Justin Yirka

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

Virginia Commonwealth University (VCU) **Richmond, VA**
B.S. in Computer Science *(Dual degree program) 2018*
B.S. in Mathematical Sciences, GPA: 3.98 out of 4.0
Specialization in Data Science, Minor in Physics
Supported by VCU Presidential Scholarship

Research

Experience

Graph Theory Computational Discovery Lab, VCU
Research Assistant *Summer 2018*
Supervisor: Craig Larson, Ph.D.
Topic: Use of automated conjecturing software (Python) to find conditions for graph hamiltonicity.

Joint Center for Quantum Information and Computer Science (QuICS), University of Maryland (UMD)
NSF REU Undergraduate Researcher *Summer 2017*
Supervisor: Andrew Childs, Ph.D.
Topic: Quantum tomography. Pure-state tomography with Pauli observables.
Support: NSF Research Experience for Undergraduates (REU). P.I.: William Gasarch, Ph.D.

Quantum Computing Lab, VCU
Undergraduate Research Assistant *2015–2016*
Supervisor: Sevag Gharibian, Ph.D.
Topics: Quantum computational complexity. Complexity of local physical problems, quantum oracle classes (e.g. $\mathrm{P}^{\mathrm{QMA[log]}}$), quantum variants of the polynomial hierarchy.

Preprints

Sevag Gharibian, Stephen Piddock, and **Justin Yirka**. "Local measurements on physical Hamiltonians and oracle complexity classes". Preprint available soon.

Sevag Gharibian, Miklos Santha, Aarthi Sundaram, and **Justin Yirka**. "Quantum generalizations of the polynomial hiearchy with applications to QMA(2)". Preprint available soon.

Sevag Gharibian and **Justin Yirka**. "The complexity of simulating local measurements on quantum systems". Available at https://arxiv.org/abs/1606.05626 [quant-ph]. 2016.

Conference presentations

Sevag Gharibian and **Justin Yirka**. *The complexity of simulating local measurements on quantum systems*. Contributed talk by S. Gharibian at 12$^{\text{th}}$ Conference on the Theory of Quantum Computation, Communication, and Cryptography (TQC). 2017.

Sevag Gharibian and **Justin Yirka**. *The complexity of estimating local physical quantities*. Poster at 20$^{\text{th}}$ Conference on Quantum Information Processing (QIP). 2017.

Justin Yirka. *Evaluation of TCP header fields for data overhead efficiency*. Poster at 30$^{\text{th}}$ National Conference on Undergraduate Research (NCUR). 2016.

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

Department seminars

Pure state tomography with Pauli observables. QuICS, University of Maryland. 2017.
Quantum complexity of estimating local physical quantities. Department of Computer Science, VCU. 2016. — **Only undergraduate invited in previous 5 years**.

Public-audience talks

Computer Science theory is *fun*. VCU RamDev software development club. 2018.
Quantum programming (e.g. IBM Q, LIQ$Ui|\rangle$*)*. VCU RamDev software development club. 2017.

Programming Experience

Languages: Java, C, Python, Sage, Perl, Wolfram Language, Lua

Software: LaTeX, git, Unix, Android & mobile apps, Mathematica, Weka, AutoCAD

Software Engineering coursework: Software Engineering (Agile, Android), Algorithm Analysis, Programming Languages (C, Python, Racket), Introduction to Operating Systems, Object Oriented Programming (Java)

Applications coursework: Convex Optimization (graduate course), Introduction to Natural Language Processing (assignments in Perl), Introduction to Data Science (Weka), Artificial Intelligence (neural networks), Graphs and Algorithms, Visualization of Physics with Mathematica

Projects

Graph Brains Project — Graph Theory Computational Discovery Lab, VCU
Python *Summer 2018*
Implement functions for calculating graph properties. Manage known examples and properties in Python and SQL. Improve project structure, documentation, and usability.

***Campus Bluetooth tag network* — Senior project**
Java, Swift, Python, Android, iOS, Raspberry Pi / Unix, Google Firebase *(2 semesters) 2017–2018*
Team project developing campus item-tracking system implementing Android, iOS, and Raspberry Pi programs to locate users' items tagged with BLE beacons.

***GeoViewer* Android app — Software Engineering course project**
Java, Android, Amazon AWS *Fall 2016*
Team project with focus on Agile development. Implemented Android app enabling users to share and discover geocached photos.

***Run Planner* Mathematica program — RamHacks hackathon**
Wolfram Language, Mathematica *2016*
Developed program utilizing opensource GPS data to take as input a starting location and a distance goal and output a jogging route of that distance along the city road network.

***GroupMe Stats* Android app — VTHacks hackathon**
Java, Android *2016*
Team project developing app to use GroupMe API to retrieve information about user's GroupMe conversations and provide interesting statistics to the user.

Vex, FIRST, and Zero (Interational Space Station) robotics competitions
C++ *2010–2014*

***After-school student manager* and *Padlock database* Java programs**
Java *2012–2013, 2013–2014*
Course projects with emphasis on software life cycle and OOP. Evaluated requirements and implemented database programs with GUI for real-world use by the school.

VA Governor's Cybersecurity Cup
Networking fundamentals (e.g. TCP/IP, OSI model) *Fall 2012*
Learned and competively demonstrated cybersecurity fundamentals with a focus on network security. Qualified for invitation to 2013 VA Governor's Cybersecurity Conference and CTF.

iOS game
Lua, iOS *2011–2012*
Designed and implemented an iPhone game, including graphics, in fulfillment of academic project.

Extracurricular Experience

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

Awards and Honors

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

Mark A. Sternheimer Capstone Design Award
VCU School of Engineering *2017*
For "innovation and entrepreneurship" of senior project developing mobile app.
Included grant of $660.

Launch Award for Outstanding Research Poster
VCU Symposium for Undergraduate Research and Creativity *2015*

Presidential Scholarship *[unable to accept]*
$80,000, Worcester Polytechnic Institute *2014*

Rensselaer Medal Merit Scholarship *[unable to accept]*
$100,000, Rensselaer Polytechnic Institute *2014*