Mononito Goswami

Newell-Simon Hall, Carnegie Mellon University
Pittsburgh, PA-15213, USA
mgoswami [at] andrew [dot] cmu [dot] edu
LinkedIn | ResearchGate | Google Scholar | Website

Technical Expertise

Foundation Models

- *Core capabilities:* Structured Data (MOMENT, IngesTables), Multimodality (JoLT), Long-context (Infini-Channel Mixer),
- *Emergent capabilities:* Reasoning (TimeSeriesExam, P1), Agents
- *Pragmatic Advancements:* Agents, Interpretability & Steerability (P1), Efficiency

Machine Learning in the Real World

- *Considerations:* Distributed data (WSHFL, PICSR), Label Noise (AQuA), Model Selection (TSADMS), Unlabeled Data (Programmatic Weak Supervision)
- *Applications:* Healthcare (ECG, SPO_2 & Pleth, EEG, Clinical Notes, Survival Analysis), Education (Peer Learning, Problem Solving, Intelligent Tutoring Systems)

Education

Doctor of Philosophy in Robotics 2020 – 2025
Carnegie Mellon University, Pittsburgh PA, USA

- Thesis: Towards Pragmatic Time Series Intelligence
- Advisor: Prof. Artur Dubrawski

Bachelor of Technology in Computer Engineering 2016 - 2020
Delhi Technological University, New Delhi, India

- Thesis: Towards Social & Engaging Peer Learning [Paper 1, Paper 2]

Fellowships

Centre for Machine Learning and Health (CMLH) 2021 2021 - 2022

Professional Experience

Student Researcher May – December 2024
Google Research, New York, USA

- Machine Learning research on building, pre-training and evaluating **foundation models for tabular data**, along with Scott Yak, Joe Toth, Yihe Dong, Sercan Arik.

Applied Scientist Intern May – August 2023
Amazon Web Services AI Labs, Seattle, USA

- Ideated and built one of the first **time series foundation models**, along with Barış Kurt, Andrey Kan, Gauthier Guinet, Jingchao Ni, Jonas Kübler and Laurent Callot.

Applied Scientist Intern May – August 2022
Amazon Web Services AI Labs, Seattle, USA

- Developed one of the first algorithms for unsupervised model selection of time series anomaly detection models, in collaboration with Andrey Kan, Lenon Minorics and Laurent Callot [Paper].

Robotics Institute Summer Scholar June 2019 – August 2020
Auton Lab, Carnegie Mellon University, Pittsburgh, USA

- Machine Learning research on detecting cognitive disequilibrium and flow in children solving math problems, advised by Prof. Lujie (Karen) Chen and Prof. Artur Dubrawski [Paper, Student abstract].

Robotics Institute Summer Scholar June 2018 – September 2020
RoboTutor Project, Carnegie Mellon University, Pittsburgh, USA

- Developed Statistical Probe of Tutoring (SPOT), a tool for iterative data-driven improvement of RoboTutor, an Intelligent Tutoring System (ITS), advised by Prof. Jack Mostow [Paper, Student abstract].

Equity Research Intern December 2017
Phillip Capital, Mumbai, India

- Conducted research on emerging technologies such as Blockchain and edge computing and their potential impact on the FinTech sector.

Intern June - July 2017
Goods & Services Tax Network (GSTN), New Delhi, India

- Collaborated with consultants from PwC, Infosys, and State Tax departments to design an Analytics and Risk Management framework. Co-created a user-friendly tool to streamline tax submissions for the nationwide GST rollout in India.

Undergraduate Researcher 2017 – 2020
Delhi Technological University, New Delhi, India

- Analyzing dyadic interactions between young children to identify non-verbal cues that aid effective story-telling, advised by Prof. Rajni Jindal [Paper 1, Paper 2].
- Developed a Multi-task Learning approach for Open Domain Suggestion Mining and a novel language model-based text over-sampling method, advised by Ms. Minni Jain [Paper, Student abstract].
- Improvised energy-efficient clustering & routing algorithms for Wireless Sensor Networks using modified Binary Particle Swarm Optimization, advised by Prof. Indu S and Prof. Daya Gupta [Paper].
- Designed an Intrusion detection algorithm for critical RBAC administered databases using Pattern Mining and nearest-neighbours Anomaly Detection, advised by Ms. Indu Singh [Paper].
- Investigating applications & modelling of fractional order-differential equations (FODEs) for control of infectious diseases using SVEIR models, advised by Dr. Nilam [Report].
- Distracted driver detection in real-time using a simple CNN-model. Advisors: Dr. Rajiv Ratn Shah, Dr. Yifang Yin and Dr. Roger Zimmermann [Paper].

