Jasmer Singh Sanjotra

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Education

Indian Institute of Technology Indore, Bachelor of Technology in Electrical Engineering — 2022 – 2026

- CGPA: 9.1/10
- 2 AP grades (conditionally awarded to the top 2% in a strength of >= 50)

Experience

Research Intern, IIT Kharagpur – Kharagpur, IN — May 2026 – Present

- Conducting research under Prof. Dibbendu Roy on **Causal Reinforcement Learning** and **World Models**, building upon prior work on causally-aware policy optimization.
- Developing a methodological framework to evaluate the causal capabilities of world models across **Pearl's Ladder of Causation** (association, intervention, and counterfactual reasoning).
- Designing a three-stage evaluation pipeline using **CausalGym** and custom environments to quantitatively assess causal understanding and intervention awareness in learned latent representations.
- Ongoing research submitted towards publication at **AAAI 2027**.

B.Tech Thesis: Causal Inference in Reinforcement Learning — Aug 2025 – Dec 2025

- Developed causal variants of **REINFORCE, PPO, and A2C** by introducing **causal-aware action-independent baselines** for variance reduction in policy gradient estimation.
- Derived theoretical regret guarantees and validated the proposed methods on custom **Structural Causal Models (SCMs)** environments.
- Demonstrated improved sample efficiency and policy learning stability under causal interventions and distribution shifts.
- Extended first-authored research paper based on this work submitted to **AAAI 2027**.

IEEE SPS SigMA Research Fellow, University of Groningen & IIT Indore — Feb 2025 – Jun 2026

- Conducted joint research under Prof. Shekhar Nayak (University of Groningen, Netherlands) and Prof. Nagendra Kumar (IIT Indore) on the reliability of objective evaluation metrics for modern **in-the-wild Text-to-Speech (TTS)** systems.
- Investigated the research question: *Can existing objective MOS predictors reliably evaluate speech synthesized by discrete-token and in-the-wild TTS models?*
- Designed experimental pipelines for speech generation, human listening studies, statistical significance testing, and metric benchmarking, resulting in a comprehensive assessment of current evaluation practices.
- **Recognition:** First-authored paper accepted at **INTERSPEECH 2026** main track.

Teaching Assistant, IIT Indore – Indore, IN — Mar 2026 – May 2026, Aug 2025 – Dec 2025

- Teaching Assistant for **EE216: Machine Learning and Signal Processing** and **EE319: Communication Systems**.
- Designed assignments, quizzes, and tutorial material covering **Deep Learning, Signal Processing, Probability Theory, Markov Chains, and Queueing Systems**.
- Conducted tutorials and problem-solving sessions
- Assisted in evaluation and grading.

Developer Intern, Samsung R&D Institute India – Bengaluru, IN — May 2025 – July 2025

- **Engineered** novel deep learning frameworks for the **6G Standards Team**, focusing on high-fidelity CSI-RS (Channel State Information Reference Signal) recovery.
- **Designed** customized UNet-inspired models for spectral super-resolution, achieving a Normalized Mean Squared Error (NMSE) of 10^{-3} on sparse, complex-valued 2D-FFT signals.

- Co-authored an innovation currently under internal patent filing process; secured an Advanced Developer return offer.

Research Intern, Prof. M. Tanveer | OPTIMAL Research Group, IIT Indore – IN May 2024 – November 2024

- Developed LSTMSE-Net, an audio-visual speech enhancement model to isolate and enhance speaker audio in noisy environments.
- Engineered a temporal feature extraction pipeline using **RNN and LSTM** units to jointly model audio-visual dependencies.
- Achieved a **3× reduction** in inference time compared to the baseline model with improvements in speech quality.
- Paper accepted in InterspeechW 2024.

Research Intern, Prof. Nagendra Kumar | LIPG, IIT Indore – IN May 2023 – May 2026

- Developed novel U-Net based deep learning models for liver tumor segmentation, handling data pre-processing and **creating custom callbacks, metrics, and loss functions**.
- Implemented advanced architectures like **Squeeze-and-Excitation Networks and Atrous Spatial Pyramid Pooling**, achieving a state-of-the-art accuracy of **98%**.
- Co-authored a research paper detailing the methods and results. Published in Elsevier Biomedical Signal Processing and Control.

Research Contributor, Dr. Debesh Jha | Northwestern University – IL, USA May 2024 – July 2024

- Implemented various liver tumor segmentation models including **DeepLabv3+, UNet, and HiFormer-L** on the LiTS dataset using PyTorch and TensorFlow.
- Engineered **custom, modular PyTorch data loaders** and transformation pipelines for the LITS dataset.
- Source code available at GitHub/TheAlphaJas/Liver-Tumor-Seg-Implements.

