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Curriculum Vitae

Alina Jade Barnett

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Education

1. **Ph.D. Program in Computer Science** 2017–2023
   Duke University, NC USA

   - Advisor: Prof. Cynthia Rudin
   - Selected courses: Artificial Intelligence, Machine Learning, Computer Vision, Algorithms, Advanced Computer Architecture, Fault Tolerance in Computer Architecture, Mathematical Statistics

2. **H. B.Sc. in Physics with Co-op (summa cum laude)** 2012–2017
   McMaster University, Canada

   - Selected courses: Particle Physics, Computational Physics, Quantum Physics, Mathematical Biology, Combinatorics

Papers

1. "A Case-based Interpretable Deep Learning Model for Classification of Mass Lesions in Digital Mammography." Alina Jade Barnett, Fides Regina Schwartz, Chaofan Tao, Chaofan Chen, Yinhao Ren, Joseph Y. Lo, and Cynthia Rudin. *Nature Machine Intelligence.* (2021). https://arxiv.org/abs/2103.12308

2. "Deformable ProtoPNet: An Interpretable Image Classifier Using Deformable Prototypes." Jon Donnelly, Alina Jade Barnett, and Chaofan Chen. *CVPR: Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition.* (2022). https://arxiv.org/abs/2111.15000

3. "Interpretable Deep Learning Models for Better Clinician-AI Communication in Clinical Mammography." Alina Jade Barnett, Vaibhav Sharma, Neel Gajjar, Jerry Fang, Fides Regina Schwartz, Chaofan Chen, Joseph Y. Lo, and Cynthia Rudin. *Medical Imaging 2022: Image Perception, Observer Performance, and Technology Assessment. SPIE.* (2022).

4. "Interpretable Mammographic Image Classification using Cased-Based Reasoning and Deep Learning." Alina Jade Barnett, Fides Regina Schwartz, Chaofan Tao, Chaofan Chen, Yinhao Ren, Joseph Y. Lo, and Cynthia Rudin. *IJCAI-21 Workshop on Deep Learning, Case-Based Reasoning, and AutoML: Present and Future Synergies.* (2021). https://arxiv.org/abs/2107.05605

5. "This Looks Like That: Deep Learning for Interpretable Image Recognition." Chaofan Chen, Oscar Li, Chaofan Tao, Alina Jade Barnett, Cynthia Rudin, and Jonathan K. Su. *NeurIPS: Advances in Neural Information Processing Systems 32* (2019): 8930-8941. https://arxiv.org/abs/2103.12308

   - Spotlight (top 3%) paper at NeurIPS 2019
   - A neural network that explains its image classifications while maintaining accuracy.
   - 2018: Featured on "Data Science at Home" podcast (Episode 41)
   - 2018: Presented as a 3-minute thesis and poster at the French-American Doctoral Exchange, a program developed by the Office for Science and Technology of the Embassy of France.

Articles Under Review

6. Yanchen Jessie Ou[†], Alina Jade Barnett[†], Anika Mitra[†], Fides Regina Schwartz, Chaofan Chen, Lars Grimm, Joseph Y. Lo, and Cynthia Rudin. "A User Interface to Communicate Interpretable AI Decisions to Radiologists." (2022).

   - Submitted for peer review 2022.

Working Papers

7. "Mapping the Ictal-Interictal-Continuum Using Interpretable Machine Learning (ProtoPMed-EEG)." Alina Jade Barnett[†], Zhicheng Guo[†], Wendong Ge, M. Brandon Westover, Jin Jing and Cynthia Rudin. (2022).

8. "Active Learning for Breast Mass Segmentation." Vaibhav Sharma[†], Alina Jade Barnett[†], Neal Hall, Avivah Wang, Fides Regina Schwartz, Chaofan Chen, Lars Grimm, Joseph Lo and Cynthia Rudin. (2022).

9. "High-Resolution ProtoPNet." Satvik Kishore[†], Alina Jade Barnett[†], Chaofan Chen, Fides Regina Schwartz, Joseph Lo and Cynthia Rudin. (2022).

Awards

Grants

1. $19,831.00   PI for a Duke Incubation Fund Award from the *Duke Innovation & Entrepreneurship Initiative*. A multi-department interdisciplinary project for superior interpretability on neural networks that analyze mammograms. 2019–2021.

