Shruthi Hiremath

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Research Interest

My research agenda lies at the intersection of Ubiquitous Computing and Applied Machine Learning for Computational Behavior Analysis, focusing on developing robust activity recognition pipelines for longitudinal behavior and health monitoring. I work extensively with data from movement sensors – such as accelerometers and gyroscopes embedded in everyday wearable devices (e.g., smartphones and smartwatches), as well as from ambient nearable sensors. By leveraging and expanding these sensing technologies, my overarching goal is to assess and enhance well-being.

My work centers on two key objectives. First, I aim to transform common consumer wearables into sophisticated systems capable of performing complex tasks, such as behavior modeling and longitudinal health monitoring. Second, I employ both data-driven and application-focused approaches to build novel activity recognition systems from scratch and to optimally deploy humans-in-the-loop for opportunistic data acquisition.

Dissertation Thesis Statement: By utilizing minimal human-in-the-loop supervision, it is possible to derive and continuously improve bespoke human activity recognition systems for smart homes using data-driven procedures.

Education

May '25	**Ph.D.** in Computer Science GEORGIA INSTITUTE OF TECHNOLOGY **Ph.D. Thesis:** "Deriving Bespoke Human Activity Recognition Systems for Smart Homes" *DOCTORAL COMMITTEE:* Thomas Plötz (Advisor, Georgia Tech), Sonia Chernova (Georgia Tech), Diane Cook (Washington State University), Gregory Abowd (Northeastern University and Georgia Tech), Uichin Lee (Korea Advanced Institute of Science and Technology (KAIST)	ATLANTA, GA
May '17	**M.S.** in Computer Science GEORGIA INSTITUTE OF TECHNOLOGY	ATLANTA, GA
July '14	**B.Tech** in Computer Science VIT UNIVERSITY	VELLORE, INDIA

Skills

Research	Identifying research questions, experimental design, analyzing large scale data, model development, time-series data, and machine learning approaches
Quantitative	Time-series data analysis, applied machine learning, deep learning

Machine Learning	Supervised, unsupervised, semi-supervised, self-supervised approaches
Deep Learning	Pytorch, keras (tensorflow), transformers
Data Analysis	Python (pandas, numpy, scikit-learn, NLTK (NLP), AutoGlon, basic use of LLMs (prompt engineering)
Data Visualization	Interactive Plots using Plotly (Python)
Sensors	Understanding of mobile, wearable (i.e. motion and physiology) and nearable (state-change based) sensors and their application areas (e.g., activity monitoring, behavior analysis, health)
Programming Languages	Python
Database Systems	MySQL, SQLite
Software Engineering	Foundational knowledge of UML, design patterns

Publications

Journals

[AAAI] '26	Zikang Leng, Megha Thukral, Yaqi Liu, Hrudhai Rajasekhar, **Shruthi K. Hiremath**, and Thomas Plötz. (2025). AgentSense: Virtual Sensor Data Generation Using LLM Agent in Simulated Home Environments; Arxiv
[IMWUT '25]	Sourish Dhekane, Megha Thukral, **Shruthi K. Hiremath**, Harish Haresamudram, and Thomas Plötz.(2025). Layout Agnostic Human Activity Recognition in Smart Homes through Textual Descriptions Of Sensor Triggers (TDOST); Paper
[IMWUT '23]	**Shruthi K. Hiremath,** Yasutaka Nishimura, Sonia Chernova and Thomas Plötz.(2022). Bootstrapping Human Activity Recognition Systems for Smart Homes from Scratch. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies; Paper
[Research in ASD '22]	Mindy Scheithauer, **Shruthi K. Hiremath**, Audrey Southerland, Agata Rozga, Thomas Plötz, Chelsea Rock, Nathan Call (2022). Feasibility of accelerometer technology with individuals with autism spectrum disorder referred for aggression, disruption, and self-injury. Research in Autism Spectrum Disorders; Paper
[IMWUT '20]	**Shruthi K. Hiremath** and Thomas Plötz.(2020). Deriving effective human activity recognition systems through objective task complexity assessment. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies; Paper

Conferences and Workshops

[Px: IEEE Pervasive]	**Shruthi K. Hiremath** and Thomas Plötz.(2024). Smart Homes: What's next? *(In progress)*
[Ubicomp '24].	**Shruthi K. Hiremath** and Thomas Plötz.(2024). Game of LLMs: Discovering Structural Constructs in Activities using Large Language Models. UbiComp '24: Companion of the 2024 on ACM International Joint Conference on Pervasive and Ubiquitous Computing; Paper

[ABC '24]   **Shruthi K. Hiremath** and Thomas Plötz.(2024).Maintenance Required: Updating and Extending Bootstrapped Human Activity Recognition Systems for Smart Homes. The 6th International Conference on Activity and Behavior Computing; Paper

[Sensors '23]   **Shruthi K. Hiremath** and Thomas Plötz.(2023).The Lifespan of Human Activity Recognition Systems for Smart Homes. Sensors 2023, 23(18), 7729; Paper

