

Dr. A. Stanley Raj

Assistant Professor of Physics, St. Stephen's College, Delhi

Computational Geophysics | Astrophysics & Astroinformatics | AI & Environmental Science

Brief Bio

Dr. A. Stanley Raj is an Assistant Professor of Physics with research experience in computational geophysics, artificial intelligence, machine learning, neuro-fuzzy systems, wavelet analysis, groundwater studies, climate variability, environmental sustainability, microplastics, graphene-based filtration, nanomaterials, and space physics. His research approach integrates physics, mathematical modelling, computational intelligence, GIS, remote sensing, and emerging technologies to address scientific and environmental problems. His current research direction places particular emphasis on groundwater sustainability, microplastic contamination, AI-assisted environmental analysis, and graphene-based water filtration.



Research

Computational Geo-
physics/Astroinformatics/
AI / ML / Neuro-Fuzzy



PhD

2 Ph.D scholars com-
pleted degree under
University of Madras

Publications

Refereed journal
and conference research

Innovation

4 design-patent records
AI / water / environ-
ment

Research Vision

“Research is everywhere; how we see it depends on our perception.”

Observe differently. Question deeply. Connect disciplines. Create meaningful solutions.

Research Areas

- Artificial Intelligence & Machine Learning
- Artificial Neural Networks
- Fuzzy Logic & Neuro-Fuzzy Systems
- Computational Geophysics
- Goelectrical Resistivity Inversion
- Groundwater & Water Resources
- Climate Change
- Environmental Sustainability
- Microplastics & Water Pollution
- Graphene & Nanomaterials
- Wavelet & Signal Processing
- Nature-Inspired Optimization
- GIS & Remote Sensing
- Astrophysics & Space Physics
- Scientific Computing
- Instrumentation & IoT

Education & Academic Experience

Ph.D. in Physics (Geophysics)

Centre for Geo Technology, Manonmaniam Sundaranar University, Tirunelveli.

Dissertation: “The inversion of goelectrical resistivity data using Adaptive Neuro-Fuzzy Inference System (ANFIS).”

2013

Assistant Professor of Physics

St. Stephen's College, Delhi.

July 2026–Present

Assistant Professor of Physics

Loyola College, Chennai.

2015–July 2026

Previous Academic Experience

Assistant Professor, Vel Tech University

2013–2015

Academic / Administrative Roles

Sports Coordinator; ERP Coordinator (2017–2021); Placement Coordinator (2017–2023); LOCF Mentor for UG/PG restructuring (2021); In-charge, Loyola Astronomy and Rocketry Club, Shift II Physics (2023–Present).

Ph.D. Research Supervision

Two Ph.D. scholars Guided and Completed

University of Madras

1. Ronald Win Roy I.

Microplastics and contamination studies in groundwater and surface water.

Ph.D. Reg. No.: Ph.D./Prov. Regn./22071422/FT/10/2022/237 | Application No.: 22071422

2. Joseph Pious

Climate variability and groundwater stress – management and mitigation studies using GIS and Remote Sensing.

Ph.D. Reg. No.: RP.(D.2)/Admin/Ph.D/Full-Time/Jan 2023/AC/204

Selected Research Publications

2026

1. A. Stanley Raj, S. Adityan, K. C. Praveen Kumar. *Modified Teukolsky Framework for Environmentally-Coupled Black Hole Ringdown: A Physics-Informed Neural Network Approach for Improved Gravitational Wave Analysis.* *Astronomy and Computing*, 55, Article 101072, 2026. DOI: 10.1016/j.ascom.2026.101072.
2. A. Stanley Raj, S. Adityan, Josephine Usha, K. C. Praveen Kumar. *Quantum gravitational tunnelling and black-hole evaporation: A multimodal approach using WKB, RK4 and physics-informed neural networks.* *Pramana*, 2026.
3. K. Joseph Pious and A. Stanley Raj. *Spatial-temporal variability and risk assessment of surface and groundwater resources under climate change and urbanization: A physics-informed analysis.* *Science of the Total Environment*, 1029, Article 181723, 2026.

