P. N. Karthik

website | linkedin | scholar

Personal Data

Place and Date of Birth:	Bengaluru, India | 20 Apr 1992
Address:	02-19, 19 Shelford Road, Singapore 288408
Phone:	+65 8591 2944
Email:	karthik@nus.edu.sg

Research Interests

Markov decision problems, statistical learning, multi-armed bandits, statistical inference, stochastic adaptive control, optimal stopping problems

Work Experience

01/2022 - present — Research Fellow
Institute of Data Science, National University of Singapore
Supervisor: Prof. Vincent Y. F. Tan
Project: Towards Trustable Model-Centric Sharing for Collaborative Machine Learning

11/2021 - 12/2021 — Research Associate - 1
Indian Institute of Science
Supervisor: Prof. Rajesh Sundaresan

11/2019 - 03/2020 — Intern
Netradyne Technology India Pvt Ltd
Mentors: Pratik Verma, Dr. Ajeesh Sahadevan, and Prof. Rajesh Sundaresan

08/2019 - 12/2019 — Graduate Teaching Assistant
Indian Institute of Science
Course: E2 201: Information Theory
Course Instructor: Prof. Himanshu Tyagi

08/2018 - 12/2018
08/2017 - 12/2017 — Graduate Teaching Assistant
Indian Institute of Science
Course: E2 202: Random Processes
Course Instructors: Prof. Utpal Mukherji and Prof. Parimal Parag

08/2014 - 06/2015 — Project Assistant
Indian Institute of Science
Supervisor: Prof. Chandra R. Murthy

08/2013 - 12/2013 — Project Trainee
Karnataka State Sericulture Research and Development Institute
Mentor: Prof. M. Govinda Raju

Education

07/2015 - 11/2021 Doctor of Philosophy, **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 | List of Courses

08/2010 - 07/2014 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

Almost Cost-Free Communication in Federated Best Arm Identification [arxiv]
Kota Srinivas Reddy, P. N. Karthik, and Vincent Y. F. Tan
Submitted, Aug 2022

Best Arm Identification in Restless Markov Multi-Armed Bandits [arxiv]
P. N. Karthik, Kota Srinivas Reddy, and Vincent Y. F. Tan
Submitted to the IEEE Transactions on Information Theory, Mar 2022

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
Submitted to the Special Issue of Transport Policy Journal on
Sustainable City Transportation in the Indian Subcontinent, Jan 2022

Learning to Detect an Odd Restless Markov Arm with a Trembling Hand [arxiv]
P. N. Karthik and Rajesh Sundaresan
Submitted to the Journal of Machine Learning Research, Jan 2022

Axiomatic Characterisation of Projection Rules: An Open Question [draft]
P. N. Karthik and Rajesh Sundaresan
Draft

Journal Publications

Detecting an Odd Restless Markov Arm with a Trembling Hand [xplore]
P. N. Karthik and Rajesh Sundaresan
IEEE Transactions on Information Theory, Aug 2021

Learning to Detect an Odd Markov Arm [xplore]
P. N. Karthik and Rajesh Sundaresan
IEEE Transactions on Information Theory, Jul 2020

Thesis

Sequential Controlled Sensing to Detect an Anomalous Process [pdf]
Karthik Periyapattana Narayanaprasad
Department of Electrical Communication Engineering,
Indian Institute of Science, Nov 2021

Conference Publications

Best Restless Markov Arm Identification
Karthik Periyapattana Narayana Prasad, Kota Srinivas Reddy, and Vincent Y. F. Tan
Accepted for presentation at the IEEE Information Theory Workshop, Nov 2022

Detecting an Odd Restless Markov Arm with a Trembling Hand [xplore]
P. N. Karthik and Rajesh Sundaresan
IEEE International Symposium on Information Theory, Jun 2020

Learning to Detect an Odd Markov Arm [xplore]
P. N. Karthik and Rajesh Sundaresan
IEEE International Symposium on Information Theory, Jul 2019

On The Equivalence of Projections in Relative α-Entropy and Rényi Divergence [xplore]
P. N. Karthik and Rajesh Sundaresan
National Conference on Communications, Feb 2018

Model-Based Interference Cartography and Visualization [xplore]
P. N. Karthik, Raksha Ramakrishna, Geethu Joseph,
Chandra R. Murthy, Joyson Sebastian, and Neelesh B. Mehta
National Conference on Communications, Mar 2016

Research Presentations and Seminars

2022 *Behind the Scenes of $Ax = b$: Axioms and an Open Question* [video] [slides]
A talk given to Prof. Vincent Tan's research group, Mar 2022

2021 *Sequential Controlled Sensing to Detect an Anomalous Process* [video] [slides]
Ph.D. defence, Department of Electrical Communication Engineering,
Indian Institute of Science, Nov 2021

Finding a Markov Anomaly Quickly and Accurately [video]
100 seconds competition organised by the Kanpur Chapter of INAE, Oct 2021
First place under "Electronics and Communication Engineering" category

GATE 2022: A Pathway to Research [video]
An online interactive session on the Graduate Aptitude Test in Engineering as a pathway to research organised by the Division of EECS,
Indian Institute of Science, Oct 2021

Information Geometry and Its Applications to Statistics [video] [notes]
An online lecture for the students of Indian Institute of Science, Sep 2021

Learning to Detect an Odd Restless Markov Arm [video] [slides]
2021 IEEE International Symposium on Information Theory, Jul 2021

