JITESH JOSHI

jitesh.joshi.20@ucl.ac.uk | linkedin.com/in/jnj256 | jnj256.github.io

PROFESSIONAL SUMMARY

AI researcher completing Ph.D. in Computer Science at University College London with 10+ years of healthcare technology experience spanning three complete product development cycles. Architected novel multidimensional attention mechanisms that deliver robust out-of-distribution generalization in remote physiological sensing, with contributions published in top-tier venues including NeurIPS and BMVC. Led cross-functional teams on $1M+ medical device development projects, successfully delivering healthcare solutions from concept to market. Passionate about building robust and reliable AI systems that perform effectively in diverse real-world conditions.

EDUCATION

Ph.D., Computer Science | *University College London, UK* | **Oct, 2020 – Final Ph.D. viva scheduled in July'25**

- **Title:** Enhancing Out-of-distribution Generalization for Camera-based Remote Physiological Sensing

- **Contribution Summary:** Developed a novel **multidimensional attention mechanisms**, that proved highly effective in extracting physiological signals from RGB-Thermal facial videos, achieving $5\times$ cross-dataset generalization and state-of-the-art inference latency, while reducing model parameters by $50\times$, significantly outperforming transformer-based architectures. Additional contributions include a robust **semantic segmentation** framework for thermal facial images comprising domain-specific data **augmentation techniques** and **multiscale contrastive loss**, a real-time **signal quality assessment** for wearable biosensors, and an **rPPG dataset** that is now widely used by researchers.

- **Advisors:** Prof. Youngjun Cho, Prof. Nadia Berthouze

M.Sc., Cognitive Systems & Interactive Media | *Universitat Pompeu Fabra, Spain* | **Sept, 2010 – Dec, 2011**

- **Dissertation:** EEG-based Investigation of Brain Wave Entrainment by Binaural Beats & Music This study sought to examine the impact of auditory stimuli on brain functional connectivity among healthy individuals and patients in a comatose state. Multichannel EEG data were visualized using spectrogram analysis and further analyzed using phase coherence and independent component analysis (ICA).

B.Tech., Electronics & Communication | *Nirma University, India* | **Aug, 2004 – Sept, 2008**

PROFESSIONAL EXPERIENCE

Part-time Research Associate | *University College London, UK* | **Nov, 2024 – Present**

- Developed multimodal guidance framework for diffusion-based image synthesis, combining text prompts and RGB-thermal segmentation masks to assist garment repair for sustainable textile practices.

Post-graduate Teaching Assistant | *University College London, UK* | **Oct, 2020 – Dec, 2024**

- Served as teaching assistant alongside Ph.D. for three postgraduate (COMP0145, COMP0053, PSYC0021) and one undergraduate (COMP0016) course modules while mentoring 20+ students on dissertation projects spanning deep learning, signal processing, and data analysis.

Solution Architect (Part-time, Consultant) | *Tata Elxsi, UK* | **Oct, 2020 – Nov, 2024**

- Led feasibility studies and proof-of-concept development for several projects, including i) an eye-gaze tracking system for the diagnosis of autism spectrum disorder, ii) automated patient-bed positioning and monitoring in ICU environments, and iii) growth curve analysis algorithms for molecular detection systems using real-time PCR data.

- Served as a reviewer for technical proposals, design documents, and deliverables for customer projects.

- Supported the pre-sales team by providing a walk-through of the specialized scope of technical proposals (AI/ML, Computer Vision, Optical Imaging) to the prospective business clients.

Specialist - AI/ ML · Systems Engineering | *Tata Elxsi, India* | **Oct, 2016 – Sept, 2020**

- Led the development of robust AI systems and optical imaging technologies for healthcare applications, successfully translating research innovations into clinically deployed solutions.

- Managed cross-functional teams on high-impact projects exceeding $1M, ensuring seamless alignment between R&D, optical imaging, software engineering, hardware, and verification and validation teams.

- Mentored a team of 10+ AI engineers on implementing advanced deep learning architectures and computer vision solutions across object detection, semantic segmentation, video action recognition, and barcode reading applications, accelerating technical skill development, and improving project delivery outcomes.

- Optimized and deployed object detection architectures (Faster R-CNN, YOLO) on NVIDIA Jetson devices, achieving an optimal balance between accuracy and computational efficiency.