2025

1. Joseph Pious and Stanley Raj. *Groundwater Potential Zone Mapping and Sustainable Management in Chennai, Kancheepuram, and Tiruvallur Districts Using GIS-Based Multi-Criteria Decision Analysis.* Discover Water, Springer. Accepted, 2025.
2. H. M. Henrietta and A. Stanley Raj. *AI-enabled Recapitulated Neuro Fuzzy Optimization (RNFO) algorithm for evaluating the food consumption and nutrition during COVID-19.* IEEE IATMSI, pp. 1–6, 2025. DOI: 10.1109/IATMSI64286.2025.10984798.
3. S. Adityan and A. Stanley Raj. *Tracing gravitational waves by integrating wavelet, PCA and clustering analysis using pulsar timing array data.* *Astrophysics and Space Science*, 370, 35, 2025.
4. Ronald Win Roy, A. Stanley Raj and Stefano Viaroli. *Microplastic removal, identification and characterization in Chennai sewage treatment plants.* *Journal of Environmental Management*, 380, 125120, 2025.
5. Ronald Win Roy and Stanley Raj. *Identifying microplastic contamination in drinking water: analysis and evaluation using spectroscopic methods.* *International Environmental Review*, 24(2), 2025.

2024

1. A. Stanley Raj, A. Thamizhazhagan and N. S. Nirmala Jothi. *Eco-friendly fabrication of carbon nanotubes (CNTs) from waste materials – review.* *Smart Science*, pp. 1–20, 2024.
2. Henrietta and Stanley Raj. *AI-Enabled Algorithm for Evaluating the Impact of COVID-19 on Food Consumption and Nutrition.* *Open Access Journal of Data Science and Artificial Intelligence*, 2(1), 2024.
3. Stanley Raj, S. S. Abimanyu, M. C. Roshan Raj, T. Infant Jessly and Aaron Samuel. *Earthquake Early Warning from Space? Investigating M8+ Earthquakes and Kp-Index Fluctuations.* *International Journal of Emerging Technologies and Innovative Research*, 11(5), pp. a64–a77, 2024.

Selected Earlier Work

- *Rainfall data classification using Mann-Kendall test statistics associated with Neuro Fuzzy technique: A case study of Chennai district.* *International Journal of Hybrid Intelligent Systems*, 19(1–2), 95–109, 2023.
- *Presentation of neurofuzzy optimally weighted sampling model for geoelectrical data inversion.* *Modeling Earth Systems and Environment*, 7, 1927–1938, 2021.

- *The impact of rainfall on groundwater table in Chennai city, India: GIS and wavelet approach*. Sustainable Water Resources Management, 6, Article 85, 2020.
- *A novel and generalized approach in the inversion of geoelectrical resistivity data using Artificial Neural Networks (ANN)*. Journal of Earth System Science, 123(2), 395–411, 2014.
- *Geoelectrical Inversion and Evaluation of Lithology Based on Optimized Adaptive Neuro Fuzzy Inference System (ANFIS)*. Studia Geophysica et Geodaetica, 57(3), 520–534, 2012.

Patents & Design Innovations

Indian Design Patent / Application Records

1. A Novel Organic Fertilizer Based on Leaves and Nano Formulations Process

Date: 30 September 2022 | Application No.: 202241056437A

2. Machine Learning Based Stress Detection Device

Date: August 2024 | Application No.: 422371-001

3. Water Microplastic Contamination Detecting Device

Date: 20 November 2024 | Application No.: 437948-001

UK Design Patent

1. AI Based Groundwater Detecting Device for Agriculture

Date: 12 May 2025 | Design No.: 6441694

Books & Book Chapters

Books

- *Properties of Matter and Sound for B.Sc. Physics – Semester I*. Department of Physics, School of Sciences, Tamil Nadu Open University, Chennai, 2021.
- *Have a Ride in Time Machine*. Justfiction Edition, Omniscryptum, Republic of Moldova, Europe, 2022. ISBN: 978-613-9-42304-0.

Selected Book Chapters

- A. Stanley Raj, J. P. Angelena, R. Damodharan and D. S. Kumar (2023). *Self-Generating Training Model (SGTM) Algorithm to Estimate Groundwater Level in Consensus with Climate Change Impact Study in Cauvery Delta Zone, Tamil Nadu, India*. In: *Climate Change Impacts in India*, Springer. DOI: 10.1007/978-3-031-42056-6_5.
- Stanley Raj A. and Chendhoor B. (2021). *Impact of Climate Extremes of El Nina and La Nina in Patterns of Seasonal Rainfall over Coastal Karnataka, India*. Springer Climate. DOI: 10.1007/978-3-030-67865-4_10.
- Stanley Raj A., Mary Henrietta H., Kalaiarasi K. and Sumathi M. (2021). *Rethinking the Limits of Optimization Economic Order Quantity (EOQ) Using Self Generating Training Model by Adaptive-Neuro Fuzzy Inference System*. Springer. DOI: 10.1007/978-981-16-0708-0.

