

Vinayak

DESIGNATION

Principal Scientist & AcSIR Assistant Professor
CSIR-National Institute of Science Communication and Policy Research (CSIR-NIScPR)
Pusa Gate, Dr. K. S. Krishnan Marg, New Delhi, 110012, India

PERSONAL DATA

PLACE AND DATE OF BIRTH: Gorakhpur, India | 14 March 1981
NATIONALITY: Indian
ADDRESS: 17A SF, Eldeco Mystic Greens, Omicron 1, Greater NOIDA, India
PHONE: +91 8130841938
EMAIL: vinayak.18@niscpr.res.in, vinayaksp2003@gmail.com

EDUCATION

Dec. 2009 Ph.D. in Physics
School of Physical Sciences
Jawaharlal Nehru University, New Delhi
Thesis: "Random Matrices and Chaos: Wishart and Circular Ensembles"
Advisor: Prof. Akhilesh Pandey
June 2003 M.Sc. in Physics
School of Physical Sciences
Jawaharlal Nehru University, New Delhi
June 2001 B.Sc. in Physics and Mathematics
Deen Dayal Upadhyay Gorakhpur University, Gorakhpur

COMPUTER SKILLS

Programming: Fortran, Python (NumPy, SciPy, Pandas, NLTK, etc.), R, SQL
Tools: Mathematica, LaTeX, xmgrace, gnuplot, MS Office, Keynote
OS: Linux, Windows, macOS, UNIX

RESEARCH INTERESTS

Quantitative Studies of S&T, Socioeconomic Impact Assessment, Policy Research, Mathematical Modelling, Machine Learning, NLP, Data Mining, Random Matrices, Econophysics, Time Series Analysis, Nonlinear and Complex Systems

RESEARCH ACTIVITIES AND CREDENTIALS

6.1 Quantitative Studies of S&T and Policy Research

The contemporary S&T system is increasingly complex and interdisciplinary. I employ quantitative approaches using complex network theory, data science, and AI to study STI dynamics and inform science policy.

6.2 Socioeconomic Impact Assessment

I have contributed to SEIA studies at CSIR-NIScPR, evaluating the socioeconomic impact of technologies and fellowship programs. This includes stakeholder analysis, qualitative data assessment, and actionable policy recommendations.

6.3 Nonlinear and Complex Systems

Worked with global research groups in nonlinear systems and Random Matrix Theory. Authored multiple high-quality research articles and lecture notes in this area.

WORK EXPERIENCE

2022–present	Principal Scientist & AcSIR Assistant Professor, CSIR-NIScPR, New Delhi
2018–2022	Senior Scientist & AcSIR Assistant Professor, CSIR-NIScPR
2016–2017	Postdoc, Holon Institute of Technology (HIT), Israel
2015–2016	Visiting Scholar, School of Physical Sciences, JNU, New Delhi
2011–2015	Postdoctoral Fellow, ICF-UNAM, Mexico
2009–2010	Postdoctoral Fellow, Technion – Israel Institute of Technology

LANGUAGES

Hindi:	Mother tongue
English:	Fluent
Spanish:	Basic knowledge

Research Articles

1. Profiling Team Exploration Strategies of Collaborating Authors from Artificial Intelligence in Computer Science
A. Raghuvanshi and [Vinayak](#)
J. Informetrics 18 (2024) 101586 (14 pages)
DOI:doi.org/10.1016/j.joi.2024.101586
Cited: 1 Time
2. Signature of Capacity Development through Research Collaborations in Artificial Intelligence and Machine Learning
[Vinayak](#), A. Raghuvanshi, and A. Kshitij
J. Informetrics 17 (2023) 101358 (17 pages)
DOI:[10.1016/j.joi.2022.101358](https://doi.org/10.1016/j.joi.2022.101358)
Cited: 5 Times
3. Parametric Number Covariance in Quantum Chaotic Spectra
[Vinayak](#), S. Kumar, and A. Pandey
Phys. Rev. E 93 (2016) 032217 (6 pages)
DOI:[10.1103/PhysRevE.93.032217](https://doi.org/10.1103/PhysRevE.93.032217)
Cited: 1 Time
4. Time Series, Correlation Matrices and Random Matrix Models
[Vinayak](#) and T. H. Seligman
AIP Conf. Proc. 1575, (2014) 196 (22 pages)
DOI:[10.1063/1.4861704](https://doi.org/10.1063/1.4861704)
Cited: 22 times
5. Spectral analysis of finite-time correlation matrices near equilibrium phase transitions
[Vinayak](#), T. Prosen, B. Buca, and T. H. Seligman
Euro Phys. Lett. 108 (2014) 20006 (5 pages)
DOI: [10.1209/0295-5075/108/20006](https://doi.org/10.1209/0295-5075/108/20006)
Cited: 24 times.
6. Spectral Domain of Large Nonsymmetric Correlated Wishart Matrices
[Vinayak](#) and Luis Benet
Phys. Rev. E 90, (2014) 042109 (10 pages)
DOI: [10.1103/PhysRevE.90.042109](https://doi.org/10.1103/PhysRevE.90.042109)
Cited: 12 times. (*Recently cited in PNAS by a research group from Massachusetts Institute of Technology, Cambridge, in the context of the Ecosystem stability*)
7. Spectral density of the non-central correlated Wishart ensembles
[Vinayak](#)
Phys. Rev. E 90 (2014) 042144 (8 pages)
DOI: [10.1103/PhysRevE.90.042144](https://doi.org/10.1103/PhysRevE.90.042144)
Cited: 1 time.
8. Emerging Spectra of Singular Correlation Matrices Under Small Power-Map Deformations
[Vinayak](#), Rudi Schäfer and Thomas H. Seligman
Phys. Rev. E 88 (2013) 032115 (9 pages).
DOI: [10.1103/PhysRevE.88.032115](https://doi.org/10.1103/PhysRevE.88.032115)
Cited: 26 times.
9. Spectral density of a Wishart Model for Nonsymmetric Correlation Matrices
[Vinayak](#)
Phys. Rev. E 88 (2013) 042130 (6 pages).
DOI: [10.1103/PhysRevE.88.042130](https://doi.org/10.1103/PhysRevE.88.042130)
Cited: 12 times (from ADS).

