Edward (Eddie) Guo

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Education

University of Calgary 2022 – 2025
Doctor of Medicine (MD)
- President of the Class of 2025; principal investigator for the project "ChatGPT for clinical question generation"
- Awarded $9,090 for social innovation projects and artificial intelligence research; awarded $2,500 for academic achievements; awarded $1,000 USD from OpenAI to investigate large language models for medicine

University of Alberta 2020 – 2022
Bachelor of Science, Engineering Physics (Partially completed degree) GPA: 4.00/4.00
- Awarded $9,000 for exoskeleton artificial intelligence research; awarded $11,000 for academic and leadership achievements
- Top of class in multivariable/vector calculus

New College, University of Oxford 2021
Study Abroad, Magnetic Resonance Imaging and Stem Cell Engineering First Class Honours

University of Alberta 2018 – 2020
Bachelor of Science Honours, Neuroscience (Partially completed degree) GPA: 4.00/4.00
- Awarded $8,600 for nerve regeneration research; awarded $9,900 for academic, computing science, and leadership achievements
- Top of class in English critical analysis and organic chemistry II; SAT Math Level 2: 800/800, SAT Biology E: 800/800

Research Experience

Project neuroArm Jul 2022 – Present
Research Trainee (PI: Dr. Garnette Sutherland, Div. of Neurosurgery)
- Creating natural language platforms as a clinical tool for physician consultation, automated notes, and education
- Designing machine learning-driven platforms for surgical devices and education; projects include automatic surgeon identification using their surgical tool force profile, quantification of force components which differentiate 'expert' vs 'novice' surgeons, and an end-to-end platform to track surgical trainee progress
- Ideating and analyzing clinical trials to assess the efficacy of the SmartForceps system for surgical education

Telerobotic and Biorobotic Systems Group Sep 2021 – Jun 2023
Research Assistant (PI: Dr. Mahdi Tavakoli, Dept. of Electrical and Computer Engineering)
- Designed reinforcement learning algorithms for exoskeletons to personalize the patient rehabilitation process; implemented the TD3 algorithm with a lower limb exoskeleton to set a user's desired walking speed; manuscript accepted at ICRA 2023; media coverage: CTV and University of Alberta interviews
- Led the development of a voice-controlled exoskeleton; users complete tasks 54% faster than using a mobile app

Zochodne Laboratory, University of Alberta Oct 2018 – Oct 2020
Research Assistant (PI: Dr. Douglas Zochodne, Div. of Neurology)
- Studied mouse models of peripheral nerve damage to improve patient outcomes after injury
- Performed mouse sciatic nerve microsurgery, electroporation, immunohistochemistry, co-IP, and Western blot

Publications

Manuscripts

1. **E. Guo***, M. Gupta, J. Deng, Y. Park, M. Paget, C. Naugler, "Automated Paper Screening for Clinical Reviews Using Large Language Models," *Journal of Medical Internet Research*, [accepted].
2. **E. Guo**, M. Gupta, S. Sinha, K. Rössler, M. Tatagiba, R. Akagami, O. Al-Mefty, T. Sugiyama, P.E. Stieg, G.E. Pickett, M. de Lotbiniere-Bassett, R. Singh, S. Lama, G. Sutherland*, "neuroGPT-X: Towards a Clinic-Ready Large Language Model," *Journal of Neurosurgery*, doi 10.3171/2023.7.JNS23573 [accepted].
3. A. Baghdadi, **E. Guo**, R. Singh, S. Lama, G. Sutherland*, "Force Profile as Surgeon-Specific Signature," *Annals of Surgery Open*, Sep. 2023, doi: 10.1097/AS9.0000000000000326.

