

Justin Yirka

Candidate for B.S. in Computer Science and B.S. in Mathematical Sciences
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Research Interests

Quantum computing, Algorithms, Complexity Theory

Education

B.S. in Computer Science

2014 - 2018

B.S. in Mathematical Sciences - concentration in Pure Math

Dual degree program

Virginia Commonwealth University (VCU), Richmond, VA

- Minor in Physics
- Candidate for University Honors
- GPA: 3.97

International Baccalaureate Diploma

2014

Gar-Field Senior High School, Woodbridge, VA

- IB Diploma score: 37 out of possible 45 (88th percentile globally).

Research

Research Internships

Quantum Computing Lab, Virginia Commonwealth University

Fall 2017 – current

Supervisor: Sevag Gharibian, Ph.D.

2015 – 2016

Topic: Computational complexity of local physical problems, quantum oracle classes, quantum variant of Polynomial Hierarchy

Joint Center for Quantum Information and Computer Science (QuICS),
University of Maryland (UMD)

Summer 2017

Supervisor: Andrew Childs, Ph.D.

Topic: Pure-state tomography with Pauli observables

Research Papers

S. Gharibian and J. Yirka. The complexity of simulating local measurements on quantum systems.

Available at <https://arxiv.org/abs/1606.05626>

To appear in:

Proceedings of 12th Conference on the Theory of Quantum Computation, Communication, and Cryptography (TQC 2017).

Contributed talk:

12th Conference on the Theory of Quantum Computation, Communication, and Cryptography (TQC 2017). Presented by S. Gharibian.

2017

Poster presentation:

20th conference on Quantum Information Processing (QIP 2017).

2017

Presented under a different title.

Invited talk:

Weekly department seminar, Department of Computer Science, VCU 2016
Only undergraduate to be invited within previous 5 years.

J. Yirka. Evaluation of TCP header fields for data overhead efficiency.

Available at <http://scholarscompass.vcu.edu/uresposters/148/>

Poster presentations:

- 30th National Conference on Undergraduate Research (NCUR 2016) 2016
- VCU Symposium for Undergraduate Research and Creativity 2015

Awarded "Launch Award" for Outstanding Research Poster.

Independent Studies

Convex Optimization (CMSC 601), Virginia Commonwealth University Fall 2017
Studied material for graduate optimization course as an undergraduate.
Only undergraduate to receive independent study approval in Computer Science in Fall 2017.

Funding and Scholarships

Presidential Scholarship 2014 - 2018
 Virginia Commonwealth University. Approx. \$110,000 USD.
 Details: Top scholarship offered. Full cost of 4-year tuition, room, and board.

Event grants for RamDev software club talks (see below) 2016 - current
 Student Government Association, VCU. Approx \$1,400 USD to date.

NSF Research Experience for Undergraduates (REU). 2017
 Combinatorics and Algorithms for Real Problems REU, UMD. Apprx. \$6,000 USD.
 P.I.: William Gasarch, Ph.D.
 Details: Stipend and housing to fund summer research internship with UMD QuICS.

Travel grant for poster presentation at QIP 2017 2017
 VCU Honors College. \$500 USD.

Travel grant for poster presentation at NCUR 2016 2016
 VCU Honors College. Approx. \$550 USD.

Presidential Scholarship *[declined]* 2014
 Worcester Polytechnic Institute. Approx. \$80,000 USD.

Rensselaer Medal Merit Scholarship *[declined]* 2014
 Rensselaer Polytechnic Institute. Approx. \$100,000 USD.

Teaching Experience**Instructor**

Lifeguard, first aid, and management certification courses, 2016 - current
 Prince William County Department of Parks and Recreation, Woodbridge, VA
 Planned, lead, and co-taught critical, non-traditional classes of up to 40 students.

Teaching Assistant

Algebra with Applications (MATH 141), Virginia Commonwealth University 2016 - 2017
 Assisted with in-class exercises, offered weekly tutoring sessions, graded assignments. 2 semesters
 Details: First-year mathematics course. Up to 28 students.
 Average student evaluation scores - Fall 2016: 4.78 / 5.0, Spring 2017: 4.36 / 5.0

Honors Rhetoric (HONR 200), Honors College, Virginia Commonwealth University	2015
Critiqued student papers, assisted with in-class work, advised on research practices.	1 semester
Details: First-year honors writing and composition course. 17 students.	

