A. Gowrisankar

Assistant Professor Senior
Department of Mathematics, School of Advanced Sciences,
Vellore Institute of Technology, Vellore, Tamil Nadu, India
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Education Profile

September, 2017 — **Institute Post-Doctoral Programme (IPDF)** in Indian Institute of Technology Guwahati (IITG), Guwahati, India (April-September, 2017)

March, 2017 — **Ph.D. in Mathematics** in The Gandhigram Rural Institute (Deemed to be University), Gandhigram, Tamil Nadu, India
Thesis title: ***Generation of Fractals through Iterated Function Systems***

April, 2012 — **M.Sc. Mathematics** in The Gandhigram Rural Institute (Deemed to be University), Gandhigram, Tamil Nadu, India
Percentage of Marks: **72%**

April, 2010 — **B.Sc. Mathematics** in Government Arts College, Udumalpet, Tamil Nadu, India
Percentage of Marks: **69%**

Professional Profile

1. **Assistant Professor Senior Grade 1,** Department of Mathematics, School of Advanced Sciences, Vellore Institute of Technology, Vellore, Tamil Nadu, India. **(01.01.2023– present)**
2. **Assistant Professor Grade 2,** Department of Mathematics, School of Advanced Sciences, Vellore Institute of Technology, Vellore, Tamil Nadu, India. **(01.07.2022–31.12.2022)**
3. **Assistant Professor Grade 1,** Department of Mathematics, School of Advanced Sciences, Vellore Institute of Technology, Vellore, Tamil Nadu, India. **(05.10.2017–30.06.2022)**

Research Interests

- Fractal Analysis - Fractal Interpolation Functions
- Fractional Calculus
- Approximation Theory - Climate Change, Nonlinear Dynamics
- Image and Signal Analysis

Research Profile

Journal Publications

1. T.M.C. Priyanka, K. Udhayakumar, S.S. Mohanrasu, A. Gowrisankar and R. Rakkiyappan, Chaotic synchronization and fractal interpolation-based image encryption: exploring event-triggered impulsive control in variable-order fractional lur'e systems, *Multimedia Tools and Applications*, Accepted (2024).
2. A. Agathiyan, A. Gowrisankar, P. Natarajan, K. Bingi and N.B. Shaik, Note on Fourier Transform of Hidden Variable Fractal Interpolation, *Engineering Journal*, 27(12) (2024) 23–36.

3. T.M.C. Priyanka, **A. Gowrisankar**, Bilel Selmi and Pankajam Natarajan, Fractal modelling of dynamical systems in association with Weyl-Marchaud fractional derivative, *Journal of Applied Nonlinear Dynamics*, Accepted (2024).

4. T.M.C. Priyanka, **A. Gowrisankar** and Jinde Cao, Fractal functions associated with Reich contractions: an approximation of chaotic attractors, *Numerical Algorithms*, https://link.springer.com/article/10.1007/s11075-023-01687-7 (2023).

5. M. Meenakshi and **A. Gowrisankar**, Fractal based approach on analyzing the trends of climate dynamics, *International Journal of Modern Physics B,* https://doi.org/10.1142/S021797922440006X(2023).

6. T.M.C. Priyanka, C. Serpa and **A. Gowrisankar**, α-fractal function with variable parameters: An explicit representation, *Fractals*, https://doi.org/10.1142/S0218348X24400085 (2023).

7. A. Agathiyan, **A. Gowrisankar** and N.A.A. Fataf, On the integral transform of fractal interpolation functions, *Mathematics and Computers in Simulation* (2023) https://doi.org/10.1016/j.matcom.2023.08.018.

8. A. Agathiyan, **A. Gowrisankar,** N.A.A. Fataf and J. Cao, Remarks on the integral transform of non-linear fractal interpolation functions, *Chaos, Solitons & Fractals,* 173 (2023) 113749.

9. R. Valarmathi and **A. Gowrisankar,** Variable order fractional calculus on α-fractal functions, *Journal of Analysis* (2023) 1–17.

10. B. Pradhan, **A. Gowrisankar**, A Abdikian, S. Banerjee and A. Saha, Propagation of ion-acoustic wave and its fractal representations in spin polarized electron plasma, *Physica Scripta* 98(6) (2023) 065604.

