SUJAY NAGARAJ

MD/PHD CANDIDATE
UNIVERSITY OF TORONTO
Faculty of Medicine
Department of Computer Science

403 973 5699
s.nagaraj@mail.utoronto.ca

SUMMARY

MD and PhD (Computer Science) student exploring the intersection of machine learning and healthcare: medical time-series, wearable sensors, clinical integration, and deployment.

EDUCATION

University of Toronto
Doctor of Medicine (Expected 2026)

-Completed pre-clinical years of MD training from 2018-2020
-Extensive clinical shadowing experience from family medicine to acute care and surgery

University of Toronto
PhD (Expected 2024)

-Department of Computer Science (Candidacy achieved in 2021)
Supervisor: Dr. Anna Goldenberg
-4.0/4.0 Cumulative GPA

Queen's University
Bachelor of Science (Honours) 2018

- Life Sciences Major, Computing Minor
- Dean's Honour List (2015, 2016, 2018)
- Dean's Honour List with Distinction (2017) - top 3% of students

AWARDS & ACHIEVEMENTS

CIHR Vanier Scholarship (3 years, $150,000) - 2022
Ruggles MD/PhD Scholarship (2 years, $50,000) - 2022
CIHR CGS Doctoral Scholarship (3 years, $90,000) - 2022 (Declined)
SickKids Restracomp PhD Scholarship (5 years, $130,000) - 2021
Ontario Graduate Scholarship (1.5 years, $15,000) - 2021
Chancellor's Scholarship (Queen's University) (4 years, $36,000) - 2014

PHD RESEARCH

University of Toronto
Dr. Anna Goldenberg (supervisor)

Robust causal discovery from wearables

-Leveraged causal discovery to learn robust representations of stress from multimodal time-series data from mobile health data
-Characterized extensive heterogeneity of stress in a real-world dataset of frontline healthcare workers during the COVID19 pandemic
-Abstract at ML4H Conference and 2x NeurIPS workshops. Paper in Submission to Lancet Digital Health

Learning from noisy-labels in time-series

-Extending noise-tolerant classifiers to the time-series setting
-Learning from time-dependent label noise

Streaming anomaly detection from high-frequency ICU waveform

- Development and implementation of machine-learning models
- Deploying models at the bedside for real-time inference
- Designed a CNN-based model to automate catheter access detection using physiological waveform data
-One of first ML models deployed at SickKids Hospital in Toronto, currently running 24/7 across all ICU bedspaces

LEADERSHIP & EXTRACURRICULAR

Techfugees

Mentor (2022)

- 1:1 mentorship, tutoring, and career skill building with a Syrian refugee student based in Beirut, Lebanon
-Prepared weekly workshops and exercises to teach English literacy, networking, and other career-skills (ie: CV writing)

Artificial Intelligence in Medicine Student Society (AiMSS)

Co-Director (2019 - 2020)

- Organizing speaker sessions about various topics in AI and medicine/healthcare
- Engaging medical students in the ever-evolving role AI will play in their future careers

COVID-19 Vaccination Volunteer

Medical Student (2021)

- Working at various community and pop-up vaccination clinics in the Greater Toronto Area
- Registering patients, consenting, collecting socio-demographic data for outreach, and administering intramuscular COVID-19 vaccinations

Wilderness Medicine Society

Co-Lead (2019 - 2020)

- Organizing outdoors activities for medical students
- Backcountry portage trips, rock climbing, hiking

PUBLICATIONS & PRESENTATIONS

Sujay Nagaraj, Thomas Hartvigsen, Adrien Boch, Luca Foschini, Marzyeh Ghassemi, Sarah M Goodday, Stephen Friend, Anna Goldenberg. *Dissecting In-the-Wild Stress from Multimodal Sensor Data***.** Learning from Time Series for Health Workshop, ***NeurIPS***. December, 2022.

Sujay Nagaraj, Thomas Hartvigsen, Adrien Boch, Luca Foschini, Marzyeh Ghassemi, Sarah M Goodday, Stephen Friend, Anna Goldenberg. *Dissecting In-the-Wild Stress from Multimodal Sensor Data***. *Machine Learning for Health.*** December, 2022.

