P. N. Karthik

Email | Website | LinkedIn | Google Scholar

Research Interests

multi-armed bandits, federated learning, privacy-preserving learning, reinforcement learning, information theory, statistics

Experience

Feb'24 - Present **Assistant Professor**
Department of Artificial Intelligence, IIT Hyderabad
Date of joining: 26 February 2024

Jan'22 - Jan'24 **Research Fellow**
Institute of Data Science, National University of Singapore
Supervisor: Prof. Vincent Y. F. Tan

May'23 - Jun'23 **Visiting Researcher**
Technion Israel Institute of Technology, Haifa, Israel
Host: Prof. Nir Weinberger

Nov'19 - Mar'20 **Research Intern**
Netradyne Technology India Pvt. Ltd., Bengaluru
In collaboration with Bengaluru Metropolitan Transport Corporation
Academic Mentor: Prof. Rajesh Sundaresan
Industry Mentor: Pratik Verma

Aug'19 - Dec'19
Aug'18 - Dec'18
Aug'17 - Dec'17 **Graduate Teaching Assistant**
Department of ECE, Indian Institute of Science, Bengaluru
Courses: Information Theory (E2 201), Random Processes (E2 202)
Instructors: Prof. Himanshu Tyagi, Prof. Utpal Mukherji, Prof. Parimal Parag

Aug'14 - Jun'15 **Project Assistant**
Department of ECE, Indian Institute of Science, Bengaluru
Supervisor: Prof. Chandra R. Murthy

Education

Jul'15 - Mar'22 **Doctor of Philosophy and Master of Science (Engineering),**
Indian Institute of Science, Bengaluru
Department: Electrical Communication Engineering
Thesis: Sequential Controlled Sensing to Detect an Anomalous Process
Supervisor: Prof. Rajesh Sundaresan
GPA: 7.0/8.0

Aug'10 - Jul'14 **Bachelor of Engineering,**
R V College of Engineering, Bengaluru
Major: Electronics and Communications
GPA: 9.72/10.00 (rank 2 among 140 students)

Publications

Preprints

1. *Learning to Detect an Odd Restless Markov Arm with a Trembling Hand* arxiv
   P. N. Karthik and Rajesh Sundaresan

2. *Axiomatic Characterisation of Projection Rules: An Open Question* draft
   P. N. Karthik and Rajesh Sundaresan

Journal Publications

1. *Optimal Best Arm Identification with Fixed Confidence in Restless Bandits* arxiv
   P. N. Karthik, Vincent Y. F. Tan, Arpan Mukherjee, and Ali Tajer
   Accepted, IEEE Transactions on Information Theory, 2024
   Doi: 10.1109/TIT.2024.3419924
2. *Federated Best Arm Identification with Heterogeneous Clients*
   Chen Zhirui, P. N. Karthik, Vincent Y. F. Tan, and Yeow Meng Chee
   IEEE Transactions on Information Theory, volume 70, number 6, pp. 4258-4279, 2024
   Doi: 10.1109/TIT.2023.3338027
3. *Bus Priority lane in Bengaluru: A Study of its Effectiveness and Driver Stress*
   P. N. Karthik, Nihesh Rathod, Sarath Yasodharan, Wilson Lobo,
   Ajeesh Sahadevan, Rajesh Sundaresan and Pratik Verma
   Special Issue on Sustainable City Transportation in the Indian Subcontinent, Transport Policy, 2023.
   Doi: 10.1016/j.tranpol.2023.04.018
4. *Best Arm Identification in Restless Markov Multi-Armed Bandits*
   P. N. Karthik, Kota Srinivas Reddy, and Vincent Y. F. Tan
   IEEE Transactions on Information Theory, volume 69, number 5, pp. 3240-3262, 2023.
   Doi: 10.1109/TIT.2022.3230939
5. *Detecting an Odd Restless Markov Arm with a Trembling Hand*
   P. N. Karthik and Rajesh Sundaresan
   IEEE Transactions on Information Theory, volume 67, number 8, pp. 5230-5258, 2021.
   Doi: 10.1109/TIT.2021.3075021
6. *Learning to Detect an Odd Markov Arm*
   P. N. Karthik and Rajesh Sundaresan
   IEEE Transactions on Information Theory, volume 66, number 7, pp. 4324-4348, 2020.
   Doi: 10.1109/TIT.2020.2972875

Doctoral Dissertation

- *Sequential Controlled Sensing to Detect an Anomalous Process* pdf source etd iisc
  Ph.D. thesis, Department of ECE, Indian Institute of Science, Nov 2021

