

Satyadev Nandakumar

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CURRENT POSITION

Associate Professor, Department of Computer Science, IIT Kanpur. June 2018-Present.
Assistant Professor, Department of Computer Science, IIT Kanpur. June 2010 – June 2018.

EDUCATION

- Ph.D. in Computer Science, Iowa State University, Ames, IA, USA, December 2009.
Title of Dissertation: *Dynamics, Measure and Dimension in the Theory of Computing*. GPA – 4.0/4.0 (Advisor – Dr. Jack Lutz)
- M.S. in Computer Science, Iowa State University, Ames, IA, USA, December 2003. GPA – 4.0/4.0 (Advisor – Dr. Suresh C. Kothari)
- B.Tech (Bachelor of Technology) in Computer Science and Engineering from Regional Engineering College, Calicut, India, June 2000, first class with distinction.

RESEARCH AREAS

- Algorithmic Information Theory, Kolmogorov complexity, and effective fractal dimension.
- Effective symbolic measure-theoretic and topological dynamical systems
- Normal numbers, continued fractions, finite-state dimension.
- Computability and complexity in analysis
- Computational complexity theory, pseudorandomness.

RESEARCH FUNDING

- Google Funding for CCR 2017.
- DST SERB Young Scientist, 2014-2017.
- Initiation grant from IIT Kanpur, 2010-2012.

INVITED LECTURES

- “*Equidistribution: Arithmetic, Computational and Probabilistic Aspects*”, NUS, Singapore, May 2019.
- MFO, “*Computability Theory*”, Oberwolfach, January 2018.
- Aspects of Computation, Institute of Mathematical Sciences, National University of Singapore, August 2017.
- Banff International Research Centre-Casa Matemática Oaxaca. Workshop on Effective Symbolic Dynamics, Oaxaca, Mexico, December 2016.
- Conference on Computability, Complexity and Randomness, Honolulu, Hawaii, USA, January 2016.
- Asian Logic Conference, Mumbai, 2015.
- NII Shonan workshop on Algorithmic Information Theory, Shonan, Japan, September 2014.
- ARA workshop on Algorithmic Randomness and Analysis, Gotemba, Japan, September 2014.

INVITED WORKSHOPS

- Erwin Schrödinger Institute workshop on *Normal Numbers*, Vienna, November 2016.
- Dagstuhl workshop on *Algorithmic Information Theory*, Schloss Dagstuhl, January 2012.

SPONSORED RESEARCH VISITS

- Institute of Mathematical Sciences, NUS, Singapore, April-May 2016.
- Nanyang Technological University, Singapore, June 2016. (Host: Dr. Keng-Meng Ng, Department of Mathematics, NTU)
- Victoria University Wellington and University of Auckland, New Zealand, January-April 2015. (Hosts: Dr. Rod Downey, Department of Mathematics, VUW and Dr. André Nies, Department of Computer Science, University of Auckland)
- IMS Singapore, National University of Singapore, June 2014. (Host: Dr. Yang Yue, Department of Mathematics, NUS).

Ph. D DEGREES SUPERVISED

- Diptarka Chakraborty (co-supervised with Manindra Agrawal, 2012-2016), now Assistant Professor, School of Computing, National University of Singapore.

CURRENT Ph.D. STUDENTS

- Subin P. (2018-Present)
- Prateek Vishnoi. (2016-Present)

POSTGRADUATE (M.Tech/M.S.) THESES SUPERVISED

- 25 students supervised (2 co-supervised) in the Department of Computer Science and Engineering, and 1 M.S. student co-supervised in the Department of Mathematics, IIT Kanpur.

UNDERGRADUATE RESEARCH SUPERVISION

- 12 undergraduate B. Tech theses supervised, 3 SURGE projects, including two best SURGE project winners.

CONFERENCE PROGRAM COMMITTEES AND EDITORSHIPS

- Program Committee Co-chair: Conference on Computability, Complexity and Randomness (CCR), 2017
- Program Committee Member for Indian Conference on Logic and its Applications (ICLA) 2017.

TEACHING

- New Courses developed:
 - CS 687: Algorithmic Information Theory
 - CS 698D: Special Topics in Data Compression.
- Other Postgraduate courses taught:
 - CS 744: Pseudorandom Generators
- Computer Science Undergraduate Core Courses taught:
 - Esc101 : Fundamentals of Computing. 2013 (instructor), Summer 2014 (co-instructor), Summer 2015 (co-instructor).
 - CS 350: Principles of Programming Languages (2011, 2012, 2014, 2015)
 - CS 202A: Computer Science Laboratory II (2016)
 - CS 330: Operating Systems (Summer 2012)
- Courses taught in other departments:

- Math 404A: Analysis II (2017)

PROFESSIONAL HONORS

- Department of CSE, IIT Kanpur ACA Best Faculty Award by the graduating batch of 2014.

OUTREACH

- Taught the NPTEL MOOC on "Introduction to Programming in C" in 2014, 2015, 2017, and 2018. (approx. enrolment : about 1,20,000 till date)

OTHER PROFESSIONAL SERVICE

- Journals Refereed – Theoretical Computer Science, Information and Computation.
- Conferences Refereed – ICALP, FSTTCS, STOC, STACS.

