

curriculum vitae of
Prachi Bisht

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 ORCID  LinkedIn  GitHub  Creative

Satellite systems engineer and data scientist with 5+ years at ISRO, applying physics-informed modeling and machine learning to problems in solar energy forecasting, earth observation, and on-orbit system diagnostics. Skilled in EO data pipelines, remote sensing, statistical modeling, and solar power systems optimization.

Skills

AI/ML: Machine Learning, Deep Learning, Time Series Forecasting, Computer Vision, NLP, LLMs, Transformers, MLOps.
Tech Stack: Python, C++, SQL, TensorFlow, PyTorch, Scikit-learn, LangChain, HuggingFace, REST APIs, Git, CI/CD, GCP
Specialized Expertise: Geospatial Analytics, Predictive Maintenance, HPC Pipelines, Remote Sensing, Energy Forecasting

Education

MITx MicroMasters <i>Specialization in Statistics and Data Science, Grade:9.5/10</i>	<i>2024 - 2025</i>
Indian Institute of Space Science and Technology (IIST), Trivandrum, India <i>B.Tech. in Engineering Physics and M.S. in Solid State Physics, CGPA:8.6/10</i>	<i>2014 - 2019</i>

Work Experience

U R Rao Satellite Centre, Indian Space Research Organization (ISRO) <i>Scientist/Engineer-'SD' / Data Analysis & Modeling Lead—Power Systems</i>	<i>Bangalore</i> <i>July 2022–present</i>
<ul style="list-style-type: none">○ Led ML-driven predictive analytics for spacecraft solar panel health, combining time-series telemetry with earth-observation datasets, boosting forecasting accuracy by 30%. Deployed real-time diagnostics into production pipelines, reducing operational insight latency by 50%.○ Architected ML-driven  solar power simulation framework for Mars Lander Mission 2028, enabling adaptive scenario planning under uncertain landing conditions. Collaborated with cross-functional mission teams to embed ML-based decision-support into design trade studies.○ Designed and deployed a lightweight domain-specific Retrieval-Augmented Generation (RAG) system, enabling instant summarization and semantic QnA across hundreds of technical documents for Indian Space Station mission planning, boosting information retrieval time by 70%.	

Scientist/Engineer-'SC' *Sep 2019 - June 2022*

- Developed physics-informed ML models to predict solar cell degradation under radiation exposure, validated against telemetry from 30+ LEO satellites with <1% error. Published in Journal of Applied Physics (2022).
- Built a lightweight CV pipeline using MobileNet for defect detection in solar cell electroluminescence imagery, accelerating lab inspection workflows by 25% and supporting scalable quality control for 1000+ cells.

Publications

1. **P. Bisht** & P. Yash, *Investigating Double Peak Photocurrent Phenomena in Solar Panels of LEO Spacecrafts: Machine Learning-Based Albedo Modeling*, forthcoming, **Advances in Space Research** (2025).
2. **P. Bisht** & G. Krishna Priya, *Radiation-induced Degradation of GaAs and InGaP Solar Cells in Space Environments: A Predictive Model*, **Journal of Radiation and Cancer Research** 15(4):145-188 (2024).
3. **P. Bisht**, *Modeling diffusion length damage coefficient in GaAs and InGaP solar cells under electron irradiation*, **J. Appl. Phys.** 131, 104503 (2022), Special Edition: *Radiation effects in Materials*.
4. **P. Bisht** & M. Barma, *Interface growth driven by a single active particle*, **Phys. Rev. E** 100, 052120 (2019).

Open Archives

5. **P. Bisht**, *Lanes and lattice structures in a repulsive model for self-propelled agents* **arXiv:2412.10577** (2024).
6. **Prachi Bisht** & Prajjwal Yash, *Unveiling On-Orbit Solar Panel Performance: Investigating Double Peaks in Photocurrent Dynamics*, **ESS Open Archive** (2024).

