

# Gautham Krishna Gudur

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## RESEARCH INTERESTS

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

*Focus Areas:* LLMs, Foundation Models, {Continual, Active, Few-shot, Federated, Self-supervised} Learning, Post-training (In-context Learning, Parameter-Efficient Fine-Tuning, Reasoning), Multimodal Time-series, Personalization

*Applications:* Multimodal Learning (language, health, wearable, acoustic, inertial), Physiological Sensing, Ubiquitous Computing

## EDUCATION

**The University of Texas at Austin**, Austin, TX

Aug 2023 – Present

**Ph.D.**, Electrical and Computer Engineering, **GPA: 3.9/4.0**

*Advisors:* [Prof. Joydeep Ghosh](#), [Prof. Edison Thomaz](#)

**Anna University**, Chennai, India

2013 – 2017

**B.Tech.**, Information Technology

## SELECTED PUBLICATIONS [Conference/Journal/Workshop]

\* denotes equal contribution and joint lead authorship

[Citations: 337, h-index: 11, i-index: 11]

### Conference/Journal/Workshop

- E Farahmand, RR Azghan, NT Chatrudi, E Kim, [Gautham Krishna Gudur](#), E Thomaz, G Pedrielli, P Turaga, H Ghasemzadeh. [AttenGlucO: Multimodal Transformer-Based Blood Glucose Forecasting on AI-READI Dataset](#), **IEEE EMBC 2025**.
- 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.
- [Gautham Krishna Gudur](#), E Thomaz. [Dataset Distillation for Audio Classification: A Data-Efficient Alternative to Active Learning](#), **NeurIPS 2024 – ENLSP** workshop.
- 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 versions:* **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.
- [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.

### Preprints

- [Gautham Krishna Gudur\\*](#), M Malu\*, RR Azghan, A Rayas, P Turaga, H Ghasemzadeh, E Thomaz, G Pedrielli. Unsupervised Latent Partitioning of Foundation Models: Towards Efficient Continual Learning with Experts for Audio Classification.
- RR Azghan, [Gautham Krishna Gudur](#), M Malu, E Thomaz, G Pedrielli, P Turaga, H Ghasemzadeh. Gated Adaptation for Continual Learning in Human Activity Recognition [Under Submission].
- RR Azghan, [Gautham Krishna Gudur](#), M Malu, E Thomaz, G Pedrielli, P Turaga, H Ghasemzadeh. [CLAD-Net: Continual Activity Recognition in Multi-Sensor Wearable Systems](#) [Submitted].
- E Farahmand, RR Azghan, NT Chatrudi, VYA Baidoo, E Kim, [Gautham Krishna Gudur](#) et al. [GluMind: Multimodal Parallel Attention and Knowledge Retention for Robust Cross-Population Blood Glucose Forecasting Systems](#) [Submitted].

## RESEARCH AND WORK EXPERIENCE

### The University of Texas at Austin – Graduate Research Assistant

Austin, TX

Advisors: [Prof. Joydeep Ghosh](#), [Prof. Edison Thomaz](#)

Aug 2023 – Present

- Devised test-time LLM user personalization for multimodal time-series health tasks using few-shot In-Context Learning.
- Proposed SVFT (Singular Vector guided Fine-Tuning) – a Pareto-optimal PEFT technique [*Mentor: [Prof. Sujay Sanghavi](#)*].
- Developed multimodal contrastive acoustic-motion feature alignment methods to enhance audio-based HAR.
- Designed continual learning methods spanning unsupervised partitioning of latent representations, multi-sensor wearable HAR, and cross-population glucose prediction; reduced labeling costs up to 3000× with dataset distillation.
- Enhanced Chain-of-Thought reasoning in multimodal LLMs using uncertainty-guided principles.

### The University of Texas at Austin – Graduate Teaching Assistant

Austin, TX

Primary Instructors: [Prof. Joydeep Ghosh](#), [Prof. Edison Thomaz](#)

Jan 2025 – Dec 2025

- Designed/evaluated assignments and exams for *Deep Learning* (~50 students) and *Human Signals* (~80 students) courses.
- Mentored students on designing quizzes, paper reviews, presentations, and course projects.

### Nokia Bell Labs – Research Intern (Device Intelligence team)

Cambridge, UK

Mentors: [Soumyajit Chatterjee](#), [Mohammad Malekzadeh](#), [Fahim Kawsar](#)

May 2025 – Aug 2025

- Improved generalizability of PPG foundation models for health sensing. Filed a patent, paper under preparation.

### Independent Research

Dec 2018 – May 2023

- 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: [Shrihari Vasudevan](#), [M J Prasath](#)

Feb 2019 – Apr 2023

- Worked on ML for network intelligence and telecom, leading to multiple publications, patents, and AI-driven solutions.
- Contributed to 3GPP standardization on federated learning and multi-vendor model sharing; defined [Ericsson's AI-Native](#) design principles. Built spatiotemporal connectivity models (<5% error) and mobility models in 5G NWDAF.
- Built [E-ADF](#), an unsupervised anomaly detection framework with Bayesian model selection and dynamic thresholds.
- Created E-LangHub (Ericsson LLM Hub) with telco-rich data and SOTA models; enhanced customer-symptom models using LLMs, active learning, and 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: [Srinivasan Murali](#)

May 2018 – Nov 2018

- Implemented gradient-boosted ensembles and LSTM models for regression and classification on imbalanced time-series wearable clinical data; engineered biomarker-driven features for 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).
- Mentored 10+ students in embedded ML assignments and research projects (Feb '17 - May '18).

### SSN College of Engineering – Undergraduate Student Researcher

Chennai, India

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

Feb 2015 – Mar 2017

- Developed a CNN-based bus stop recognition system with ~96% accuracy in dynamic Indian environments.
- 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 identify the optimal IoT mote.

## PATENTS

- Efficient Backpropagation Free Test-Time Adaptation on Foundation Models for PPG [*Filed*].
- [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, Docker, GCP, Arduino, Raspberry Pi

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

## PROFESSIONAL SERVICE

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- **Program Committee/Reviewer:** ICASSP 2026, UbiComp/ISWC 2025, ACM ICMI 2025, ICASSP 2025, ICML 2024 – ES-FoMo workshop, ICLR 2021 – DPML workshop, NeurIPS – ML4H 2020 and ML4H 2019 workshops, KONVENS 2019 – GermEval
- Technical Reviewer of the book titled “Hands-On Meta Learning With Python”
- Event Organizer of “Data Nuggets” – a Data Science contest at Invente 2016, SSN College of Engineering

## HONORS AND AWARDS

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- [SVFT](#) selected for an *oral presentation* at the WANT workshop at ICML 2024.
- *Graduate Ph.D. Fellowship* from the Cockrell School of Engineering at The University of Texas at Austin
- [Top 1 percentile in HackerRank](#) in the Algorithms Domain – Problem Solving (Advanced)
- Full financial registration grants to attend ICLR 2021, NeurIPS 2020, and OxML 2020
- *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 the 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**, Indian Institute of Information Technology (IIIT) Hyderabad
- **Eastern European Machine Learning Summer Schools** – both EEML 2020 and EEML 2021  
Presented ActiveHARNet (EEML '20); zero-shot federated learning and task-independent continual learning (EEML '21)
- **Oxford Machine Learning Summer School, OxML 2020**

## POSTERS AND EXTENDED ABSTRACTS

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- Uncertainty-Aware Chain-of-Thought Reasoning in Large Language Models, AI in Health – Course Project.
- [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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- Resource-efficient Machine Learning – 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)

## TECHNICAL COURSEWORK AND MOOCs

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