

# Jay Gala

## AI Resident, AI4Bharat (IIT Madras)

[Website](#) [GitHub](#) [Google Scholar](#) [Email](#) [LinkedIn](#)

### Education

#### Dwarkanadas J. Sanghvi College of Engineering (University of Mumbai)

2017 - 2021

Bachelor of Engineering (B.E.) in Computer Engineering

Overall GPA: **9.86/10**

Applied Math, Discrete Math, Algorithms, Machine Learning, Artificial Intelligence, Natural Language Processing.

### Experience

#### AI4Bharat (IIT Madras)

Aug 2022 - Present

AI Resident

Advisors: [Prof. Mitesh Khapra](#), [Dr. Anoop Kunchukuttan](#) and [Dr. Raj Dabre](#)

- > Mined 5M high-quality bitext pairs from the web (ebooks, lecture transcripts, etc) using LaBSE and margin score.
- > Developed SOTA IndicTrans2 translation models and created a challenging IN22 benchmark for 22 Indian languages. Notably, these models are used by the **Supreme Court of India** to translate legal proceedings and **Wikimedia Foundation** to translate Wikipedia content ([Coverage](#)).
- > Working on developing multilingual text generation models – IndicBART v2 supporting 22 Indian languages and also exploring multilingual instruction-tuning on [BLOOM](#) (Scao et al., 2022).

#### Research Collaboration

June 2023 - Present

Independent Researcher (Remote)

Advisor: [Dr. Sara Hooker](#), [Prof. Bruce Bassett](#), [Orevaoghene Ahia](#)

- > Working on understanding the effective ways of data pruning for machine translation.
- > Preliminary results demonstrate superior performance using entropy measure from early model checkpoints compared to sentence embedding models for English-German (high-resource) and vice-versa for English-Swahili (low-resource).

#### Research Collaboration

Sep 2021 - Present

Independent Researcher (Remote)

Advisor: [Dr. Zeerak Talat](#)

- > Proposed cross-dataset generalization for hate speech detection using Federated Learning extending [Fortuna et al. \(2021\)](#).
- > Experiments show around 10% improvement in f1-score with relatively less data compared to centralized training.
- > Working on mitigating biases in adversarial federated learning for hate speech by minimizing vulnerabilities induced by potential client adversaries due to data distributional shifts during server aggregation.

#### University of California San Diego

Jun 2021 - Jun 2022

Research Intern (Remote)

Advisor: [Prof. Pengtao Xie](#)

- > Implementation of [Learning from Mistakes for Neural Architecture Search](#) (Garg et al., 2021) in PyTorch [[Code](#)].
- > Proposed an efficient multi-level optimization algorithm as an extension to [Garg et al. \(2021\)](#) for improving NAS by conducting performance-aware data generation using class-wise evaluation during the architecture search.
- > Model-agnostic framework that can be coupled with any gradient-based (differentiable) search approaches.

#### Tata Consultancy Services

Dec 2019 - Feb 2020

Machine Learning Intern

- > Developed models using VAEs and K-means clustering for customer behavior analysis to prevent customer churn.
- > Prepared a custom dataset by developing surveys to handle open-ended and closed-ended questions.
- > Extracted feedback responses from handwritten survey forms using OCR achieving 12% CER and 18% WER.

#### Unicode Research

Aug 2020 - Dec 2022

Research Student

Advisor: [Swapneel Mehta](#)

- > Worked on [SimPPL](#) to develop tools for policymakers and journalists to audit online disinformation on social media (currently supported by NYC Media Lab, Wikimedia Foundation, and AI4ABM).
- > Collaborated with The Sunday Times and Ippen Digital to develop [parrot.report](#), part of [SimPPL](#).
- > **Teaching Assistant:** Summer Machine Learning Course, [UMLSC 2021](#), supported by [Google Research India](#).

### Publications

Complete List at [Google Scholar](#) (\* = equal contribution)

#### IndicTrans2: Towards High-Quality and Accessible Machine Translation Models for all 22 Scheduled Indian Languages [[📄](#)] [[Code](#)]

[Jay Gala](#)<sup>\*</sup>, [Pranjal A. Chitale](#)<sup>\*</sup>, et al.

