Mononito Goswami

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

RESEARCH INTERESTS

Foundation Modeling, Modeling Structured Data (time series and tabular), Machine Learning (ML), ML for Healthcare, Weak Supervision

EDUCATION

Doctor of Philosophy in Robotics 2020 - 2025 (expected)
Carnegie Mellon University, Pittsburgh PA, USA

- Doctoral Dissertation: 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

RESEARCH EXPERIENCE

Student Researcher May 2023 - Present
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 Bariş 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].

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].

GUEST LECTURE (at CMU)

- Implicit Communication and Theory of Mind (for 16-467– Human-Robot Interaction)

TEACHING ASSISTANTSHIP (at CMU)

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

CONFERENCE & JOURNAL ARTICLES

See also my google scholar page. ** indicates equal contribution*

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. Michał Wiliński, **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]

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
   - 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 — 2024–Present
8. Konrad Szafer, RISS — 2023–2024
7. Arjun Choudhry, *now* Masters Student at CMU — 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 — 2022 - 2023
2. Arnab Dey, RISS — 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

WORK EXPERIENCE

Equity Research Intern December 2017
Phillip Capital, Mumbai, India

- Carried out a study on disruptive technology like Blockchain & edge-computing that can potentially transform the *FinTech* sector.

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

- Designed the Analytics & Risk Management framework along with consultants from PwC, Infosys and State Tax departments. Co-developed a simplified tool for tax submissions for the pan-India GST roll out.

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

- Developed a Grade-1 Unified English Braille (UEB) Conversion utility in C++. This work helped would help in implementation of UEB in India.

ACHIEVEMENTS

- Secured 1.2 million in research funding through leading and contributing to successful NSF grant proposals, including SCH: Multimodal Interactive Generalist Health AI (MAGENTA) and ATD: Spatiotemporal Foundation Models for Multimodal Threat Detection at Scale.
- 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-chaired and co-organized the highly successful [AAAI 2024 Spring Symposium on Clinical Foundation Models], attracting significant attendance within the AAAI Spring Symposium Series.

Reviewer

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

HOBBIES Chess, Photography, Cooking