Sequential Controlled Sensing to Detect an Anomalous Process [video] [slides]
Ph.D. colloquium talk, Department of Electrical Communication Engineering,
Indian Institute of Science, Jun 2021

Crack Open the GATE [video]
A session conducted for the students of R V College of Engineering
to educate them about the Graduate Aptitude Test in Engineering, May 2021

2020 *Probability in Real-Life: Example Applications from Visual Neuroscience, Colour Blindness Detection, and Covid-19 Outbreak Modelling* [video] [slides]
A talk presented virtually to the 5th semester students and the faculty of the department of Electronics and Communication Engineering,
R V College of Engineering, Sep 2020

Odd Arm Identification in Multi-armed Bandits with Markov Observations [video] [slides]
2020 EECS Research Students' Symposium, Indian Institute of Science, JUL 2020
Best paper award under "Signal Processing, Communication Networks, and Information Theory" track

Detecting an Odd Restless Markov Arm with a Trembling Hand [video] [slides]
2020 IEEE International Symposium on Information Theory, JUN 2020

Visual Search with a Trembling Hand: An Analysis of Odd Arm Identification in Restless Multi-armed Bandits [video] [slides]
Centre for Networked Intelligence, Indian Institute of Science, MAY 2020

On Detecting an Anomalous Arm in a Multi-armed Bandit with Markov Observations [slides]
STCS Symposium, School of Theory and Computer Science, Tata Institute of Fundamental Research, Mumbai, JAN 2020

2019 *Search in Research: The Importance of the Theory of Probability in Real-Life* [slides]
R V College of Engineering, DEC 2019

Learning to Detect an Odd Markov Arms [slides]
Lectures on Probability and Stochastic Processes XIV, Indian Statistical Institute Delhi, DEC 2019

On Detecting an Anomalous Arm in Multi-armed Bandits with Markov Observations [slides]
Networks Seminar, Robert Bosch Centre for Cyber Physical Systems, Indian Institute of Science, NOV 2019

Learning to Detect an Odd Markov Arm [poster]
2019 Joint Telematics Group Summer School, Indian Institute of Technology, Madras, AUG 2019

Learning to Detect an Odd Markov Arm [slides]
ICTS Program on Advances in Applied Probability, International Centre for Theoretical Sciences, AUG 2019

Learning to Detect an Odd Markov Arm [slides]
2019 IEEE International Symposium on Information Theory (ISIT), JUL 2019

A Short Course on Probability and Random Processes [course material]
R V College of Engineering, JUN 2019

$Ax = b$*: A Familiar Setup, Axioms and An Open Question* [slides]
ECE Students' Seminar Series, Department of Electrical Communication Engineering, Indian Institute of Science, FEB 2019

2018 *On the Equivalence of Projections in Relative* α*-Entropy and Rényi Divergence* [slides]
National Conference on Communications, Indian Institute of Technology, Hyderabad, FEB 2018

2017 *On the Equivalence of Projections in Relative* α*-Entropy and Rényi Divergence* [slides]
Lectures on Probability and Stochastic Processes XII, Indian Statistical Institute, Kolkata, DEC 2017

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 award at the ECE Students' Seminar Series, Department of Electrical Communication Engineering, 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

Professional Service

- Graduate teaching assistant for the course "E2-201: Information Theory", Aug-Dec 2019, Department of Electrical Communication Engineering, Indian Institute of Science
- Graduate teaching assistant for the course "E2-202: Random Processes", Aug-Dec 2018, 2017, Department of Electrical Communication Engineering, Indian Institute of Science
- Reviewer, IEEE Transactions on Information Theory
- Reviewer, IEEE Transactions on Signal Processing
- Reviewer, Entropy
- Reviewer, Sadhana
- Reviewer, IEEE International Symposium on Information Theory
- Reviewer, National Conference on Communications

Software Knowledge

Python | Microsoft PowerBI | Notion | LaTeX | MATLAB

Professional Referees

Name	Designation	Department	Institute	Email
Rajesh Sundaresan	Professor	ECE*	IISc**	rajeshs@iisc.ac.in
Utpal Mukherji	Professor	ECE	IISc	utpal@iisc.ac.in
Navin Kashyap	Professor	ECE	IISc	nkashyap@iisc.ac.in
Himanshu Tyagi	Associate Professor	ECE	IISc	htyagi@iisc.ac.in
Parimal Parag	Associate Professor	ECE	IISc	parimal@iisc.ac.in

* ECE: Electrical Communication Engineering
** IISc: Indian Institute of Science

Doctor of Philosophy, Indian Institute of Science

List of Courses Taken for Credit and Grades Obtained

Course Code	Course	Grade*	Credit Hrs
E2 201	Information Theory	S	3
E2 202	Random Processes	S	3
E2 205	Error-Control Codes	A	3
MA 221	Analysis-I	D	3
E1 244	Detection and Estimation Theory	S	3
MA 222	Analysis-II: Measure and Integration	A	3
MA 229	Calculus on Manifolds	B	3
MA 241	Ordinary Differential Equations	A	3
MA 361	Probability Theory	S	3

Total Credit Hrs	27
GPA (out of 8.0)	**7.0**

*Grading scheme (out of 10): S=8, A=7, B=6, C=5, D=4

List of Courses Taken for Audit

Topics in Information Theory and Statistical Learning
Concentration Inequalities
Topics in Multi-user Communications
Large Deviations
Online Prediction and Learning
Data Analytics
Stochastic Approximation Algorithms