INSTITUTE SERVICE

- Organizing Vice-chairman, JEE (Advanced) 2018.
- Warden of Hall 2 (May 2014-January 2018)
- Admissions-in-charge, Department of Computer Science and Engineering, 2012-2014.

INDUSTRY EXPERIENCE

- Source Allies Inc., Des Moines, Iowa, USA, January 2010 to March 2010 as Software Engineering apprentice.
- Sasken Communications Technologies Ltd., Bangalore, India, July 2000 to August 2001 as Software Engineer

ACADEMIC HONORS

- Teaching Excellence Award, Sp. 2004, Iowa State University.
- Stood second overall in class for the undergraduate course in Computer Science, Regional Engineering College, Calicut.
- National Talent Search Examination Scholarship, 1994, awarded to less than 1000 students annually, all over India
- Ranked eighth in the Secondary School Leaving Exam (conducted by the Govt. of Kerala State, India), 1994. More than half a million students appeared for this examination.

PUBLICATIONS

CONFERENCE PUBLICATIONS

1. Randomness and Effective Dimension of Continued Fractions (joint work with Prateek Vishnoi), *45th International Symposium on the Mathematical Foundations of Computing Science*, Prague, Czech Republic, 2020.
2. On Resource-Bounded van Lambalgen's Theorems (joint work with Diptarka Chakraborty and Himanshu Shukla), *14th Annual Conference on Theory and Applications of Models of Computation*, Bern 2017.
3. Dimension, Pseudorandomness and Extraction of Pseudorandomness (joint work with Manindra Agrawal, Diptarka Chakraborty and Debarati Das), *35th Foundations of Software Technology and Theoretical Computer Science*, Bangalore 2015.

4. Multiple Recurrence and Algorithmic Randomness (joint work with Rodney G. Downey and André Nies), *10th International Conference on Computability and Randomness*, Heidelberg, Germany, 2015.
5. Ornstein Isomorphism and Algorithmic Randomness (joint work with Mrinalkanti Ghosh and Atanu Pal), *9th International Conference on Computability and Randomness*, Singapore, 2014.
6. Normality and Finite State Dimension (with Santosh Vangapelli), *8th International Conference on Computability, Complexity and Randomness (CCR)*, (Moscow, Russia, 2013)
7. Predictive Complexity and Generalized Entropy of Stationary Ergodic Games (with Mrinalkanti Ghosh), *23rd International Conference on Algorithmic Learning Theory (ALT)*, (Lyons, France, 2012).
8. Axiomatizing Resource Bounded Measure (with Xiaoyang Gu, Jack Lutz and James S. Royer), *7th Annual Conference on Computability in Europe (CiE)*, (Sofia, Bulgaria, 2011).
9. An Effective Ergodic Theorem and Some Applications, *40th ACM Annual Symposium on Theory of Computing*, (Victoria, Canada, May 2008).
10. A Characterization of Constructive Dimension, *Computability and Complexity in Analysis*, (Siena, Italy, July 2007).
11. Finite State Dimension and Real Arithmetic (with David Doty and Jack Lutz), *Proceedings of the Thirty-Third International Colloquium on Automata, Languages, and Programming* (Venice, Italy, July 9-16, 2006), Springer-Verlag, 2006, pp. 537-547.

JOURNAL PUBLICATIONS

1. A weak-2 generic which bounds a minimal degree, (joint work with Rod Downey). *Journal of Symbolic Logic*, 84(4): 1326-1347, 2019.
2. Martin-Löf randomness implies multiple recurrence in effectively closed sets, (joint work with Rod Downey and André Nies), *Notre Dame of Formal Logic*, 60(3):491-502, 2019.
3. Dimension, Pseudorandomness and Extraction of Pseudorandomness (joint work with Manindra Agrawal, Diptarka Chakraborty and Debarati Das), *Computability vol 6. no. 3*, pp. 277-305, 2017.
4. Normality and Finite-State Dimension of Liouville Numbers (joint work with Santosh Kumar Vangapalli.) *Special Issue for CCR 2013, Theory of Computing Systems*, 58 (3) 392-402, 2015.
5. Finite State Dimension and Real Arithmetic (with David Doty and Jack Lutz), *Information and Computation*, 205 (207), pp. 1640-1651, 2007.
6. A New Characterization of Constructive Dimension, *Mathematical Logic Quarterly*, 55(3), 271-286, 2009.

WORKSHOP PUBLICATIONS

1. Axiomatizing Resource-Bounded Measure, (with Xiaoyang Gu, Jack Lutz and Jim Royer), *Logic in Computational Complexity*, Los Angeles, CA, August 2009.

ARTICLES UNDER PREPARATION

1. Martingales and Restricted Ratio Betting (joint work with Sumedh Masulkar and Keng-Meng Ng)
2. An Analogue of Pillai's Theorem for Continued Fractions and An Application to Arithmetic Progression Subsequences (joint work with Subin Pulari, Prateek Vishnoi and Gopal Viswanathan.)

REFERENCES

Available upon request.