Justin Yirka

Curriculum Vitae
B.S. in Computer Science and B.S. in Math
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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
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

Graph Theory Computational Discovery Lab ("Graph Brain Project"), VCU   Summer 2018
    Supervisor: Craig Larson, Ph.D.
    Topic: Necessary and sufficient conditions for graph hamiltonicity.

Joint Center for Quantum Information and Computer Science (QuICS),   Summer 2017
University of Maryland (UMD)
    Supervisor: Andrew Childs, Ph.D.
    Topic: Quantum tomography, pure-state tomography with Pauli observables.

Quantum Computing Lab, VCU   2015 – 2016
    Supervisor: Sevag Gharibian, Ph.D.
    Topics: Quantum computational complexity, complexity of local measurements, quantum oracle
        classes (e.g. $P^{QMA[log]}$), quantum variant of the polynomial hierarchy.

Pre-prints

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

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

S. Gharibian and *J. Yirka*. The complexity of simulating local measurements on quantum systems.   2017
  Preprint available at: https://arxiv.org/abs/1606.05626

Conferences

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

S. Gharibian and J. Yirka. The complexity of simulating local measurements on quantum systems.   2017
20th Conference on Quantum Information Processing (QIP 2017). Presented under a different title.

J. Yirka. Evaluation of TCP header fields for data overhead efficiency.   2016
30th National Conference on Undergraduate Research (NCUR 2016).

J. Yirka. Evaluation of TCP header fields for data overhead efficiency.   2015
VCU Symposium for Undergraduate Research and Creativity.
  Awarded: "Launch Award" for Outstanding Research Poster.

Research Seminars

Pure state tomography with Pauli observables.   2017
Department seminar at UMD QuICS.
  Discussed partial results from summer internship.

Quantum complexity of estimating local physical quantities.   2016
Department of Computer Science, VCU
  Only undergraduate invited in previous 5 years.

Talks for general audiences

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

Quantum programming.   2017
Seminar for VCU RamDev software club.
  Discussed quantum computing software (e.g. IBM Q, LIQ*UI*⟩).

Independent Studies

                                 Fall 2017
Convex Optimization (CMSC 601), VCU.
  Independently 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   (all dollar amounts in USD)

Presidential Scholarship   2014 – 2018
~$110,000. VCU.
  Top scholarship offered. Full cost of 4-year tuition, room, and board.
  Awarded to ~0.6% of students.

Funding for *RamDev* software club seminars	2016 – 2018

~$1,900. VCU Student Government Association.

NSF Research experience for undergraduates (REU).	2017

~$6,000. Combinatorics and Algorithms for Real Problems REU, UMD.
    Stipend and housing to fund summer research internship with UMD QuICS.
    Acceptance rate: ~11%.

Travel grant for poster presentation at QIP 2017	2017

$500. VCU Honors College.

Travel grant for poster presentation at NCUR 2016	2016

~$550. VCU Honors College.

Presidential Scholarship *[unable to accept]*	2014

~$80,000. Worcester Polytechnic Institute.

Rensselaer Medal Merit Scholarship *[unable to accept]*	2014

~$100,000. Rensselaer Polytechnic Institute.

Awards and Honors

Pure Mathematics Award	2018

VCU College of Humanities and Sciences
    Awarded to student in pure mathematics concentration with highest graduating GPA.

Mark A. Sternheimer Capstone Design Award	2017

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.

University Student Scholar Award, VCU	2015

Launch Award for Outstanding Research Poster	2015

VCU Symposium for Undergraduate Research and Creativity

Volunteer of the Year	2014

Grade-school robotics program, Prince William County Schools, VA

Teaching Experience

VCU

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

Mentor for 1st year student	Fall 2016

    VCU Honors freshman mentorship program

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)

Student Advisory Board member   2016 – 2018
Department of Computer Science
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*)

Senior Reader: Honors graduation dossiers   (2 academic years) 2016 – 2017
Honors College
        Assess papers submitted in fulfillment of University Honors. Coordinate other readers.

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

Panelist, Undergraduate conference preparation sessions   2017
Honors College

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

Extracurricular service (VCU)

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.

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

Volunteer, *FIRST* and *Vex* robotics competitions   2011 – 2015
        Prince William County Schools, VA
        Awarded: "Volunteer of the Year," for commitment to grade school robotics program.

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

Additional Employment

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