DYUTIDEEPTA BANERJEE

From Physics to Product | Applied AI, Imaging & System Optimization

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Deep Tech professional with strong Physics background, skilled in image data interpretation, fundamental science based modeling and advanced analytics. Experienced in stakeholder engagement, presenting papers & use cases internationally and automating cross-domain workflows. Passionate about building innovative solutions for emerging industries like spacetech, defence, healthcare, robotics, automotive, and marine. My strengths lie in fusing scientific insight, Physics fundamentals, and advanced AI and vision technologies that solve complex, real-world challenges.

WORK EXPERIENCE

Artificial Intelligence Research Intern - MathWorks: Customer Success Engineering Group 🔗   [**Project link**](#)
Munich, Germany | Nov 2022 - May 2023 | Continued engagement as researcher

- Established a **work pipeline** for standardised satellite imagery with **Multispectral & Digital Terrain Model for morphological analysis** using **JAXA's SELENE image datacubes** of the **KAGUYA mission.**
- Designed and developed a MATLAB **AI application** with custom functions for efficient, semi-automated multispectral **image preprocessing** like **segmentation, annotation, and enhancement** to create **gold-standard training data for Lunar sinuous rille features**.
- Adapted **CNN** model using **deep and transfer learning**, achieving above **95% prediction accuracy**, surpassing benchmark AI systems.
- Partnering with international research teams at the ***Max Planck Institute for Solar System Research*** and the ***University of Padova Department of Geosciences***, leveraging expertise in **Physics and AI-driven computer vision** in planetary science.
- The work pipeline enables **cross-domain applications** in the geospatial, medical, and manufacturing sectors.
- ***The manuscript for publication is currently under review with Elsevier - To date, continued engagement with all entities for research progress.***

Visiting Fellow - International Center for Theoretical Sciences Tata Institute of Fundamental Research 🔗
Bangalore, India | Jul 2019 - Apr 2020

- Developed and validated **Physics-based simulation models** for turbulent flows, applicable in robotics, aerodynamics and turbulent mechanics.
- Established an experimental dropping **mechanism for zero initial velocity**. Conducted **experimental validation** of Newtonian **drag models** for high & low Reynolds' number limits.
- **Designed** gcodes and **3D printed lab apparatus** for experimental setup.

Cross-Platform Solutions Specialist - Freelance Contractor for Johnson & Johnson 🔗
Bangalore, India | Jun 2024 - Present

- Engaged **global stakeholders** to define **solutions** for business needs, conducted cross-platform **manual testing**, and delivered actionable improvements for Johnson & Johnson's **product lookup system,** reducing fix turnaround by **40%**.
- Drove **collaboration and process enhancements** for web, mobile, and internal platforms.

Automation Specialist: Batch QR Code System - Freelancer for Toriox PRJ Packaging Pvt Ltd 🔗
Bangalore, India | Sep 2024 - Dec 2024

- Designed and implemented **Python-based**, **production-ready** modules for **real-time data input**, **rapid-processing pipelines** for batch QR code scanning, QR code generation, and **high-frequency database updates**, reducing manual intervention by 80% and enabling **low-latency edge processing** for production environments.

EDUCATION

MSc in Physics of Data 🔗
University of Padua, Padua, Italy | Oct 2020 - Apr 2024
Dissertation: AI-based detection of Lunar Sinuous rilles: A comparison with manual detection methods
Select Projects:

- AI in Medicine: Paediatric bone age estimation using X-ray datasets
- Network Science for Smart Governance: Models to analyse global trends from social media

BSc (Hons) in Physics & minor in Data Science 🔗
Azim Premji University, Bangalore, India | Aug 2016 - Aug 2019
Dissertation: Bristle Bots as a Minimal Model of Directed Motion
Developed 3D-printed adaptive microbots for conducting real-time motion capture and analysis.

PUBLICATION & MANUSCRIPT

Published Poster: "AI-based detection of Lunar Sinuous rilles: A comparison with manual detection methods" | *11th European Lunar Symposium, Padua, Italy* | *Jul 2023*   ***View Poster***

First-authored Manuscript under review: "A Modular Vision Pipeline for Multi-Dataset Analysis: Application to Sinuous Rille Detection Using CNNs" | *Elsevier - Int. J. Appl. Earth Obs. Geoinf* | *Jul 2025*
Co-authors from Max Planck Institute, Mathworks & University of Padua 🔗

SKILLS

Core Competencies:
- **Physics & Computational Modelling:** Strong foundation in Physical sciences with expertise in simulations, spectral imaging, and algorithm development
- **AI & Data Science:** Deep Learning, Predictive Analytics, Model Deployment, Statistical Modelling, Data Wrangling, Computer Vision, Data Processing, Machine Learning frameworks (TensorFlow, PyTorch)
- **Programming & Tools:** Python, MATLAB, R, SQL, MS Office, QGIS, CAD, learning C++
- **Version Control & Agile Methodologies:** Git, Bash, Jira, Scrum
- **Design & Visualisation:** Figma, Canva
- **Financial & Business Acumen**

Soft Skills:
Public Speaking, Team Leadership, Cross-Disciplinary Collaboration

Languages:
English (Native), Hindi (Native), Bengali (Mother Tongue), Italian (Beginner) & German (Beginner)

SELECT TECHNICAL CONTRIBUTIONS

Encrypted QR generator with Decryption Algorithm, *Bangalore, India* | *May 2025*   ***Project Link***
A Python-based toolkit for encrypted QR code generation, secure data encoding, and visual data screening. Includes a Tkinter GUI for input, QR generation with/without background designs, and a Fernet-based decryption system. Ideal for product packaging, secure tagging, and data tracking workflows.

Celestial Quest: AI-Powered Ed-tech Platform, *Ahmedabad, India* | *Oct 2024*   ***View Platform***
Created and deployed real-time data pipelines for automated NASA dataset acquisition, integrated with LLaMA-based NLP/LLM modules. Built UI for email templates and platform logo, and contributed to live delivery to end-users, ensuring scalable, low-latency access via AWS infrastructure. This was a team project for the ***NASA Space Apps Hackathon 2024***. 🔗

AWARDS & CERTIFICATIONS

- **Finance for Non-Finance Professionals** | *Rice University by Coursera (2025)*   ***View Certificate***
- **Deep Learning Onramp Certification** | *MathWorks (2023)*   ***View Certificate***
- **Introduction to Cosmology Certification** | *M.P. Birla Institute of Fundamental Research (2017)*
- Winner of **ERODEM Research Grant** | *University of Padua (2024)*
- Winner of **Erasmus Plus Traineeship Grant** | *Erasmus+ (2022)*

INVITED SPEAKER

Seminar Speaker, Max Planck Institute for Solar System Research, *Göttingen, Germany* | *May 2023* 🔗
"*Applicability of AI in feature detection using hyperspectral satellite imagery*"

Scientific Presenter, Indian Institute of Science (IISC), *Bangalore, India* | *Feb 2020* 🔗
"*Experimental presentation for Buffon's Mathematical Model*"

VOLUNTEERING, OUTREACH & LEADERSHIP

Academic Coach for graduate-level Physics & Mathematics | *Classgap by GoStudent (Jan 2024 - Dec 2024)* 🔗
Communication Coach | *Center for Linguistics, University of Padua, Italy (Dec 2021 - Jan 2022)* 🔗
Certified Peer Counsellor for Mental Health | *Azim Premji University, Bangalore, India (Jul 2017 - Apr 2019)* 🔗
Special-ed teacher for the underprivileged at NGO | *Parikrma Humanity Foundations, Bangalore, India (Jul 2017 - Dec 2017)* 🔗