Competitions

2. AI for Art 2019, *Duke University* $2500: A competition for art made using artificial intelligence. [Article link]

Competitive National Research Awards

3. NSERC IUSRA Natural Sciences & Engineering Research Council Industrial Undergraduate Student Research Award 2015, *E-One Moli Energy* $4500+

4. NSERC USRA Natural Sciences & Engineering Research Council Undergraduate Student Research Award 2014, *University of Toronto* $4500+

Selected Institutional Awards

5. TRIPODS
   2021, *Duke University*

6. Energy Data Analytics Fellowship
   2019–2020, *Duke University*

7. Graduate Fellowship
   Spring 2019, *SAMSI – The Statistical and Applied Mathematical Sciences Institute*

8. Graduate Fellowship
   2017–2018, *Duke University*

9. The Catherine & Albert Roeder Memorial Scholarship (for highest cumulative average in Honours Physics)
   2014, *McMaster University*

10. The William McKeon Memorial Academic Grant in Physics (for high academic standing)
    2013, *McMaster University*

11. Deans' Honours List
    2012–2013, 2013–2014, 2015–2016, *McMaster University*

Conferences Not Included Above

Talks

1. INFORMS Annual Meeting *Indianapolis*
   (2022) 20 min invited talk

2. Responsible Machine Learning *Raleigh, NC*
   (2021) 45 min invited talk

3. Energy Data Analytics Symposium *Duke University*
   (2020) 5 min talk

4. Canadian Association of Physicists Congress *Laurentian University*
   (2014) 30 min talk

5. Canadian Undergraduate Physics Conference *Queen's University*
   (2014) Second place prize winning talk

6. Annual Soft-Condensed Matter and Biophysics Retreat *McMaster University*
   (2013) 15 min talk

Posters

7. Canadian Conference for Undergraduate Women in Physics *McMaster University*
   (2017) Poster presentation

8. Canadian Undergraduate Physics Conference *Dalhousie University*
   (2016) Prize winning, first place poster

9. Canadian Conference for Undergraduate Women in Physics *McGill University*
   (2014) Poster presentation

Other

10. Canadian Undergraduate Physics Conference *University of Ottawa*
    (2017) Judge for student talks

11. Grace Hopper Conference
    (2017,2020) Delegate

12. Canadian Conference on Student Leadership *McMaster University*
    (2014) Delegate

13. IUPAP ICWIP International Union of Pure and Applied Physics International Conference on Women in Physics *Wilfrid Laurier University*
    (2014) Delegate

Teaching Experience

1. **Student Mentoring**   Summer 2018–present
   Dept. Computer Science; *Duke University*

   - Recruit, supervise and guide undergraduate and master's students in short-term and long-term research projects
   - Mentor with the Duke CS+ Summer program 2021, 2022
   - Previous mentees include Chaofan Tao (now at Meta), Neel Gajjar, Lei Chen (master's student), Jerry Fang

- Current mentees include Vaibhav Sharma, Jessie Ou, Anika Mitra, Celeste A'Brassard, Jon Donnelly (PhD student), Zhicheng Guo (PhD student), Satvik Kishore (master's student)

2. **Teaching Assistant: Graduate Artificial Intelligence**   Fall 2018
   Dept. Computer Science; *Duke University*

   - Graduate course "Artificial Intelligence" with ~ 50 students
   - Designed and implemented a course module on deep learning

3. **Teaching Assistant: Undergraduate Artificial Intelligence**   Spring 2018
   Dept. Computer Science; *Duke University*

   - Undergraduate course "Introduction to Artificial Intelligence" with ~ 110 students

4. **Private Tutor**   2010–2016, 2020–present

5. **Teaching Assistant: Physics for the Life Sciences**   Fall 2014
   Dept. Physics & Astronomy; *McMaster University*

   - Lectured a class of 30 first year physics students one hour each week

6. **Physics Help Initiative Volunteer Tutor**   2013–2014
   MUPS McMaster Undergraduate Physics Society; *McMaster University*

Selected Research & Work Positions Not Included Above

1. **Software Systems Developer Internship**   May 2019–August 2019
   Dr. Anthony Hoogs; *Kitware, Inc.*

