**Justin Yirka**

*Curriculum Vitae*

B.S. in Computer Science and B.S. in Mathematics

Virginia Commonwealth University, Richmond, VA, USA

[YirkaJk@vcu.edu](mailto:YirkaJk@vcu.edu)

(703) 229-7956

[www.linkedin.com/in/yirkajk](http://www.linkedin.com/in/yirkajk)

**Research Interests**

Quantum computing, algorithms, complexity theory

**Education**

**B.S. in Computer Science** – specialization in Data Science

**B.S. in Mathematical Sciences** – concentration in Pure Math

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| *Dual-degree* – Virginia Commonwealth University (VCU) (Richmond, VA, USA) | 2014 – 2018 |

* GPA 3.97 / 4.0
* Minor in Physics
* University Honors

**Research** (hyperlinks embedded in titles when available)

**Internships**

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| --- | --- |
| Graph Theory Computational Discovery Lab (“Graph Brain Project”), VCU  Supervisor: Craig Larson, Ph.D. | Summer 2018 |

Topic: Necessary and sufficient conditions for graph hamiltonicity.

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| Joint Center for Quantum Information and Computer Science (QuICS),  University of Maryland (UMD) | Summer 2017 |

Supervisor: Andrew Childs, Ph.D.

Topic: Quantum tomography, pure-state tomography with Pauli observables.

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| Quantum Computing Lab, VCU  Supervisor: Sevag Gharibian, Ph.D. | 2015 – 2016 |

Topics: Quantum computational complexity, complexity of local measurements, quantum oracle classes (e.g. ), quantum variant of the polynomial hierarchy.

**Pre-prints**

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| S. Gharibian, S. Piddock, and *J. Yirka*. Local measurements on physical Hamiltonians and oracle complexity classes. | 2018 |

Preprint available soon.

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| S. Gharibian, M. Santha, J. Sikora, A. Sundaram, and *J. Yirka*. Quantum generalizations of the polynomial hierarchy with applications to QMA(2). | 2018 |

Preprint available soon.

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| [S. Gharibian and *J. Yirka*. The complexity of simulating local measurements on quantum systems.](https://arxiv.org/abs/1606.05626)  Preprint available at: <https://arxiv.org/abs/1606.05626> | 2017 |

**Conferences**

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| S. Gharibian and *J. Yirka*. The complexity of simulating local measurements on quantum systems.  12th Conference on the Theory of Quantum Computation, Communication, and Cryptography (TQC 2017). | 2017 |

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| S. Gharibian and J. Yirka. [The complexity of simulating local measurements on quantum systems.](yirkajk.github.io/QIP_Poster_2017_v6_final.pdf)  20th Conference on Quantum Information Processing (QIP 2017). Presented under a different title. | | 2017 |
| [J. Yirka. Evaluation of TCP header fields for data overhead efficiency.](http://scholarscompass.vcu.edu/uresposters/148/)  30th National Conference on Undergraduate Research (NCUR 2016). | 2016 | |
| [J. Yirka. Evaluation of TCP header fields for data overhead efficiency.](http://scholarscompass.vcu.edu/uresposters/148/)  VCU Symposium for Undergraduate Research and Creativity.  **Awarded:**“Launch Award” for Outstanding Research Poster*.* | 2015 | |

**Research Seminars**

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| [Pure state tomography with Pauli observables.](http://quics.umd.edu/events/tba-16) | 2017 |

Department seminar at UMD QuICS.

Discussed partial results from summer internship.

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| [Quantum complexity of estimating local physical quantities.](yirkajk.github.io/csseminar-3-25-16-flyer.pdf)  Department of Computer Science, VCU  *Only undergraduate invited in previous 5 years.* | 2016 |

**Talks for general audiences**

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| Computer Science theory *is* fun.  Seminar for VCU RamDev software club. | 2018 |

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| Quantum programming. | 2017 |

Seminar for VCU RamDev software club.

Discussed quantum computing software (e.g. IBM Q, LIQ*UI*).

**Independent Studies**

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| Convex Optimization (CMSC 601), VCU. | Fall 2017 |

Independently studied material for graduate optimization course as an undergraduate.

