

# Prayaag Venkat

---

(443) 326-7975  
pkvasv@gmail.com

## RESEARCH INTERESTS

Theoretical computer science: Approximation algorithms, computational geometry, quantum computing

## EDUCATION

University of Maryland, College Park 2014-2018 (expected)

- B.S. Computer Science, B.S. Mathematics.
- Advisors: Andrew Childs, Samir Khuller, David Mount, Penghui Yao.

## AWARDS

- Banneker Key Scholarship (2014-2018): Full ride offered to top 200 incoming students at UMD.
- 2017 Goldwater Scholarship.
- 2016 CRA Undergraduate Research Award, Honorable Mention.
- 2016 Abramowitz Award: Awarded by the UMD Department of Mathematics for superior competence and promise in the field of mathematics and its applications.

## PUBLICATIONS

- *Select and Permute: An Improved Online Framework for Scheduling to Minimize Weighted Completion Time*. S. Khuller, J. Li, P. Sturmfels, K. Sun, P. Venkat. LATIN 2018. Preprint available at: <https://arxiv.org/abs/1704.06677>.
- *A Succinct, Dynamic Data Structure for Proximity Queries on Point Sets*. P. Venkat, D.M. Mount. CCCG 2014.

## EXPERIENCE

*Undergraduate Researcher* Summer 2017 - Present  
CAAR REU, University of Maryland, College Park

- Mentored by Dr. Penghui Yao and Professor Andrew Childs on a project in classical and quantum communication complexity.
- Studied the relationship between various communication complexity and information complexity lower bound methods through the lens of linear programming.
- Gave new, simplified proofs of previously known relationships with the aim of establishing new relationships.

*Undergraduate Researcher* Summer 2016 - Fall 2016  
CAAR REU, University of Maryland, College Park

- Mentored by Professor Samir Khuller on a project in approximation algorithms for scheduling problems.
- Designed a general algorithmic framework which gives improved approximation guarantees for several scheduling problems.
- Implemented numerous scheduling heuristics and ran numerical experiments on real-world data (Matlab).
- Summarized theoretical and practical improvements in a manuscript (submitted).

*Undergraduate Researcher* Summer 2014, Spring 2017  
University of Maryland, College Park

- Mentored by Professor David Mount on a project in computational geometry.
- Created space-efficient data structure for solving geometric proximity search problems (range searching, nearest neighbor searching) by transforming tree-based structures into compact linear bit strings.
- Studied new techniques like locality sensitive hashing for geometric data structure problems.
- Delivered oral presentation of results at CCCG 2014 in Halifax, Nova Scotia.

Johns Hopkins University Applied Physics Lab, Laurel, MD

- Mentored by Dr. Anurag Dwivedi.
- Developed graph analytics and visualization tool to analyze critical infrastructure (Matlab).
- Researched and implemented efficient heuristic algorithms for NP-Hard optimization problems (Matlab).
- Developed a custom REST web service to provide integration with large-scale, distributed graph database (Java, MySQL, Apache TinkerPop, Apache Tomcat, GraphML).
- Improved mission visualization software to translate graph analytics into mission dependency models (Java, Matlab, XML).

**PRESENTATIONS**

- “On Characterizing the Relationship between Lower Bound Methods in Communication Complexity,” J. Liu and P. Venkat.
  - Joint Center for Quantum Information and Computer Science (QuICS) Special Seminar. University of Maryland, College Park. August 2017.
  - Joint CAAR REU and Salisbury REU Poster Session. University of Maryland, College Park. July 2017.
- “Online Concurrent Open Shop Scheduling.” J. Li, P. Sturmfels, K. Sun, and P. Venkat. Joint CAAR REU and Salisbury REU Poster Session. University of Maryland, College Park. August 2016.
- “On Parameter-free LSH for Spherical Range Reporting by Ahle, Aumüller, and Pagh.” P. Venkat. Computational geometry reading group seminar. University of Maryland, College Park. April 2017.
- “On the polynomial partitioning method by Guth and Katz.” P. Venkat. Computational geometry reading group seminar. University of Maryland, College Park. November 2014.
- “On the Szemerédi-Trotter Theorem.” P. Venkat. Computational geometry reading group seminar. University of Maryland, College Park. September 2014.
- ‘A Succinct, Dynamic Data Structure for Proximity Queries on Point Sets.’ P. Venkat. Canadian Conference on Computational Geometry (CCCG) 2014. Dalhousie University, Halifax, Nova Scotia, Canada. August 2014.

**COURSES**

- Computer Science: Object Oriented Programming, Introduction to Computer Systems, Organization of Programming Languages, Machine Learning, Design and Analysis of Algorithms, Computational Methods, Cryptography, Introduction to Quantum Information Processing (graduate-level), Computer Vision (current), Computational Cancer Biology (graduate-level, current).
- Mathematics: Linear Algebra, Differential Equations, Discrete Math, Combinatorics and Graph Theory, Analysis, Abstract Algebra, Field Theory, Topology, Probability Theory.

**SERVICE AND TEACHING***Banneker-Key Peer Mentor*

2016-Present

University of Maryland, College Park

- Mentored three computer science freshman Banneker-Key Scholarship recipients on selecting courses, pursuing research and internship opportunities, and preparing for future career endeavors.

*Computer Science Department Tutor*

2016-Present

University of Maryland, College Park

- Tutored several undergraduate students in algorithms and discrete math courses every week for entire semester.

*External reviewer for DCC*

2015