11. T.M.C. Priyanka, C. Serpa and **A. Gowrisankar**, On the classical integral of fractal functions, *Fractals* 31(5) (2023) 2350057.

12. T.M.C. Priyanka and **A. Gowrisankar**, Construction of new affine and non-affine fractal interpolation functions through the Weyl-Marchaud derivative, *Fractals* 31(5) (2023) 2350041.

13. R. Valarmathi and **A. Gowrisankar**, On the variable order fractional calculus of fractal interpolation functions, *Fractional Calculus and Applied Analysis* 26(3) (2023) 1273–1293. https://doi.org/10.1007/s13540-023-00150-7

14. C. Kavitha and **A. Gowrisankar**, On the variable order Weyl-Marchaud fractional derivative of non-affine fractal function, *The Journal of Analysis* (2023)

15. P. K. Prasad, **A. Gowrisankar**, S. Banerjee and A. Saha, Fractal representation of electron-acoustic waves in the Earth's auroral zone, *Advances in Space Research* (2023). https://doi.org/10.1016/j.asr.2023.02.009

16. A. Agathiyan, N. A. A. Fataf and **A. Gowrisankar**, Explicit relation between Fourier transform and fractal dimension of fractal interpolation functions, *The European Physical Journal Special Topics* (2023). DOI: 10.1140/epjs/s11734-023-00779-8

17. S.S. Mohanrasu, K. Udhayakumar, T.M.C. Priyanka, **A. Gowrisankar**, S. Banerjee and R. Rakkiyappan, Event-triggered impulsive controller design for synchronization of delayed chaotic neural networks and its fractal reconstruction: An application to image encryption, *Applied Mathematical Modelling,* 115 (2023) 490–512.

18. T.M.C. Priyanka, A. Agathiyan and **A. Gowrisankar**, Weyl–Marchaud fractional derivative of a vector valued fractal interpolation function with function contractivity factors, *The Journal of Analysis* 31 (2023) 657– 689.

19. R. Valarmathi and **A. Gowrisankar**, On the variable order fractional calculus characterization for the hidden variable fractal interpolation function, *Fractal and Fractional* 7(1) (2023) 34.

20. A. Jha, **A. Gowrisankar,** S. He, H. Anand and A. Saha, Fractal representation of tsunami waves: a generalized geophysical gardner equation, *The European Physical Journal Special Topics* 232 (2023) 979–990.

21. T.M.C. Priyanka, R. Valarmathi, K. Bingi and **A. Gowrisankar**, On Approximation Properties of Fractional Integral for A-Fractal Function, *Mathematical Problems in Engineering,* 2022 (2022) Article ID 6409656.

22. **A. Gowrisankar**, T.M.C. Priyanka, A. Saha, L. Rondoni, Md. K. Hassan and S. Banerjee, Greenhouse gas emissions: A rapid submerge of the world, *Chaos: An Interdisciplinary Journal of Nonlinear Science,* 32(6) 061104 (2022).

23. A. Agathiyan, **A. Gowrisankar**, T.M.C. Priyanka, Construction of new fractal interpolation functions through integration method, *Results in Mathematics*, 77, Article number:122 (2022).

24. **A. Gowrisankar**, T.M.C. Priyanka and S. Banerjee, Omicron: a mysterious variant of concern, *The European Physical Journal Plus*, 137, 100 (2022).

25. T.M.C. Priyanka and **A. Gowrisankar**, Riemann–Liouville fractional integral of nonaffine fractal interpolation function and its fractional operator, *The European Physical Journal Special Topics*, 1-17 (2021).

26. N. Balasubramani and **A. Gowrisankar**, Affine recurrent fractal interpolation functions, *The European Physical Journal Special Topics,* 1–15, 2021.

27. **A. Gowrisankar**, A.K. Golmankhaneh and C. Serpa, Fractal calculus on fractal interpolation functions, *Fractal and Fractional* 5(4), 157, 2021.

28. D. Easwaramoorthy, **A. Gowrisankar**, A. Manimaran, S. Nandhini, L. Rondoni and S. Banerjee, An exploration of fractal-based prognostic model and comparative analysis for second wave of COVID-19 diffusion, *Nonlinear Dynamics,* 106, 1375-1395, 2021.