   - Developed prototype for Phase 2 of DARPA's explainable artificial intelligence program
   - Used PyTorch to add an interpretability component to content-based image retrieval system

2. **Software Systems Developer Internship**   2016
   Government of Canada

   - Developed Python package to implement advanced mathematical techniques such as large matrix reduction with multiple data types

3. **4-month Undergraduate Research Internships**
   Dr. Bruce Gaulin; *Brockhouse Institute of Materials Research, McMaster University* 2016
   E-One Moli Energy; *Maple Ridge, British Columbia* 2015
   Dr. Stephen Morris; *Dept. Physics, University of Toronto* 2014
   Dr. Maikel Rheinstadter & Dr. Reza Nejat; *Dept. Physics & Astronomy, McMaster University* 2013

4. **Physics Simulation Developer Internship**   2015
   Sidense Corp.; *Ottawa, Ontario*

Selected Service

1. **Social Committee: Co-chair, Chair**   2020–2022
   Duke University Computer Science

2. **Harassment Grievance Appeals Board Member**   2019–2020
   Duke University OIE

   - Serving on the judicial board to mediate harassment complaints across all levels of the university: student, staff and faculty.

3. **Social Committee: Alcohol Coordinator**   2018–2022
   Duke University Computer Science

4. **Special Task Force for Parking & Transportation Member**   2019–2020
   Duke University Graduate and Professional School Council (GPSC)

5. **Graduate Student Affairs Student Liaison**   2018–present
   Duke University

6. **CS+ Speaker**   2020
   Duke University Computer Science

7. **Harassment Grievance Board Member**   2017–2019
   Duke University OIE

8. **Hiring Committee for Administrative Staff Member**   2018, 2021
   Duke University Department of Computer Science

9. **Panel Member for Women in Computer Science Events**   2018–present
   Duke University Electrical and Computer Engineering

10. **Physics Talk Judge for CUPC Conference**   2017
    Canadian Undergraduate Physics Conference

11. **Mentor for LLC Ladies Learning Code**   2017
    Ontario, Canada

12. **Physics Outreach Volunteer**   2013–2017
    Sara Cormier; *Dept. Physics & Astronomy, McMaster University*

    - Lab tours & demonstrations for Fall Preview I (2015, 2013), May@Mac (2016, 2014, 2013), Let's Talk Science (2013)

13. **Ontario Universities Fair McMaster Student Representative**   2014
    McMaster University

14. **Science & Engineering Fair Judge**   2014
    Hamilton Wentworth District School Board

15. **Physics Society Elected Representative**   2013–2014
    MUPS McMaster Undergraduate Physics Society

    - Developed website; designed and ordered society clothing; promoted physics events via social media and in class

16. **MacACE McMaster Ambassador for Community Events**   2013–2014

Extra-Curricular Involvement

1. **Classical Vocal Studies**   2006–2018
   Dr. Joan Heels; *Joan Heels' Vocal Plus Studio*

   - VP External and member of the Duke Chapel Choir (2018)

   - Placed second in Ontario Registered Music Teachers' Association (ORMTA) Provincial Student Vocal Competition after winning branch and regional competitions (2016) [Video link]

   - Placed third in Ontario Registered Music Teachers' Association (ORMTA) Provincial Student Vocal Competition after winning branch and regional competitions (2013) [Video link]

   - Jazz vocalist for the Westmount Secondary Jazz Band (Mr. Ted Bohn) (2011–2012) [Mr. Zoot Suit], [Georgia]

2.   Coxswain for Varsity and Club Rowing   2013–2017
Men's and Women's Rowing; *McMaster Athletics, Ottawa Rowing Club, Saratoga Rowing Association*

- Direct team of rowers by steering, assist in coaching, balancing, and executing race strategies for eight and coxed four
- Gold Medal from 2015 Royal Canadian Henley Masters Regatta Coxed Four
- Most Valuable Coxswain (2014) McMaster Varsity Rowing

3.   Royal Canadian Air Cadet Career   2008–2012
779 Black Knight Squadron

- Ambassador of the Royal Canadian Air Cadets on the historic International Air Cadet Exchange (IACE) to the United Kingdom funded by the Department of National Defense (2012)
- Appointed Chief of Training & Athletics Coordinator, managing a team of 11 instructors