

RANJITH RAVINDRANATHAN NAIR

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Research Interests

- Multi-Robot/ Multi-Vehicle Systems, Nonlinear distributed Control, Intelligent Control, Multi-Agent Systems, Cyber-Physical systems.

Publications

Book

1. Laxmidhar Behera, Swagat Kumar, Prem Kumar P, **Ranjith Ravindranathan Nair**, Samrat Dutta, "Intelligent Control of Robotic Systems", *Taylor & Francis Publications* (Approved for Publication in Nov. 2017).

Journals

2. **Ranjith Ravindranathan Nair**, Laxmidhar Behera, Swagat Kumar, "Event triggered finite time integral sliding mode controller for consensus-based formation of multi-robot systems with disturbances", *IEEE Transactions on Control Systems Technology* (Accepted- in press), vol. PP, no. 99, Oct. 2017, doi: 10.1109/TCST.2017.2757448
Online available at: <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=8065034>
3. **Ranjith Ravindranathan Nair**, Hamad Karki, Amit Shukla, Laxmidhar Behera, Mo Jamshidi " Fault tolerant formation control of nonholonomic robots using fast adaptive gain nonsingular terminal sliding mode control", *IEEE Systems Journal* (Accepted- in press), vol. PP, no. 99, Feb. 2018, doi: 10.1109/JSYST.2018.2794418
Online available at: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8293786>
4. **Ranjith Ravindranathan Nair**, Laxmidhar Behera, "Robust adaptive gain higher order sliding mode observer based control-constrained nonlinear model predictive control for spacecraft formation flying", *IEEE/CAA Journal of Automatica Sinica*, vol. 5, no. 1, pp 367-381, Jan. 2018.
Online available at: <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7783979>
5. **Ranjith Ravindranathan Nair**, Laxmidhar Behera, Vinod Kumar, Mo. Jamshidi, "Multi-satellite formation control for remote sensing applications using artificial potential field and adaptive fuzzy sliding mode control", *IEEE Systems Journal*, vol. 9, no. 2, pp 508-518, Jun. 2015.
Online available at: <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6872543>
6. Radhe Shyam Sharma, **Ranjith Ravindranathan Nair**, Pooja agrawal, Laxmidhar Behera, Venkatesh Subramanian, "Robust Hybrid Visual Servoing using Reinforcement Learning and Finite Time Adaptive FOSMC", *IEEE Systems Journal* (Accepted- Oct 2018).
7. Anuj Nandanwar, **Ranjith Ravindranathan Nair**, Hamad Karki, Amit Shukla, Laxmidhar Behera, "Optimal Routing and Mobility Control in a Robotic Network using Fuzzy Potential Field and Disturbance observer-based Adaptive SOSMC", *IEEE Transactions on Industrial Informatics* (Under Review).
8. **Ranjith Ravindranathan Nair**, Laxmidhar Behera, "Robust tracking control of spacecraft formation flying system using fast adaptive nonlinear sliding mode techniques", *Asian Journal of Control, Wiley*, (invited paper-to be submitted).

Conferences

9. **Ranjith Ravindranathan Nair**, Laxmidhar Behera, "Robust adaptive gain nonsingular fast terminal sliding mode control for spacecraft formation flying", 54th *IEEE Conference on Decision and Control (CDC 2015)*, Osaka, Japan, Dec. 2015, pp 5214-5219.
Online available at: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7403051>