Publications

LSTMSE-Net: Long Short Term Speech Enhancement Network for Audio-visual Speech Enhancement Sep 2024

Arnav Jain*, ***Jasmer S. Sanjotra****, Harshvardhan Choudhary, Krish Agrawal, Rupal Shah, Rohan Jha, MD Sajid, Amir Hussain, M. Tanveer

10.21437/AVSEC.2024-8
3rd COG-MHEAR Workshop on Audio-Visual Speech Enhancement (AVSEC), ISCA

Ethical framework for responsible foundational models in medical imaging 2025

Debesh Jha, Gorkem Durak, Abhijit Das, ***Jasmer Sanjotra***, Onkar Susladkar, Suramyaa Sarkar, Ashish Rauniyar, Nikhil Kumar Tomar, Linkai Peng, Sirui Li, Koushik Biswas, Ertugrul Aktas, Elif Keles, Matthew Antalek, Zheyuan Zhang, Bin Wang, Xin Zhu, Hongyi Pan, Deniz Seyithanoglu, Alpay Medetalibeyoglu, Vanshali Sharma, Vedat Cicek, Amir A. Rahsepar, Rutger Hendrix, A. Enis Cetin, Bulent Aydogan, Mohamed Abazeed, Frank H. Miller, Rajesh N. Keswani, Hatice Savas, Sachin Jambawalikar, Daniela P. Ladner, Amir A. Borhani, Concetto Spampinato, Michael B. Wallace, Ulas Bagci

10.3389/fmed.2025.1544501
Frontiers in Medicine, Volume 12, 2025

MNet-SAt: A Multiscale Network with Spatial-enhanced Attention for Segmentation of Polyps in Colonoscopy 2025

Chandravardhan Singh Raghaw, Aryan Yadav, ***Jasmer Singh Sanjotra***, Shalini Dangi, Nagendra Kumar

10.1016/j.bspc.2024.107363
Biomedical Signal Processing and Control, Volume 102, 2025

T-MPEDNet: Unveiling the Synergy of Transformer-aware Multiscale Progressive Encoder-Decoder Network with Feature Recalibration for Tumor and Liver Segmentation 2025

Chandravardhan Singh Raghaw, ***Jasmer Singh Sanjotra***, Mohammad Zia Ur Rehman, Shubhi Bansal, Shahid Shafi Dar, Nagendra Kumar

10.1016/j.bspc.2025.108225
Biomedical Signal Processing and Control, Volume 110, 2025

Projects

rawML: Autograd Engine & Neural Framework from Scratch Oct 2024

- Engineered a lightweight, NumPy-based deep learning library featuring a **custom Autograd engine** (jTensor) with dynamic computational graph construction and gradient tracking.
- Implemented vectorized modular layers, loss functions, and optimizers (SGD, Adam), enabling training of multi-layer perceptrons without high-level framework dependencies.

Memory-Augmented RL for Stochastic Word-Games Aug 2024

- Designed a **Deep Q-Network (DQN)** agent integrated with an **RNN (LSTM/GRU)** architecture to handle the partially observable state space of the Hangman game.
- Utilized **Experience Replay and Target Networks** to stabilize training, achieving an 85%+ win rate across a vocabulary of 50k+ words.

Technical Skills

Languages: C++, Python, MATLAB

Frameworks & Tools: Git, PyTorch, Tensorflow, OpenCV, NumPy, backtesting.py, UnTrade SDK, Pennylane

Operating Systems: Windows, Linux

Other Skills: Competitive Programming, Data Structures and Algorithms, Object Oriented Programming, Probability and Statistics

Achievements

Advanced Performance (AP) grade awared in the course "Game Theory and Mechanism Design". 2026

Received IEEE SPS ME-UYR Grant, In collaboration with UoG, Netherlands 2025

Advanced Performance (AP) grade awared in the course "Microprocessors and Digital System Design". 2024

Expert on Codeforces, demonstrating strong coding and reasoning ability handle

Qualified for Amazon ML Summer School, Amazon MLSS 2024

All India Rank 3002 (out of 200k+ aspirants), JEE Advanced 2022 2022

99.1%ile (out of 800k+ aspirants), JEE Mains 2022 2022

IOQM Certificate of Merit, Indian Olympiad Qualifier in Mathematics 2021,2022