Daniel E Ehrmann, Sara N Gallant, **Sujay Nagaraj**, Sebastian D Goodfellow, Danny Eytan, Anna Goldenberg, Mjaye L Mazwi, *Evaluating and reducing cognitive load should be a priority for machine learning in healthcare*. ***Nature Medicine*** (2022)

Devin Singh, **Sujay Nagaraj**, Pouria Mashouri, Erik Drysdale, Jason Fischer, Anna Goldenberg, and Michael Brudno. *Assessment of Machine Learning–Based Medical Directives to Expedite Care in Pediatric Emergency Medicine.* ***JAMA Network Open*** (2022).

Sujay Nagaraj, Andrew Goodwin, Robert W. Greer, Danny Eytan, Sebastian D. Goodfellow, Anand Jayarajan, Anna Goldenberg, Mjaye L. Mazwi. 2021. Improving quality of care in critically ill children by real-time detection of bedside interventions using physiological waveforms and deep learning. ***Symposium on Artificial Intelligence for Learning Health Systems. Abstract***. Hamilton, Bermuda.

Bret Nestor, Jaryd Hunter, Raghu Kainkaryam, Erik Drysdale, Jeffrey B Inglis, Allison Shapiro, **Sujay Nagaraj,** Marzyeh Ghassemi, Luca Foschini, and Anna Goldenberg. 2021. *Dear Watch, Should I Get a COVID-19 Test? Designing deployable machine learning for wearables*. medRxiv (2021).

Sujay Nagaraj, Vinyas Harish, Liam G. McCoy, Felipe Morgado, Ian Stedman, Stephen Lu, Erik Drysdale, Michael Brudno, and Devin Singh. 2020. *From Clinic to Computer and Back Again: Practical Considerations When Designing and Implementing Machine Learning Solutions for Pediatrics*. ***Current Treatment Options in Pediatrics***. DOI:https://doi.org/10.1007/s40746-020-00205-4

Sujay Nagaraj, Liam G. McCoy, Felipe Morgado, Vinyas Harish, Sunit Das, and Leo Anthony Celi. 2020. *What do medical students actually need to know about artificial intelligence?* ***Nature Digital Medicine***. 3, 1 (2020), 1–3.

Sebastian D Goodfellow, Dmitrii Shubin, Robert W Greer, **Sujay Nagaraj**, Carson McLean, Will Dixon, Andrew J Goodwin, Azadeh Assadi, Anusha Jegatheeswaran, Peter C Laussen, and others. 2020. *Rhythm Classification of 12-Lead ECGs Using Deep Neural Networks and Class-Activation Maps for Improved Explainability*. In 2020 ***Computing in Cardiology***, 1–4.

Krish Bilimoria, Vinyas Harish, Liam McCoy, Nishila Mehta, Felipe Morgado, **Sujay Nagaraj**, Christine Wang, and Jennifer Zheng. 2019. *Training for the future: Preparing medical students for the impact of artificial intelligence*. ***Ontario Med. Students Assoc***. (2019).

Sujay Nagaraj, Andrew Goodwin, Robert W. Greer, Danny Eytan, Sebastian D. Goodfellow, Anand Jayarajan, Anna Goldenberg, Mjaye L. Mazwi (2019). A novel approach to machine learning-based automated vascular catheter access detection in a paediatric critical care setting. ***Joint Paediatric Critical Care International Meeting*** – Podium Presentation. London, England.

Sujay Nagaraj, Margaret Kargard, Brenda Hemmelgarn, Marvin J Fritzler, Tyler White, and Cheryl Barnabe. 2018. *Effectiveness of an outreach model of care for rheumatology specialty clinics to an on-reserve first nations community*. ***International Journal of Indigenous Health***. 13, 1 (2018), 157–167.

Sujay Nagaraj, Cheryl Barnabe, Orit Schieir, Janet Pope, Susan J Bartlett, Gilles Boire, Edward Keystone, Diane Tin, Boulos Haraoui, J Carter Thorne, and others. 2018. *Early rheumatoid arthritis presentation, treatment, and outcomes in aboriginal patients in Canada: a Canadian early arthritis cohort study analysis*. ***Arthritis Care & Research***. 70, 8 (2018), 1245–1250.