10. **Ranjith Ravindranathan Nair**, Laxmidhar Behera, "Swarm Aggregation Using Artificial Potential Field and Fuzzy Sliding Mode Control with Adaptive Tuning Technique," *American Control Conference, (ACC 2012)*, Montreal, Canada, Jun. 2012, pp 6184 - 6189.
Online available at: <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6315463>
11. **Ranjith Ravindranathan Nair**, Laxmidhar Behera, "Tracking Control of Spacecraft Formation Flying using Fuzzy Sliding Mode Control with Adaptive Tuning Technique", *IEEE International Conference on Fuzzy Systems (Fuzz-IEEE 2013)*, Hyderabad, India, Jul. 2013, pp 1-8.
Online available at: <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6622540>
12. **Ranjith Ravindranathan Nair**, Laxmidhar Behera, "Adaptive fuzzy nonsingular fast terminal sliding mode control for spacecraft formation flying", *IEEE First International Conference on Control, Measurement and Instrumentation, Kolkata, India, Jan. 2016, pp 408-413*.
Online available at: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7413780>
13. **Ranjith R**, Laxmidhar Behera, "Formation Control of Non- Holonomic Robots using Artificial Potential Field and Fuzzy Sliding Mode Control with Adaptive Tuning Technique", *International Conference on Advances in control and optimization of dynamical systems (ACODS 2012) (2nd BEST PAPER AWARD)*, IISc, Bangalore, India, Feb. 2012.
14. **Ranjith R**, Laxmidhar Behera, "Multi-Agent Formation Control using Adaptive Fuzzy Sliding Mode Control", *International UKIERI workshop on Fusion of Brain Computer Interface and Assistive Robotics (Poster)*, University of Ulster, UK, Jul. 2011.
15. **Ranjith R**, Laxmidhar Behera, "Spacecraft formation control using artificial potential field and fuzzy terminal sliding mode control with adaptive tuning technique", *EE Research Scholars Day (Poster)*, IIT Kanpur, India, Nov 2014.
16. **Ranjith R**, Rajeev U. P, Dinesh Pai A, " A Decentralized Guidance Strategy for Multi-Aircrafts Flight Formation," *International Conference on Advances in Control and Optimization of Dynamical Systems (ACODS' 2007)*, IISc, Bangalore, India, Feb. 2007.
17. **Ranjith R**, Rajeev U. P, Dinesh Pai A, "Modeling drag Optimal Configuration of Aircrafts in Formation, " *7th National Conference on Technological Trends*, Thiruvananthapuram, Kerala, India, Nov. 2006.

Major Projects

- **A condition monitoring system with multi-agent mechanism for external non-contact smart inspection of buried oil and gas pipelines** (undergoing, supported by ADNOC-GRC, Abu Dhabi, PI : Prof. Laxmidhar Behera, IIT Kanpur)
- **Multi-mobile wireless sensor networks in tracking and surveillance** (supported by Department of Electronics and Information Technology, Govt. of India, PI : Prof. L. Behera, IIT Kanpur)
- **Satellite formation Keeping control**(Done as a part of Ph.D Thesis) (supported by Indian Space Research Organization (ISRO), Govt. of India, *PI: Prof. Laxmidhar Behera, IIT Kanpur*)
- **Leader-follower-based formation control of multi-satellite and multi-robot systems using sliding mode techniques** (Ph.D Thesis)
(*Supervisor: Prof. Laxmidhar Behera, IIT Kanpur*)
- **Design and development of a DAQ based mobile robot** (Summer internship)
(*at IIT Jodhpur under the guidance of Dr. Swagat Kumar*)
- **Closed Loop Guidance Algorithm for Multi-Aircrafts Flight Formation** (M. Tech.Thesis)
(*Supervisors: Dr. Rajeev U.P, Head, Guidance Design Division, CGSE, Vikram Sarabhai Space Centre (ISRO), Trivandrum, India; Dr. Dinesh Pai A, College of Engg., Trivandrum, India, Dec 2005 - Dec 2006*)
- **AIO (All in One Solution) for Engineering constructions and operations.**
(*L & T Infotech limited Chennai, Duration : 1 year, Technical Environment: SAP R/3 ECC 6.0*)
 - SAP-ABAP Development

