

Inder Pal Singh

Curriculum Vitae

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Education

- 2020–2024 **PhD, Computer Science**, *University of Luxembourg*, Luxembourg.
Towards Compact Yet Effective Multi-Label Image Classification: From A Single Domain to Multiple Domains | Supervisor: Prof. Dr. Djamila Aouada
- 2018–2020 : **Master of Science, Computer Vision & Machine Learning**, *Université de Bourgogne*, France.
3D Human Pose Estimation In-The-Wild Using Arbitrary Camera Viewpoints.
- 2005–2009 : **Bachelor of Engineering, Electronics & Communication**, *Maharshi Dayanand University*, India.

Research Projects

ROBOCOMP: Robotic Process Automation in Anti-Money Laundering (AML)

- Lead researcher **Source: FNR (NCER)**, 2023 – 2024, Total funding: 180k €, PMs: 1 RA.
Developed LLM-powered AML compliance reporter; Building RAG pipelines using jurisdiction-specific legal documentation; Technical documentation and reporting.

DIOSSA-(Phase 2): Deep Learning-based In-orbit Space Situational Awareness

- Postdoctoral researcher **Source: ESA**, 2024 – 2026, Total funding: 700k €, PMs: 4 RAs.
Developed DL-based models for 6-DoF spacecraft pose estimation addressing synthetic-to-real domain gap; Technical documentation and reporting; 1 peer-reviewed conference paper.

Zero-G Lab project

- PhD researcher **Source: Ministry of Economy, Luxembourg**, 2021 – 2022, Total funding: 180k €, PMs: 2 RAs, 0.5 PhD.
Supported equipment selection and setup for “SnT Zero-G Lab”; 1 peer-reviewed journal paper.

FakeDeTeR: Deep Fake Detection Using Spatio-Temporal-Spectral Representations for Effective Learning

- PhD researcher **Source: FNR BRIDGES**, 2022 – 2025, Total funding: 400k €, PMs: 2 RAs, 2 PhDs.
Proposed novel approach to minimize the domain-gap in vision-based classification tasks; 1 peer-reviewed conference paper.

UNFAKE: Deep Fake Detection Using Spatio-Temporal-Spectral

- PhD researcher **Source: FNR Industrial Fellowship**, 2021 – 2024, Total funding: 184k €, PMs: 2 PhDs.
Developed DL-based strategies to identify multiple facial manipulations in deepfakes; 1 peer-reviewed conference paper.

MEET-A: Multi-modal Fusion of Electro-optical Sensors for Spacecraft Pose Estimation

- PhD researcher **Source: FNR BRIDGES**, 2021 – 2023, Total funding: 400k €, PMs: 2 RAs, 2 PhDs.
Developed DL-based strategies to identify multiple facial manipulations in deepfakes; 1 peer-reviewed conference paper.

Work Experience

University of Luxembourg, Luxembourg

Aug, 2024 – present **Research Associate (postdoctoral researcher).**

- Conducted academic research on deep learning-based algorithms for 6-DoF spacecraft pose estimation, addressing domain adaptation challenges for space situational awareness.
- Contributed to the establishment of the SnT Zero-G laboratory, including hardware selection, experimental setup, and data acquisition for space operations research.
- Coordinated and supported teaching activities, including organizing schedules, mentoring and assigning teaching assistants, supervising laboratory experiments, and evaluating coursework.
- Led research on anti-money laundering (AML) automation, developing retrieval-augmented generation (RAG) pipelines to generate compliance reports from jurisdiction-specific regulatory texts.
- Prepared technical reports and documentation for periodic reviews, compliance submissions, and funding agencies.
- Actively engaged in outreach and public engagement, presenting research and demonstrations at SmartSchoul 2025, Esch 2022 — Sound of Data, and the GovTech Lab for public administration.

Tata Consultancy Services Ltd., India/Sweden

Aug, 2014 – Sep 2018 **Assistant Project Manager: Operations (Business Process Lead).**

- Led a 14-member outsourced team at TeliaSonera AB, Stockholm, delivering projects in line with client expectations while meeting SLAs and KPIs.
- Developed SOPs and technical documentation, ensuring knowledge transfer and error reduction.
- Managed the full project lifecycle from due diligence to BAU stabilization, with transparent stakeholder reporting.
- Drove process optimization, reducing manual effort by 30%, and earned multiple awards and promotions for leadership.

Apr, 2013 – Jul 2014 **Senior Process Associate | Network Design Engineer for Silcar NBN Co., Australia.**

- Contributed to network planning and design across ISP & OSP FDA stages.
- Prepared telecommunication layouts and selected optimal route corridors and construction methods.
- Generated BOMs and documentation for cost-effective routing and coordinated deployment activities.
- Performed QC checks to identify and resolve design errors.