Intern December 2016
Centre for Development in Advanced Computing (CDAC), Noida, India

- Developed a Grade-1 Unified English Braille (UEB) Conversion utility in C++, potentially helping widespread adoption of UEB in India.

Conference & Journal Articles

Summary: **29 peer-reviewed publications**, including **first-author papers** at NeurIPS, ICML, and ICLR, with 300+ citations.

** indicates equal contribution*

16. Michał Wiliński, **Mononito Goswami**, Nina Żukowska*, Willa Potosnak*, and Artur Dubrawski. "*Exploring Representations and Interventions in Time Series Foundation Models.*" *International Conference on Machine Learning (ICML 2025).* [PDF, Code]
15. **Goswami, Mononito**, Konrad Szafer*, Arjun Choudhry*, Yifu Cai, Shuo Li, and Artur Dubrawski. "*MOMENT: A Family of Open Time-series Foundation Models.*" *International Conference on Machine Learning (ICML 2024).* [PDF, Code, Pre-trained Model, Pre-training Dataset]
14. **Goswami, Mononito***, Vedant Sanil*, Arjun Choudhry, Arvind Srinivasan, Chalisa Udompanyawit, Artur Dubrawski. "*AQuA: A Benchmarking Tool for Label Quality Assessment.*" *Neural Information Processing Systems (NeurIPS 2023) Track on Datasets and Benchmarks.* [PDF, Code] (**Poster**)
13. **Goswami, Mononito**, Cristian Challu, Laurent Callot, Lenon Minorics, and Andrey Kan. "*Unsupervised Model Selection for Time-series Anomaly Detection.*" *International Conference of Learning Representations (ICLR 2022).* [PDF, Code] (**Spotlight**)
12. Gao, Chufan*, **Mononito Goswami***, Jieshi Chen and Artur Dubrawski. "*Classifying Unstructured Clinical Notes via Automatic Weak Supervision.*" *Machine Learning for Healthcare Conference (MLHC 2022).* [PDF, Code]
11. Dey, Arnab, **Mononito Goswami**, Joo Heung Yoon, Gilles Clermont, Michael R. Pinsky, Marilyn Hravnak, Artur Dubrawski. "*Weakly Supervised Classification of Vital Sign Alerts as Real or Artifact.*" In *AMIA Annual Symposium Proceedings.* American Medical Informatics Association. [PDF, Code]
10. Nagpal, Chirag, **Mononito Goswami**, Keith Dufendach, and Artur Dubrawski. "*Counterfactual Phenotyping with Censored Time-to-Events*". (2022) In *ACM Conference on Knowledge Discovery and Data Mining.* [PDF, Code]
9. **Goswami, Mononito**, Benedikt Boecking, and Artur Dubrawski. "*Weak Supervision for Affordable Modeling of ECG Data.*". (2021) In *AMIA Annual Symposium Proceedings.* American Medical Informatics Association. [PDF]
8. McReynolds, Andrew A., Sheba P. Naderzad, **Mononito Goswami**, and Jack Mostow. "*Toward Learning at Scale in Developing Countries: Lessons from the Global Learning XPRIZE Field Study.*" In Proceedings of the Seventh ACM Conference on Learning@ Scale, pp. 175-183. 2020. [PDF]
7. Singh, Indu, Minkush Manuja*, Rishabh Mathur*, and **Mononito Goswami***. "*Detecting intrusive transactions in databases using partially-ordered sequential rule mining and fractional-distance based anomaly detection.*" International Journal of Intelligent Engineering Informatics 8, no. 2 (2020): 138-171. [PDF].
6. Kaushik, Ajay*, **Mononito Goswami***, Minkush Manuja*, Indu S. and Daya Gupta. "*A Binary PSO Approach for Improving the Performance of Wireless Sensor Networks.*" Wireless Personal Communications (2020): 1-35. [PDF]