29. T.M.C. Priyanka and **A. Gowrisankar**, Analysis on Weyl-Marchaud fractional derivative for types of fractal interpolation function with fractal dimension, *Fractals*, 29(7), 2150215 (2021).

30. C. Kavitha, **A. Gowrisankar** and S. Banerjee, The second and third waves in India: when will the pandemic be culminated? The European Physical Journal Plus, 136 Article number: 596, 2021.

31. **A. Gowrisankar**, L. Rondoni and S. Banerjee, Can India develop herd immunity against COVID-19?, *The European Physical Journal Plus,* 135(6), 1-9, 2020.

32. P. K. Prasad, **A. Gowrisankar**, A. Saha and S. Banerjee, Dynamical properties and fractal patterns of nonlinear waves in solar wind plasma, Physica Scripta, 95(6), 2020.

33. N.A.A. Fataf, **A. Gowrisankar** and S. Banerjee, In search of self-similar chaotic attractors based on fractal function with variable scaling approximately, *Physica Scripta,* 95(7), 2020.

34. R. Mohan, **A. Gowrisankar**, R. Uthayakumar and K. Jayakumar, Morphology dependent electrical property of chitosan film and modeling by fractal theory, *The European Physical Journal Special Topics,* 228, 233–243, 2019.

35. **A. Gowrisankar** and M.G.P. Prasad, Riemann-Liouville calculus on quadratic fractal interpolation function with variable scaling factors, *The Journal of Analysis,* 27(2), 347–363, 2019.

36. D. Easwaramoorthy, P.S. Eliahim Jeevaraj, **A. Gowrisankar**, A. Manimaran and S. Nandhini, Fuzzy generalized fractal dimensions using inter-heartbeat interval dynamics in ECG signals for age related discrimination, *International Journal of Engineering & Technology,* 7, 90–903, 2018.

37. **A. Gowrisankar** and R. Uthayakumar, Fractional calculus on fractal interpolation for a sequence of data with countable iterated function system, *Mediterranean Journal of Mathematics,* 13(3) 3887–3906, 2016.

38. R. Uthayakumar and **A. Gowrisankar**, Mid-sagittal plane detection in magnetic resonance image based on multifractal techniques, *IET Image Processing,* 10(10), 751 – 762, 2016.

39. R. Uthayakumar and **A. Gowrisankar**, Generation of fractals via self-similar group of Kannan iterated function system, *Applied Mathematics & Information Sciences,* 9(6), 3245–3250, 2015.

40. R. Uthayakumar and **A. Gowrisankar**, Attractor and self-similar group of generalized fuzzy contraction mapping in fuzzy metric space, *Cogent Mathematics,* 2(1):1024579, 1–12, 2015.

41. R. Uthayakumar and **A. Gowrisankar**, Generalized fractal dimensions in image thresholding technique, *Information Sciences Letters,* 3(3) 125–134, 2014.

Book Chapters/Conference Proceedings

1. T.M.C. Priyanka, A. Agathiyan, and **A. Gowrisankar**, Perspective of Fractal Calculus on Types of Fractal Interpolation Functions, Frontiers of Fractal Analysis Recent Advances and Challenges, 83–100, CRC Press, 2022.

2. A. K. Golmankhaneh, K. Welch, T.M.C. Priyanka and **A. Gowrisankar**, Fractal Calculus, Frontiers of Fractal Analysis Recent Advances and Challenges, 67–82, CRC Press, 2022.

3. T.M.C. Priyanka and **A. Gowrisankar**, Results on Fractal Dimensions for a Multivariate Function, Nonlinear Dynamics and Applications, 1123–1131, Springer, Cham, 2022.

4. **A. Gowrisankar** and M. K. Hassan, Randomness and Fractal Functions on the Sierpinski Triangle, Nonlinear Dynamics and Applications, 1057–1068, Springer, Cham, 2022.

5. C. Kavitha, T.M.C. Priyanka, C. Serpa and **A. Gowrisankar**, Fractional Calculus for Multivariate Vector-Valued Function and Fractal Function, Applied Fractional Calculus in Identification and Control, 1–23, Springer, Singapore, 2022.

