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: 338, 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 mobility and connectivity models (<5% error) for 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 50%.

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

- **Program Committee/Reviewer:** ICASSP 2026/2025, UbiComp/ISWC 2025, ACM ICMI 2025, ICML 2024 – ES-FoMo workshop, ICLR 2021 – DPML workshop, NeurIPS – ML4H 2020/2019, 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

- 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

- **5th 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

- 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, 3rd International Conference on Cognition, Brain and Computation (**CBC 2015**), Indian Institute of Technology (IIT) Gandhinagar.

SELECTED TALKS

- 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

- **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