[ISWC '22]   Yulai Cui, **Shruthi K. Hiremath** and Thomas Plötz (2022). ROAR: Reinforcement Learning Based Online Active Learning for Human Activity Recognition. In 2022 International Symposium on Wearable Computers; Paper

[ISWC '21]   **Shruthi K. Hiremath** and Thomas Plötz. (2021). On the Role of Context Length for Feature Extraction and Sequence Modeling in Human Activity Recognition. In 2021 International Symposium on Wearable Computers; Paper

[IJCNDS]   **Shruthi K. Hiremath**, Pallavi Chandra, Anne M. Joy, and B. K. Tripathy (2015). Neighborhood rough set model for knowledge acquisition using MapReduce. International Journal of Communication Networks and Distributed Systems (IJCNDS); Paper

[IJAER]   **Shruthi K. Hiremath** and Govinda K(2014). Rainfall Prediction Using Artificial Neural Network. International Journal Applied Engineering Research, 9, (pp. 21243-21254).

Professional Experience

MAR '25 - PRESENT	**Lead AI / ML Scientist** Optum Tech AI/ML (Group: Digital Signals) Developing, deploying, and iterating on advanced machine learning solutions within the healthcare domain, with a focus on driving innovation and impact. Specializing in modernizing foundational models that leverage clinical and claims data to predict and analyze disease progression. Successfully deployed scalable models into production environments, ensuring high performance and real-world applicability. Leading **two** industry-academic collaborations in my current role. Skills: Signals processing (text, wearables and nearables), time-series data analysis, self-supervised learning, fine-tuning
AUG '24 - DEC '24	**PhD AI Intern** Optum Tech AI/ML (Group: Digital Signals) A three-month fall internship in the Digital Signals AI team Mentors: Drs. Sankalita Saha and Katrin Haensel. During my internship, I focused on identifying behavioral markers for patients with mental health disorders by analyzing text-based clinical notes extracted from electronic health records. I managed the entire data pipeline, including gathering, cleaning, and analyzing the data, and subsequently developed AI tools to phenotype the patient population. In addition, I designed a framework to characterize these patients with the ultimate goal of creating a clinically deployable system. Throughout this project, I collaborated with and presented findings to key stakeholders, including clinicians, to ensure the systems relevance and practical utility. Skills: NLP, topic Modeling, transformers, explainable AI, supervised and unsupervised machine learning

Aug '18 - Jan '20 & Jan '21 - Jan '23	**Graduate Research Assistant** Georgia Institute of Technology I developed data-driven technologies for wearable and nearable-based applications to create deployable human activity recognition systems, with a particular emphasis on health monitoring. Through this work, I demonstrated the feasibility of unsupervised learning for recognizing activities from sensor data, over varying temporal contexts. I also investigated methods to continually update patterns for known activities, as well as strategies for identifying newly emerging activities. Furthermore, I explored the use of language as a modality to enhance (ambient-) sensor-based activity recognition. My research has been supported by the National Institutes of Health (NIH), the Georgia Clinical & Translational Science Alliance Grant, and KDDI Research.
May - July '16	**Data Science Intern** ADP A two-month summer internship in the Data Science Team. My work involved development of data analysis procedures to analyze and gather insights from collected payroll data. Skills: SQL, data analysis
Aug '14 - July '15	**Software Developer** Deloitte USI (Hyderabad, India) I contributed to developing a tool that served as an interface between end users and project management activities (PMC), reducing the need for manual tickets raised to handle project team changes. By streamlining these processes, the tool reduced ticket-related handling costs by 70%, leading to substantial cost savings. Skills: C#, SQL, Java, Tableau

Teaching Experience

Graduate Teaching Assistant

Summer '19, '20, '21	CS 6601: Artificial Intelligence	Georgia Institute of Technology
Summer '22	CS 7470: Mobile & Ubiquitous Computing	Georgia Institute of Technology
Fall '16, '17	CS 4400: Database Systems	Georgia Institute of Technology

Funding

2022 - 2024	**Novel Human-in-the-Loop Learning for realization of real-world AI** (PIs: Dr. Thomas Plötz and Dr. Sonia Chernova)	
	Collaboration with KDDI Corporation to build activity recognition systems for smart homes.	LEAD RESEARCHER
2019 - 2020	**Georgia Clinical and Translational Science Alliance Grant** (PI: Dr. Thomas Plötz), $15,000 [Read More].	
	Optimizing context length for improved activity recognition in wearable sensing.	LEAD RESEARCHER
2019	**Imlay Pre-Proposal** (PIs: Dr. Thomas Plötz and Dr. Nathan Call)	
	Automated Behavior Assessments in Youth Autism Spectrum Disorders through Body-Worn Movement Sensors for a Naturalistic Setting.	LEAD RESEARCHER
2018 - 2019	**Pilot Grant from NIH** via **Georgia Institute of Technology** (PI: Dr. Thomas Plötz)	
	Analyzing the feasibility of using accelerometers to identify episodes of server behavior in youth on the Autism Spectrum Disorder (ASD)	LEAD RESEARCHER

