

Shaun Allison

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Toronto, Canada • US citizen and Canadian permanent resident

Software engineer with a computer science degree from Carnegie Mellon and a PhD in mathematics. Built machine-learned ad and notification targeting at Meta, holding two granted patents from that work, then spent a decade in mathematical research — most recently writing large Lean 4 formalizations and publishing in top mathematics journals. Returning to industry engineering.

SKILLS

- **Languages:** Python, Lean 4 (current); Hack, JavaScript, Haskell, C (industry use, 2012–2016)
- **Tools:** git, Mathlib, $\LaTeX$; familiar with numpy, pandas, matplotlib, PyTorch
- **Domains:** formal verification, machine-learned ranking and targeting, mathematical logic

EXPERIENCE

Software Engineer — Meta (then Facebook) June 2015 – August 2016

- Built machine-learned targeting for ads and notifications on the Games team — deciding which users to reach and with what.
- Work produced two granted patents on machine-learned ranking (below).

Postdoctoral Fellow / Lecturer — Univ. of Toronto; Hebrew Univ. of Jerusalem 2021 – 2025

- Independent research program in mathematical logic; published in the *Journal of the European Mathematical Society*, *Advances in Mathematics*, and the *Journal of Mathematical Logic*.
- Instructor of record for eight courses, including a 400-student calculus class — scoping a syllabus, building assessments, and managing a teaching staff.

Independent Research January 2026 – present

- Two Lean 4 formalization projects (below); carried two journal papers through revision to acceptance.
- Writing a textbook on mathematical logic with Spencer Unger, alongside continuing research in descriptive set theory.
- Research visits to Cornell University and the University of Vienna; upcoming visit to the Institute for Advanced Study in Mathematics, Zhejiang University.

Earlier: software engineering internship at Meta (2014); research and development at VMware (2013); Cisco (2012).

PROJECTS

Knight model formalization — Lean 4, Mathlib, 2026 <https://github.com/shalliso/KnightModel>

- ~5,700 lines of Lean formalizing a generalization of a classical model-theoretic construction. Developed with substantial AI assistance (Claude) under my direction; the mathematics and proof architecture are my own.

Automatic continuity — Lean 4, Mathlib, 2025 https://github.com/shalliso/automatic_continuity

- ~300 lines of Lean, written by hand. Complete machine-checked proof of a classical theorem in topological group theory.

PATENTS

- *Automatic recipient targeting for notifications* (US10506055B2) — machine-learned selection of notification recipients. Granted.
- *Selecting assets* (US11019177B2) — machine-learned selection of which creative asset to serve. Granted.

EDUCATION

- **Ph.D. Mathematics**, Carnegie Mellon University, 2021
- **B.S. Computer Science** and **B.S. Mathematics** (Discrete Mathematics and Logic), Carnegie Mellon University, 2015
- Putnam Competition top 500; CMU College Honors (Computer Science); Phi Beta Kappa