Transactions on Machine Learning Research

[In Submission to TMLR]

## Needs-Aware Image Generation [🔗]

Jay Gala, Pengtao Xie

37<sup>th</sup> Conference on Neural Information Processing Systems

[In Submission to NeurIPS 2023]

## A Federated Approach for Hate Speech Detection [🔗] [Code]

Jay Gala\*, Deep Gandhi\*, Jash Mehta\*, Zeerak Talat

17<sup>th</sup> Conference of the European Chapter of the Association for Computational Linguistics

[EACL 2023]

## Expanding Access to ML Research through Student-led Collaboratives [🔗]

Deep Gandhi, Raghav Jain, Jay Gala, Jhagrut Lalwani, Swapneel S Mehta

NeurIPS Workshop on Broadening Research Collaborations 2022

[WBRC 2022]

## Improving Image-Based Dialog by Reducing Modality Biases [🔗] [Code]

Jay Gala, Hrishikesh Shenai, Pranjal Chitale, Kaustubh Kekre, Pratik Kanani

5<sup>th</sup> International Conference on Advances in Computing and Data Sciences

[ICACDS 2021]

## Pothole Detection and Dimension Estimation System using Deep Learning (YOLO) and Image Processing [🔗] [Code]

Pranjal A. Chitale, Kaustubh Y. Kekre, Hrishikesh R. Shenai, Ruhina Karani, Jay P. Gala

35<sup>th</sup> International Conference on Image and Vision Computing New Zealand

[IVCNZ 2020]

## Projects

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### Ocubot - Image-based Dialog [Code]

Advisor: Prof. Pratik Kanani

- › Bachelor's project which focused on improving performance on the multimodal task of [Visual Dialog](#).
- › Adversarial analysis of existing systems to identify modality biases towards historical context and salient visual features.
- › Reduced modality biases by improving visual context with dense captions and attention over these captions.
- › Achieved competitive performance to the baseline with around 70% training data (85K images out of 120K images).

### Pothole Detection and Depth Estimation [Code]

Advisor: Prof. Ruhina Karani

- › Developed an autonomous surveillance system for road safety to identify potholes using YOLOv4 and estimate depth using triangular similarity.
- › Collected and released a dataset of 1.2K pothole images annotated as per the YOLO labeling format.

### Anomaly Detection in ECG Signals

Advisor: Prof. Pratik Kanani

- › Industry collaboration to develop neural models for detecting anomalies in processed ECG signals from IoT devices with a human-in-the-loop approach to semi-automate the process while ensuring the safety of human lives.
- › Applied distributed computing algorithms for speed improvements during inference and load balancing by 60%.

### Annotated PyTorch Paper Implementations [Code]

- › Annotated PyTorch implementations of deep learning papers as interactive jupyter notebooks.
- › Includes papers such as Word2Vec, GloVe, KimCNN, Bahdanau Attention, Transformer, Neural Style Transfer, etc.

### C Programming Exam Portal [📺]

- › A paperless solution for conducting C programming exam for over 500 students at [D.J. Sanghvi](#) institution.
- › Generated data-driven detailed reports for students and instructors to enhance the overall learning experience.

## Skills

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<b>Languages</b>	Python, C, Java, JavaScript, SQL, HTML5
<b>Databases</b>	MySQL, SQLite, PostgreSQL, MongoDB
<b>Libraries</b>	PyTorch, Keras, Transformers, Scikit-learn, NumPy, Pandas, OpenCV, Gensim, SpaCy, NLTK, Flask, FastAPI, Streamlit, Gradio, ReactJs, NodeJs
<b>Others</b>	Git, Jupyter, Docker, Raspberry Pi, LaTeX

## Academic Service

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**Volunteer** EACL 2023

## Co-Curricular Activities

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- › Former Member of [Shalizi-Stats](#) reading group which focuses on the stats book [Advanced Data Analysis from an Elementary Point of View](#) by Cosma Shalizi and [Bayesian Statistics](#).
- › Attended the [Advanced Language Processing Winter School \(ALPS\) 2022](#).
- › Attended the [Eastern European Machine Learning Summer School \(EEML\) 2022](#).
- › [ML Collective](#) NLP Reading Group Moderator and [Cohere for AI](#) Interactive Reading Group Organizer.