5. Jindal, Rajni*, Maitree Leekha*, Minkush Manuja*, and **Mononito Goswami***. "*What makes a better companion? towards social & engaging peer learning.*" In ECAI 2020, pp. 482-489. IOS Press, 2020. [PDF]
4. Leekha, Maitree*, **Mononito Goswami*** and Minni Jain "*A Multi-task Approach to Open Domain Suggestion Mining using Language Model for Text Over-sampling*". In: Jose J. et al. (eds) Advances in Information Retrieval. ECIR 2020. Lecture Notes in Computer Science, vol 12036. Springer, Cham [PDF]
3. **Goswami, Mononito***, Lujie Chen* and Artur Dubrawski. "*Discriminating Cognitive Disequilibrium and Flow in Problem Solving: A Semi-supervised Approach Using Involuntary Dynamic Behavioral Signals*". Proceedings of the AAAI Conference on Artificial Intelligence. Vol. 34. 2020. [PDF]
2. Leekha, Maitree*, **Mononito Goswami***, Rajiv Ratn Shah, Yifang Yin and Roger Zimmermann. "*Are You Paying Attention? Detecting Distracted Driving in Real-time*". Proceedings of the IEEE International Conference on Multimedia Big Data (BigMM) [PDF]
1. Mian, Shiven*, **Mononito Goswami***, and Jack Mostow. "*What's Most Broken? Design and Evaluation of a Tool to Guide Improvement of an Intelligent Tutor.*" International Conference on Artificial Intelligence in Education. Springer, Cham, 2019 [PDF]

Peer-Reviewed Workshop Publications & Abstracts

14. Potosnak, Willa, Cristian Challu*, **Mononito Goswami***, Michał Wiliński, Nina Żukowska, and Artur Dubrawski. "*Implicit Reasoning in Deep Time Series Forecasting.*" In NeurIPS 2024 Workshop on System 2 Reasoning At Scale *and* NeurIPS 2024 Workshop on Time Series in the Age of Large Models.
13. Wiliński, Michał, **Mononito Goswami**, Nina Żukowska*, Willa Potosnak*, and Artur Dubrawski. "*Exploring Representations and Interventions in Time Series Foundation Models.*" In NeurIPS 2024 Workshop on Fine-Tuning in Modern Machine Learning: Principles and Scalability *and* NeurIPS 2024 Workshop on Time Series in the Age of Large Models.
12. Żukowska, Nina, **Mononito Goswami**, Michał Wiliński, Willa Potosnak, and Artur Dubrawski. "*Towards Long-Context Time Series Foundation Models.*" In NeurIPS 2024 Workshop on Fine-Tuning in Modern Machine Learning: Principles and Scalability *and* NeurIPS 2024 Workshop on Time Series in the Age of Large Models.
11. Cai, Yifu, Arjun Choudhry*, **Mononito Goswami***, and Artur Dubrawski. "*TimeSeriesExam: A Time Series Understanding Exam*". In NeurIPS 2024 Workshop on Time Series in the Age of Large Models (*Spotlight*) [PDF] *and* ICAIF 2024 Foundation Models for Time Series: Exploring New Frontiers Workshop (*Oral*, **Best Paper Honorable Mention**) [PDF] .
10. Choudhry, Arjun*, Konrad Szafer*, **Mononito Goswami**, Yifu Cai, and Artur Dubrawski. "*Datasets for Time Series Foundation Models*". ICML 2024 Workshop on Data-Centric Machine Learning Research (DMLR 2024). 2024. [PDF]
9. Cai, Yifu, Arvind Srinivasan, **Mononito Goswami**, Arjun Choudhry, and Artur Dubrawski. "*JoLT: Jointly Learned Representations of Language and Time-Series for Clinical Time-series Interpretation*" Proceedings of the AAAI Conference on Artificial Intelligence (Student Abstract). 2024. **Best student abstract presentation award winner.** [PDF]

