JITESH JOSHI

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

PROFESSIONAL SUMMARY

AI researcher with a Ph.D. from University College London and extensive experience in deep learning, computer vision, physiological computing, and medical imaging. Developed novel multidimensional attention mechanisms that address domain generalization challenges in remote physiological sensing (rPhys), with contributions published at leading venues including NeurIPS and BMVC. Created efficient multitask architectures that substantially outperform existing state-of-the-art rPhys models including transformer-based ones while maintaining real-time inference capabilities. Successfully translated research innovations into production systems, navigating regulatory compliance, and deployment challenges across international healthcare markets. Committed to creating efficient, generalizable AI systems that translate fundamental advances into robust real-world applications.

EDUCATION

Ph.D., Computer Science | *University College London, UK* | **Oct, 2020 – July, 2025**

- **Title:** Enhancing Out-of-distribution Generalization for Camera-based Remote Physiological Sensing
- **Key Contributions:** Developed novel **multidimensional attention mechanisms** for extracting physiological signals from RGB-Thermal facial videos, achieving **5-fold cross-dataset generalization**, real-time inference, and **50-fold parameter reduction**—outperforming state-of-the-art models including transformer-based. Additional contributions include a robust thermal facial **segmentation** framework with domain-specific **augmentation** and multiscale **contrastive loss**, a real-time signal quality assessment system for wearable biosensors, and a widely adopted RGB-Thermal **rPPG dataset**.
- Served as a **post-graduate 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.

M.Sc., Cognitive Systems | *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 was visualized using spectrogram analysis and further analyzed using phase coherence and independent component analysis.

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

PROFESSIONAL EXPERIENCE

Part-time Research Associate | *University College London, UK* | **Nov, 2024 – Mar, 2025**

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

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

- Led the feasibility and development of PoC for multimodal ML systems, including eye gaze tracking and ICU patient monitoring.

- Designed and optimized AI pipelines for growth curve analysis for molecular detection systems using real-time PCR data.
- Delivered technical pitches to international clients for projects focusing on computer vision and optical imaging.

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

- **Research Translation Leadership:** Successfully translated two research innovations into commercially deployed devices, navigated the integration of then state-of-the-art computer vision architectures into optical imaging systems for healthcare applications, established validation protocols and ensured regulatory compliance for international markets across projects exceeding $1M revenue.
- **Project Portfolio Management:** Managed cross-functional teams spanning R&D, optical imaging, software engineering, hardware and verification teams, ensuring seamless alignment between technical innovation and business objectives while maintaining requisite quality standards.
- **Technical Architecture & Mentorship:** Designed optical imaging systems including calibration techniques and automated validation protocols, while mentoring 10+ AI engineers on deep learning architectures for object detection, semantic segmentation, and video action recognition applications.
- **Edge AI Deployment:** Optimized and deployed object detection architectures (Faster R-CNN, YOLO) on NVIDIA Jetson devices, achieving an optimal balance between 95%+ accuracy and computational efficiency for resource-constrained embedded system.

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***. | 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, EEG, EMG), 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.