Justin Yirka *Curriculum Vitae*

Candidate for B.S. in Computer Science and B.S. in Math
Virginia Commonwealth University, Richmond, VA, USA

Email: YirkaJk@vcu.edu | Phone: (703) 229-7956
LinkedIn: www.linkedin.com/in/yirkajk

Research Interests

Quantum computing, Algorithms, Complexity theory

Education

B.S. in Computer Science 2014 – 2018
B.S. in Mathematical Sciences - concentration in Pure Math 2014 – 2018
Virginia Commonwealth University (Richmond, VA, USA) – *Dual degree program*
GPA: 3.97 / 4.0 | Minor in Physics | University Honors

International Baccalaureate Diploma, Gar-Field High School 2014
IB Diploma score: 37 out of possible 45 (88th percentile globally).

Research

Internships

Quantum Computing Lab, Virginia Commonwealth University Fall 2017 – current
Supervisor: Sevag Gharibian, Ph.D. 2015 – 2016
Topics: Complexity of local measurements, quantum oracle classes (e.g. $P^{QMA[log]}$), quantum variant of the polynomial hierarchy.

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

Publications and Talks

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). 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 presentation: 30th National Conference on Undergraduate Research (NCUR 2016) 2016
Poster presentation: VCU Symposium for Undergraduate Research and Creativity 2015
Awarded: "Launch Award" for Outstanding Research Poster.

Additional Talks

Pure state tomography with Pauli observables. 2017
Invited talk at UMD QuICS discussing partial results from summer internship.

"Quantum programming." 2017
Contributed talk to *RamDev* software club at VCU on quantum computing software (e.g. IBM Q, LIQ*UI*⟩)

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.

Teaching Experience

Instructor for CPR, First-aid, & Lifeguard certification courses 2016 – current
Department of Parks and Recreation, Prince William County, VA
Plan, *lead*, and *co-teach* critical, non-traditional courses of up to 40 students.

Teaching Assistant for *Algebra with Applications* (MATH 141) (2 semesters) 2016 – 2017
Virginia Commonwealth University
Assisted with class exercises, offered weekly tutoring sessions, 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) (1 semester) Fall 2015
Virginia Commonwealth University
Critiqued student papers, assisted with in-class work, advised on research practices. 17 students.
Details: First-year honors writing and composition course.

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

- **Presidential Scholarship** 2014 – 2018
  Virginia Commonwealth University. Approx. $110,000.
  Top scholarship offered. Full cost of 4-year tuition, room, and board.
- **Event grants for RamDev software club seminars (see below)** 2016 – current
  VCU Student Government Association. Approx. $1,400 to date.
- **NSF Research Experience for Undergraduates (REU).** 2017
  Combinatorics and Algorithms for Real Problems REU, Univ. of Maryland. Apprx. $6,000.
  Stipend and housing to fund summer research internship with UMD QuICS.
- **Travel grant for poster presentation at QIP 2017** 2017
  VCU Honors College. $500.
- **Travel grant for poster presentation at NCUR 2016** 2016
  VCU Honors College. Approx. $550.
- **Presidential Scholarship *[declined]*** 2014
  Worcester Polytechnic Institute. Approx. $80,000.
- **Rensselaer Medal Merit Scholarship *[declined]*** 2014
  Rensselaer Polytechnic Institute. Approx. $100,000.

Service

Founder and President, *RamDev: Software Development at VCU* 2016 – current

Details:
- Coordinated over 37 weekly seminars *to-date*, including 6 corporate speakers.
- Secured and managed over $2000 in funding and resources.
- *Increased attendance to 20 students weekly – now largest C.S. organization at VCU.*

Student Advisory Board member 2016 – current

Department of Computer Science, Virginia Commonwealth University

Details:
- Work with faculty and students to improve quality of undergraduate program.
- **Invited to**: School of Engineering Strategic Planning Retreat, 2017.
- **Invited to:** Participated in hiring interviews for new faculty and instructors, 2017.

Senior Reader: Honors graduation dossiers, Virginia Commonwealth University 2016 – 2017

Reviewed final papers submitted in fulfillment of University Honors. Coordinated other readers.

Panelist, 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).
Planned and hosted 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

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

Awards and Honors

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 grade-school robotics program

Additional Employment

Waterpark Supervisor 2011 – 2016

Department of Parks and Recreation, Prince William County, VA

Worked summers. On-site manager for staff of 12 in aquatics, safety, concessions, and cash handling.

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
- Physics Visualization w/ *Mathematica* – 2017
- Multivariate Calculus – 2015
- Differential Equations – 2015
- Linear Algebra – 2015
- Mathematical Reasoning / Proofs – 2015
- Intro to Statistics - 2016
- Graph Theory and Algorithms – 2016
- Abstract Algebra – 2016
- Real Analysis – 2017
- Topology – 2017
- Complex Analysis – 2018
- Linear Alg. applications in Graph theory - 2018

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.