Cenk **Baykal**

Efficient ML& Quant Researcher

baykal@alum.mit.edu | people.csail.mit.edu/baykal | linkedin.com/in/cenkbaykal | Scholar: tinyurl.com/cbaykal-scholar

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
Chapel Hill, NC

Undergraduate Research Assistant — *August 2012 - May 2015*

- Developed and analyzed efficient algorithms for motion planning and design optimization of concentric tube medical robots — Computational Robotics Group under Prof. Ron Alterovitz
- Enhanced and implemented a Self-Aware Traffic Route Planning Algorithm (http://gamma.cs.unc.edu/TROUTE/) as a member of the GAMMA group under Prof. Ming Lin
- Developed enabling technologies, such as the Tar Heel Reader (tarheelreader.org), with Prof. Gary Bishop

University of North Carolina
Chapel Hill, NC

Undergraduate Teaching Assistant for Intro. to Scientific Computing (COMP 116) — *August 2014 - December 2014*

- Conducted office hours to help students on problem sets and concepts covered in lectures; designed and graded assignments

SAS
Cary, NC

Software Engineering Intern — *Summer 2014*

- Developed fully-automated tests and utilized SAS software to perform data analysis of coverage reports

SAS
Cary, NC

Software Engineering Intern — *Summer 2013*

- Developed automated tests for SAS University, a web-based SAS platform

UNC Eshelman School of Pharmacy
Chapel Hill, NC

Software Developer Intern — *Summer 2012*

- Developed novel educational products using XHTML/HTML, CSS, PHP, JavaScript to facilitate learning for pharmacy students

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

Weighted Distillation with Unlabeled Examples — *NeurIPS* 2022
Vasilis Kontonis, Fotis Iliopoulos, Cenk Baykal, Gaurav Menghani, Khoa Trinh, Erik Vee

A Theoretical View on Sparsely Activated Networks — *NeurIPS* 2022
Cenk Baykal, Nishanth Dikkala, Rina Panigrahy, Cyrus Rashtchian, Xin Wang

SiPPing Neural Networks: Sensitivity-informed Provable Pruning of Neural Networks — *SIAM SIMODS* 2022
Cenk Baykal*, Lucas Liebenwein*, Igor Gilitschenski, Dan Feldman, and Daniela Rus

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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*