Sr. Scientist - R&D | *Azoi Inc, India* | **Aug, 2014 – Sept, 2016**

- Architected signal processing and machine learning algorithms for multichannel physiological sensing (ECG, PPG, respiratory, cuffless blood pressure), for real-time health tracking within mobile device constraints while leading R&D as well as clinical validation team.

- Authored technical documentation for regulatory approval and ensured system performance under diverse operating conditions through rigorous testing protocols.

Senior R&D Engineer | *National Brain Research Centre, India* | **Dec, 2011 – Aug, 2014**

- Conducted functional MRI (fMRI) research, applying multivariate pattern analysis and machine learning techniques to identify statistically significant visuospatial perception biomarkers for early-stage Alzheimer's disease detection.

- Designed a framework to synchronize fMRI data acquisition and audiovisual stimuli presentation.

RESEARCH ARTICLES AND PATENTS

Journal Articles & Conference Proceedings

1. **J. Joshi** and Y. Cho, "Efficient and Robust Multidimensional Attention in Remote Physiological Sensing through Target Signal Constrained Factorization", **2025**; ***under review at IJCV***. | Paper | Code | Demo

2. **J. Joshi**, S. Agaian, and Y. Cho, "FactorizePhys: Matrix factorization for multidimensional attention in remote physiological sensing", in ***NeurIPS, 2024***. | Paper | Code

3. **J. Joshi** and Y. Cho, "iBVP Dataset: RGB-Thermal rPPG dataset with high resolution signal quality labels", ***Electronics***, vol. 13, no. 7, p. 1334, **2024**. | Paper | Dataset access

4. **J. Joshi**, K. Wang, and Y. Cho, "Physiokit: An Open-source, Low-cost Physiological Computing Toolkit for Single-and Multi-user Studies", **Sensors**, 23(19), **2023** | Paper | Code

5. **J. Joshi**, N. Bianchi-Berthouze, and Y. Cho, "Self-adversarial multi-scale contrastive learning for semantic segmentation of thermal facial images", in *33rd British Machine Vision Conference*, ***BMVC 2022***, London, UK, November 21-24, 2022. | Paper | Code

6. **J. Joshi**, S. Saharan, P. K. Mandal, "BOLDSync: a MATLAB-based toolbox for synchronized stimulus presentation in functional MRI", Journal of neuroscience methods. **2014** Feb 15;223:123-32.

7. P. K. Mandal, **J. Joshi**, and S. Saharan, "Visuospatial perception: an emerging biomarker for Alzheimer's disease", Journal of Alzheimer's Disease, 31.s3 (**2012**): S117-S135.

Patents

1. T. Tran, H. Watson, **J. Joshi**, "Imaging device with illumination components", **2021**. | WO2021229347A1

2. T. Tran, H. Watson, **J. Joshi**, A. SK, and R. Tiwari, "Detecting a condition for a culture device using a machine learning model", **2021**. | WO2021234514A1 | Product

3. T. Tran, H. Watson, **J. Joshi**, R. Patel, "Compensation of intensity variances in images used for colony enumeration", **2021**. | WO2021229337A1

SKILLS & COMPETENCIES

Technical Skills: Deep learning (CNNs, Transformers), machine learning, computer vision, attention mechanisms, signal processing, physiological computing, wearable devices, representation learning, diffusion models, contrastive learning, domain generalization, model optimization, edge computing, system engineering.

Domain Awareness: Healthcare & life-sciences, Physiological Signals (ECG, PPG, BP, GSR, EMG, EEG, MEG, IMUs), Medical Imaging (MRI, fMRI), Human-Computer Interaction

Frameworks: PyTorch, TensorFlow, Python, C++, TensorRT, ONNX.

Certifications: Generative AI with Large Language Models (Coursera, 2025), Executive Data Science Specialization (Coursera, 2019), Deep Learning Specialization (Coursera, 2018).

AWARDS AND ACHIEVEMENTS

2020   **Project Excellence Awards, Tata Elxsi**
Led the design of an AI-based edge imaging device for automated bacterial counting.

2019   **Hackathon Winner, Tata Elxsi**
Implemented deep learning based super resolution technique to enhance X-ray images.

2018   **Prestigious Tata Innovista Award**
Point-of-care diagnostic device for malaria and sickle cell disease.