Meghal Dani

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EDUCATION

International Max Planck Research School for Intelligent Systems — Tübingen, DE
Ph.D. in Computer Science — *Aug. 2022 – Apr. 2026*

Indraprastha Institute of Information Technology Delhi (IIITD) — New Delhi, IN
M.Tech. in Computational Biology, Cummulative GPA: 9.55/10 — *Jul. 2017 – Jul. 2019*

Birla Institute of Technology (BIT, Mesra) — Mesra, IN
B.Tech in Computer Science, Cummulative GPA: 8.47/10 — *Jul. 2012 – May. 2016*

RELEVANT RESEARCH EXPERIENCE

Ph.D. Candidate –University of Tübingen — Tübingen, DE
Research Focus: Multimodal AI, safe AI in healthcare, Epilepsy, Neuroscience, Diffusion Models — *Aug. 2022 – Present*
- Guest researcher at Helmholtz AI, Munich
- Supervisors: Dr. Prof. Zeynep Akata and Dr. rer. nat. Stefanie Liebe
- Thesis focus on analyzing safety and trustworthiness of different modalities in medicine for improved clinical care

Researcher – TCS Research and Innovation Labs — New Delhi, IN
Research Focus: 3D Computer Vision and Medical Imaging — *Aug. 2019 – Aug. 2021*
- worked at Deep Learning and AI division, New Delhi
- Advisors: Dr. Lovekesh Vig, Ramya Hebbalaguppe
- Developed an anchor-free universal lesion detection network for CT scans, achieving **86.05%** sensitivity by leveraging multi-intensity images. This work resulted in publications at **BMVC'22 and ISBI'22 and a patent** filing
- Developed a lightweight 3D pose estimation technique using skeletal graphs, achieving $11\times$ space and $3\times$ time reduction, resulting in publications at **SIGGRAPH Asia'20 and WACV'21, and a patent**.

Graduate Student Researcher – Image Analysis and Biometrics Lab (IAB) — New Delhi, IN
Research Focus: Machine Learning, Deep Learning, fMRI connectivity analysis — *Aug. 2018 – Jul. 2019*
- Supervisors: Prof. Dr. Richa Singh and Prof. Dr. Mayank Vatsa, IAB@IIT Jodhpur
- Investigated gender-based autism detection disparities in fMRI, revealing camouflage effects and developed a novel ML method that improves the classification accuracy by 6%; **nominated for the best thesis award**

Research Intern – TCS Research and Innovation Labs — New Delhi, IN
Research Focus: 3D Computer Vision, Augmented Reality, Deep Learning — *May 2018 – Jul. 2018*
- Advisors: Ramya Hebbalaguppe
- Developed a cost-effective mixed reality data visualization solution using frugal VR devices, implementing an innovative fingertip gesture recognition framework with deep learning models to enable intuitive user interactions.
- This work got accepted at **ISMAR'18**.

SELECTED PUBLICATIONS

- **M. Dani**, M. J. Prakash, Z. Akata, and S. Liebe, "Semiollm: Assessing large language models for semiological analysis in epilepsy research," arXiv preprint arXiv:2407.03004, 2024. (**Accepted at ICML 2024, AI for Science Workshop**)

- **M. Dani***, I. Rio-Torto*, S. Alaniz, and Z. Akata, "Devil: Decoding vision features into language," in DAGM GCPR (Oral), Springer, 2023, pp. 363–377. (**Also presented at ICCV-CLVL workshop, 2023**)

- M. Sheoran*, **M. Dani***, M. Sharma, and L. Vig, "An efficient anchor-free universal lesion detection in ct-scans," in 2022 IEEE 19th International Symposium on Biomedical Imaging (ISBI), IEEE, 2022, pp. 1–4.

- M. Sheoran*, **M. Dani***, M. Sharma, and L. Vig, "DKMA-ULD: Domain knowledge augmented multi-head attention based robust universal lesion detection," BMVC, pp. 363–377, 2022.

- **M. Dani**, K. Narain, and R. Hebbalaguppe, "3DPoseLite: A compact 3d pose estimation using node embeddings," in WACV, Springer, 2021, pp. 1878–1887

- **M. Dani**, A. Popli, and R. Hebbalaguppe, "PoseFromGraph: Compact 3-d pose estimation using graphs," in SIGGRAPH Asia, 2020, pp. 1–4.

Relevant Projects

Structured Inference from Unstructured Verbal Symptoms (Ongoing)   2024
Technologies Used: PyTorch, LLMs, Statistics, Data Visualization
- Developed comprehensive framework to analyze SOTA LLMs' capability in translating verbal epilepsy symptom descriptions to brain seizure onset zone identification, evaluating model performance across accuracy, confidence, reasoning, and cross-language medical comprehension.

SAM-Conditioned Medical Image Generation using Diffusion Models (Ongoing)   2024
Technologies Used: PyTorch, OpenCV, Diffusion Models
- We develop a mask conditioned diffusion model to generate anatomically coherent organ structures without ground truth segmentation mask data.

Towards Automatized Analysis of Epileptic Seizure Behavior in VEEG Recordings   2023
Technologies Used: PyTorch, OpenCV, FFmpeg, MediaPy
- This multi-modal work aims towards pose estimation and trajectory analysis of epilepsy patients.

Technical Skills

Programming Languages: Python, R, MATLAB, SQL, C/C++, Java, HTML, CSS

ML/DL/CV Frameworks: PyTorch, OpenCV, HuggingFace, LangChain, scikit-learn, FFmpeg

Tools and Libraries: Linux, Git, Bash, Inkscape, SLURM, HPC Servers, LaTeX

Courses, Workshops and Summer Schools

Core Science Courses: Data Structured and Algorithms, Database Systems, Operating Systems, Discrete Mathematical Structures, Computer System Architectures, Computer Networks, Compiler Design, Optimization Techniques

ML/AI Courses: Statistical Computation, Artificial Intelligence, Deep Learning for Computer Vision (CS231n), Data Mining, ChatGPT Prompt Engineering, Preprocessing Unstructured Data for LLM Applications, Building Applications Vector Databases

Biology Courses: AI for Medical diagnosis, AI for Medical Prognosis, Introduction to fMRI, Algorithms in Computational Biology, Big Data Mining in Healthcare, Foundations of Modern Biology, Cell Biology and Biochemistry

Workshops: Connecting Minds and Machines 2023 (Helmholtz AI, Munich), IMPRS-IS Bootcamp 2023-24 (DE), Bernstein Conference on Computational Neuroscience 2023 (DE)

Summer School: Oxford MLxHealth Summer School 2023 (Oxford, United Kingdom)

Past Achievements, Awards and Community Service

- **Awarded ClinBrAIn PhD Fellowship**: by EKFS, Tübingen, Germany
- **Employee Recognition**: Earned an accolade by Prof. Dr. Jeffrey Ullmann for developing an AR project for TCS RnI annual ceremony.
- **Best Thesis Award Nominee**: for masters thesis at IIIT-Delhi
- **Postgraduate Fellowship**: Received funding from the Government of India
- **Special Recommendation, IIM-A Internship**: for outstanding effort & performance.
- **Reviewer** at ECCV, MICCAI, ICML, in 2024 and ICCV in 2023
- Soft Skills Seminar Series (S4) Workshop Organizer at IMPRS-IS
- **Ph.D. Representative** in Search Committee for Tenure-Track Professor of Machine Learning and Intelligent Systems, University of Tübingen
- **IMPRS-IS Interview Symposium Helper** involved in recording and moderating candidate talks