Cenk Baykal

32-376 Ray and Maria Stata Center,
Massachusetts Institute of Technology,
Cambridge, MA 02139

baykal@csail.mit.edu
http://www.mit.edu/~baykal

Education

Massachusetts Institute of Technology (MIT) — Cambridge, MA 2017 — 2021

Ph.D. in Computer Science (EECS)
Minor: Probability in High Dimension (Mathematics)
Relevant Graduate Coursework: *Advanced Algorithms, Randomized Algorithms, Sketching Algorithms for Big Data, High Dimensional Probability*
GPA: 5.00/5.00
Thesis: *Sampling-based Algorithms for Fast and Deployable AI*
Advisor: Prof. Daniela Rus

Massachusetts Institute of Technology (MIT) — Cambridge, MA 2015 — 2017

S.M. Electrical Engineering and Computer Science (EECS)
GPA: 4.91/5.00
Thesis: *Algorithms for Persistent Autonomy and Surveillance*
Advisor: Prof. Daniela Rus

University of North Carolina at Chapel Hill (UNC) — Chapel Hill, NC 2011 — 2015

B.S. with Highest Honors, Computer Science
B.A. Mathematics
Graduated with Highest Distinction
GPA: 3.91/4.00
Thesis: *Design Optimization Algorithms for Concentric Tube Robots*
Thesis Advisor: Prof. Ron Alterovitz

Publications & Pre-prints

1. **Cenk Baykal***, Murad Tukan*, Dan Feldman, and Daniela Rus, *Coresets for Support Vector Machines*, in journal of *Theoretical Computer Science (TCS),* 2021.
2. Junteng Jia, **Cenk Baykal**, Vamsi Potluru, and Austin Benson, *Graph Belief Propagation Networks*, *submitted,* 2021.
3. **Cenk Baykal,** Lucas Liebenwein, Dan Feldman, Daniela Rus, *Low-Regret Active Learning, submitted, arXiv pre-print available: https://arxiv.org/abs/2104.02822* , 2021.
4. Lucas Liebenwein, **Cenk Baykal,** Brandon Carter, David Gifford, and Daniela Rus, Lost in Pruning: The Effects of Pruning Neural Networks beyond Test Accuracy, in Proc. Conference on Machine Learning and Systems (MLSys), 2021.
5. Lucas Liebenwein*****, **Cenk Baykal***, Harry Lang, Dan Feldman, and Daniela Rus, *Provable Filter Pruning for Efficient Neural Networks,* in *Proc. International Conference on Machine Learning (ICLR)*, 2020.
6. **Cenk Baykal***, Lucas Liebenwein*, Igor Gilitschenski, Dan Feldman, and Daniela Rus, *SiPPing Neural Networks: Sensitivity-informed Provable Pruning of Neural Networks, arXiv preprint (https://arxiv.org/abs/1910.05422)*, 2020.
7. **Cenk Baykal***, Murad Tukan*, Dan Feldman, and Daniela Rus, *On Coresets for Support Vector Machines*, in *Theory and Applications of Models of Computation (TAMC),* 2020.

8. **Cenk Baykal***, Lucas Liebenwein*, Igor Gilitschenski, Dan Feldman, Daniela Rus, *Data-Dependent Coresets for Compressing Neural Networks with Applications to Generalization Bounds*, in *Proc. International Conference on Machine Learning (ICLR)*, May 2019.
9. **Cenk Baykal***, Harry Lang*, Najib Abu Samra, Tony Tannous, Dan Feldman, and Daniela Rus, *Deterministic Coresets for Stochastic Matrices with Applications to Scalable Sparse PageRank,* in *Theory and Applications of Models of Computation (TAMC),* April 2019.
10. Stephanie Gil, **Cenk Baykal**, and Daniela Rus, *Resilient Multi-Agent Consensus using Wi-Fi Signals,* in *IEEE Control Systems Letters*, 2019.
11. **Cenk Baykal***, Lucas Liebenwein*, Igor Gilitschenski, Sertac Karaman, and Daniela Rus, *Sampling-Based Approximation Algorithms for Reachability Analysis with Provable Guarantees,* in *Proc. Robotics: Science and Systems (RSS)*, June 2018.
12. **Cenk Baykal,** Chris Bowen, and Ron Alterovitz, *Asymptotically Optimal Kinematic Design of Robots using Motion Planning*, in Autonomous Robots, 2018.
13. Alan Kuntz, Chris Bowen, **Cenk Baykal**, Arthur W. Mahoney, Patrick L. Anderson, Fabien Maldonado, Robert J. Webster III, and Ron Alterovitz, *Kinematic Design Optimization of a Parallel Surgical Robot to Maximize Anatomical Visibility via Motion Planning*, in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2018.
14. **Cenk Baykal** and Ron Alterovitz, *Asymptotically Optimal Design of Piecewise Cylindrical Robots using Motion Planning,* in *Proc. Robotics: Science and Systems (RSS)*, July 2017.

