

# 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](mailto: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    GRADUATE TEACHING ASSISTANT  
08/2017 - 12/2017    *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*  
[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](#), [Niresh 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* [xplora]

P. N. Karthik and Rajesh Sundaresan

IEEE International Symposium on Information Theory, JUN 2020

*Learning to Detect an Odd Markov Arm* [xplora]

P. N. Karthik and Rajesh Sundaresan

IEEE International Symposium on Information Theory, JUL 2019

*On The Equivalence of Projections in Relative  $\alpha$ -Entropy and Rényi Divergence* [xplora]

P. N. Karthik and Rajesh Sundaresan

National Conference on Communications, FEB 2018

*Model-Based Interference Cartography and Visualization* [xplora]

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  $\alpha$ -Entropy and Rényi Divergence* [slides]  
National Conference on Communications,  
Indian Institute of Technology, Hyderabad, FEB 2018

2017 *On the Equivalence of Projections in Relative  $\alpha$ -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](#) |  $\text{\LaTeX}$  | MATLAB

## PROFESSIONAL REFEREES

---

Name	Designation	Department	Institute	Email
<a href="#">Rajesh Sundaresan</a>	Professor	ECE*	IISc**	<a href="mailto:rajeshs@iisc.ac.in">rajeshs@iisc.ac.in</a>
<a href="#">Utpal Mukherji</a>	Professor	ECE	IISc	<a href="mailto:utpal@iisc.ac.in">utpal@iisc.ac.in</a>
<a href="#">Navin Kashyap</a>	Professor	ECE	IISc	<a href="mailto:nkashyap@iisc.ac.in">nkashyap@iisc.ac.in</a>
<a href="#">Himanshu Tyagi</a>	Associate Professor	ECE	IISc	<a href="mailto:htyagi@iisc.ac.in">htyagi@iisc.ac.in</a>
<a href="#">Parimal Parag</a>	Associate Professor	ECE	IISc	<a href="mailto:parimal@iisc.ac.in">parimal@iisc.ac.in</a>

---

\* ECE: Electrical Communication Engineering

\*\* IISc: Indian Institute of Science

## Ph.D. and M.Sc. Engg., 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

List of Courses Taken for Audit

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