8. Enouen, Eric, Sebastian Caldas, **Mononito Goswami**, and Artur Dubrawski. "*PICSR: Prototype-Informed Cross-Silo Router for Federated Learning*" Proceedings of the AAAI Conference on Artificial Intelligence (Student Abstract). 2024. *3-min presentation contest finalist.*
7. Cai, Yifu, **Mononito Goswami**, Arjun Choudhry, Arvind Srinivasan and Artur Dubrawski. "*JoLT: Jointly Learned Representations of Language and Time-Series.*" Neural Information Processing Systems Workshop on Deep Generative Models for Health (DGM4H NeurIPS) (2023) (Poster).
6. Caldas, Sebastian, **Mononito Goswami** and Artur Dubrawski. "*Encoding Expert Knowledge into Federated Learning Using Weak Supervision.*" International Conference of Learning Representations Workshop on Machine Learning for IoT (ICLR ML4IoT) (2023).
5. Rooney, Sydney R, Roman Kaufman, **Mononito Goswami**, Michael R Pinsky, J. Kyle Miller, Salah Al-Zaiti, Artur Dubrawski and Gilles Clermont. "*Using Weakly Supervised Machine Learning to Label Atrial Fibrillation in Real-World Intensive Care Unit Telemetry Data.*" Circulation 146.Suppl_1 (2022): A10198-A10198.
4. **Goswami, Mononito***, Lujie Chen*, Chufan Gao and Artur Dubrawski. "*Modeling Involuntary Dynamic Behaviors to Support Intelligent Tutoring (Student Abstract)*". Proceedings of the AAAI Conference on Artificial Intelligence. Vol. 34. 2020. [PDF]
3. Gao, Chufan, Fabian Falck, **Mononito Goswami**, Michael R. Pinsky, Anthony Wertz and Artur Dubrawski. "*Detecting Patterns of Physiological Response to Hemodynamic Stress via Deep Unsupervised Learning*". Machine Learning for Health (ML4H) Workshop at NeurIPS 2019 [PDF]
2. Jain, Minni*, Maitree Leekha*, **Mononito Goswami***. "*A Multi-task Approach to Open Domain Suggestion Mining (Student Abstract)*". Proceedings of the AAAI Conference on Artificial Intelligence. Vol. 34. 2020. [PDF]
1. **Goswami, Mononito***, Shiven Mian*, and Jack Mostow. ''*What's Most Broken? A Tool to Assist Data-Driven Iterative Improvement of an Intelligent Tutoring System.*" Proceedings of the AAAI Conference on Artificial Intelligence (Student Abstract). Vol. 33. 2019. *3-min presentation contest finalist* [PDF]

Guest Lecture (at CMU)

- Implicit Communication and Theory of Mind (for 16-467– Human-Robot Interaction, Spring 2023)
- Time Series– Applications, Challenges, and Research Frontiers (for 10-718– Machine Learning in Practice, Spring 2025)

Teaching Assistantship (at CMU)

- 16-811 – Math Fundamental for Robotics — Fall 2022
- 16-467 – Human-Robot Interaction — Spring 2022

Invited Talks

2. Why, What, and How of Graduate School Applications
   - Auton Lab RISS Interns — Summer, 2022 & 2023
   - RI Climate Committee Webinar — Fall, 2022
1. Time series foundation models– Challenges, approaches, and opportunities
   - ML Research Morgan Stanley — February, 2025
   - AI Foundations, Capital One — February, 2025
   - IBM Research — February, 2025

- DataDog AI Research February, 2025
- Q-Developer Team, Amazon Science February, 2025
- Bosch AI Research January, 2025
- Lockheed Martin Generative AI Community of Practice January, 2025
- Datadog November, 2024
- Salesforce Research Asia November, 2024
- Commonwealth Bank of Australia October, 2024
- US Naval Center Warfare Center - Carderock Division September, 2024
- Forecasting Impact, Podcast by International Symposium of Forecasting July, 2024
- Prof. Xiao Hu's Lab, Emory University April, 2024
- CMU Flame Seminar April, 2024
- Gradient AI [webinar] April, 2024
- AAAI 2024 Spring Symposium on Clinical Foundation Models March, 2024

