Anish Acharya

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Education

- **University of Texas, Austin** — **Austin, TX**
  PhD, Electrical and Computer Engg. — *Fall, 2019 – Spring, 2025*
  Advisor(s): **Prof. Inderjit S Dhillon** and **Prof. Sujay Sanghavi**
  PhD Thesis: **Robust and Efficient Learning in High Dimensions from Noisy Data**

- **University of California, Irvine** — **Irvine, CA**
  M.S. Electrical Engg. and Computer Science — *Fall, 2013 – Winter, 2014*

- **Jadavpur University** — **Kolkata, India**
  B.E. Electronics and Instrumentation Engineering — *Spring, 2009 – Spring, 2013*
  Advisor(s): **Amitava Gupta** and **Shantanu Das**

Core Technical Skills

- **Research Interests:** My recent research focuses on developing theoretically grounded, robust (e.g to distribution shifts, label noise, byzantine corruption) and (parameter / data) efficient training and fine-tuning algorithms for Foundation Models (e.g., diffusion models, LLMs). We study these problems under (un/ weakly / semi / fully) supervised settings. Beyond foundational training methods, I work on multi-agent LLM architectures and develop core methods such as prompt optimization, controllable generation, self-play dialog simulation, formal state modeling, LLM-as-Judge evaluation – deploying these systems in production with rigorous evaluation loops.
- **Keywords:** Large Language Models, Multi-Agent Framework, Decentralized AI, Deep Learning, Machine learning, Robust (outliers, distribution shifts) Training, Data / Parameter Efficient Training, Self Supervised Learning, Diffusion Models, Federated Learning, Natural Language Processing.

Industry Experience

- **Amazon** — **Austin, TX**
  Senior Research Scientist (Full Time) — *April 2025 -*
  Building Decentralized AI Marketplace.
  My work spans the full life-cycle of **multi-agent dialog system** – defining the architecture, developing core methods (prompt optimization, controllable generation, self-play for dialog simulation, formal state and artifact modeling, LLM-as-Judge evaluation), integrating these into production-ready pipelines, and closing the loop through evaluation and iteration.
  This research directly powered the launch of **AWS Marketplace Agent Mode** at re:Invent 2025 – a **deep research** tool bringing structured requirements analysis, long-context reasoning, and grounded solution comparison to real customers. In the news : **Amazon Blog**, **The Ravit Show**, **CRN**, **ZDNet**, **Inside Partnering**

- **Eidon AI** — **Austin, TX**
  Head of AI Research (Part Time) — *July 2024 - Feb 2025*
  The AI is the Blockchain, the Blockchain is the AI.
  I proposed and developed a novel **multi-agent dynamic point-based system** that integrates blockchain technology with AI – making it accessible, transparent, and equitable for everyone. Designed and implemented comprehensive evaluation metrics for content quality, AI alignment, and community standards, establishing a flexible **tokenomics framework for fair reward distribution** in our decentralized network. Spearheaded the end-to-end system architecture, successfully launching the platform. Take a look at the **Technical Docs** for details on the algorithms.

- **Meta** — **Menlo Park, CA**
  Student Researcher (Part Time) — *Fall, 2022*
  Research Scientist (Intern) — *Summer, 2022*
  Student Researcher (Part Time) — *Fall, 2021*
  Research Scientist (Intern) — *Summer, 2021*
  With Meta Capacity Engineering and Meta Fundamental AI Research group, I worked on online low resource training to scale up Facebook's recommendation models. In particular, we investigated contrastive learning applied to weakly supervised prediction task.

- **Microsoft** — **Redmond, WA**
  Research Scientist (Intern) — *Summer, 2020*
  As part of the **Speech and Dialog Research Group**, my research was focused on developing algorithms to train large scale robust models in Federated Learning setting. Also, designed an **Open Source Federated Learning Platform** - **OpenMSFTL**.