10. Subsystem Dynamics Under Random Hamiltonian Evolution
[Vinayak](#) and M. Znidarič
 J. Phys. A: Math. Theor. 45 (2012) 125204 (14 pages).
 DOI: [10.1088/1751-8113/45/12/125204](https://doi.org/10.1088/1751-8113/45/12/125204)
 Cited: 64 times (ADS).
11. Statistics of Resonances in a One-Dimensional Chain : a Weak Disorder Limit
[Vinayak](#)
 J. Phys. A: Math. Theor. 45 (2012) 235302 (17 pages)
 DOI: [10.1088/1751-8113/45/23/235302](https://doi.org/10.1088/1751-8113/45/23/235302).
12. Correlated Wishart Ensembles and Chaotic Time Series
[Vinayak](#) and A. Pandey
 Phys. Rev. E 81 (2010) 036202 (17 pages).
 DOI: [10.1103/PhysRevE.81.036202](https://doi.org/10.1103/PhysRevE.81.036202)
 Cited: 30 times.
13. Contour-integral method for transitions to the circular unitary ensemble
[Vinayak](#) and A. Pandey
 J. Phys. A: Math. Theor. 42 (2009) 315101 (11 pages).
 DOI: [10.1088/1751-8113/42/31/315101](https://doi.org/10.1088/1751-8113/42/31/315101)
 Cited 3 times.
14. Transition from Poisson to Circular Unitary Ensemble
[Vinayak](#) and A. Pandey
 Pramana - J. Phys. 73 (2009) 505 (15 pages).
 DOI: [10.1007/s12043-009-0103-y](https://doi.org/10.1007/s12043-009-0103-y)
 Cited 1 time.

Pre-print

1. Rethinking Scientific Rankings with Breakthrough and Disruption Metrics: A Complex Network-Based Approach
 Adarsh Raghuvanshi, Hrishidev Unni, [Vinayak](#), Anirban Chakraborti
 arXiv preprint arXiv:2506.18804 (2025)

Policy Bulletins

1. Assessment of the impact Created by CSIR-RRF programm
[Vinayak](#) and A. Kshitij
 CSIR-NIScPR Policy Bulletin/January -2022/02
2. Assessment of the impact Created by CSIR-CWTS programm
[Vinayak](#) and A. Kshitij
 CSIR-NIScPR Policy Bulletin/January -2022/03
3. Assessment of CSIR's Technologies based on TRL Framework Ranjana Aggarwal, Vipin Kumar, Sujit Bhattacharya, Shiv Narayan Nishad, and [Vinayak](#)
 CSIR-NIScPR Policy Bulletin/January -2022/01

Research Reports

1. Economic Impact Assessment of The Paraffin Wax Production Technology
Y. Suman, [Vinayak](#), and K. Mandal, 2019
2. Economic Impact Assessment of the Benzene Recovery Technology
Y. Suman and [Vinayak](#), 2019
3. Linguistic Analysis of Product Review Text
[Vinayak](#), 2019
4. Evaluating the market demand for the three fractions of biomass - Lignin, Cellulose and Hemicellulose' submitted to EID-Parry, 2019
Y. Suman, Madhulika Bhati, and [Vinayak](#)
5. Assessment of the Impact Created by CSIR-TWAS and CSIR-RRF Fellowships
[Vinayak](#) and A. Kshitij, 2020
6. Socio-economic assessment of KisanSabha
F. Azad, [Vinayak](#) and Y. Suman, 2022
7. Assessing the Citation-based Performance Evaluation in Research Reward System
[Vinayak](#) and A. Kshitij, 2023
8. Utilization pattern of Ashwagandha and its formulations for and Alzheimer's disease (AD)/dementia management in Indian Scenario: A policy perspective study
S. Ray and [Vinayak](#), 2023

Book Chapters

1. Civil, Infrastructure & Engineering Theme: CSIR Compendium of Technologies 2021
[Vinayak](#) and L. Pulamte

International Conference

- STliG2025— CSIR-NIScPR hosted a two-day international conference on “Aligning Science-Technology-Innovation Indicators for Effective R&D Governance” (14–15 January 2025). I proposed the conference along with Dr. Avinash Kshitij and Dr. Naresh Kumar, and served as the Coordinator of the Organizing Committee. I contributed to the conceptualization and development of five core themes of the conference, viz:
 - R&D and Society
 - R&D and Social Media
 - Methods, Approaches, and Practices in Performance Evaluation
 - Open Science, Open Access, and Open Source
 - Foresight in R&D Governance