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
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 - 03/2022 Doctor of Philosophy and Master of Science (Engineering),
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

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
Under preparation

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 Publications

Almost Cost-Free Communication in Federated Best Arm Identification [arxiv]
Kota Srinivas Reddy, P. N. Karthik, and Vincent Y. F. Tan
Accepted for presentation at the
37th AAAI Conference on Artificial Intelligence (**AAAI**), Feb 2023

Best Restless Markov Arm Identification
Karthik Periyapattana Narayana Prasad, Kota Srinivas Reddy, and Vincent Y. F. Tan
IEEE Information Theory Workshop (**ITW**), Nov 2022

Learning to Detect an Odd Restless Markov Arm [xplore]
P. N. Karthik and Rajesh Sundaresan
IEEE International Symposium on Information Theory (**ISIT**), Jul 2021

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

Learning to Detect an Odd Markov Arm [xplore]
P. N. Karthik and Rajesh Sundaresan
IEEE International Symposium on Information Theory (**ISIT**), 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 (**NCC**), 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 (**NCC**), 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 Sundaresan	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