- **Amazon** **Sunnyvale,CA**
  Applied Scientist(**Full Time**) *June 2016 - July 2019*
  As an Applied Scientist in the **Amazon Alexa AI** group, I was involved in proposing, designing and implementing NLP models shared across all alexa devices. I was also a member of the **Alexa Conversational AI** where we launched **Alexa Conversations**. I was involved in designing and implementing the Natural Language Processing (NLP) frameworks for the following Alexa Domain Models: Timers, Alarms, Reminders, Calendar, Communications consumed across multiple Alexa IOT devices (e.g. Echo Show, FireTv). I was also the **primary inventor** of the following research: **Model Compression via Low Rank Matrix Factorization** (**paper**, **patent**), **Goal Oriented Dialog Generation** (**paper**, **patent**). My work at Amazon has been featured at: **Forbes**, **CNN**, **Packt Blog**, **VentureBeat**, **HakerNews**, **Amazon Science (2019)**,**Amazon Blog (2019)**, **Amazon Science (2021)**.
- **eBay inc** **San Jose,CA**
  Data Scientist (**Contract**) *Nov 2015 - June 2016*
  As part of the Customer Insights and Analytics (CSI) group, I worked on developing **deep recommendation algorithms** to **personalize buyer search** and *personalized eBay advertising* e.g. **generative models for targeted (personalized) emails**.
- **Schlumberger** **Houston,Tx**
  Data Scientist(**Full Time**) *March, 2015- Nov 2015*
  As one of the early member in the newly formed **Digital Transformations Services** AI research group some of my work include: **Failure Prediction** of deployed oil service instruments, **Oil Level Estimation** from various sensor data generated from different parts of oil extraction life-cycle.
- **FEM inc** (acquired by **Nielsen Gracenote**) **Los Angeles,CA**
  Data Engineer(**Full Time**) *Winter, 2015*
  I worked closely with the co-founders on envisioning Natural Language Processing models, designing content recommendation system using these models and building visualization tools for interactive online analytics dashboard.
- **Toyota Technological Institute Chicago (TTIC)** **Chicago,IL; Ann Arbor,MI**
  Visiting Researcher (**Intern**) *Summer, 2014*
  We developed a real-time stereo algorithm to reconstruct 3D surrounding for autonomous car. Another extension was to develop a stereo evaluation benchmark based on slanted plane model of the surrounding. This project was developed for **Toyota Research in North America (TRINA)**.

Teaching Experience

- **University of Texas at Austin** **Austin, TX**
  - Directed Reading Program (DiRP): **Natural Language Optimization (NLO) for LLMs** Fall, 2025
  - MIS 285N: **Introduction to Deep Learning** with Prof. C. Caramanis, Prof. A. Dimakis Spring, 2024
  - MIS 185N: **Emerging Trends in Machine Learning** with Prof. S. Shakkottai Spring, 2024
  - ECE 461P: **Data Science Principles** with Prof. Sujay Sanghavi. Fall, 2023
- **University of California Irvine** **Irvine,CA**
  - EECS 50 : Discrete Time signals and systems (Undergraduate) Fall, 2014
  - EECS 280A: Advanced Engineering Electromagnetics I (Graduate) Spring, 2014
  - EECS 118: Introduction to Knowledge Management and software Engineering (Undergraduate) Winter, 2014
  - EECS 119: Introduction to VLSI (Undergraduate) Fall, 2013

Academic Awards

- **Meta PhD Research Grant** of $ 100,000 Spring, 2021 - Spring, 2023.
- **Meta PhD Research Fellowship Finalist** - AI HW/SW co-design (**Press Release**) Spring, 2022.
- **Travel Grants** to attend ML Conferences (NeuRips, ICML, AISTATS, UAI) from UT Austin. Spring, 2022-Fall, 2024.
- **Travel Grants** to visit Simons Institute for the theory of computing, UC Berkley. Fall 2021, 2022.
- Awarded Bachelor of Engineering with **Highest Honors** (First Class), Jadavpur University Fall, 2013
- **Fellowship , Ministry of Human Resource Development, Govt. of India** for Academic Excellence. Fall, 2009 - Spring, 2013.
- **Mamraj Agarwal Rashtriya Puraskar (National Award)** from Governor (West Bengal), for Academic Excellence. Summer, 2007.

Invited Talks

- Fall 2023. (Austin, TX) **Future of Chatbots and Conversational AI Summit (FOCA 2023)** (Keynote, Panel)
- Fall 2022. (Berkley, CA) **Simons Institute for the Theory of Computing**: Data-Driven Decision Processes Workshop (Poster)
- Summer 2022. (Eindhoven, Netherlands) **UAI 2022** (Spotlight, Poster)
- Summer 2022. (Baltimore, MD) **ICML 2022 - PODS** (Recorded Talk, Poster)
- Spring 2022. (Austin, TX) **6g@UT Forum** (Poster)
- Spring 2022. (Virtual) **AISTATS 2022** (Recorded Talk, Poster)
- Spring 2022. (Virtual) **University of Exeter - Department of Mathematics** (Invited Talk)