6. **A. Gowrisankar** and D. Easwaramoorthy, Local Countable Iterated Function Systems, ICAMS-2017 - Trends in Mathematics - Springer Book Series, 1, 169–175, 2018.

7. R. Uthayakumar and **A. Gowrisankar**, Fractals in Product Fuzzy Metric Space, Fractals, Wavelets, and their Applications, Springer Proceedings in Mathematics & Statistics, 92, 157–164, 2014.

Book Publications

1. **A. Gowrisankar**, K.M. Reddy and S. Banerjee, Fractal Patterns with MATLAB, Springer, (2023).

2. S. Banerjee, D. Easwaramoorthy, **A. Gowrisankar**, Fractal Functions, Dimensions and Signal Analysis, Springer Cham, (2021). 978-3-030-62672-3.

3. S. Banerjee, M. K. Hassan, S. Mukherjee, **A. Gowrisankar**, Fractal Patterns in Nonlinear Dynamics and Applications, CRC Press, Taylor & Francis Group, ISBN-13: 978-1498741354 (2019).

Edited Books

1. S. Banerjee, **A. Gowrisankar**, D. Easwaramoorthy, S. Nandhini and A. Manimaran, Interplay of Fractals and Complexity in Mathematical Modelling and Physical Patterns, Springer Proceedings in Physics, 2023 (Ongoing).
2. **A. Gowrisankar,** K. Bingi and C. Serpa, Studies in Infrastructure and Control, Springer Nature Singapore (2023) (Ongoing).
3. S. Banerjee and **A. Gowrisankar**, Fractal Signatures on the Dynamics of Epidemiology: An Analysis of COVID-19 Transmission, CRC Press, Taylor & Francis Group (2023).
4. S. Banerjee and **A. Gowrisankar**, Frontiers of Fractal Analysis: Recent Advances and Challenges, CRC Press, Taylor & Francis Group, ISBN-978-1-003-23120-2, ISBN-10: 1498741355 (2022).

Guest Editor

1. Special Issue: Recent Trends in Fractals and Nonlinear Dynamical Systems, International Journal of Applied Mathematics and Computer Science, 2023 (Ongoing).
2. EPJ ST Special Issue: Framework of Fractals in Data Analysis: Theory and Interpretation, The European Physical Journal Special Topics, Issue 965-967, 2023.
3. EPJ ST Special Issue: Frontiers of Fractals for Complex Systems: Recent Advances and Future Challenges, The European Physical Journal Special Topics, Issue 21-22, 2021.

Reviewer

1. IET Image Processing
2. The Journal of Analysis
3. The European Physical Journal Plus
4. The European Physical Journal Special Topics
5. Fractals
6. Current Signal Transduction Therapy
7. Chaos, Solitons and Fractals
8. Computational and Mathematical Methods in Medicine
9. Mathematical Reviews/MathSciNet
10. Fractal and Fractional

Conference/Workshop/Training Programme Organized

1. Organizing Secretary of "International Symposium on Mathematical Analysis on Fractals and Dynamical Systems - 2023 (ISMAFDS-2023)", organized during 24th–25th August 2023 at Vellore Institute of Technology, Vellore, India.
2. Organizing Secretary of "Sixth Biennial International Group Theory Conference – 2021 (6BIGTC–2021)", organized during 4th–6th March 2021 at Vellore Institute of Technology, Vellore, India.
3. Coordinator of "Workshop on Mathematical Applications - 2018", a two days National level workshop organized by the Department of Mathematics, School of Advanced Sciences, Vellore Institute of Technology, Vellore held from 05th to 06th, March 2018.

4. Organizing Secretary of "Advanced Training Programme on Algebra and its Applications – 2018 (ATPAA–2018)" a five days National level workshop organized by the Department of Mathematics, School of Advanced Sciences, Vellore Institute of Technology, Vellore held from 9th to 23rd, November 2018.

Invited Talk

1. Delivered an invited talk titled for "A Two Days State Level Workshop on LaTex (Documentation & Presentation)" organized by Sri Ramakrishna College of Arts & Science (Autonomous), Coimbatore, Tamil Nadu, India during 3–4 August 2023.
2. Delivered an invited talk titled "Fractal perspective on the dynamics of SARS-CoV 2" at the International Conference on Nonlinear Dynamics and Applications (ICNDA 2022), Sikkim Manipal Institute of Technology (SMIT), Majitar, Sikkim, India.
3. Delivered an invited talk on "Fractal Approximation and Its Applications" at the International Symposium on Quantum and Complexity Sciences 2019, held on 19–20 September 2019, at Institute for Mathematical Research, Universiti Putra Malaysia, Serdang, Malaysia.

