

Tarang Ghetia

Robotic Systems Engineering (MSc), RWTH Aachen

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EDUCATION

RWTH Aachen University

Aachen, Germany

M.Sc. Robotic Systems Engineering · GPA 2.2 (German scale: 1.0 best, 4.0 pass) · Oct 2024 to present (expected 2026/2027)

Pandit Deendayal Energy University

Gandhinagar, India

B.Tech. Computer Science and Engineering · CGPA 9.83 / 10 (top of department) · Jul 2020 to Jul 2024

SKILLS

Programming: Python, C++, C, SQL, Prolog

ML & Deep Learning: PyTorch, TensorFlow, Keras, fast.ai, Hugging Face, Scikit-learn, Pandas, NumPy, SciPy, Matplotlib, Seaborn

Computer Vision: OpenCV, YOLO, Pillow, Timm, VoTT; segmentation (U-Net, SegFormer, Barlow-Twin U-Net); tracking (Deep SORT)

Sensors & Signal Data: NIR / MIR / FIR & hyperspectral spectroscopy; multi-modal sensor fusion; dataset recording, annotation and tooling

Data & Web: Hadoop, Spark, Apache Kafka; Flask, Django, HTML, CSS

Currently learning: ROS 2, Gazebo, and SLAM (Nav2) for robotics simulation and navigation

EXPERIENCE

Research Assistant (HiWi), ANTS, RWTH Aachen

Oct 2024 to present

Applied ML/AI for multi-modal spectroscopy and industrial material sorting

- Build classification pipelines that sort 7+ materials, plus finer composition-based sub-classes, from NIR, MIR, FIR and hyperspectral data, reaching **0.91 F1** on live industrial sorting. Material properties come straight from the spectra.
- Recorded the datasets from scratch. That meant **millions of spectra** captured across varying conditions and hand-annotated, since nothing off-the-shelf fit these materials.
- Wrote the team's internal tooling: a custom annotation app that cut labeling time, and a graph-generation tool whose plots go into the group's papers.
- Prototype in the lab; once it proves out, it moves onto the client's production line.

India Space Research Organization (ISRO)

Jan 2024 to Mar 2024

Cloud segmentation in satellite imagery

- Segmented clouds in Landsat-8 imagery (38-Cloud, 18,000+ patches) with U-Net, SegFormer and a Barlow-Twin U-Net. U-Net reached **97.04% accuracy** at 0.8944 Dice.
- The self-supervised BT-UNet held up best on thin cloud and haze, pushing recall to 93.28%.

Research Assistant, Pandit Deendayal Energy University

Aug 2022 to Dec 2024

Environmental and agricultural time-series forecasting

- Ran forecasting projects across air quality (PM2.5/PM10), crop and soil quality, and groundwater pollution, using LSTM, GRU, Transformer and VAR models on 18,000+ records.
- Checked every model with proper time-series statistics (Granger causality, Johansen cointegration, ADF) before trusting a forecast.

- Built and maintained a Flask web app, reworking the front end and the authentication flow through API integrations.

PROJECTS

Real-time object tracking with YOLOv3 and Deep SORT [GitHub](#)

- Real-time perception pipeline pairing YOLOv3 detection with Deep SORT tracking; the natural next step is wrapping it as a ROS 2 node.

Image colorization with GANs [GitHub](#)

- A GAN that colorizes grayscale photos (ResNet-18 and U-Net), with clear PSNR and realism gains over classical methods.

Handwritten math-expression localization (U-Net) [GitHub](#)

- A U-Net that localizes handwritten math expressions at 99.46% validation accuracy, ahead of SegNet and ResNet baselines.

Game-theory stock-price prediction [GitHub](#)

- A price model mixing game theory, news sentiment and deep learning; RMSE dropped from 5.45 to 3.29 and R^2 rose from 0.89 to 0.99.

PUBLICATIONS

- Effective Heart Disease Prediction Using Machine Learning Techniques. *Algorithms, MDPI*, 2023. [DOI](#)
- Automated Fungi Classification using Deep Learning with Explainable AI. *IEEE IndiaCom*, 2025. [DOI](#)
- Automated Cervical Cancer Prediction using Ensemble Machine Learning. *IEEE ICRASET*, 2023. [DOI](#)
- Early Prediction of Down Syndrome using Deep Transfer Learning. *ICNGCIS'23, Taylor & Francis*, 2023. [DOI](#)
- A Novel Approach to Glass Identification using Ensemble Learning for Forensics. *ICNGCIS'23, Taylor & Francis*, 2023. [DOI](#)

Two further papers currently under review at Elsevier journals.

PATENTS & DESIGN CERTIFICATIONS

Patents (filed, under review): three Indian applications in AI/ML covering drug discovery, blockchain-based healthcare surveillance, and air-quality forecasting.

Design certification: AI-enabled robot for UV-C disinfection, now deployed and live ([see it here](#)).

AWARDS, CERTIFICATIONS & LANGUAGES

Awards: Merit-cum-Means Scholarship (top 7 in the department); 1st at school level, National General Knowledge Olympiad (2016, 2017).

Certifications: Stanford Online (Machine Learning); NVIDIA (Deep Learning, AI for Anomaly Detection, Data Engineering Pipelines); IIT Madras (Python for Data Science).

Languages: English (C1), German (A1.2, improving), Hindi and Gujarati (native).

LEADERSHIP & ACTIVITIES

Founded and ran Grow, a student group for interview and communication practice. I was also General Secretary of the Debate Society, VP of the Hackers Meetup (running hackathons and cyber-awareness sessions), and Publicity Head for the Computer Society of India.