

Yash Patel

yppatel@umich.edu <https://yashpatel5400.github.io/>

EDUCATION

University of Michigan, Ph.D. in Statistics, GPA: 4.00 **Sep 2021 – Dec 2025 (Expected)**

Selected Courses: Computation and Optimization Methods, Monte Carlo Methods, Systems for Generative AI, LLMs and Transformers, Causal Inference, Uncertainty Quantification in Modeling, Regression Analysis

Princeton University, A.B. in Mathematics **Sep 2014 – Jun 2018**

Certificates: Applications of Computing, Statistics and ML

Selected Courses: Topology, Real Analysis, Complex Analysis, Theoretical ML (Graduate), Fairness in ML (Graduate), Machine Learning/Pattern Recognition (Graduate), Stochastic Systems, Computer Vision

SUMMARY

I am an **ML research engineer** with significant practical experience in **3D reconstruction and real-time rendering**, **GPU**, **C++**, and **Python** programming, and research expertise in **uncertainty quantification** (variational inference and conformal prediction), **robust decision-making**, **control theory**, **convex optimization**, and **ML for PDEs**.

EXPERIENCE

Meta, Senior Software Engineer (**IC5**) *Managers: Albert Pozo, Brian Cabral* **Jul 2018 – Sep 2021**

- Designed and implemented **novel real-time (72 FPS) novel dynamic object reconstruction** algorithm for 300k+ vertex meshes in Unity HLSL/C#.
- Implemented **real-time (72 FPS)** point cloud, dense mesh, and TSDFs (KinectFusion) scene **reconstruction & rendering on HMDs & lenticular displays with C++/OpenGL/GLES/OpenCL**.
- Implemented **deep learning model (PyTorch)** and optimized via Qualcomm SNPE & QAT to **run at 30 FPS on Qualcomm SoC** for Portal platforms. Added translation support for quantized nodes in PyTorch-JIT to Caffe2.
- Added distributed rendering with Docker, RabbitMQ, and Kubernetes to Manifold camera (https://github.com/facebook/facebook360_dep). Reduced depth estimation time by 30% with novel “Gaussian funnel.”

INDUSTRY INTERNSHIPS

Waymo (Data Science PhD Intern, Simulations) *Advisor: Aman Sinha* **Jun 2025 – Sep 2025**

- Implemented an ADMM-based **distributed convex optimization** algorithm in C++ for **importance sampling of rare events** to achieve a **20x speedup** in the simulations pipeline.

Bose (Machine Learning Research Co-op) *Advisor: Russell Izadi* **Jan 2025 – Jun 2025**

- Implemented **SAC** and **PPO** methods for adaptive-FIR noise cancellation (PyTorch). Developed novel transformer-based approach for Wiener filter adaptation that **outperforms FxLMS (10% dB reduction)**.

Amazon (Software Engineering Intern) **Jun 2017 – Aug 2017**

- Built Java Spring MVC debugging service for Kiva Picking Optimization team. Deployed globally via AWS.

SELECTED PUBLICATIONS

- “Conformal Contextual Robust Optimization”, **Patel Y**, Rayan S, Tewari A. *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2024. **Oral Presentation**
- “Amortized Variational Inference with Coverage Guarantees”, **Patel Y**, McNamara D, Loper J, Regier J, Tewari A. *International Conference on Machine Learning (ICML)*, 2024
- “Conformal Prediction for Ensembles: Improving Efficiency via Score-Based Aggregation”, EO Rivera*, **Patel Y*** (* equal contribution), Tewari A. *Neural Information Processing Systems (NeurIPS)*, 2025.
- “Continuum Transformers Perform In-Context Learning by Operator Gradient Descent”, **Patel Y***, Mishra A*, Tewari A. *arXiv:2505.17838*, 2025.

ACADEMIC RESEARCH INTERSHIPS

Columbia University (Research Intern) *Advisor: Abdulrahmen El-Sayed*

May 2015 – Sep 2015

- Developed and simulated agent-based models of the dynamics of self-efficacy for sexual minority populations from enrollment in exercise coach programs: <https://github.com/yashpatel15400/SexualEqualityABM>

Princeton Plasma Physics Lab (Research Intern) *Advisor: Ilya Dodin*

Jun 2013 – Jan 2014

- Developed FDTD numerical simulations in C++/Python of the Vlasov equation (see <https://arxiv.org/abs/1006.3717.pdf>) to study plasma evolution: <https://yashpatel15400.github.io/files/cos.mp4>

Rutgers University (Research Intern) *Advisor: Michael Shiflett*

Jun 2012 – Aug 2012

- Investigated the role of axonal guidance in the manifestation of social withdrawal by studying social behavior in mice with NRP2 gene mutations. Prepared brain slices, set up mice trials, and annotated/analyzed data.