Panels

1. Panel on Foundation models for Time Series for Financial Applications at the ICAIF 2024 FM4TS Workshop November, 2024

Mentorship (at CMU)

10. Nina Żukowska, Robotics Institute Summer Scholar Program (RISS), *now* Master's student at FU Berlin 2024–Present
9. Michał Wiliński, RISS, *next* Robotics Ph.D. Student at CMU 2024–Present
8. Konrad Szafer, RISS, *now* Research Assistant at ETH Zurich 2023–2024
7. Arjun Choudhry, *next* Ph.D. Student at Georgia Tech 2023 - Present
6. Yifu Cai, *now* Masters Student at CMU 2023 - Present
5. Eric Enouen, *now* Ph.D. student at Cornell 2023
4. Undergrad AI Mentoring Program 2021 - 2022
3. Chalisa Udompanyawit, CIT Honors Research Program, *now* Embedded Software Engineer at Intuitive 2022 - 2023
2. Arnab Dey, RISS, *now* Medical School Student at UPenn 2021 - 2022
1. Graduate Application Support Program 2020

Committee Membership (at CMU)

3. Willa Potosnak, Ph.D. RI
2. Xinyu (Rachel) Li, Ph.D. RI
1. Ambareesh Revanur, Masters RI, *now* Adobe MLE

Achievements

- Secured **2+ million in research funding** through leading and contributing to successful grant proposals to the National Science Foundation (SCH: Multimodal Interactive Generalist Health AI (MAGENTA), ATD: Spatiotemporal Foundation Models for Multimodal Threat Detection at Scale), in collaboration iwht international labs (Exploratory Research Projects with CMU Portugal) and industrial labs (GE Vernova).
- Awarded for the best essay on *Goods & Services Tax*, its financial and technological implications, in the 2017 Indian Institute of Public Administration Essay Competition, by the *Vice President of India*.
- Secured second place among 500+ teams from colleges and startups across India in a National Payments Council of India (NCPI) Hackathon. Designed an intrusion detection architecture using fuzzy logic and keystroke dynamics.

Scholarships

- **Conference Travel Grants:** AAAI 2024, NeurIPS 2023, Microsoft Research Travel Grant for AAAI-20, AAAI-20 Student Scholarship, National Science Foundation Student Travel Grant to attend AIED 2019

Professional Service

Organization

- Co-organizing ICML 2025 Workshop on Foundation Models for Structured Data
- Co-chaired and co-organized the highly successful AAAI 2024 Spring Symposium on Clinical Foundation Models, attracting the highest attendance within the AAAI-2024 Spring Symposium Series.

Reviewer

- AAAI– 2020
- American Medical Informatics Association (AMIA) 2021 Annual Symposium
- Journal of Electrocardiology
- ICLR– 2025, 2024, 2023, 2022
- ICML– 2025, 2024, 2023, 2021 ML4data workshop
- MLHC 2024
- NeurIPS– 2025, 2024 Main Track (Top Reviewer) & TSALM workshop, 2023 (Top Reviewer), 2022, 2021

Admissions Committee

- Robotics Institute Summer Scholar (RISS) - 2020, 2021, 2022

Social Outreach

- Co-led the development of a course on Justice, Equity, Diversity and Inclusion in the Robotics Institute 2023
- As a member of the Robotics Institute Climate Committee, identified challenges in the experiences of various groups within RI and made policy recommendations to the Director to address them. 2021–2024
- Mentored two undergraduate students of an underrepresented groups interested in pursuing AI research, under the CMU AI Mentoring Program. 2020–2022
- Exposed our research on RoboTutor to primary stakeholders, some 8-10 year olds from Pittsburgh schools and obtained interesting feedback for comparative cognitive processes, as a part of the Gelfand Outreach program. July 2018

PROGRAMMING	Python, PyTorch, Jax
LANGUAGES	English (*native/bilingual proficiency*), Hindi, Bengali (*professional working proficiency*), French (*elementary proficiency*)
HOBBIES	Cooking, Photography, Gardening, Chess