Selected Projects

ML-Based Albedo Modeling	MLBAM ↗
◦ Built ensembled tree-based machine learning models to predict the impact of Earth's albedo on solar cell performance aboard LEO satellites. Reduced on-orbit solar current prediction MAPE by 30% across diverse spacecraft classes.	
Solar Cell Crack Detection and Segmentation	SolarCellCrackDetection ↗
◦ Designed and deployed a lightweight solar cell crack segmentation system using U-Net/MobileNet, achieving IoU of 0.7 on real-world EL images and reducing manual inspection time by ~25% in lab workflows via a Gradio-based demo interface.	
On-Orbit Solar Panel Performance Analysis	SPOOPA ↗
◦ Developed a scalable, analysis-ready telemetry database from multi-year raw satellite data through automated ingestion, cleaning, and structuring pipelines. Deployed a near-real-time framework for performance monitoring of on-orbit LEO spacecraft solar arrays, reducing inference latency by 50% and enabling early anomaly detection and power forecasting.	
Flood detection using SAR imagery	ETCi contest ↗
◦ Developed a flood segmentation model using U-Net with an EfficientNet-B0 encoder trained on Sentinel-1 SAR imagery for the NASA ETCI 2021 GRSS Flood Detection Challenge, achieving an IoU score of 0.6.	
Solar Cell Single/Double-Diode Modelling using Genetic Algorithm	SolarCellGA ↗
◦ Developed a genetic algorithm to extract diode parameters from non-linear IV-curves with <1% error using manufacturing data. Under flight integration for in-orbit performance calibration in highly radiative, transfer orbits.	
Statistical Modeling Portfolio (MITx MicroMasters)	StatMod ↗
◦ Spatial Statistics: Applied kriging and variogram modeling to explore ocean current dynamics and predict debris flow patterns in the Philippine archipelago.	
◦ Time Series Forecasting: Modeled time series predictions in CO ₂ levels in Mauna Lua data using SARIMA and exponential smoothing.	
◦ Network Analysis: Simulated criminal network evolution using stochastic block models and visualized graph dynamics.	
◦ Genomic Clustering: Applied k-means and PCA/t-SNE for dimensionality reduction and classification in DNA gene expression datasets.	

Graduate Research Experience

Interface growth driven by a single active particle.	Prof. Mustansir Barma
<i>Tata Institute for Fundamental Research (TIFR), Hyderabad</i>	<i>Aug 2018 - June 2019</i>
◦ Developed a statistical-physics model of active particle-driven interface growth, capturing protein-induced deformation and motility in cell membranes, with implications for understanding biophysical processes and cellular dynamics.	
Coherent Population Oscillations in D1 Transition of 87Rb.	Late Prof. Vasant Natarajan
<i>Indian Institute of Science (IISc), Bangalore</i>	<i>May 2018 - July 2018</i>
◦ Investigated optical responses in Rubidium's D1 transition using two detuned coherent lasers, demonstrating the robustness of resonant coherent population oscillations to stray magnetic fields, with implications for quantum optics and precision sensing.	
Understanding the Magellanic System.	Prof. Annapurni Subramanian
<i>Indian Institute of Astrophysics (IIA), Bangalore</i>	<i>May 2017 - July 2017</i>
◦ Analyzed the dynamical evolution of the Magellanic Galaxy system by modeling stellar age distributions, star formation rates, and spatial structures to reconstruct past interactions and project future trajectories.	

Scholarships

ISRO Industrial Training Program Fellowship	2019
TIFR-VSRP Tata Institute for Fundamental Research - Visiting Student Research Fellowship	2018-2019
IAS-SRPF Indian Academy of Sciences - Summer Research Program Fellowship	2018
IIA-SRPF Indian Institute of Astrophysics - Summer Research Program Fellowship	2017
Full-Ride Department of Space (DoS) Scholarship for Undergraduate Program at IIST	2014-2019
MIET Pre-University Scholarship for IIT-JEE; 2nd in district.	2013

Conferences and Workshops

International Conference on Radiation Research: Human Health & Environment	<i>Nov 2024</i>
<i>Oral Talk, All India Institute of Medical Science (AIIMS), Patna</i>	
Statistical Physics: Recent Advances and Future Directions	<i>Mar 2022</i>
<i>Delegate, International Center for Theoretical Sciences (ICTS), Bangalore</i>	

Society for Mathematical Biology (SMB) Annual Meeting 2020 (Virtual)	<i>Aug 2020</i>
<i>Poster Presentation: Interface growth driven by a single active particle</i>	
7th Indian Statistical Physics Community Meeting	<i>Feb 2020</i>
<i>International Center for Theoretical Sciences (ICTS), Bangalore</i>	
ISRO Industrial Training Program	<i>Oct 2019</i>
<i>Vikram Sarabhai Space Centre, Satish Dhawan Space Centre</i>	
Science Academies' Refresher Course in Statistical Physics	<i>Dec 2018</i>
<i>Ramakrishna Mission Vivekananda University, Belur Math, Kolkata</i>	
Mid-year Meeting of Scientific Lectures	<i>Jun 2018</i>
<i>Indian Academy of Sciences, Indian National Science Academy, The National Academy of Sciences</i>	
Summer School in Physics and Astrophysics	<i>May 2017</i>
<i>Indian Institute of Astrophysics (IIA), Kodaikanal</i>	
Annual Astronomy and Technological Festival	<i>Mar 2016</i>
<i>Indian Institute of Space Science and Technology (IIST), Trivandrum</i>	
<i>Best Poster Presentation Award on "Lunar Liquid Mirror Telescope: A Review"</i>	