

# Gary Peng

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## RESEARCH INTERESTS

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I am broadly interested in mechanism design and algorithms/complexity. I am currently working on **profit maximization in bilateral trade** and **hardness of approximation for (bi)clique**.

## EDUCATION

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### University of Maryland

Fall 2022 – Spring 2026

*Bachelor of Science, Computer Science and Mathematics*

GPA: 4.00 / 4.00

## RESEARCH EXPERIENCE

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### University of Maryland

January 2024 - Present

*Advisors: MohammadTaghi Hajiaghayi, Suho Shin*

- Showed that the approximation ratio to the first-best gains-from-trade can be arbitrarily close to zero in bilateral trade with a profit-maximizing broker
- Proved that a simple single-sample mechanism simultaneously achieves constant-factor approximations to the first-best gains-from-trade, first-best social welfare, and optimal profit in certain regimes of bilateral trade

### Rutgers University

April 2025 - Present

*Advisor: Karthik C.S.*

- Collaborated with two other undergraduates to prove super-linear lower bounds for the gap-clique and gap-biclique problems when the parameters are certain small constants
- Discovered a simple proof bypassing the highly non-trivial PCP Theorem that any constant-approximation for the clique problem requires  $n^{\Omega(\log n)}$  time under the Exponential Time Hypothesis

## INTERNSHIPS

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### DIMACS Research Experience for Undergraduates, Rutgers University

Summer 2025

*Advisor: Karthik C.S.*

### Director's Summer Program, National Security Agency (*regretfully declined*)

Summer 2025

## AWARDS & HONORS

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### John D. Gannon Scholarship

July 2025

*Department of Computer Science, University of Maryland*

Award Amount: \$3,243.04

### Philip Merrill Presidential Scholar

May 2025

*University of Maryland*

### Abramowitz Award

May 2025

*Department of Mathematics, University of Maryland*

Award Amount: \$1,000.00

### Honorable Mention for Outstanding Undergraduate Researcher Award

January 2025

*Computing Research Association*

### President's Scholarship

February 2022

*University of Maryland*

Award Amount: \$12,000.00 (annually)

### Platinum Contestant

April 2021

*USA Computing Olympiad*

## ACCEPTED PAPERS

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### **Gains-from-Trade in Bilateral Trade with a Broker**

**SODA25**

*Ilya Hajiaghayi, MohammadTaghi Hajiaghayi, Gary Peng, Suho Shin*

## SUBMITTED PAPERS

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### **Single-Sample Bilateral Trade with a Broker**

*MohammadTaghi Hajiaghayi, Gary Peng, Suho Shin*

## WORKING PAPERS

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### **The Sample Complexity of Profit Maximization in Bilateral Trade**

*MohammadTaghi Hajiaghayi, Gary Peng, Suho Shin*

### **On Inapproximability of Cliques and Bicliques of Small Size**

*Reina Itakura, Karthik C.S., Mayank Motwani, Gary Peng*

## PROFESSIONAL SERVICE

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### **External Reviewer**

**SODA26**

## TEACHING EXPERIENCE

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### **Calculus II (MATH141), University of Maryland**

**Spring 2025**

*Strauss Teaching Assistant*

### **Calculus I (MATH140), University of Maryland**

**Fall 2024**

*Strauss Teaching Assistant*

### **Design and Analysis of Computer Algorithms (CMSC451), University of Maryland**

**Summer 2024**

*Teaching Assistant*

### **Discrete Structures (CMSC250), University of Maryland**

**Spring 2023**

*Teaching Assistant*