4. S. Samnani, F. Sachedina, M. Gupta, **E. Guo**, V. Navani*, "Mechanisms and clinical implications in renal carcinoma resistance: narrative review of immune checkpoint inhibitors," *Cancer Drug Resistance*, Jun. 2023, doi: 10.20517/cdr.2023.2.
5. J. K. Mehr, **E. Guo**, M. Akbari, V. K. Mushahwar, M. Tavakoli*, "Deep Reinforcement Learning Based Personalized Locomotion Planning for Lower-Limb Exoskeletons," *2023 IEEE International Conference on Robotics and Automation (ICRA)*, London, United Kingdom, 2023, pp. 5127-5133, doi: 10.1109/ICRA48891.2023.10161559.
6. S. Becker, D. Clark*, M. Gupta, S. Kannappan, B. Wong, E. Hernandez-Zavaleta, and **E. Guo**, "More than a Eureka Moment: Undergraduate Students' Reflective Understanding of Science Inquiry in a Citizen Science Project," *Alberta Science Education Journal*, vol. 48, no. 1, pp. 22-36, Jun. 2022.
7. **E. Guo***, P. Torabi, D. E. Nielsen, and M. Pietrosanu, "Deep learning transcriptomic model for prediction of pan-drug chemotherapeutic sensitivity," *STEM Fellowship Journal*, Jan. 2022, doi: 10.17975/sfj-2021-013.

Conferences & Presentations

1. **E. Guo**, M. Gupta, S. Sinha, K. Rössler, M. Tatagiba, R. Akagami, O. Al-Mefty, T. Sugiyama, P.E. Stieg, G.E. Pickett, M. de Lotbiniere-Bassett, R. Singh, S. Lama, G. Sutherland*, "neuroGPT-X: Advancing Responsible Large Language Models for Clinical Use," *CNS 2023*, Washington, DC, USA, Sep. 9-13, 2023 [accepted].
2. **E. Guo**, M. Gupta, B. Wong, J. Ali, A. Pillai, P. Torabi, M. Paget, C. Naugler*, "Performance of ChatGPT on Case-Based Clinical Scenarios: Potential for Incremental Utility of Large Language Models in Medical Education," *Association for Medical Education in Europe Glasgow 2023*, Glasgow, Scotland, Aug. 26-30, 2023 [accepted].
3. **E. Guo***, M. Gupta, J. Ali, A. Pillai, P. Torabi, "Large Language Models: Practicing Clinical Decision Making," *Health and Medical Education Scholarship Symposium*, Calgary, AB, Canada, May 11, 2023.
4. **E. Guo**, A. Baghdadi, R. Singh, S. Lama, G. Sutherland*, "What Makes a Surgeon Unique? Machine Learning for Surgeon Identification Using Their Force Profile," *2023 AANS Annual Scientific Meeting*, Los Angeles, CA, USA, Apr. 21-24, 2023.
5. **E. Guo**, A. Baghdadi, R. Singh, S. Lama, G. Sutherland*, "Machine Learning Characterization of Important Tool-Tissue Interaction Forces Using Bipolar Forceps," *2023 AANS Annual Scientific Meeting*, Los Angeles, CA, USA, Apr. 21-24, 2023.
6. S. Becker, D. Clark*, M. Gupta, S. Kannappan, B. Wong, **E. Guo**, and E. Hernandez-Zavaleta, "Deepening Undergraduate Student Understanding of Science Inquiry by Reflecting on the Creation and Enactment of a Citizen Science Project," *Canadian Society for the Study of Education XLIX Annual Conference*, Canada, May 30-June 3, 2021.

Preprints

1. **E. Guo***, M. Gupta, J. Deng, Y. Park, M. Paget, C. Naugler, "Automated Paper Screening for Clinical Reviews Using Large Language Models," *arXiv*, May 2, 2023, doi: 10.48550/arXiv.2305.00844.
2. **E. Guo**, M. Gupta, S. Sinha, K. Rössler, M. Tatagiba, R. Akagami, O. Al-Mefty, T. Sugiyama, P.E. Stieg, G.E. Pickett, M. de Lotbiniere-Bassett, R. Singh, S. Lama, G. Sutherland*, "neuroGPT-X: Towards an Accountable Expert Opinion Tool for Vestibular Schwannoma," *medRxiv*, Feb. 26, 2023, doi: 10.1101/2023.02.25.23286117.

