Cenk **Baykal**

ML & Quant Researcher

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Education

Massachusetts Institute of Technology
Cambridge, MA

Ph.D. in Computer Science — *2017-2021*

- Minor: Probability in High Dimension (Mathematics)
- Thesis: *Sampling-based Algorithms for Fast and Deployable AI*
- Advisor: Daniela Rus
- GPA: 5.00/5.00

Massachusetts Institute of Technology
Cambridge, MA

S.M. in Computer Science — *2015-2017*

- Thesis: *Algorithms for Persistent Autonomy and Surveillance*
- Advisor: Daniela Rus
- GPA: 4.91/5.00

University of North Carolina at Chapel Hill
Chapel Hill, NC

B.S. Computer Science with Highest Honors, B.A. Mathematics — *2011-2015*

- Graduated with Highest Distinction
- Advisor: Ron Alterovitz
- Thesis: *Design Optimization Algorithms for Concentric Tube Robots*
- GPA: 3.91/4.00

Experience

Two Sigma
New York City, NY

Quantitative Researcher — *July 2024 - Present*

- Design systematic alpha strategies that combine alternative data and market microstructure signals
- Build and maintain Python/pandas/NumPy research tooling to accelerate signal evaluation and backtesting
- Partner with portfolio managers to translate promising research prototypes into production pilots

Google Research
Cambridge, MA

Research Scientist — *January 2022 - June 2024*

- Developed conditional computation algorithms for transformers that enabled up to **30%** speedups on Large Language Models (LLMs)
- Designed data-efficient knowledge distillation strategies that led to improved transformer architectures with only **50%** of teacher labeling cost
- Mentored scholars in Google CSRMP, supporting project design and research execution for students from historically marginalized groups
- Received the 2023 Google Research Tech Impact Award for leading "high-impact projects made sustainable by achieving tech excellence and great team dynamics"
- Received a Google Spot Bonus for "critical contributions to the efficiency of compact Gemini models"

Massachusetts Institute of Technology
Cambridge, MA

Post-doc — *September 2021 - January 2022*

- Worked on algorithms for privacy-aware and efficient Machine Learning

JP Morgan
New York City, NY

AI Research Intern — *May 2021 - September 2021*

- Developed sampling-based algorithms with regret guarantees for large-scale graph neural network training

Massachusetts Institute of Technology
Cambridge, MA

Teaching Assistant for Advanced Algorithms (6.854J / 18.415J) — *Fall 2019*

- Conducted office hours to help students on problem sets and concepts covered in lectures; designed and graded assignments
- TA rating according to the official MIT subject evaluation report: 7.0/7.0

Microsoft *Redmond, WA*

Software Engineer Intern *Summer 2015*

- Improved the computational efficiency of Huffman coding in SQL Server as part of the SQL Server Performance Team

University of North Carolina at Chapel Hill *Chapel Hill, NC*

Undergraduate Research & Teaching Assistant *Aug 2012 – May 2015*

- Developed motion-planning and design-optimization algorithms for concentric-tube medical robots in the Computational Robotics group
- Built smart-transportation and educational platforms (Self-Aware Route Planning, Tar Heel Reader) across UNC research labs
- Supported COMP 116 instruction via office hours, assignment design, and grading

SAS Institute *Cary, NC*

Software Engineering Intern *Summers 2013–2014*

- Automated test suites and delivered data-analysis workflows for SAS University and enterprise SQL performance tooling
- Created interactive learning modules for UNC Eshelman pharmacy programs

Honors & Awards

2024	**Google Spot Bonus,** For critical contributions to the efficiency of compact Gemini models	*Google*
2023	**Google Research Tech Impact Award,** For contributions to ML efficiency techniques	*Google*
2023	**NeurIPS Spotlight Paper,** Neural Information Processing Systems	*NeurIPS*
2021	**Winner,** MIT The Engine's Interval Program (one of 2 winning teams)	*MIT*
2021	**Expert Reviewer,** International Conference on Learning Representations	*ICLR*
2021	**Expert Reviewer,** International Conference on Machine Learning	*ICML*
2020	**Expert Reviewer,** International Conference on Learning Representations	*ICLR*
2020	**Top 10% of Reviewers,** Neural Information Processing Systems	*NeurIPS*
2017	**Best Paper Award,** Robotics: Science and Systems Conference	*RSS@MIT*
2015	**Carolina Research Scholar,** University of North Carolina at Chapel Hill	*UNC*
2015	**Finalist,** CRA Outstanding Undergraduate Researcher Award	*CRA*
2014	**Phi Beta Kappa,** University of North Carolina at Chapel Hill	*UNC*
2014	**Charles H. Dunham Scholarship,** SAS-funded scholarship at UNC	*UNC*
2014	**Dunlevie Honors Undergraduate Award,** University of North Carolina at Chapel Hill	*UNC*
2014	**Summer Undergraduate Research Fellowship,** University of North Carolina at Chapel Hill	*UNC*
2012-2015	**Honors Carolina,** UNC Honors Program	*UNC*
2011-2015	**Dean's List,** University of North Carolina at Chapel Hill	*UNC*