Outreach Program

1. Completed course Fractal Geometry: Foundations to Frontiers offered by Global Initiative of Academic Networks (GIAN) during 14–31 August, 2017.
2. Completed course Fractals and Splines in Approximation and Interpolation Theory offered by Global Initiative of Academic Networks (GIAN) during 15–29 July, 2016.

PhD Supervision

Ongoing: 05

- 2022 – : R. Gandhimathi, Teaching Cum Research Assistant Fellowship (TRA) (August, 2022 – July, 2025) funded by VIT, Vellore.
- 2020 – : C. Kavitha, Teaching Cum Research Assistant Fellowship (TRA) (October, 2021 – September, 2024) funded by VIT, Vellore.
- 2020 – : M. Meenakshi, Teaching Cum Research Assistant Fellowship (TRA) (October, 2021 – September, 2024) funded by VIT, Vellore.
- 2020 – : A. Agathiyan, Teaching Cum Research Assistant Fellowship (TRA) (March, 2021 – February, 2024) funded by VIT, Vellore.
- 2020 – : T.M.C. Priyanka, Teaching Cum Research Assistant Fellowship (TRA) (March, 2021 – February, 2024) funded by VIT, Vellore.

Completed: 01

- Jan 2020 – Jun 2023: R. Valarmathi, Teaching Cum Research Assistant Fellowship (TRA) (February, 2020-June, 2023) funded by VIT, Vellore (Viva: October 31, 2023).

Funded Projects

- Sanctioned project "Perturbed fractal splines and its Caputo-fractional derivative in the modelling of chaotic attractors" under **Teachers Associateship for Research Excellence (TARE)** by the Science and Engineering Research Board (SERB) for the period 2024 – 2026; Reference No. TAR/2023/000210.

- Sanctioned project under **VIT-International Research Fund Scheme (VIN)** for the year 2023 - 2024 with a grant of Rs. 5,50,000/- from the Vellore Institute of Technology, Vellore.

- Sanctioned project under "Assistance to Professional Bodies & Seminar / Symposia Scheme" has been funded by the **Science & Engineering Research Board (SERB).** A grant of Rs. 2,50,000/- for organizing "International Symposium on Mathematical Analysis of Fractals and Dynamical Systems - 2023 (ISMAFDS-2023)" during Aug 24 – 25, 2023; Sanction Order No.: SSY/2023/000534.

- Sanctioned project under **SEED grant (RGEMS)** funded by the Vellore Institute of Technology, Vellore for the financial year 2023 - 2024; Sanction Order No.: SG20230002.

Research IDs

- Scopus: 56418470400
- ORCID: orcid.org/0000-0002-5093-2805
- Research Gate: https://www.researchgate.net/profile/A-Gowrisankar
- Google Scholar: https://scholar.google.co.in/citations?user=15UGE8gAAAAJ&hl=en

Professional Membership

- 2018-Present: Life Member in International Society of Difference Equations.
- 2019-2020: Annual Member in The Indian Science Congress Association, (A3386).

Foreign Visit

- National Defence University of Malaysia, Malaysia
- University Putra Malaysia, Malaysia

Awards/Fellowships/Recognitions

- Received fellowship under **Teachers Associateship for Research Excellence (TARE)** by SERB for the year 2024; Reference No. TAR/2023/000210.
- Distinguished EPJ Referees-2021.
- Worked as a **Project Fellow** of University Grants Commission sponsored Major Research Project entitled “Fractal Analysis of Brain Tumour Detection and Growth Estimation” at Department of Mathematics, The Gandhigram Rural Institute – Deemed to be University, Gandhigram from **May-2013 to April 2016 (3 Years).**

Technical Skills

- MATLAB, R, C++
- LaTex

Personal Information

- Date of Birth: May 22, 1989
- Gender: Male
- Languages: Tamil, English, Kannada
- Nationality: Indian

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