Steven Roberts | Curriculum Vitae

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Education

Virginia Tech
Ph.D. Student in Computer Science, 3.97 GPA — *Fall 2016 – present*

Virginia Tech
B.S. in Computer Science and B.S. in Mathematics, 3.98 GPA — *Fall 2012 – Spring 2016*
Highest GPA in both graduating classes

Skills and Qualifications

Programming Languages: Proficient in MATLAB and Mathematica, experienced with C (including OpenMP and MPI), CUDA, C++, C#, Python, and Java

Mathematics: Strong background in linear algebra, numerical analysis, and differential equations

Web Development: Experienced in HTML, ECMAScript 2018, Node.js, CSS, SASS, and creating Chrome Extensions

Databases: Experienced with SQL databases and basic querying

Work History

Virginia Tech Computational Science Laboratory
Research Assistant — *Spring 2015 – present*
- Designing, analyzing, and testing new multirate time integrators for numerically solving multiscale differential equations
- Developing new implicit-explicit (IMEX) methods for suitable for stiff problems and differential algebraic equations.
- Creating a new framework for multimethods based on partitioned general linear methods

CS 4234: Parallel Computation
Graduate Teaching Assistant — *Fall 2019*
- Held weekly office hour to help students on assignments
- Taught eight of the classes

Lawrence Livermore National Laboratory
Intern — *Summer 2019*
- Developed new implicit multirate Runge–Kutta methods for solving stiff, multiscale systems of ordinary differential equations
- Compared and implemented variants of multirate backward differentiation formula methods

Lawrence Livermore National Laboratory
Intern — *Summer 2018*
- Implemented and optimized finite element operations for GPUs using CUDA
- Achieved 10 to 100 times speedup over other other CPU and GPU implementations
- Contributed to the open-source project libCEED

NASA Glenn Research Center
Intern — *Summer 2017*

- Created 1D hybrid direct kinetic simulation of a Hall thruster
- Developed software in C++ from the ground up
- Modeled time-dependent velocity distribution functions of various species in plasma
- Gained experience with using the finite volume method, solving integro-differential equations, and using visualization tools

Insurance Institute for Highway Safety

Intern *Summer 2013 – 2016*

- Worked on C# applications for managing vehicle records stored in SQL databases
- Redesigned and updated mobile website
- Set up OAUTH server
- Worked with several frontend web frameworks
- Gained first-hand experience in software development life cycle

Web Developer

Freelance *2016 – present*

- Designed and created websites for two VT Materials Science and Engineering professors' research groups
- Developed four Chrome Extensions used by more than 75,000 users

Volunteer Work and Involvement

Spring 2019 – present: Treasurer of VT Chess Club

Fall 2017 – Fall 2019: Volunteer for VT CSRC Career Fair

2016: Volunteer Math Tutor for Teacher Praxis Preparation

2013 – 2015: Galipatia Academic Committee Member

2014: Volunteer Android app developer for Institute of Industrial Engineers Mid-Atlantic Conference

Recognitions and Accomplishments

Fall 2018 – Spring 2020: Virginia Space Grant Consortium Graduate STEM Research Fellowship Recipient

2017: Davenport Fellowship Recipient

2016 – present: Member of Phi Beta Kappa Honor Society

2016: Winner of VT David Heilman Memorial Award for Outstanding Undergraduate Research

2016: Winner of VT Math Outstanding Senior, Applied Computational Option

2016: Pivot Point Hackathon - Third place

2014 – 2016: Winner of VT CS Sophomore, Junior, and Senior Scholar Awards

2012 – 2016: VT Dean's List with Distinction

Publications

[1] S. Roberts, A. Sarshar, and A. Sandu, "Parallel implicit-explicit general linear methods," *arXiv preprint arXiv:2002.00868*, submitted 2020.

[2] S. Roberts, J. Loffeld, A. Sarshar, C. S. Woodward, and A. Sandu, "Implicit multirate GARK methods," *arXiv preprint arXiv:1910.14079*, submitted 2019.

[3] A. Sarshar, S. Roberts, and A. Sandu, "Alternating directions implicit integration in a general linear method framework," *Journal of Computational and Applied Mathematics*, p. 112619, 2019.

[4] S. Roberts, A. Sarshar, and A. Sandu, "Coupled multirate infinitesimal GARK schemes for stiff systems with multiple time scales," *arXiv preprint arXiv:1812.00808*, submitted 2019.

[5] A. Sarshar, S. Roberts, and A. Sandu, "Design of high-order decoupled multirate GARK schemes," *SIAM Journal on Scientific Computing*, vol. 41, no. 2, pp. A816–A847, 2019.

Conference Presentations

International Conference on Scientific Computation Differential Eqs. **Innsbruck, Austria**
Implicit Multirate GARK Methods *July 23, 2019*
Steven Roberts, John Loffeld, Arash Sarshar, Adrian Sandu, and Carol Woodward

Virginia Space Grant Consortium Student Research Conference **Hampton, VA**
Practical Multirate Time Integration Methods *April 8, 2019*
Steven Roberts, and Adrian Sandu

SIAM Conference on Computational Science and Engineering **Spokane, WA**
Implicit Multirate Generalized Additive Runge–Kutta Methods *March 1, 2019*
Steven Roberts, John Loffeld, Arash Sarshar, Adrian Sandu, and Carol Woodward

Software

ODE Test Problems **0.0.1**
A MATLAB suite of initial value problems
Steven Roberts, Andrey Popov, and Adrian Sandu
`https://github.com/ComputationalScienceLaboratory/ODE-Test-Problems`