- Fall 2021. (Virtual) University of Denver - Department of Computer Science (Guest Lecture)
- Fall 2021. (Berkley, CA) **Simons Institute for the Theory of Computing** - IFML/CCSI Symposium (Poster)
- Spring 2021. (Virtual) **NSF-TRIPODS Workshop on Communication Efficient Distributed Optimization** (Poster)
- Fall 2019. (Austin, Tx) **UT Austin Graduate Research Showcase** (Poster)
- Fall 2019. (Austin, Tx) **Texas Wireless Summit** (Poster)
- Spring 2019. (Honolulu, Hawaii) **AAAI 2019** (Oral)
- Summer 2018. (Seattle, WA) **Amazon Machine Learning Conference** (Oral)

Granted US Patents (Primary Inventor)

1. (Amazon Alexa) *"Goal Oriented Dialog Generation using Dialog Template, API and Entity data"*; July, 2022. **USPTO Link**
   A. Acharya , A. Metallinou, T. Chung, S. Paul, S. Chandra, C. Lin, D. H. Tur, A. Mandal
2. (Amazon Alexa) *"Natural Language Processing : Amazon Alexa AI"*; Dec 2020. **USPTO Link**
   A. Acharya , A. Metallinou, R. Goel, I. Dhillon

Publications

Preprints

1. *"Understanding Contrastive Representation Learning from Positive Unlabeled (PU) Data."* **Preprint**
   Anish Acharya, Li Jing, Bhargav Bhushanam, Dhruv Choudhary, Michael Rabbat, Sujay Sanghavi, Inderjit S Dhillon
   Short version presented at International Conference on Machine Learning (ICML), 2022 : PODS Workshop.
   Short version presented at Simons Institute - UC Berkley : Data-Driven Decision Processes Workshop.

Peer Reviewed Journal Articles.

1. *"Neural Distributed Source Coding"*
   IEEE Journal on Selected Areas in Information Theory. 2024. **Read Online**
   A. Nagle, J. Whang, **A. Acharya**, H. Kim, A. Dimakis.
2. *"On the Benefits of Multiple Gossip Steps in Communication Constrained Federated Learning"*
   IEEE Transactions on Parallel and Distributed Systems, 2021. **Read Online**
   A. Hashemi, **A. Acharya**, R. Das, H. Vikalo, S. Sanghavi, I. Dhillon.
3. *"Extending The Concept of Analog Butterworth Filter For Fractional Domain"*
   Signal Processing (Elsevier), 2014. **Read Online**
   Anish Acharya, Saptarshi Das, Indranil Pan, Shantanu Das.
4. *"Simulation studies on the design of optimum PID controllers to suppress chaotic oscillations in a family of Lorenz-like multi-wing attractors"*
   Mathematics and Computers in Simulation (Elsevier), 2014. **Read Online**
   Saptarshi Das, **Anish Acharya**, Indranil Pan

Peer Reviewed Conference Articles.

1. *"Geometric Median Matching for Robust k-Subset Selection from Noisy Data"*.
   International Conference on Machine Learning (ICML), 2025 **Read Online**
   Anish Acharya, Sujay Sanghavi, Alex Dimakis, Inderjit Dhillon.
   Short version presented at International Conference on Machine Learning (ICML), 2024 - FMWild Workshop.
2. *"Faster Non-Convex Federated Learning via Global and Local Momentum"*. **(Spotlight)**
   The Conference on Uncertainty in Artificial Intelligence (UAI) 2022 **Read Online**
   R. Das, **A. Acharya**, A. Hashemi, S. Sanghavi, I. Dhillon, U. Topku.
3. *"Robust Training in High Dimensions via Block Coordinate Geometric Median Descent"*. **(Spotlight)**
   International Conference on Artificial Intelligence and Statistics (AISTATS) 2022. **Read Online**
   A. Acharya, A. Hashemi, P. Jain, S. Sanghavi, I. Dhillon, U. Topku.
   Short version presented at Joint IFML/CCSI Symposium (Simons Institute - UC Berkley).
   Short version presented at NSF-TRIPODS Workshop on Communication Efficient Distributed Optimization.
4. *"LDKP: A Dataset for Identifying Keyphrases from Long Scientific Documents"*
   ACM International Conference on Information and Knowledge Management (CIKM) 2022
   DL4SR'22: Workshop on Deep Learning for Search and Recommendation. **Read Online**
   D Mahata, N Agarwal, D Gautam, A Kumar, S Parekh, Y K Singla, **A Acharya**, R R Shah.

