JITESH JOSHI

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PROFESSIONAL SUMMARY

A researcher in artificial intelligence focused on the convergence of deep learning, computer vision, and physiological sensing, with contributions published in NeurIPS and BMVC. Developed novel multidimensional attention mechanisms that achieved **5**× better generalization while reducing the model parameters by massive **50**×. Combined academic research with industry experience to deliver AI-enabled healthcare solutions in regulated environments, resulting in patented technologies and clinical deployments. Fostered the field's research through open-source contributions to physiological computing frameworks and remote sensing toolkits. Experienced in leading cross-functional teams and translating complex algorithms into efficient edge computing implementations.

PROFESSIONAL EXPERIENCE

Post-graduate Teaching Assistant, Research Associate | *University College London, UK* | **2020 – 2025**

- Served as a post-graduate teaching assistant for four course modules (COMP0145, COMP0053, COMP0016, PSYC0021), mentoring students on dissertation projects through research methodologies, experimental design, computational pipeline implementation, signal processing, and data analysis strategies.
- Conducted research on photorealistic image-inpainting using diffusion models with controlnet-based multi-modal guidance, optimizing visual fidelity and computational efficiency.

Solution Architect | *Tata Elxsi, India and UK* | **2016 – 2024**

- 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 Faster R-CNN architecture for NVIDIA Jetson TX2 and Nano deployment, achieving optimal balance between accuracy and computational efficiency for edge computing applications.

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

- Architected real-time algorithms for multi-channel physiological sensing (ECG, PPG, respiratory, cuff-less blood pressure), optimizing signal processing and machine learning-based health-tracking within mobile device constraints while leading cross-functional R&D as well as clinical validation team.
- Developed frameworks for FDA/CE medical device certification, authored technical documentation for regulatory approval, and ensured system performance across diverse operational conditions through rigorous testing protocols.

Senior R&D Engineer | *National Brain Research Centre, India* | **2011 – 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.
- Developed frameworks for synchronized acquisition of fMRI data and presentation of audiovisual stimuli.

EDUCATION

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

- **Title:** Enhancing Out-of-distribution Generalization for Camera-based Remote Physiological Sensing
- **Contribution Summary:** Developed a novel **multidimensional attention mechanism** for an end-to-end learning-based computational pipeline to extract physiological signals from RGB-Thermal facial videos, achieving **5**× performance gains on cross-dataset evaluation and state-of-the-art inference latency, while reducing model parameters by **50**×, 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 in remote physiological sensing.

- **Methods:** Multidimensional attention through constrained nonnegative matrix factorization, multitask optimization, multimodal CNN architectures, contrastive learning, generative adversarial networks.
- **Advisors:** Prof. Youngjun Cho, Prof. Nadia Berthouze

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

- **Dissertation:** EEG-based Investigation of Brain Wave Entrainment by Binaural Beats & Music
- An examination of phase coherence was conducted on multi-channel EEG data that had been pre-processed using independent component analysis to investigate the effect of auditory stimulus on functional brain connectivity, among healthy individuals and comatose patients.

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

- **Key Modules:** Signal Processing, Digital System Design, Modern Processor Architecture

SELECTED PUBLICATIONS AND PATENTS

1. **J. Joshi** and Y. Cho, "Efficient and Robust Multidimensional Attention in Remote Physiological Sensing through Target Signal Constrained Factorization", **2025**, arXiv: 2505.07013; ***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. T. Tran, H. Watson, **J. Joshi**, "Imaging device with illumination components", **2021**. | Patent | Product

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

SKILLS & COMPETENCIES

Technical Skills: Deep learning architectures, attention mechanisms, representation learning, diffusion models, contrastive learning, domain generalization, computer vision, signal processing, physiological computing, wearable devices, system engineering.

Technical Stack: PyTorch, TensorFlow, Python, C++, model optimization, edge computing, 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 colony counting.

2019 **Hackathon Winner, Tata Elxsi**
AI-based medical image enhancement solution.

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