Conference Publications

1. *Optimal Multi-Objective Best Arm Identification with Fixed Confidence*
   Chen Zhirui, P. N. Karthik, Yeow Meng Chee, and Vincent Y. F. Tan
   International Conference on Artificial Intelligence and Statistics (AISTATS 2025), May 2025
2. *Best Arm Identification with Arm Erasures*
   Kota Srinivas Reddy, P. N. Karthik, and Vincent Y. F. Tan
   IEEE International Symposium on Information Theory (ISIT 2024), Jul 2024
   Doi: 10.1109/ISIT57864.2024.10619688
3. *Fixed-Budget Differentially Private Best Arm Identification*
   Chen Zhirui, P. N. Karthik, Yeow Meng Chee, and Vincent Y. F. Tan
   International Conference on Learning Representations (ICLR 2024), May 2024
4. *Best Arm Identification in Bandits with Limited Precision Sampling*
   Kota Srinivas Reddy, P. N. Karthik, Nikhil Karamchandani, and Jayakrishnan Nair
   IEEE International Symposium on Information Theory (ISIT 2023), Jun 2023
   Doi: 10.1109/ISIT54713.2023.10206610
5. *Almost Cost-Free Communication in Federated Best Arm Identification*
   Kota Srinivas Reddy, P. N. Karthik, and Vincent Y. F. Tan
   Proceedings of the 37th AAAI Conference on Artificial Intelligence (AAAI 2023), Washington D.C., Feb 2023.
   Doi: 10.1609/aaai.v37i7.26010

6. *Best Restless Markov Arm Identification*
   P. N. Karthik, Kota Srinivas Reddy, and Vincent Y. F. Tan
   Proceedings of the 2022 IEEE Information Theory Workshop (ITW 2022), IIT Mumbai, Nov 2022.
   DOI: 10.1109/ITW54588.2022.9965908
7. *Learning to Detect an Odd Restless Markov Arm*
   P. N. Karthik and Rajesh Sundaresan
   Proceedings of the 2021 IEEE International Symposium on Information Theory (ISIT 2021), virtual, Jul 2021.
   DOI: 10.1109/ISIT45174.2021.9518083
8. *Detecting an Odd Restless Markov Arm with a Trembling Hand*
   P. N. Karthik and Rajesh Sundaresan
   Proceedings of the 2020 IEEE International Symposium on Information Theory (ISIT 2020), virtual, Jun 2020.
   DOI: 10.1109/ISIT44484.2020.9174397
9. *Learning to Detect an Odd Markov Arm*
   P. N. Karthik and Rajesh Sundaresan
   Proceedings of the 2019 IEEE International Symposium on Information Theory (ISIT 2019), Paris, France, Jul 2019.
   DOI: 10.1109/ISIT.2019.8849807
10. *On The Equivalence of Projections in Relative α-Entropy and Rényi Divergence*
    P. N. Karthik and Rajesh Sundaresan
    Proceedings of the 34th National Conference on Communications (NCC 2018), IIT Hyderabad, Feb 2018.
    DOI: 10.1109/NCC.2018.8599980
11. *Model-Based Interference Cartography and Visualization*
    P. N. Karthik, Raksha Ramakrishna, Geethu Joseph, Chandra R. Murthy,
    Joyson Sebastian, and Neelesh B. Mehta
    Proceedings of the 22nd National Conference on Communications (NCC 2016), IIT Guwahati, Mar 2016.
    DOI: 10.1109/NCC.2016.7561174

Awards and Honors

- First place in the 100 seconds competition organised by INAE Kanpur Chapter
- Best paper award at the 2020 EECS Research Students' Symposium, Indian Institute of Science
- Best 3-minute presentation, ECE Students' Seminar Series, Department of ECE, Indian Institute of Science
- Rank 136 (among the top 0.01%) in the 2015 Graduate Aptitude Test in Engineering
- Infineon India scholarship for securing rank 2 in the 2011 Visvesvaraya Technological University examinations.
- Rank 23 (among the top 0.02%) in the 2010 Karnataka Common Entrance Test

Service at IIT Hyderabad

- Member, Faculty Search Committee (FSC), Department of AI (Jan 2025 – Present)
- Faculty Advisor (FA) for MTech 2024 batch of students (Aug 2024 – Present)
- Faculty-in-Charge, Graduate Admissions, Department of AI (Oct 2024 – Present)
- Faculty Coordinator, Advanced Executive Program in AI and Cybersecurity (to start in Mar 2025)
- Co-Organiser, 2024 JTG/IEEE ITSoc Summer School (24–28 Jun 2024)

Professional Service

- Technical Program Committee (TPC) Member, ISIT 2025
- Reviewer, IEEE Transactions on Information Theory
- Reviewer, IEEE Transactions on Signal Processing
- Reviewer, Journal on Selected Areas in Communications (JSAC)
- Reviewer, International Conference on Machine Learning (ICML 2024)
- Reviewer, International Conference on Learning Representations (ICLR 2024)

- Reviewer, Conference on Neural Information Processing Systems (NeurIPS 2023, 2024)
- Reviewer, Conference on Decision and Control (CDC 2023)
- Reviewer, IEEE International Symposium on Information Theory (ISIT 2019, 2023, 2024)
- Reviewer, National Conference on Communications (NCC 2018)