

Gautham Krishna Gudur

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RESEARCH INTERESTS

I am interested in building resource-efficient, data-centric, and human-centric machine learning systems.

Focus Areas: Ubiquitous Computing, Human Activity Recognition, Cross-modal Learning (inertial and acoustic sensing), Generative AI, Foundation models/LLMs, Continual Learning, Active Learning, Federated Learning, Limited Supervision

EDUCATION

The University of Texas at Austin, Austin, TX

Aug 2023 – Present

Ph.D., Electrical and Computer Engineering, **GPA: 3.83/4.00**

Advisor: [Prof. Edison Thomaz](#)

Anna University (SSN College of Engineering), Chennai, India

2013 – 2017

B.Tech., Information Technology

RESEARCH AND WORK EXPERIENCE

University of Texas at Austin – Graduate Research Assistant

Austin, TX

Advisor: [Prof. Edison Thomaz](#)

Aug 2023 – Present

- Designing data-efficient continual learning methods to alleviate catastrophic forgetting. Introduced dataset distillation as an alternative strategy to active learning, reducing user labeling efforts by up to 3000x for audio sensing tasks.
- Developed multi-modal acoustic-motion feature alignment approaches to enhance human activity recognition.
- Proposed SVFT (Singular Vector guided Fine-Tuning) – a Pareto-dominant PEFT technique [*Mentor: [Prof. Sujay Sanghavi](#)*].
- Leveraging efficient sample selection techniques for LLM training and fine-tuning.

Independent Research

Dec 2018 – Present

- Analyzed the effect of calibration on prioritizing important samples during training [*Mentor: [Prof. Emtiyaz Khan](#)*].
- Designed zero-shot federated learning frameworks to handle new heterogeneous classes and models for audio sensing.
- Worked on Bayesian active learning for on-device human activity recognition (HAR) and wearable sensing tasks.

Ericsson R&D, Global AI Accelerator (GAIA) – Data Scientist III

Chennai, India

Mentors: [Dr. Shrihari Vasudevan](#), [M J Prasath](#)

Feb 2019 – Apr 2023

- Worked on ML for network intelligence and telecom resulting in multiple publications, patents, and deployed products.
- Contributed to 3GPP standardization for federated learning and multi-vendor model sharing; defined and positioned [Ericsson's AI-Native](#) design principles. Created spatiotemporal models for indoor building connectivity prediction with <5% error; improved mobility prediction of user devices in 5G Network Data Analytics Function (NWDAF).
- Developed [E-ADF](#) – an end-to-end unsupervised anomaly detection framework with data-efficient Bayesian model selection and dynamic threshold optimization with >60% reduction in data points.
- Created E-LangHub (Ericsson NLP Hub) with telco-rich data and SOTA models. Improved AIB (Automated Intelligent Knowledge Base) for customer symptoms using LLMs and active learning; worked on telco-specific language translation.
- Deployed an object detection system for infrastructure failures at cell sites, reducing field technician hours by over 20.

SmartCardia (EPFL) – Machine Learning Engineer

Chennai, India

Mentor: [Dr. Srinivasan Murali](#)

May 2018 – Nov 2018

- Implemented gradient-boosted ensembles and LSTM models for regression and classification on imbalanced time-series clinical data; extracted features from biomarkers such as sleep apnea, troponin, blood pressure, and hemoglobin.

Solarillion Foundation – Research Assistant

Chennai, India

Mentor: [Vineeth Vijayaraghavan](#)

Feb 2016 – May 2018

- Led the development of *HARNet* – deep ensemble models for activity recognition with on-device incremental learning.
- Designed dynamic gesture recognition models with efficient feature engineering on a low-cost Raspberry Pi Zero (\$5).
- Deployed a movie occupancy predictor for a top Indian multiplex chain using tree-based models and branched LSTMs.

SSN College of Engineering – Undergraduate Student Researcher

Chennai, India

Mentor: [Prof. Bhalaji N](#), [Prof. Srinivasan R](#)

Feb 2015 – May 2017

- Developed a vision-based intelligent bus stop recognition system using CNNs; employed data augmentation and active learning strategies to ensure scalability and adaptability in dynamic Indian environments, achieving ~96% accuracy.
- Led an HCI research project – Neurocinematics, to classify real-time cognitive responses of film viewers using EEG data.
- Evaluated routing protocol performance metrics on a Contiki testbed to select the optimal mote for two IoT scenarios.