Mentor

1 st year student, Virginia Commonwealth University	2016
Part of VCU Honors freshman mentorship program.	

Awards and Honors

Dean's List – ten-time recipient	2014 - 2017
VCU School of Engineering, VCU College of Humanities & Sciences	
University Student Scholar Award	2015
Virginia Commonwealth University	
Launch Award for Outstanding Research Poster	2015
VCU Poster Symposium for Undergraduate Research and Creativity	
Volunteer of the Year	2014
Prince William County Schools, VA	
Details: Awarded for commitment to grade school robotics program.	

Service

Organization Service

Founder and President	2016 - current
RamDev: Software Development at VCU	
Details: <ul style="list-style-type: none"> ○ Secured and managed over \$2000 in funding and resources. ○ Coordinate weekly seminars featuring industry, faculty, and student speakers. ○ Increased attendance to 20 students weekly – <i>now largest C.S. organization at VCU.</i> 	

University Service

Student Advisory Board member	2016 - current
Department of Computer Science, Virginia Commonwealth University	
Details: <ul style="list-style-type: none"> ○ Work with professors to address student concerns. ○ Engage undergraduate and recruit high school students. ○ Invited to School of Engineering Strategic Planning Retreat, 2017. ○ Participated in hiring interviews for new faculty and instructors. 	
Senior Reader, Senior Honors graduation dossiers	2016 - current
Honors College, Virginia Commonwealth University	
Details: Review final papers submitted in fulfillment of University Honors. Coordinate other readers.	
Panelist (representing research careers), Career Workshop for freshman mentorship program	2017
Computer Science Department, Virginia Commonwealth University	
Panelist, Undergraduate conference preparation sessions	2017
Honors College, Virginia Commonwealth University	
Organizer, Local Hack Day of Richmond, VA hosted at VCU	2016
Hosted through RamDev software club (see above).	
Details: Planned and hosted an event for over 30 students including 12 high school students.	

Judge, Launch award for Outstanding Research Poster 2016
VCU Symposium for Undergraduate Research and Creativity

Community Service

Volunteer, FIRST and Vex robotics competitions 2011 - 2015
Prince William County Schools, VA

Mentor, FIRST Tech Challenge robotics team 2014
Wilder Middle School, Richmond, VA

Courses, Skills, and Additional Projects

Selected Courses:

- Theory of Computation – 2016
- Computer Architecture – 2016
- Algorithms and Data Structures – 2016
- Operating Systems – 2016
- Software Engineering – 2016
- Intro to Artificial Intelligence – 2016
- Intro to Data Science – 2016
- Programming Languages – 2017
- Intro to Natural Language Processing – 2017
- Convex Optimization – 2017
- Multivariate Calculus – 2015
- Differential Equations – 2015
- Linear Algebra – 2015
- Mathematical Reasoning / Proofs – 2015
- Intro to Statistics - 2016
- Graphs and Algorithms – 2016
- Abstract Algebra – 2016
- Real Analysis – 2017
- Topology – 2017
- Physics Visualization w/ *Mathematica* – 2017

Technical Skills

LaTeX, Git, Java, C++, C, Python, Perl (with NLP applications), Android development, Mathematica, Weka (Data Science), Lua

Selected Software Projects:

Senior Project: Campus Bluetooth tag network 2017 - current
Two-semester capstone project for VCU Computer Science degree.

Group project developing system for VCU campus implementing Crowd GPS model to locate users' tagged items. Implementing iOS and Android, applying security considerations from literature.

Course Project: "GeoViewer" Android app 2016
Semester project for VCU CMSC 355: Software Engineering.
Group project in Agile development. Enables users to visit geocached photos shared by other users. Implemented in Java with Android Studio, using AWS and Google Maps APIs.

Hackathon Project: Run planning program implemented in Mathematica 2016
Developed at RamHacks 2016 hackathon.
Utilizes GPS data to calculate and plot jogging route of a given distance along city road network.

Hackathon Project: "GroupMe Stats" Android app 2016
Developed at VT Hacks 2016 hackathon.
Uses *GroupMe* API to provide users with interesting statistics on Android platform.

Zero Robotics International Space Station Programming Challenge 2012 – 2014
Competed in MIT sponsored robotics competition controlling SPHERES satellites aboard ISS.
Implemented in C++.
Team qualified for international finals two years in a row. Served as Code Lead 2013 - 2014.