Experience

- **Post-Doctoral Research Fellow at Intelligent Systems and Control Lab, Department of Electrical Engineering, Indian Institute of Technology Kanpur, India** (*5th Feb 2018-Present*)
 - Project: A condition monitoring system with multi-agent mechanism for external non-contact smart inspection of buried oil and gas pipelines, funded by Adnoc-GRC, Abu Dhabi.
- **Sr. Project Engineer at Intelligent Systems and Control Lab, Department of Electrical Engineering, Indian Institute of Technology Kanpur, India** (*1st Jul 2017- 31st Dec 2017*)
 - Project: A condition monitoring system with multi-agent mechanism for external non-contact smart inspection of buried oil and gas pipelines, funded by ADNOC- GRC, Abu Dhabi.
- **Research Intern at TCS Robotics Innovation Lab, New Delhi, India** (*15th Mar 2016-14th Sep 2016*)
- **Sr. Student Research Associate at Intelligent Systems and Control Lab, Department of Electrical Engineering, Indian Institute of Technology Kanpur, India** (*19th Aug 2015- 31st Mar 2016, 15th Sep 2016- 15th Nov 2016, 1st Dec 2016- 31st May 2017*)
 - Projects: 1) Multi-mobile wireless sensor networks in tracking and surveillance 2) A condition monitoring system with multi-agent mechanism for external non-contact smart inspection of buried oil and gas pipelines
- **Tutor in the Department of Electrical Engineering, Indian Institute of Technology Kanpur, India** (*Fall 2014*)
 - Courses handled: Control Systems Lab.
- **Teaching Assistant in the Department of Electrical Engineering, Indian Institute of Technology Kanpur, India**
 - Theory courses assisted: Control of Cyberphysical systems, Control system analysis, Basics of Modern control, Introduction to Electrical Engineering.

Prior Experience (Total: 4 years & 5 months):

- **Software Engineer, Larsen & Toubro Infotech Limited Chennai, India**
- **Lecturer in the Department of Electrical Engineering, Rajiv Gandhi College of Engineering Sriperumbudur, affiliated to Anna University, Chennai, India**
- **Lecturer in the Department of Electrical Engineering, Saint Gits College of Engineering, affiliated to Mahatma Gandhi University, Kottayam, Kerala, India**
- **Adhoc-lecturer in the Department of Electrical Engineering, College of Engineering Thiruvananthapuram, Kerala, India**
- **Adhoc-lecturer in the Department of Electrical Engineering, Government Engineering College Idukki, Kerala, India**

Professional Services

- Reviewer of IEEE Transactions on Industrial Electronics
- Reviewer of IEEE Transactions on Industrial Informatics
- Reviewer of IEEE Transactions on Cybernetics
- Reviewer of IEEE Systems Journal
- Reviewer of IEEE Transactions on Automation, Science and Engineering
- Reviewer of IET Electric Power Applications
- Reviewer of International Journal of Control- Taylor & Francis
- Reviewer of IETE Journal of Research- Taylor & Francis

- Reviewer of Advances in Mechanical Engineering- SAGE publishing corporation.
- Reviewer of Part I: Journal of Systems and Control Engineering- SAGE publishing corporation.
- Reviewer of couple of international conferences

Memberships

- Member of IEEE Control Systems Society
- Member of IEEE Robotics and Automation society
- Member of IEEE Industrial Electronics society
- Member of IEEE Systems Council
- Member of IEEE Sensors Council
- Member of IEEE Internet of Things community
- Member of IEEE Young Professionals

Awards and Fellowships

- *2nd* Best Paper award in International Conference on Advances in Control and Optimization of Dynamical Systems (ACODS 2012) held at Indian Institute of Science (IISc) Bangalore, India, Feb. 2012.
- Best Presentation award of the session in ACODS 2012, IISc Bangalore, India, Feb 2012.
- Received research fellowship for doctoral studies from MHRD, Govt. of India.
- Received GATE fellowship for Master of Technology course from MHRD, Dec. 2004- Dec. 2006.

Education

- **Ph.D- Specialisation:** Control and Automation, **Discipline:** Electrical Engineering, **Year:** 2017
Institute: Indian Institute of Technology Kanpur, India
CPI: 9.0/10 (graded in relative scale)
Thesis topic: Leader-Follower-based Formation Control of Multi-Satellite & Multi-Robot Systems using Sliding Mode Techniques
Supervisor: Prof. Laxmidhar Behera, Professor, Department of Electrical Engineering, IIT Kanpur, India.