    (Best Paper Award)
15. **Cenk Baykal**, Guy Rosman, Sebastian Claici, and Daniela Rus, *Persistent Surveillance of Events with Unknown, Time-varying Statistics,* in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2017.
16. **Cenk Baykal**, Guy Rosman, Kyle Kotowick, Mark Donahue, and Daniela Rus, *Persistent Surveillance of Events with Unknown Rate Statistics,* in *Proc. Workshop on the Algorithmic Foundations of Robotics (WAFR)*, Dec. 2016.
17. **Cenk Baykal**, Luis G. Torres, and Ron Alterovitz, *Optimizing Design Parameters for Sets of Concentric Tube Robots using Sampling-based Motion Planning*, in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Sep. 2015.
18. David Wilkie, **Cenk Baykal**, and Ming Lin, *Participatory Route Planning*, in *Proc. International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL)*, November 2014.
19. Luis G. Torres, **Cenk Baykal**, and Ron Alterovitz, *Interactive-rate Motion Planning for Concentric Tube Robots,* in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2014.

***** *denotes equal contribution*

Awards

MIT The Engine's Interval Program Winner (one of two winning teams across MIT)	2021
Expert Reviewer – ICLR 2021	2021
Expert Reviewer – ICML 2021	2021
ICLR Reviewer Award	2020
Top 10% of Reviewers - NeurIPS 2020	2020
Best Paper Award, Robotics: Science and Systems Conference	2017
Carolina Research Scholar	2015
CRA Outstanding Undergraduate Researcher Award Finalist	2015
UNC Honors Program - Honors Carolina	2012 — 2015
Dean's List	2011 — 2015

Phi Beta Kappa	2014
Charles H. Dunham Scholarship	2014
Dunlevie Honors Undergraduate Award	2014
Summer Undergraduate Research Fellowship (SURF)	2014

Professional Experience

AI Research Intern — J.P. Morgan AI Research, New York City, NY — Summer 2021

- Developed sampling-based algorithms with theoretical regret guarantees to accelerate training of and conducting inference with large graph neural networks

Teaching Assistant for Advanced Algorithms (6.854J / 18.415J) — MIT Computer Science and Artificial Intelligence Laboratory (CSAIL) (Prof. David Karger), Cambridge, MA — Fall (September – December) 2019

- Conducted weekly sessions and 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

Graduate Research Assistant — MIT Computer Science and Artificial Intelligence Laboratory (CSAIL) (Prof. Daniela Rus), Cambridge, MA — September 2015 — Present

- Developed sampling-based approaches with provable guarantees to enable efficient and deployable AI systems

Software Engineering Intern — Microsoft, Redmond, WA — Summer 2015

- Improved the computational efficiency of Huffman coding in SQL Server as part of the SQL Server Performance Team using SIMD and AVX2 instruction set

Undergraduate Research Assistant — UNC Computational Robotics Group (Prof. Ron Alterovitz), Chapel Hill, NC — January 2013 — May 2015

- Developed and analyzed efficient algorithms for the design optimization of concentric tube medical robots on a patient and application-specific basis
- Conducted research on and developed a codebase for interactive-rate motion planning for concentric tube medical robots

Undergraduate Research Assistant — UNC Gamma Group (Prof. Ming C. Lin), Chapel Hill, NC — January 2015 — May 2015

- Conducted Research in Machine Learning and Computer Vision to develop patient-specific cancer classification algorithm that leveraged patient's medical images and medical history

Undergraduate Teaching Assistant — UNC Computer Science Department (Prof. Marc Niethammer), Chapel Hill, NC — August 2014 — December 2014

- Worked as a Teaching Assistant (TA) for the Computer Science course COMP 116 - Introduction to Scientific Programming

Undergraduate Research Assistant — UNC Gamma Group (Prof. Ming C. Lin), Chapel Hill, NC — August 2013 — August 2014

- Enhanced and implemented the Self-Aware Traffic Route Planning Algorithm (http://gamma.cs.unc.edu/TROUTE/)

Software Engineering Intern — SAS Institute Cary, NC — Summer 2013 and 2014

- Developed automated tests for SAS University, a web-based SAS platform
- Developed fully-automated tests and utilized SAS software to perform data analysis of coverage reports

Undergraduate Research Assistant — UNC Enabling Technologies (Prof. Gary Bishop), Chapel Hill, NC

August 2012 — May 2013

- Helped develop, debug, and improve Tar Heel Reader (tarheelreader.org)
- Created an HTML5 rogue-like game for visually-impaired students that employed path planning algorithms to guide users through the game

Software Developer Intern — UNC Eshelman School of Pharmacy, Chapel Hill, NC

Summer 2012

- Developed novel educational products using XHTML/HTML, CSS, PHP, JavaScript (with jQuery and jQueryUI libraries), and an iOS app using Objective-C to facilitate student learning.