5. *"Alexa Conversations: An Extensible Data-driven Approach for Building Task-oriented Dialogue Systems"*.
Conference of the North American Chapter of the Association for Computational Linguistics (NAACL) 2021. **Read Online**
A. Acharya, S. Adhikari, S. Agarwal, V. Auvray, N. Belgamwar, A. Biswas, S. Chandra, T. Chung, M. Zarandi, R. Gabriel, S. Gao, R. Goel, D. Hakkani-Tur, J. Jezabek, A. Jha, J. Kao, P. Krishnan, P. Ku, A. Goyal, C. Lin, Q. Liu, A. Mandal, A. Metallinou, V. Naik, Y. Pan, S. Paul, V. Perera, A. Sethi, M. Shen, N. Strom and E. Wang;
Media: **CNN**, **Forbes**, **VentureBeat**, **Amazon Science**, **Alexa Skill**.

6. *"GupShup: An Annotated Corpus for Abstractive Summarization of Open-Domain Code-Switched Conversations"*.
Conference on Empirical Methods in Natural Language Processing (EMNLP) 2021. **Read Online**
L. Mehnaz, D. Mahata, A. Kumar, U. S. Gunturi, R. Jain, G. Gupta, R. Gosangi, I. G. Lee, **A. Acharya**, R. Shah.

7. *"Online Embedding Compression for Text Classification using Low Rank Matrix Factorization"*. **(Spotlight)**
AAAI Conference on Artificial Intelligence (AAAI) 2019. **Read Online**
Anish Acharya , Rahul Goel, Angeliki Metallinou, Inderjit Dhillon.
Media: **Amazon Science**, **Packt**

8. *"Stability Analysis Of Delayed System Using Bode's Integral"*.
International Conference on Computer Communication and the Internet (ICCCI) 2013 **IEEE Xplore**
A. Acharya, D. Mitra, K. Halder

9. *"Optimum PID Control of Multi-wing Attractors in A Family of Lorenz-like Chaotic Systems"*
International Conference on Computing, Communication and Networking Technologies (ICCCNT) 2012. **IEEE Xplore**
A. Acharya, S. Das , I. Pan

10. *"Optimized Quality Factor of Fractional Order Analog Filters with Band-Pass and Band-Stop Characteristics"*
International Conference on Computing, Communication and Networking Technologies (ICCCNT) 2012. **IEEE Xplore**.
A. Pakhira , S. Das , **A. Acharya**, I. Pan, S. Saha

11. *"Identification of nonlinear systems from the knowledge around different operating conditions: a feed-forward multilayer ANN based approach"*
International Conference on Parallel, Distributed and Grid Computing (PDGC) 2012 **IEEE Xplore**
S. Saha, S. Das, **A. Acharya**,A. Kumar, S. Mukherjee, I. Pan, A. Gupta

12. *"Least square and instrumental variable system identification of AC servo position control system with fractional Gaussian noise"*
International Conference on Energy, Automation and Signal (ICEAS) 2011 **IEEE Xplore**
S. Das, A. Kumar, I. Pan, **A. Acharya**, S. Das, A. Gupta.

Academic Services

- Reviewer - **(JMLR) Journal of Machine Learning Research - 2025-Present**
- Reviewer - **(ACL) Association for Computational Linguistics - 2023-Present**
- Reviewer - **(ISIT) IEEE International Symposium on Information Theory - 2023**
- Reviewer - **(ICLR) International Conference on Learning Representations - 2023, 2024**
- Reviewer - **(UAI) Conference on Uncertainty in Artifical Intelligence - 2023**
- Reviewer - **(ICML) International Conference on Machine Learning - 2021, 2022, 2023, 2024, 2025**
- Reviewer - **(AISTATS) Conference on Artificial Intelligence and Statistics - 2021, 2022, 2023, 2024**
- Reviewer - **(NeurIPS) Conference on Neural Information Processing Systems - 2021, 2022, 2023, 2024**
- Reviewer - **IEEE Transactions on Knowledge and Data Engineering 2022 - Present**
- Reviewer - **Pattern Recognition Letters (Elsevier) 2021 - Present**

References

- **Inderjit S Dhillon**
Gottesman Family Centennial Professor of Computer Science at UT Austin
Vice President and Google Fellow, Google.
ACM Fellow, IEEE Fellow, SIAM Fellow, AAAS Fellow, SIAM Linear Algebra Prize.

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- **Sujay Sanghavi**
Professor, Electrical and Computer Engineering at UT Austin
Principal Research Scientist and Amazon Scholar, Amazon
Director, NSF TRIPODS Institute for Data Science at UT Austin

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