SELECTED PUBLICATIONS [Conference/Journal/Workshop]

* denotes equal contribution and joint lead authorship

[Citations: 205, h-index: 8, i-index: 8]

- [Gautham Krishna Gudur](#), E Thomaz. Dataset Distillation for Audio Classification: A Data-Efficient Alternative to Active Learning [*Under Submission*].
- V Lingam*, A Tejaswi*, A Vavre*, A Shetty*, [Gautham Krishna Gudur*](#), J Ghosh, A Dimakis, E Choi, A Bojchevski, S Sanghavi. [SVFT: Parameter-Efficient Fine-Tuning with Singular Vectors](#), **ICML 2024 – WANT [Oral Presentation]** and **ES-FoMo** workshops.
- G Tata*, [Gautham Krishna Gudur*](#), G Chennupati, ME Khan. [Can Calibration Improve Sample Prioritization?](#), **NeurIPS 2022 – HILL and HIT** workshops.
- [Gautham Krishna Gudur](#), R Raaghul, K Adithya, S Vasudevan. [Data-Efficient Automatic Model Selection in Unsupervised Anomaly Detection](#), **IEEE ICMLA 2022**.
- [Gautham Krishna Gudur](#), SK Perepu. [Zero-Shot Federated Learning with New Classes for Audio](#), **INTERSPEECH 2021**. Abridged version: **ICLR 2021 – DPML and HAET** workshops.
- [Gautham Krishna Gudur](#), SK Perepu. [Resource-Constrained Federated Learning with Heterogeneous Labels and Models for Human Activity Recognition](#), **IJCAI-PRICAI 2020 – DL-HAR** and **NeurIPS 2020 – MLMH** workshops.
- A Ragav*, [Gautham Krishna Gudur*](#). [Bayesian Active Learning for Wearable Stress and Affect Detection](#), **NeurIPS 2020 – MLMH** workshop.
- [Gautham Krishna Gudur](#), BS Balaji, SK Perepu. [Resource-Constrained Federated Learning with Heterogeneous Labels and Models](#), **KDD 2020 – AIoT** workshop.
- S Venkataramani, A Ramesh, SS Sundar, AK Jain, [Gautham Krishna Gudur](#), V Vijayaraghavan. [A Dynamically Adaptive Movie Occupancy Forecasting System with Feature Optimization](#), **IEEE ICDM 2019 – LMID** workshop.
- [Gautham Krishna Gudur](#), A Ramesh, R Srinivasan. [A Vision-based Deep On-Device Intelligent Bus Stop Recognition System](#), **ACM UbiComp 2019 – PURBA** workshop.
- [Gautham Krishna Gudur](#), P Sundaramoorthy, V Umaashankar. [ActiveHARNet: Towards On-Device Deep Bayesian Active Learning for Human Activity Recognition](#), **ACM MobiSys 2019 – EMDL** workshop.
- P Sundaramoorthy, [Gautham Krishna Gudur](#), MR Moorthy, RN Bhandari, V Vijayaraghavan. [HARNet: Towards On-Device Incremental Learning using Deep Ensembles on Constrained Devices](#), **ACM MobiSys 2018 – EMDL** workshop.
- [Gautham Krishna G](#), KS Nathan, BY Kumar, AA Prabhu, A Kannan, V Vijayaraghavan. [A Generic Multi-modal Dynamic Gesture Recognition System Using Machine Learning](#), **IEEE FICC 2018**.

PATENTS

- [Federated Learning using Heterogeneous Labels](#), WO2022013879A1.
- [Distributed Machine Learning with New Labels using Heterogeneous Label Distribution](#), WO2022162677A1.
- [Method and Apparatus for Approach Recommendation with Threshold Optimization in Unsupervised Anomaly Detection](#), WO2023166515A1.