Datasets & Registrations

1. **E. Guo***, M. Gupta, J. Deng, Y. Park, M. Paget, C. Naugler, "Automated Paper Screening for Clinical Reviews Using Large Language Models," *Mendeley Data*, V1, May 1, 2023, doi: 10.17632/np79tmhkh5.1.
2. Y-J. Park, J. Deng, A. Pillai, M. Gupta, **E. Guo***, Mike Paget, and Christopher Naugler, "Assessing the research landscape and utility of LLMs in the clinical setting: protocol for a scoping review," Mar. 28, 2023, doi: 10.17605/OSF.IO/498K6.
3. **E. Guo**, M. Gupta, S. Sinha, K. Rössler, M. Tatagiba, R. Akagami, O. Al-Mefty, T. Sugiyama, P.E. Stieg, G.E. Pickett, M. de Lotbiniere-Bassett, R. Singh, S. Lama, G. Sutherland*, "neuroGPT-X: Towards an Accountable Expert Opinion Tool for Vestibular Schwannoma," *Mendeley Data*, V1, Feb. 27, 2023, doi: 10.17632/b9mck42r35.1.

Educational Materials

- Created A Gentle Introduction to Data Science with R, an interactive e-textbook on R programming and data science used by 600+ students across Canada (Dec 2020 – May 2022)
- Founded the Atom Magazine for Engineering Physics; the first issue attracted 300+ readers in 6 countries (Dec 2021 – Feb 2022)

Research & Social Innovation Grants

CMSA Conference Funding ($200) Jul 2023
- Awarded to present machine learning in surgery research at the 2023 AANS Annual Scientific Meeting

OpenAI Researcher Access Program Grant ($1,000 USD) Jul 2023
- Awarded for research to develop responsible large language models in medicine

Ontario Medical Student Education Research Grant ($5,000) May 2023
- Awarded to create an interactive app for dermatology trainees to practice oral examinations (co-awarded with Ye-Jean Park and Dr. Mehul Gupta; PI: Dr. Trevor Champagne)

SU Conference Funding ($200) Apr 2023
- Awarded to present machine learning in surgery research at the 2023 AANS Annual Scientific Meeting

CFMS Student Initiative Grant ($1,440) Mar 2023
- Awarded to incorporate artificial intelligence into undergraduate medical education

Social Innovation Micro Grant ($1,000) Mar 2023
- Awarded to incorporate large language models into the University of Calgary Cumming School of Medicine accreditation process

Undergraduate Medical Education Travel Grant ($750) Jan 2023
- Awarded to present machine learning in surgery research at the 2023 AANS Annual Scientific Meeting

NSERC Undergraduate Student Researcher Award ($8,500) Mar 2022
- Awarded for project titled "Intelligent control of a lower-limb exoskeleton"

Dean's Research Award ($500) Sep 2021
- Awarded for project titled "Speech-based locomotion planning for lower-limb exoskeletons"

Alberta Innovates Summer Research Studentship ($6,000) Apr 2020
- Awarded for project titled "Skin and Nerves: Understanding the dialogue between axons and skin cells to restore sensation"

Office of the Provost and VP (Academic) Summer Studentship Award ($2,600) May 2019
- Awarded for project titled "Axon regrowth and plasticity in diabetic neuropathy: the role of growth cone molecules"

Selected Sports Awards

Fencing (Foil) 2011 – 2020
- Accepted annually as a High Performance Program Athlete with the Canadian Fencing Federation 2013 – 2018
- Medalled in 5 Canadian national competitions in the open, U20, U17, and U13 categories 2013 – 2018
- Achieved USA Fencing A16 ranking (highest ranking in USA Fencing) 2016
- 23rd Place Guatemala Junior (U20) World Cup; represented Team Canada 2016

Table Tennis 2007 – 2012
- Medalled in every competition (50+ national and local events) in U13 and U11 singles, doubles, and team events 2008 – 2012
- Youngest athlete at the Halifax Canada Winter Games; media coverage: CBC Sports and Toronto Star interviews 2011

Selected Scholarships and Awards (of 22)

Louise McKinney Post-Secondary Scholarship ($2,500 x3) Dec 2019, Sep 2020, Nov 2022
- Awarded on the basis of superior academic achievement (top 1.5-2% of faculty) to students at the University of Alberta and Calgary who are also Alberta residents; awarded for the 2018/19, 2019/20, and 2021/22 academic terms

Peter Lougheed Scholarship ($10,000) Sep 2021
- Awarded to University of Alberta students who demonstrate leadership through involvement in university or community organizations, sports activities, or cultural activities and academic achievement