*Only undergraduate to receive independent study approval in computer science in Fall 2017.*

**Scholarships** (all dollar amounts in USD)

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| Presidential Scholarship  ~$110,000. VCU.  Top scholarship offered. Full cost of 4-year tuition, room, and board.  *Awarded to ~0.6% of students.* | 2014 – 2018 | |
| Presidential Scholarship *[unable to accept]*  ~$80,000. Worcester Polytechnic Institute. | | 2014 |
| Rensselaer Medal Merit Scholarship *[unable to accept]*  ~$100,000. Rensselaer Polytechnic Institute. | | 2014 |

**Funding** (all dollar amounts in USD)

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| Funding for *RamDev* software club seminars  ~$1,900. VCU Student Government Association. | 2016 – 2018 | |
| NSF Research experience for undergraduates (REU).  ~$6,000. Combinatorics and Algorithms for Real Problems REU, UMD.  Stipend and housing to fund summer research internship with UMD QuICS.  Acceptance rate: ~11%. | | 2017 |
| Travel grant for poster presentation at QIP 2017  $500. VCU Honors College. | | 2017 |
| Travel grant for poster presentation at NCUR 2016  ~$550. VCU Honors College. | | 2016 |

**Awards and Honors**

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| Pure Mathematics Award  VCU College of Humanities and Sciences  Awarded to student in pure mathematics concentration with highest graduating GPA. | 2018 |
| Mark A. Sternheimer Capstone Design Award  VCU School of Engineering  For “innovation and entrepreneurship” of senior project developing mobile app.  Awarded to 23% of teams in 2016. Included grant of $660. | 2017 |
| University Student Scholar Award, VCU | 2015 |
| Launch Award for Outstanding Research Poster  VCU Symposium for Undergraduate Research and Creativity | 2015 |
| Volunteer of the Year  Grade-school robotics program, Prince William County Schools, VA | 2014 |

**Teaching Experience**

**VCU**

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| Teaching Assistant for *Algebra with Applications* (MATH 141) | (2 semesters) 2016 – 2017 |

Assisted with in-class work, offered tutorials, graded assignments. Up to 28 students.  
Average student evaluation scores – Fall 2016: 4.78 / 5.0, Spring 2017: 4.36 / 5.0

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| Mentor for 1st year student  VCU Honors freshman mentorship program | Fall 2016 |

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| Teaching Assistant for *Honors Rhetoric* (HONR 200) | Fall 2015 |

Assisted with in-class work and critiqued papers. First-year writing course. 17 students.

**Service**

**University service (VCU)**

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| Student Advisory Board member  Department of Computer Science | | 2016 – 2018 |
| Details: | **Invited to:** School of Engineering Strategic Planning Retreat, 2017. (*Only CS undergrad*)  **Invited to:** Participated in hiring interviews for new faculty and instructors, 2017.  (*One of only two students to participate*) | |

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| Senior Reader: Honors graduation dossiers | (2 academic years) 2016 – 2017 |

Honors College

Assess papers submitted in fulfillment of University Honors. Coordinate other readers.

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| Panelist, Career Workshop for freshman mentorship program  Department of Computer Science | 2017 |

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| Panelist, Undergraduate conference preparation sessions  Honors College | 2017 |

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| Judge, Launch award for Outstanding Research Poster | 2016 |

VCU Symposium for Undergraduate Research and Creativity

**Extracurricular service (VCU)**

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| Founder and President, *RamDev: Software Development at VCU* | | 2016 – 2018 |
| Details: | Coordinated 46 weekly seminars, including 9 corporate speakers.  Secured and managed over $2400 in funding and resources.  *Increased attendance to 20 students weekly, becoming largest C.S. organization at VCU.* | |

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| Organizer, Local Hack Day of Richmond, VA hosted at VCU | 2016 |

Planned and hosted event for over 30 students including 12 high school students.

**Community service**

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| Volunteer, *FIRST* and *Vex* robotics competitions  Prince William County Schools, VA  Awarded: “Volunteer of the Year,” for commitment to grade school robotics program. | 2011 – 2015 | |
| Mentor, *FIRST Tech Challenge* robotics team  Wilder Middle School, Richmond, VA | | 2014 |

**Additional Employment**

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| Instructor for CPR, first-aid, and lifeguarding courses  Department of Parks and Recreation, Prince William County, VA  Plan, lead, and co-teach critical, non-traditional courses of up to 40 students. | 2016 – 2018 |