

P. N. KARTHIK

[website](#)[linkedin](#)[scholar](#)

PERSONAL DATA

PLACE AND DATE OF BIRTH: Bangalore, India | 20 Apr 1992
ADDRESS: 06-12, Block E4, Engineering Drive 3,
National University of Singapore, 117583
PHONE: +65 85912944
OFFICIAL EMAIL: karthik@nus.edu.sg
PERSONAL EMAIL: pnkarthik1992@gmail.com

RESEARCH INTERESTS

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

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 - 03/2022 Doctor of Philosophy, **Indian Institute of Science**, Bangalore
DEPARTMENT: Electrical Communication Engineering
THESIS: Sequential Controlled Sensing to Detect an Anomalous Process
SUPERVISOR: Prof. **Rajesh Sundaresan**
GPA: 7.0/8.0
- 08/2010 - 07/2014 Bachelor of Engineering, **R V College of Engineering**, Bangalore
MAJOR: Electronics and Communications
GPA: 9.72/10.00 (**RANK 2** among 140 students)

PUBLICATIONS

PREPRINTS

- Federated Best Arm Identification with Heterogeneous Clients* [arxiv]
Chen Zhirui, **P. N. Karthik**, Vincent Y. F. Tan, and Yeow Meng Chee
Submitted, OCT 2022
- 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 Bangalore: 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

PH.D. 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 *Best Restless Markov Arm Identification*
PUBLICATIONS **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 *Best Restless Markov Arm Identification* [slides] [keynote]
2022 IEEE Information Theory Workshop, Mumbai, India, Nov 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

- 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
Vincent Y. F. Tan	Associate Professor	ECE ¹	NUS ²	vtan@nus.edu.sg
Rajesh Sundareshan	Professor	ECE ³	IISc ⁴	rajeshs@iisc.ac.in
Utpal Mukherji	Professor	ECE ³	IISc	utpal@iisc.ac.in
Navin Kashyap	Professor	ECE ³	IISc	nkashyap@iisc.ac.in
Himanshu Tyagi	Associate Professor	ECE ³	IISc	htyagi@iisc.ac.in
Parimal Parag	Associate Professor	ECE ³	IISc	parimal@iisc.ac.in

¹ ECE: Electrical and Computer Engineering ² NUS: National University of Singapore
³ ECE: Electrical Communication Engineering ⁴ IISc: Indian Institute of Science