Alberta Innovates COVID-19 Hackathon Post-Secondary Student Award ($500) May 2020
- Created an interactive app to model how COVID-19 spreads given age, poverty, income, and population density
- Media coverage: University of Alberta Folio article and the Genome Alberta podcast

Employment

University of Alberta Sep 2020 – Apr 2022

Teaching Assistant, Introduction to Tangible Computing I & II (CMPUT 274 & 275)

- Supported a class of 160+ students to understand algorithms and data structures in Python and C++
- Received an overall effectiveness rating of 93% from anonymized student feedback surveys
- Collaborated with a team of 16 teaching assistants to facilitate course delivery

Edmonton Fencing Club Nov 2016 – Oct 2020

Fencing Coach

- Coached children and teenagers and engaged their parents about their child's progress
- Gave private lessons, taught strategic fencing thinking, and resolved student conflicts

Leadership and Volunteer Experience

Medical Education Working Group Feb 2023 – Present

Co-Founder and Editor-In-Chief

- Creating a Canadian medical question bank powered by AI in collaboration with Toronto Notes and University of Calgary Cards
- Created OSCE-GPT, an AI-powered app that offers communications practice with various clinical scenarios (users speak to their device and then it speaks back); generates SOAP notes, feedback, and patient presentations based on conversation history; users span 5 continents (20+ countries)
- Created PrepCaRMS, an AI-powered app that offers interview practice with all CaRMS R-1 specialties (users speak to their device and then it speaks back) and feedback based on the interview
- Created the Royal College Oral Practice App, an AI-powered app that provides practice and feedback for Canadian residents oral board exams; the app features dynamically-added images; users speak to their device and then it speaks back

Calgary Medical Students' Association (CMSA) Sep 2022 – Present

President

- Chairing the Independent Student Analysis Committee for 2024 accreditation cycle of the Calgary MD Program by the Committee on Accreditation of Canadian Medical Schools (a 2-year process)
- Created an online platform for students to share and access study materials; created more than 1 GB of videos on course concepts, school notes, tools for career exploration, exams, shadowing, research
- Developed a financial strategy resulting in a 5% annual revenue growth for the CMSA, excluding student fees
- Organized embroidered Patagonia merchandise for all Calgary MD students; acquired a 40% discount and 14-day free trial for AMBOSS for all Calgary MD students

Youreka Canada Feb 2019 – Jun 2023

Consultant, National Strategy Team (Jun 2022 – Jun 2023)

- Collaborated on national equity, diversity, and inclusion policies affecting 200+ students across Canada
- Developed national and international expansion plans for regional Youreka branches

Vice President, Department of Programs (May 2020 – Jun 2022)

- Led a team of 17 PhD, MD, and BSc students to create and deliver the Youreka national curriculum; generated 15,000+ hours of research education for 200+ high school and undergraduate students annually across Canada
- Published an academic paper highlighting student development in Youreka in the Alberta Science Education Journal (2022)

National Operations Committee Member (May 2020 – Jun 2022)

- Co-led the creation of the first Youreka national financial aid and equity, diversity, and inclusion (EDI) policies; funded all 12 students who applied for bursaries for the 2021-22 program
- Spearheaded the first professional development and pedagogy training for 17 undergraduate teachers across Canada

Vice President of Academics (May 2019 – Jun 2021)

- Taught a ten-week science program to a cohort of 30 high school and undergraduate students in Edmonton
- Taught all Youreka Canada branches and created slide sets, worksheets, and Python 3 code during the COVID-19 pandemic
- Spearheaded a pilot project for Youreka Edmonton that doubled student enrollment from 30 to 60 students from 2019 to 2020

Skills and Hobbies

Skills Machine learning, deep learning, reinforcement learning, data science, teaching, curriculum development

Software	R, Python, C++, MATLAB, Simulink, VHDL, Git, LaTeX, HTML, CSS
Certifications	Standard First Aid CPR and AED Level C, Basic Life Support, DELF B1
Professional Societies	Congress of Neurological Surgeons, Institute of Electrical and Electronics Engineers (IEEE)
Hobbies & Interests	Billiards, programming, running, soccer, reading, physics