

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 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* [[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 |

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| TOTAL CREDIT HRS | 27 |
| GPA (OUT OF 8.0) | 7.0 |

* GRADING SCHEME: S=8, A=7, B=6, C=5, D=4

List of Courses Taken for Audit

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|---|-------------------------------------|
| 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 | |