

# 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  
EMAIL: [karthik@nus.edu.sg](mailto:karthik@nus.edu.sg)

## RESEARCH INTERESTS

---

Multi-armed bandits, anomaly identification, statistical inference, 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
- 11/2019 - 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](#)

## 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

1. *Federated Best Arm Identification with Heterogeneous Clients* [arxiv]  
Chen Zhirui, **P. N. Karthik**, Vincent Y. F. Tan, and Yeow Meng Chee  
Submitted, OCT 2022
2. *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
3. *Learning to Detect an Odd Restless Markov Arm with a Trembling Hand* [arxiv]  
**P. N. Karthik** and Rajesh Sundaresan  
Draft
4. *Axiomatic Characterisation of Projection Rules: An Open Question* [draft]  
**P. N. Karthik** and Rajesh Sundaresan  
Draft

### Journal Publications

1. *Best Arm Identification in Restless Markov Multi-Armed Bandits* [arxiv]  
**P. N. Karthik**, Kota Srinivas Reddy, and Vincent Y. F. Tan  
IEEE Transactions on Information Theory, 2022+
2. *Detecting an Odd Restless Markov Arm with a Trembling Hand* [xplore]  
**P. N. Karthik** and Rajesh Sundaresan  
IEEE Transactions on Information Theory, AUG 2021
3. *Learning to Detect an Odd Markov Arm* [xplore]  
**P. N. Karthik** and Rajesh Sundaresan  
IEEE Transactions on Information Theory, JUL 2020

### Doctoral Dissertation

- *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

1. *Almost Cost-Free Communication in Federated Best Arm Identification* [arxiv]  
Kota Srinivas Reddy, **P. N. Karthik**, and Vincent Y. F. Tan  
37th AAAI Conference on Artificial Intelligence (AAAI), FEB 2023
2. *Best Restless Markov Arm Identification* [xplore]  
**Karthik Periyapattana Narayana Prasad**, Kota Srinivas Reddy, and Vincent Y. F. Tan  
IEEE Information Theory Workshop (ITW), NOV 2022
3. *Learning to Detect an Odd Restless Markov Arm* [xplore]  
**P. N. Karthik** and Rajesh Sundaresan  
IEEE International Symposium on Information Theory (ISIT), JUL 2021
4. *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

5. *Learning to Detect an Odd Markov Arm* [xplora]   
 P. N. Karthik and Rajesh Sundaresan   
 IEEE International Symposium on Information Theory (ISIT), JUL 2019
6. *On The Equivalence of Projections in Relative  $\alpha$ -Entropy and Rényi Divergence* [xplora]   
 P. N. Karthik and Rajesh Sundaresan   
 National Conference on Communications (NCC), FEB 2018
7. *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 (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  $\alpha$ -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

---

- 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](#) | [L<sup>A</sup>T<sub>E</sub>X](#) | MATLAB

## PROFESSIONAL REFEREES

---

Name	Designation	Department	Institute	Email
<a href="#">Vincent Y. F. Tan</a>	Associate Professor	ECE <sup>1</sup>	NUS <sup>2</sup>	<a href="mailto:vtan@nus.edu.sg">vtan@nus.edu.sg</a>
<a href="#">Rajesh Sundaresan</a>	Professor	ECE <sup>3</sup>	IISc <sup>4</sup>	<a href="mailto:rajeshs@iisc.ac.in">rajeshs@iisc.ac.in</a>
<a href="#">Utpal Mukherji</a>	Professor	ECE <sup>3</sup>	IISc	<a href="mailto:utpal@iisc.ac.in">utpal@iisc.ac.in</a>
<a href="#">Navin Kashyap</a>	Professor	ECE <sup>3</sup>	IISc	<a href="mailto:nkashyap@iisc.ac.in">nkashyap@iisc.ac.in</a>
<a href="#">Himanshu Tyagi</a>	Associate Professor	ECE <sup>3</sup>	IISc	<a href="mailto:htyagi@iisc.ac.in">htyagi@iisc.ac.in</a>
<a href="#">Parimal Parag</a>	Associate Professor	ECE <sup>3</sup>	IISc	<a href="mailto:parimal@iisc.ac.in">parimal@iisc.ac.in</a>

---

<sup>1</sup> ECE: Electrical and Computer Engineering    <sup>2</sup> NUS: National University of Singapore

<sup>3</sup> ECE: Electrical Communication Engineering    <sup>4</sup> IISc: Indian Institute of Science