

Jaskirat Singh Sudan

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EDUCATION

University of Michigan – Dearborn

M.S. in Artificial Intelligence, GPA: 3.87/4.0

Dearborn, MI

Sept 2024 – May 2026

Medi-Caps University

B.Tech in Computer Science

Indore, India

Aug 2020 – May 2024

RESEARCH EXPERIENCE

ISSF Lab, University of Michigan – Dearborn

Graduate Research Assistant – Representation Learning and Speech ML

Dearborn, MI

Aug 2025 – Present

- Designed a two-stage **supervised contrastive learning** pipeline over **Wav2Vec2-XLS-R-300M** for M.S. thesis on audio deepfake detection; achieved **0.25% EER** on ASVspoof 2019 and **8.3% EER** on In-the-Wild. Scaled experiments via **SLURM** and multi-GPU **PyTorch DDP**.
- Respond to weekly direct requests from **Google** to screen flagged **YouTube** audio for synthetic speech, contributing findings to lab reports that inform Google's content takedown decisions.

TAI Lab, University of Michigan – Dearborn

Graduate Research Assistant – Computer Vision and ML Systems

Dearborn, MI

Dec 2024 – Aug 2025

- Co-primary author on **ViKey (IEEE MASS 2025)**: a \$0.20 passive optical authentication system using polarized birefringence patterns as unclonable keys; designed the real-time CV pipeline (per-channel **SIPT**, FLANN matching, RANSAC verification) reaching **90.5% accuracy** at 0.5 m with **<100 ms latency** and no deep learning.

Indian Institute of Technology, Indore

Research Assistant – Signal Processing and ML

Indore, India

Jan 2023 – May 2023

- Reduced RFI contamination in GMRT radio-telescope data using **K-Means** clustering and CASA; built a rotation- and scale-invariant star-catalog navigation system using **DNNs** and normalized cross-correlation.

SELECTED PROJECTS

Zero-Shot Deepfake Speech Detection via Spectrogram Autoencoder | github

2026

- Designed an **unsupervised** detector trained **only on real speech**: a mel-spectrogram autoencoder uses reconstruction error as an anomaly score; benchmarked **CNN** vs. **ViT-Tiny** backbones with contour/energy masks over six corpora (~1.4M samples), reaching **15.5% / 13.1% EER** on ASVspoof 2019 / In-the-Wild, fully zero-shot.

Low-Light Semantic Segmentation on BDD100K (U-Net) | github

Nov 2024

- Solved day-to-night distribution shift by pretraining on daytime then fine-tuning on nighttime; **Xception U-Net** reached **99.5% pixel accuracy** (Dice 0.90), benchmarked against **MobileNetV2 U-Net** (90.4%) for accuracy/compute tradeoff.

Behavioral-Cloning Driving Agent (CNN-LSTM, TensorFlow) | github

Apr 2025

- Built end-to-end behavioral cloning: recorded gameplay via custom GUI, trained a **CNN-LSTM** (spatial features + temporal memory) on **50K frame-action pairs**, and injected predicted controls into a closed loop at **≤60 ms latency**, reaching **94% action accuracy** and autonomous lap completion.

PUBLICATIONS

- ViKey: Secure Door Access Control Using Passive Visible Light Tags.** J. Sudan et al. *IEEE MASS 2025*. ieeexplore.ieee.org/document/11206290
- Demo: A Passive Optical Tagging Approach for Secure and Revocable Entry Systems.** H. Fynn, J. Sudan et al. *IEEE MASS 2025*. ieeexplore.ieee.org/document/11206167
- Supervised Contrastive Learning with Cross-Batch Negatives for Deepfake Audio Detection.** J. Sudan et al. *arXiv preprint*, 2025. arxiv.org/abs/2604.26057
- A Review of EEG Artifact Removal Methods for BCI Applications** (equal contribution). *ISI Journal*, Feb 2024. ieta.org/journals/isi/paper/10.18280/isi.290124

TECHNICAL SKILLS

Machine Learning: Deep learning, Representation learning, Supervised Contrastive Learning, Metric learning, Self-supervised learning, Transfer learning, Transformers, Anomaly detection

Audio and Vision: Deepfake detection, Anti-spoofing, ASVspoof, EER, Wav2Vec2, XLS-R, WavLM, Whisper; Semantic segmentation (U-Net), YOLO, CNN-LSTM, Stable Diffusion, DreamBooth, OpenCV

Frameworks & Tools: PyTorch, TensorFlow / Keras, Hugging Face, PyTorch DDP, SLURM, Multi-GPU HPC, Linux, Git **Languages:** Python, C/C++, SQL, Bash