Awards and Recognitions

2025	**Special Recognition for Outstanding Review:** CHI 2026
2025	**Organizing Committee**, Percom 2026 [Read More].
2024	Nominated for **Intern of the Year Award** by Optum AI/ML division of Optum Technology
2024	**Session Chair:** Smart Homes and IoT @ Ubicomp 2024 (20% selection rate)
2024	**Special Recognition for Outstanding Review:** NordiCHI 2024 and IMWUT 2024
2024	**Invention Disclosure**, Layout Agnostic Human Activity Recognition in Smart Homes through Textual Descriptions Of Sensor Triggers (TDOST) @ Georgia Tech
2023	**N^2 Women Young Research Fellowship ($1000)**, Percom 2023
2022	**Organizing Committee**, Ubicomp 2022
2022	**Student Travel Grant ($500)**, Ubicomp 2022 (by Georgia Institute of Technology)
2021	**Invention Disclosure**, Deriving effective human activity recognition systems through objective task complexity assessment (ID: 8563) @ Georgia Tech
2021	**N^2 Women Young Research Fellowship ($1000)**, Ubicomp 2021
2019	**Imlay pre-proposal selected**, Georgia Tech
2015, 2018, 2021	**Grace Hopper Scholar**, Georgia Tech

2014	**Merit Scholar**, VIT University

Invited Talks

2025	PaPaGei: @ Optum Journal Club (Optum AI)
2025	ImageBind: One Embedding Space to Bind Them All @ Optum Journal Club (Optum AI)
2024	Chronos: Learning the language of Time-Series @ Optum Journal Club (Optum AI)
2024	Deriving bespoke human activity recognition system for smart homes @ Optum AI Tech Sharing Session (Optum AI), Research Seminar at CMU
2024	Game of LLMs: Discovering Discovering Structural Constructs in Activities using Large Language Models @ Workshop on Human Activity Sensing Corpus and Applications (HASCA) (Ubicomp 2024)
2024	Maintenance Required: Updating and Extending Bootstrapped Human Activity Recognition Systems in Smart Homes @ ABC (International Conference on Activity and Behavior Computing)
2022	ROAR: Reinforcement Learning Based Online Active Learning for Human Activity Recognition @ Ubicomp
2022	Bootstrapping Human Activity Recognition Systems for Smart Homes from Scratch @ Ubicomp
2021	Deriving effective human activity recognition systems through objective task complexity assessment @ Ubicomp
2021	On the Role of Context Length for Feature Extraction and Sequence Modeling in Human Activity Recognition @ Ubicomp
2018	Detecting severe behavior episodes in youth on the Autism Spectrum Disorder @ Georgia Tech

Professional Service

	Reviewer
2025	ICASSP
2025	CHI
2025	IEEE Transactions on Neural Systems and Rehabilitation Engineering
2025	Frontiers in Artificial Intelligence
2025	International Journal of Human-Computer Interaction
2021 - 2026	ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)
2022 - 2024	International Symposium on Wearable Computers (ISWC)
2024	Ubicomp Posters and Demos
2024	UbiComp/ISWC 2024 Workshop on AI-infused Physical Systems

2024	UbiComp/ISWC 2024 Workshop on Physiological Methods for HII
2024	Nordic Conference on Human-Computer Interaction (NordiCHI)
2023	Workshop on Ubiquitous and Multi-domain User Modeling (UMUM)
2022	International Conference on Pervasive Computing and Communications (Percom)
2021	ACM Special Interest Group on Knowledge Discovery and Data Mining (SIGKDD)

Program Committee Member

2025	Serving on the Program Committee for 'The 22nd Workshop on Context and Activity Modeling with AI (CoMoRe-AI)'. Held in Conjunction with PerCom 2026. [Read More]
2023	Served on the Program Committee for 'The Second Workshop on Ubiquitous and Multi-domain User Modeling (UMUM2023)'. Held in Conjunction with PerCom 2023. [Read More]

Community Service

2024 - present	**Member**, Optum AI Journal Club: Actively participated in discussions on cutting-edge AI trends, leveraging insights to drive business value and foster innovation.
2018 - present	**Mentor**, Georgia Tech: mentored undergraduate (Yulai Cui, Mehul Kalia) and graduate students (Alec Drosu, Ishaani Mittal) interested in activity recognition based research
2024	**Mentor**, Mobile and Ubiquitous Computing: HomeAdapt: Identifying changing routine patterns of residents in Smart Homes (mentoring undergraduate students)
2018	**Mentor**, Mobile and Ubiquitous Computing: Evaluating meta-segments in cross-validation for activity recognition (mentoring undergraduate students)
2023	**N^2 Women Event**, Percom 2023
2022	**Organizing Committee (Web Chair)**, Ubicomp 2022
2021	**N^2 Women Event**, Ubicomp 2021
2020 - 2023	**Social Chair**, Ubicomp Lab @ Georgia Tech
2020 - 2021	**Lab Coordinator**, Computational Behavior Analysis Lab @ Georgia Tech
2015 - 2022	**Volunteer**, India Club @ Georgia Tech
2010 - 2014	**Core Member**, Robotics Club @ VIT University