Peer-Reviewed Publications

Alternating Updates for Efficient Transformers (Spotlight) *NeurIPS*

Cenk Baykal, Dylan Cutler, Nishanth Dikkala, Nikhil Ghosh, Rina Panigrahy, Xin Wang *2023*

SLAM: Student-label Mixing for Distillation with Unlabeled Examples *NeurIPS*

Vasilis Kontonis, Fotis Iliopoulos, Khoa Trinh, **Cenk Baykal**, Gaurav Menghani, Erik Vee *2023*

Robust Active Distillation *ICLR*

Cenk Baykal, Khoa Trinh, Fotis Iliopoulos, Gaurav Menghani, Erik Vee *2023*

Weighted Distillation with Unlabeled Examples *NeurIPS*

Vasilis Kontonis, Fotis Iliopoulos, **Cenk Baykal**, Gaurav Menghani, Khoa Trinh, Erik Vee *2022*

A Theoretical View on Sparsely Activated Networks *NeurIPS*

Cenk Baykal, Nishanth Dikkala, Rina Panigrahy, Cyrus Rashtchian, Xin Wang *2022*

SiPPing Neural Networks: Sensitivity-informed Provable Pruning of Neural Networks *SIAM SIMODS*

Cenk Baykal*, Lucas Liebenwein*, Igor Gilitschenski, Dan Feldman, and Daniela Rus *2022*

Coresets for Support Vector Machines — *TCS*
Cenk Baykal*, Murad Tukan*, Dan Feldman, and Daniela Rus — *2021*

Lost in Pruning: The Effects of Pruning Neural Networks beyond Test Accuracy — *MLSys*
Lucas Liebenwein, Cenk Baykal, Brandon Carter, David Gifford, and Daniela Rus — *2021*

Provable Filter Pruning for Efficient Neural Networks — *ICLR*
Lucas Liebenwein*, Cenk Baykal*, Harry Lang, Dan Feldman, and Daniela Rus — *2020*

On Coresets for Support Vector Machines — *TAMC*
Murad Tukan*, Cenk Baykal*, Dan Feldman, and Daniela Rus — *2020*

Data-Dependent Coresets for Compressing Neural Networks with Applications to Generalization Bounds — *ICLR*
Cenk Baykal*, Lucas Liebenwein*, Igor Gilitschenski, Dan Feldman, and Daniela Rus — *2019*

Deterministic Coresets for Stochastic Matrices with Applications to Scalable Sparse PageRank — *TAMC*
Cenk Baykal*, Harry Lang*, Najib Abu Samra, Tony Tannous, Dan Feldman, and Daniela Rus — *2019*

Resilient Multi-Agent Consensus using Wi-Fi Signals — *L-CSS*
Stephanie Gil, Cenk Baykal, and Daniela Rus — *2019*

Sampling-Based Approximation Algorithms for Reachability Analysis with Provable Guarantees — *RSS*
Cenk Baykal*, Lucas Liebenwein*, Igor Gilitschenski, Sertac Karaman, and Daniela Rus — *2018*

Asymptotically Optimal Kinematic Design of Robots using Motion Planning — *Autonomous Robots*
Cenk Baykal, Chris Bowen, and Ron Alterovitz — *2018*

Kinematic Design Optimization of a Parallel Surgical Robot to Maximize Anatomical Visibility via Motion Planning — *ICRA*
Alan Kuntz, Chris Bowen, Cenk Baykal, Arthur W. Mahoney, Patrick L. Anderson, Fabien Maldonado, Robert J. Webster III, and Ron Alterovitz — *2018*

Asymptotically Optimal Design of Piecewise Cylindrical Robots using Motion Planning (Best Paper Award) — *RSS*
Cenk Baykal and Ron Alterovitz — *2017*

Persistent Surveillance of Events with Unknown, Time- varying Statistics — *ICRA*
Cenk Baykal, Guy Rosman, Sebastian Claici, and Daniela Rus — *2017*

Persistent Surveillance of Events with Unknown Rate Statistics — *WAFR*
Cenk Baykal, Guy Rosman, Kyle Kotowick, Mark Donahue, and Daniela Rus — *2016*

Optimizing Design Parameters for Sets of Concentric Tube Robots using Sampling-based Motion Planning — *IROS*
Cenk Baykal, Luis G. Torres, and Ron Alterovitz — *2015*

Participatory Route Planning — *SIGSPATIAL*
David Wilkie, Cenk Baykal, and Ming Lin — *2014*

Interactive-rate Motion Planning for Concentric Tube Robots — *ICRA*
Luis G. Torres, Cenk Baykal, and Ron Alterovitz — *2014*