

# 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, acoustic, physiological 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 activity recognition using IMUs.
- 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](#), [RIKEN](#)].
- 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

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

Feb 2015 – Mar 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]

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\* denotes equal contribution and joint lead authorship

[Citations: 215, h-index: 9, i-index: 9]

- Dawei Liang\*, Yufei Shen\*, [Gautham Krishna Gudur\\*](#), E Thomaz. AMA-HAR: Improving Motion-based Human Activity Recognition with Acoustic Alignment [*Under Submission*].
- [Gautham Krishna Gudur](#), E Thomaz. Dataset Distillation for Audio Classification: [A Data-Efficient Alternative to Active Learning](#), **NeurIPS 2024 – ENLSP** workshop.
- 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](#), **NeurIPS 2024**.  
*Abridged versions: NeurIPS 2024 – FITML* workshop; **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 **HITY** 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

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- [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

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**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

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- 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)

## SUMMER SCHOOLS

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- 5<sup>th</sup> 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

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- **Program Committee/Reviewer:** ICASSP 2025, 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

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- [Adaptive Federated Learning in Conceptually Drifting Environments](#), Applied Machine Learning – 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](#), 3<sup>rd</sup> International Conference on Cognition, Brain and Computation (**CBC 2015**), Indian Institute of Technology (IIT), Gandhinagar.

## SELECTED TALKS

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- 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

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- **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