Techsignia Solutions Pvt. Ltd., India

Feb, 2011 – Apr 2013 **Network Design Engineer | GIS Engineer-Telecom.**

- Worked as Telcordia® OSS Engineer on ESRI ArcGIS platform for geospatial network planning and inventory management.
- Managed network data migration, modeling, and validation for ISP/OSP entities (fiber routes, ducts, equipment).
- Designed as-built rack diagrams and schematics, ensuring compliance with standards.
- Supported network expansion and capacity planning, applying optimization to reduce infrastructure costs.

Infinite Telecom Solutions Pvt. Ltd., India

Feb, 2011 – Apr 2013 **Project Engineer .**

- Performed RF optimization, drive testing, and RF/BTS surveys, ensuring accurate network performance assessment.
- Conducted cluster optimization analysis (statistics, plots, drop-call analysis) with recommended solutions.
- Delivered post-swap site verification, including cell parameter validation, call setup testing, and handover performance checks.

Teaching

2022 – present : **Teaching assistant, University of Luxembourg, Course: Computer Vision and Image Analysis, Master in Space Technologies and Business / Master in Information and Computer Sciences.**
Conducted laboratory sessions and supervised course projects; Assisted in grading assignments, homework, and examinations; Provided academic support to students through project and homework guidance; Organized and delivered seminars to enhance course learning.

2022 – **Lecturer, EBU, Luxembourg**, Courses: Statistics | Machine learning | Deep learning | Natural language processing, MS Data Science & AI.

Delivered lectures and prepared course materials; Designed and graded assignments and examinations.

2022 – 2023 : **Lecturer, EBU, Luxembourg**, Course: Quantitative analysis, Certificate Impact Program.

Delivered lectures and prepared course materials; Designed and graded assignments and examinations.

Software skills

Languages Python, Bash, MATLAB

ML & DL Scikit-learn, TensorFlow, PyTorch, Keras, Time Series Models

NLP & LLMs GPT-4, Mistral, OpenAI, PydanticAI, Prompt Engineering, RAG

Deployment CI/CD, Docker, HPC, AWS, MLOps best practices

Data SQL, Pandas, NoSQL, Spark, Hadoop

Tools Streamlit, Tkinter

Publications

Journal Articles

2024 **Inder Pal Singh**, Enjie Ghorbel, Oyebade Oyedotun, and Djamila Aouada. Multi-label image classification using adaptive graph convolutional networks: From a single domain to multiple domains. *Computer Vision and Image Understanding*, volume 247, page 104062, 2024.

2023 Leo Pauly, Michele Lynn Jamrozik, Miguel Ortiz Del Castillo, Olivia Borgue, **Singh, Inder Pal**, Mohatahem Reyaz Makhdoomi, Olga-Orsalia Christidi-Loumpasefski, Vincent Gaudillière, Carol Martinez, Arunkumar Rathinam, et al. Lessons from a space lab: An image acquisition perspective. *International Journal of Aerospace Engineering*, volume 2023, page 9944614. Hindawi, 2023.

In Conference Proceedings

2025 **Inder Pal Singh**, Nidhal Eddine Chenni, Abd El Rahman Shabayek, Arunkumar Rathinam, and Djamila Aouada. Bridging the synthetic-real gap: Supervised domain adaptation for robust spacecraft 6-dof pose estimation, 2025.

2024 **Singh, Inder Pal**, Enjie Ghorbel, Anis Kacem, Arunkumar Rathinam, and Djamila Aouada. Discriminator-free unsupervised domain adaptation for multi-label image classification. In *IEEE/CVF Winter Conference on Applications of Computer Vision*. IEEE/CVF, 2024.

2024 Dat Nguyen, Nesryne Mejri, **Singh, Inder Pal**, Polina Kuleshova, Marcella Astrid, Anis Kacem, Enjie Ghorbel, and Djamila Aouada. Laa-net: Localized artifact attention network for quality-agnostic and generalizable deepfake detection. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pages 17395–17405, 2024.

2023 **Singh, Inder Pal**, Nesryne Mejri, Van Dat Nguyen, Enjie Ghorbel, and Djamila Aouada. Multi-label deepfake classification. In *2023 IEEE 25th International Workshop on Multimedia Signal Processing (MMSP)*, pages 1–5. IEEE, 2023.

2022 **Singh, Inder Pal**, Enjie Ghorbel, Oyebade Oyedotun, and Djamila Aouada. Multi label image classification using adaptive graph convolutional networks (ml-agcn). In *2022 IEEE International Conference on Image Processing (ICIP)*, pages 1806–1810. IEEE, 2022.

Referees

Prof. Dr. Djamila Aouada

Vice-director, SnT | Head of CVI2 research group

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Dr. Thomas Hartmann

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