TECHNICAL SKILLS

Programming Languages & Tools: Python, C++, HTML/CSS, Bash, SQL, JavaScript, Git, LaTeX, GCP, Docker, Arduino, Raspberry Pi

Libraries & Frameworks: PyTorch, TensorFlow, Hugging Face, Keras, Numpy, Pandas, Scikit-learn, OpenCV, PySpark

HONORS AND AWARDS

- Graduate Ph.D. Fellowship from Cockrell School of Engineering at the University of Texas at Austin
- [Top 1 percentile in HackerRank](#) – Algorithms Domain – Problem Solving (Advanced)
- Full financial registration grants to attend ICLR 2021, NeurIPS 2020, OxML 2020
- Our project AIB won Ericsson's Top Performance Competition 2020 in the Operational Excellence category
- Undergraduate research grant of INR 25,000 from SSN College of Engineering
- Winner of the GermEval Shared Task 1 Challenge (Subtask (a)), KONVENS 2019 in post-evaluation phase
- Certification of Merit for Grade A1 in all subjects in AISSE (CBSE 10th boards)
- Top 10 percentile in 42nd National Mathematics Talent Competitions, India
- Completed all 10 levels of UCMAS Mental Arithmetic (Abacus)

SUMMER SCHOOLS

- 5th Summer School on Artificial Intelligence 2021, IIIT Hyderabad (Virtual)
- Eastern European Machine Learning Summer Schools – both EEML 2020 and EEML 2021 (Virtual)
Presented ActiveHARNet (EEML '20); zero-shot federated learning and task-independent continual learning (EEML '21)
- Oxford Machine Learning Summer School, OxML 2020 (Virtual)

PROFESSIONAL SERVICE

- **Program Committee/Reviewer:** ICASSP 2024, NeurIPS 2024 – ENLSP workshop, ICML 2024 – ES-FoMo workshop, ICLR 2021 – DPML workshop, NeurIPS – ML4H 2020 and ML4H 2019 workshops, KONVENS 2019 – GermEval
- Mentored 11+ students in embedded ML assignments and research projects at Solarillion Foundation (Feb '17 - May '18).
- Technical Reviewer of the book titled “Hands-On Meta Learning With Python”.
- Event Organizer of “Data Nuggets” – an inter-collegiate Data Science contest, Invente 2016, SSN College of Engineering.
- Mentor at IEEE B.Tech. Student Branch – Python Programming for Underrepresented.

POSTERS AND EXTENDED ABSTRACTS

- [Adaptive Federated Learning in Conceptually Drifting Environments](#), Course Project.
- [Heterogeneous Zero-Shot Federated Learning with New Classes for On-Device Audio Classification](#), **MobiUK 2021**.
- [Bayesian Active Learning for Wearable and Mobile Health](#), **NeurIPS** Europe meetup on Bayesian Deep Learning (**BDL 2020**).
- [Handling Real-time Unlabeled Data in Activity Recognition using Deep Bayesian Active Learning and Data Programming](#), **MobiUK 2019**, University of Oxford.
- [Neurocinematics: The Intelligent Review System](#), 3rd International Conference on Cognition, Brain and Computation (**CBC 2015**), Indian Institute of Technology (IIT), Gandhinagar.

SELECTED TALKS

- Machine Learning and Ubiquitous Computing – SSN College of Engineering (2022)
- [Heterogeneous Zero-Shot Federated Learning with New Classes for On-Device Audio Classification](#) – MobiUK 2021
- Telecom-Specific Language Translation using GCP – Ericsson/Google Cloud Day (2021)
- [Resource-Constrained Machine Learning for Ubiquitous Computing Applications](#) – Flipped by GAIUS (2020)

MOOCs AND TECHNICAL COURSEWORK

- **Relevant Coursework:** Advanced Computer Vision, Generative Models in Machine Learning, Applied Machine Learning, Human Signals: Sensing/Analytics, Spoken Language Technologies, Statistical Methods I
- HackerRank | Problem Solving – Advanced, Intermediate, Basic
- University of Washington | Coursera – [Machine Learning Specialization](#) (4 courses) – A Case Study Approach, Regression, Classification, Clustering & Retrieval
- NRU HSE | Coursera – Bayesian Methods for Machine Learning
- Stanford University | Coursera – Machine Learning
- UC San Diego | Coursera – Algorithmic Toolbox, Data Structures
- John Hopkins University | Coursera – R Programming
- Stanford University – CS231n