

Eion Blanchard

CONTACT	eionmb2@illinois.edu
EDUCATION	University of Illinois at Urbana-Champaign Champaign, IL <i>Doctor of Philosophy, Mathematics</i> Expected May 2023 Researching decidability of logical theories (adviser: Philipp Hieronymi) Advanced to doctoral candidacy in Apr 2021 <i>Master of Science, Applied Mathematics</i> May 2020 Computational Science and Engineering (CSE) concentration University of Florida Gainesville, FL <i>Bachelor of Science, Mathematics</i> May 2018 Degree conferred <i>summa cum laude</i> · Honors Program · GPA 3.97
INTERESTS	mathematical logic, theoretical CS, model theory, tame geometry, logical complexity, gerrymandering and voting systems, numerical analysis, algorithms, optimization
WORK	Microsoft Redmond, WA <i>Research Intern</i> May 2022 - Aug 2022 · Researching security and cryptography for end-to-end verifiable elections <i>Research Intern</i> May 2021 - Aug 2021 · Reduced runtimes by 33% and memory footprints by 90% for large industry problems in PUBO form on Azure Quantum's optimization solvers · Detailed algorithms in C++ and Python for factored forms of cost function terms, accelerating Markov transition cost differencing from linear (in factor length) to constant time Fields Institute for Research in Mathematical Sciences Toronto, ON, Canada <i>Long-Term Visitor, Thematic Program on Tame Geometry</i> Jan 2022 - May 2022 Sandia National Laboratories Albuquerque, NM <i>Mathematics and Analytics Research & Development Intern</i> May 2020 - Aug 2020 · Improved average precision of object detection by 6% over baseline models from FAIR's Detectron2 by developing a graph theoretic ensemble learning method in Python · Crafted graph visualizations and analyzed temporal networks with GCNs Applied Research Laboratories, University of Texas at Austin Austin, TX <i>Research Engineering Scientist Associate</i> June 2019 - Aug 2019 · Bounded quantum color code error thresholds to 4 – 8% for Pauli X errors and 0.7 – 0.8% for Pauli Z errors by implementing decoder with measurement-based lattices in Python Metric Geometry and Gerrymandering Group Cambridge, MA <i>Voting Rights Data Institute Fellow</i> June 2018 - July 2018 · Gathered and analyzed vast demographic and election voting data sets for districting plans via QGIS visualizations, topological data analysis, and Markov chain Monte Carlo methods · Prototyped <i>Districtr</i> app in Python to empower self-identification of communities of interest Budapest Semesters in Mathematics, Eötvös Loránd University Budapest, Hungary <i>Study Abroad Student and Undergraduate Researcher</i> June 2017 - Aug 2017 · Researched unit disk graphs and low-dimensional compactness for graph rigidity University of Washington Seattle, WA <i>NSF Research Experience for Undergraduates (REU) Participant</i> June 2016 - Aug 2016 · Researched graph embeddings in surfaces of extreme genera for electrical networks
PUBLICATIONS	<i>Decidability bounds for Presburger arithmetic extended by sine</i> (2022) with P. Hieronymi (arXiv:2204.00099, submitting to Annals of Pure and Applied Logic) <i>Synthesizing lemmas for inductive reasoning</i> (2022) with P. Madhusudan, et al. (arXiv 2009.10207, submitting to OOPSLA 2022) <i>A decoder for the color code with boundaries</i> (2020) with B. La Cour, et al. (arXiv 2003.11602) <i>Measuring Congressional district meandering</i> (2018) with K. Knudson (arXiv 1805.08208)

SKILLS	Intermediate: Python Basic: Git, C++, MATLAB, SQL, R	
AWARDS	University Fellowship, Mathematics Department List of Teachers Ranked As Excellent, Outstanding Distinction List of Teachers Ranked As Excellent Anderson Scholarship, Highest Distinction Benacquisto Scholarship Bright Futures Florida Academic Scholarship National Merit Scholarship	Spring 2022 Fall 2019; Spring 2019 & 2020 Fall 2020, Spring 2021 Oct 2016 Aug 2014 Aug 2014 June 2014
TEACHING	University of Illinois at Urbana-Champaign <i>Teaching Assistant, Department of Mathematics</i> · Led Python programming labs for Linear Algebra with Computational Applications; developed weekly lessons and homework assignments; managed 8 classroom assistants · Developed course content and led active-learning sections for Calculus I and II under the Merit program for students underrepresented in STEM <i>Teaching Assistant, Inmas</i> · Developed and led NumPy tutorials; led problem-solving sessions for Python workshop <i>Research Mentor, Illinois Geometry Lab</i> · Managed team of 5 undergraduate researchers in automated theorem proving · Verified mathematical proofs with MSR's Lean and mechanized arithmetic for Ostrowski numeration systems with Walnut University of Florida <i>Teaching Assistant, Dept. of Computer Science & Eng.</i> · Led weekly discussion sections for Applications of Discrete Structures	<i>Champaign, IL</i> Aug 2018 - Dec 2021 Jan 2021 - Feb 2021 Aug 2018 - Dec 2020 <i>Gainesville, FL</i> Aug 2016 - May 2018
TALKS	American Mathematical Society Spring Central Meeting <i>"Decidability bounds for Presburger arithmetic extended by sine"</i> Fields Institute Model Theory Seminar <i>"Decidability bounds for Presburger arithmetic extended by sine"</i> University of Illinois Logic Seminar <i>"Decidability bounds for Presburger arithmetic extended by sine"</i> Sandia Machine Learning & Deep Learning Workshop <i>"Ensemble learning with graph inference cliques"</i> University of Illinois Computability Seminar <i>"When is scalar multiplication decidable?"</i> Wolfram Research Summer School <i>"Measuring Congressional district meandering and gerrymandering"</i> Telus World of Science, Unveiling the Universe Series <i>"Extreme genera and other techniques of graph embeddings"</i>	<i>West Lafayette, IN</i> Mar 2022 <i>Toronto, ON, Canada</i> Mar 2022 <i>Champaign, IL</i> Apr 2021 <i>Albuquerque, NM</i> Aug 2020 <i>Champaign, IL</i> Apr 2020 <i>Champaign, IL</i> Nov 2019 <i>Vancouver, BC, Canada</i> Aug 2016
SERVICE	Association for Women in Mathematics <i>Member, University of Illinois Chapter</i> Varsity Vocals <i>Judge, International Championship of Collegiate A Cappella</i> Gestalt <i>Director of Music, Co-Founder</i> · Created and directed a cappella group to 1 st place at ICCA Quarterfinals and to Runner-up at ICCA Semifinals, SoJam, BOSS, and NACC · Garnered 13 nominations and 3 wins at the Contemporary A Cappella Recording Awards University of Florida Mathematics Society <i>Secretary</i>	<i>Champaign, IL</i> Aug 2018 - Present <i>Chicago, IL</i> Feb 2019 - Present <i>Gainesville, FL</i> May 2016 - Apr 2018 <i>Gainesville, FL</i> Sept 2014 - May 2017