 2015.
- [C7] **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, 19th-20th Mar 2015.
- [C6] **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 Mar 2015.
- [C5] 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 Mar 2015.
- [C4] **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 Feb 2015, **Awarded Best Paper**.
- [C3] **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 Jan 2015.

- [C2] 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 Dec 2014.
- [C1] **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 Dec 2013.

OTHERS

- [A2] **Abhinav Sinha**, S. R. Kumar, and D. Mukherjee, "Integrated Guidance and Control Design For Time-Constrained Interception", *IEEE TechRxiv*, 2020.
- [A1] **Abhinav Sinha**, R. Kaur, R. Kumar, and A. P. Bhondekar, "Cooperative control of multi-agent systems to locate source of an odor", *arXiv:1711.03819, arXiv e-prints*, 2017.

PROFESSIONAL SERVICES

REVIEWER OF REFEREED JOURNALS

- > IEEE Transactions on Automatic Control
- > Automatica
- > 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
- > Journal of Intelligent & Robotic Systems
- > Aerospace Science and Technology
- > IEEE Transactions on Neural Networks and Learning Systems
- > Asian Journal of Control
- > Information Sciences
- > IEEE Transactions on Industrial Electronics
- > IEEE Transactions on Industrial Informatics
- > ISA Transactions
- > Journal of Process Control
- > IEEE Access
- > Defence Technology
- > IEEE Systems Journal
- > IEEE Sensors Letters
- > Nonlinear Dynamics
- > Advances in Space Research
- > IET Generation, Transmission and Distribution
- > Chemical Engineering Science
- > 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
- Plos One

REVIEWER OF PEER REVIEWED CONFERENCES (SELECTED)

- Americal Control Conference (ACC)
- Control and Decision Conference (CDC)
- Indian Control Conference (ICC)
- European Control Conference (ECC)
- AIAA SciTech Forum
- IFAC World Congress
- International Workshop on Variable Structure Systems and Sliding Mode Control (VSS)
- 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)
- IFAC Symposium on Automatic Control in Aerospace (ACA)



PROFESSIONAL MEMBERSHIPS

- IITB Alumni Association
- International Federation of Automatic Control (IFAC)
- American Institute of Aeronautics and Astronautics (AIAA)
- Asian Control Association



AWARDS, ACHIEVEMENTS AND HONORABLE MENTIONS

- | | |
|---|---------------------|
| ➤ NAIK AND RASTOGI AWARD FOR EXCELLENCE IN PH.D. RESEARCH
<i>Indian Institute of Technology Bombay, India</i> | AUG 2022 |
| ➤ ACC STUDENT TRAVEL GRANT
<i>American Automatic Control Council, USA</i> | MAY 2021 |
| ➤ ACC STUDENT TRAVEL GRANT
<i>American Automatic Control Council, USA</i> | JUN 2020 |
| ➤ ICC STUDENT SUPPORT
<i>Indian Control Conference and IEEE-CSS</i> | DEC 2019 |
| ➤ MHRD POSTGRADUATE GATE FELLOWSHIP
<i>Ministry of Human Resource Development, India</i> | JUL 2016 - APR 2021 |
| ➤ CHAMPIONS OF INITIAL LEARNING PROGRAMME (ILP)
<i>TATA Consultancy Services Limited</i> | DEC 2015 |
| ➤ ON THE SPOT AWARD
<i>TATA Consultancy Services Limited</i> | JUL 2015 |
| ➤ OUTSTANDING CONTRIBUTION AWARD
<i>KIIT Robotics Society, Kalinga Institute of Industrial Technology</i> | AUG 2013 |



REFERENCES

Furnished upon request.