

# Cenk Baykal

✉ baykal@csail.mit.edu | 🏠 people.csail.mit.edu/baykal | 📖 Publications

## Education

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### 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

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### Massachusetts Institute of Technology

Cambridge, MA

POST-DOC

September 2021 - Present

- Working 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](http://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

SOFTWARE ENGINEERING INTERN

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

Cary, NC

Summer 2013

## UNC Eshelman School of Pharmacy

SOFTWARE DEVELOPER INTERN

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

Chapel Hill, NC

Summer 2012

## Honors & Awards

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2021	<b>Winner</b> , MIT The Engine's Interval Program (one of 2 winning teams)	MIT
2021	<b>Expert Reviewer</b> , International Conference on Learning Representations	ICLR
2021	<b>Expert Reviewer</b> , International Conference on Machine Learning	ICML
2020	<b>Expert Reviewer</b> , International Conference on Learning Representations	ICLR
2020	<b>Top 10% of Reviewers</b> , Neural Information Processing Systems	NeurIPS
2017	<b>Best Paper Award</b> , Robotics: Science and Systems Conference	RSS@MIT
2015	<b>Carolina Research Scholar</b> , University of North Carolina at Chapel Hill	UNC
2015	<b>Finalist</b> , CRA Outstanding Undergraduate Researcher Award	CRA
2014	<b>Phi Beta Kappa</b> , University of North Carolina at Chapel Hill	UNC
2014	<b>Charles H. Dunham Scholarship</b> , SAS-funded scholarship at UNC	UNC
2014	<b>Dunlevie Honors Undergraduate Award</b> , University of North Carolina at Chapel Hill	UNC
2014	<b>Summer Undergraduate Research Fellowship</b> , University of North Carolina at Chapel Hill	UNC
2012-2015	<b>Honors Carolina</b> , UNC Honors Program	UNC
2011-2015	<b>Dean's List</b> , University of North Carolina at Chapel Hill	UNC

## Publications

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### Graph Belief Propagation Networks

JUNTENG JIA, **CENK BAYKAL**, VAMSI POTLURU, AND AUSTIN BENSON

Submitted

2021

### SiPPing Neural Networks: Sensitivity-informed Provable Pruning of Neural Networks

**CENK BAYKAL**<sup>\*</sup>, LUCAS LIEBENWEIN<sup>\*</sup>, IGOR GILITSCHENSKI, DAN FELDMAN, AND DANIELA RUS

SIAM SIMODS

2021

### Coresets for Support Vector Machines

**CENK BAYKAL**<sup>\*</sup>, MURAD TUKAN<sup>\*</sup>, DAN FELDMAN, AND DANIELA RUS

TCS

2021

### Low-Regret Active Learning

**CENK BAYKAL**, LUCAS LIEBENWEIN, DAN FELDMAN, AND DANIELA RUS

Submitted

2021

### Lost in Pruning: The Effects of Pruning Neural Networks beyond Test Accuracy

LUCAS LIEBENWEIN, **CENK BAYKAL**, BRANDON CARTER, DAVID GIFFORD, AND DANIELA RUS

MLSys

2021

### Provable Filter Pruning for Efficient Neural Networks

LUCAS LIEBENWEIN<sup>\*</sup>, **CENK BAYKAL**<sup>\*</sup>, HARRY LANG, DAN FELDMAN, AND DANIELA RUS

ICLR

2020

### On Coresets for Support Vector Machines

MURAD TUKAN<sup>\*</sup>, **CENK BAYKAL**<sup>\*</sup>, DAN FELDMAN, AND DANIELA RUS

TAMC

2020

### Data-Dependent Coresets for Compressing Neural Networks with Applications to Generalization Bounds

**CENK BAYKAL**<sup>\*</sup>, LUCAS LIEBENWEIN<sup>\*</sup>, IGOR GILITSCHENSKI, DAN FELDMAN, AND DANIELA RUS

ICLR

2019

### Deterministic Coresets for Stochastic Matrices with Applications to Scalable Sparse PageRank

**CENK BAYKAL**<sup>\*</sup>, HARRY LANG<sup>\*</sup>, NAJIB ABU SAMRA, TONY TANNOUS, DAN FELDMAN, AND DANIELA RUS

TAMC

2019

### Resilient Multi-Agent Consensus using Wi-Fi Signals

STEPHANIE GIL, **CENK BAYKAL**, AND DANIELA RUS

L-CSS

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