Professional Memberships & Scientific Societies

- Life Member, Indian Meteorological Society (LM-3408), India.
- Indian Society for Artificial Intelligence and Robotics, India.
- International Society for Agro-meteorology (INSAM), Netherlands.
- International Association of Hydrological Sciences, United Kingdom.
- Life Member, India–UK Water Centre (IUKWC).
- Society for the Advancement of Science in Africa (SASA).
- International Society of Environment and Sustainability.
- Life Member, Interstate Technology Regulatory Council, Washington D.C., USA.
- Life Member, South Asian Meteorological Association (SAMA), SAMA-LM-IND-61.

Editorial / Academic Service

- Editorial Member, Science Publishing Group, New York, USA.
- Editor, Journal of Ageing and Healthcare, Open Access Publications, USA.
- Reviewer for international journals including Springer, Elsevier, IEEE, Taylor & Francis and Wiley journals.

Research Review & Scholarly Service

Reviewer / editorial service includes:

- IETE Journal of Research
- Arabian Journal of Geosciences
- Pattern Recognition Letters
- IEEE Geoscience and Remote Sensing Letters
- Near Surface Geophysics
- Modeling Earth Systems and Environment
- Journal of Food Processing
- International Journal of Physical Sciences
- Journal of Civil Engineering and Sciences
- Physical Sciences Research International
- Hydrogeology Journal
- Earth Sciences Research Journal
- Journal of Intelligent Systems
- Journal of Scientific Research and Reports
- Physical Science International Journal
- Global Journal of Applied Engineering
- Journal of Geography, Environment and Earth Science International

Research Projects & Innovation

- **SMART Farmer** – a future agriculture initiative using Internet of Things (IoT), sanctioned under Loyola Research Park Scheme 2018–2019.
- **Loyola Automatic Weather Station (LAWS)** – sanctioned under Loyola Research Park Scheme 2017–2018; received Best Project Award.
- **GSM Monitoring Instrument Design** – industrial project for development of a prototype Phase-I monitoring instrument implemented at Sree Paper Mills, Tirunelveli.
- **RESinvANFIS** – MATLAB-based computational tool for geoelectrical resistivity inversion using neuro-fuzzy techniques.

Awards & Recognition

- **GlantorX Education Leadership Award**, 2022, Hindustan Times and Dailyhunt.
- **National Academic Excellence Award in Geophysics**, 2022, International Multidisciplinary Research Foundation (IMRF).
- **Best Faculty Award – Diligent and Regularity**, Good Shepherd Scheme, Loyola College Management, 2015–2016.
- **Second Best Poster Presentation Award**, Indian Geophysical Union 49th Annual Convention, Gandhinagar, 2012.
- **Friends of Physics Endowment** for First Rank Holder in Physics, M.D.T. Hindu College, 2005.

Technical Expertise

Programming
GIS / Data
AI / Computational

C, C++, MATLAB, Python
ArcGIS, data acquisition, scientific computing, GIS and remote sensing
Artificial Neural Networks, Fuzzy Logic, Neuro-Fuzzy systems, ANFIS, Wavelet Transform, nature-inspired optimization

Instrumentation

Resistivity meter, proton precision magnetometer, spectrophotometer, embedded systems, microcontrollers, Arduino Uno and ATmega

Research Methods

Mathematical modelling, inversion, optimization, signal processing, environmental and geophysical data analysis

Teaching Interests

Physics

Classical Mechanics
Electromagnetism
Quantum Physics
Mathematical Physics

Computational

MATLAB
Python
AI / Machine Learning
Scientific Computing

Interdisciplinary

Environmental Studies
Introductory Astronomy
Climate Science
Sustainability

Dr. A. Stanley Raj

Assistant Professor of Physics | Researcher | Computational Geophysics | AI & Environmental Applications
Research interests: AI • Geophysics • Groundwater • Climate • Microplastics • Graphene • Astrophysics