PUBLICATIONS

Conference Papers

- “Conformal Contextual Robust Optimization”, **Patel Y**, Rayan S, Tewari A. *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2024. **Oral Presentation**
- “Amortized Variational Inference with Coverage Guarantees”, **Patel Y**, McNamara D, Loper J, Regier J, Tewari A. *International Conference on Machine Learning (ICML)*, 2024
- “Conformal Prediction for Ensembles: Improving Efficiency via Score-Based Aggregation”, EO Rivera*, **Patel Y*** (* equal contribution), Tewari A. *Neural Information Processing Systems (NeurIPS)*, 2025.

Preprints / In Submission

- “A Greedy PDE Router for Blending Neural Operators and Classical Methods”, Rayan S, **Patel Y**, Tewari A. *arXiv:2509.24814*, 2025.
- “Continuum Transformers Perform In-Context Learning by Operator Gradient Descent”, **Patel Y***, Mishra A*, Tewari A. *arXiv:2505.17838*, 2025.
- “Conformal Robust Control of Linear Systems”, **Patel Y**, Rayan S, Tewari A. *arXiv:2405.16250*
- “Operator Learning for Schrödinger Equation: Unitarity, Error Bounds, and Time Generalization”, **Patel Y***, Subedi U*, Tewari A.
- “Robust Functional Predict-Then-Optimize”, **Patel Y**, Tewari A.

Workshop Papers

- “Non-Parameteric Conformal Distributionally Robust Optimization”, **Patel Y**, Cao G, Tewari A. *ICML 2024 Workshop on Structured Probabilistic Inference & Generative Modeling*
- “Diffusion Models for Probabilistic Deconvolution of Galaxy Images”, Li Y, Xue Z, **Patel Y**, Regier J. *ICML Machine Learning for Astrophysics Workshop*, 2023
- “RL Boltzmann Generators for Conformer Generation in Data-Sparse Environments”, **Patel Y**, Tewari A. *NeurIPS Machine Learning in Structural Biology (MLSB) Workshop*, 2022
- “Scalable Bayesian Inference for Finding Strong Gravitational Lenses”, **Patel Y**, Regier J. *NeurIPS Machine Learning and the Physical Sciences (ML4PS) Workshop*, 2022

Patents

- “Holographic Calling for Artificial Reality”, AP Pozo, J Virskus, G Venkatesh, K Li, SC Chen, A Kumar, R Ranjan, BK Cabral, SA Johnson, W Ye, MA Snower, **Y Patel**. *US Patent App. 17/360,693*

AWARDS

- NSF GRFP Honorable Mention (2020, 2022)
- Outstanding First-Year Ph.D. Student Award (2022)
- Outstanding GSI Team Award (2022)
- Siemens Westinghouse National Semifinalist (2014)

INVITED PRESENTATIONS

- *Conformal Contextual Robust Optimization* (Tentative title). “Contextual Stochastic Optimization: From Data to Decisions” Workshop at 2026 Banff International Research Station (BIRS)
- *Learning Evolution Operator of the Time-Dependent Schrödinger Equation*. 2025 SciFM25 Conference
- *Continuum Transformers Perform In-Context Learning by Operator Gradient Descent*. “In-context Learning for PDEs and Inverse Problems” Workshop at 2026 SIAM Conference on Uncertainty Quantification.

SERVICE

Reviewer: NeurIPS, ICLR, AISTATS, Reliable ML from Unreliable Data Workshop @ NeurIPS, IEEE Conference on Decision and Control (CDC), IEEE Control Systems Letters

Teaching: STATS 315 (Statistics & AI): Created HWs and lab materials for first offerings of this course and taught labs, STATS 485 (Capstone Seminar), STATS 504 (Practice and Communication in Applied Statistics), STATS 250 (Introduction to Statistics and Data Analysis)

SKILLS

Python, C++, C, C#, CUDA, PyTorch, OpenCL, OpenGL, Unity, Docker, Kubernetes, Git, Java, Bash, LaTeX