Gopal Yalla | Curriculum Vitae

Oden Institute for Computational Engineering and Sciences — University of Texas at Austin
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Education

University of Texas at Austin
Institute for Computational Engineering and Sciences **Austin, TX**
PhD, Computational Science, Engineering, and Mathematics *Expected 2021*
with a concentration in Teaching and Mentoring

University of Texas at Austin
Institute for Computational Engineering and Sciences **Austin, TX**
Masters of Science, Computational Science, Engineering, and Mathematics *2017*

College of the Holy Cross **Worcester, MA**
Bachelor of Arts, Mathematics major, Computer Science minor *2015*
Summa Cum Laude, Mathematics High Honors.

Research Experience

Doctoral Thesis at the University of Texas at Austin **Austin, TX**
Discretization-Dependent LES Modeling for with Applications to the Turbulent Flow in a Wind Farm *2016-Present*
Advisors: Dr. Robert Moser, Dr. Björn Engquist Collaborators: NREL, Sandia National Lab

Investigating the impact of discretization and numerics on practical LES applications and developing models to correct for the deficiencies traditional subgrid stress models encounter in these scenarios.

Collaborative Research at the University of Texas at Austin **Austin, TX**
Parallel in Time Algorithms for Multiscale Dynamical Systems *2015-Present*
PI: Dr. Björn Engquist

Developed a coarse scale scale solver for the *parareal* framework that can be defined through interpolation or a neural network and works for high oscillatory dynamical systems and problems with strong forces localized in time.

Undergraduate Honors Thesis at College of the Holy Cross **Worcester, MA**
Classification and Statistical Analysis of Biofuels *2013-2015*
PI: Dr. Edward Soares Collaborators: Dr. Kevin Walsh, Dr. Amber Hupp

Developed a methodology for the optimization of chromatogram alignment using a class separability measure, and applied results to biodiesel data. Furthermore, machine learning techniques were applied to the optimally aligned data to classify different biodiesels based on their chemical components.

Leadership Alliance, Research Experience for Undergraduates
Program at Brown University **Providence, RI**
On Globally Defined Solutions of the Generalized Constantin-Lax-Majda Equations *2014*
PI: Dr. Johnny Guzman Collaborators: Sami Davis

Investigated the behavior of solutions of the generalized model vorticity equations to provide insight into the global existence and uniqueness of solutions to the Euler equations.

Research Experience for Undergraduates Program at College of the Holy Cross **Worcester, RI**
Linearly Stable Equilibria Utilizing a Dominant Mass *2013*
PI: Dr. Gareth Roberts Collaborators: Margaret Hauser

Investigated the effect of a dominant mass on the linear stability of relative equilibrium in n-body problems.

Publications

2019 **G. R. Yalla**, R. Moser, T. Oliver, S. Haering, and B. Engquist. "Modeling the Effect of Resolution Inhomogeneity in LES" (in preparation).

2018 **G. R. Yalla** and B. Engquist. "Parallel in Time Algorithms for Multiscale Dynamical Systems using Interpolation and Neural Networks," in *Proceedings of the High Performance Computing Symposium*, p. 9, Society for Computer Simulation International, 2018.

2015 E. J. Soares, **G. R. Yalla**, J. B. O'Connor, K. A. Walsh, and A. M. Hupp, "Hotelling trace criterion as a figure of merit for the optimization of chromatogram alignment," *Journal of Chemometrics*, vol. 29, no. 3, pp. 200-212, 2015.

Honors and Awards

Awards

2019 **Professional Development Award**, University of Texas at Austin
2019 **SIAM Certificate of Recognition**, Oden Institute
2019 **Teaching Preparation Certificate of Recognition**, University of Texas at Austin
2015 **The Gertrude McBrien Mathematics Prize**, College of the Holy Cross
2015 **Mathematics High Honors**, College of the Holy Cross
2014 **Holy Cross Scholar Program Award**, College of the Holy Cross

Fellowships

2015 **CSEM Fellowship**, Institute for Computational Engineering and Sciences — UT Austin
2015,'17 **National Science Foundation Graduate Research Fellowship**, Honorable Mention.

Leadership and Service

Leadership

2016 - Present **President**, *UT Austin's Chapter of the Society for Industrial and Applied Mathematics*
Fostering a community of mathematicians, scientists, and engineers by hosting conferences, research talks, reading groups, and social events.

2017 - 2018 **Co-organizer**, *UT SIAM Data Science Team*
Organized instructional activities and participated in competitions related to data science applications.

2016 - 2017 **Graduate Student Assembly Representative** , *Oden Institute*
Represented the Oden Institute at the Graduate Student Assembly.

2011 - 2015 **Chair**, *Student Advisory Committee*
Represented students at faculty meetings and acted as a liaison between students and faculty.

2013 - 2015 **President**, *Mathematics and Computer Science Club*
Led the organization of academic and social events to promote mathematics and computer science at the College of the Holy Cross.

2014 - 2015 **Vice-President**, *Holy Cross's Chapter of Pi-Mu-Epsilon Honor Society*
Promoted the mission of Pi Mu Epsilon mathematics honor society.

2014 - 2015 **Head Tutor**, *Holy Cross Calculus Workshop*
Led a nightly workshop of calculus tutors.

Service

2017 **Texas Applied Mathematics and Engineering Symposium**
Co-organized a conference that brought together nearly one hundred researchers from over twenty different universities. The conference was picked up by the Texas-Louisiana Section of SIAM and turned into an annual conference. Learn more at `https://users.oden.utexas.edu/~gopal/tames.io`.

2016-Present **SIAM Industry Series**
An on-going seminar series geared at connecting students with companies in industry and national labs.

2016 - 2017 **Oden Institute Graduate Student Representative**
Acted as the official avenue for student concerns, assisted the Graduate Coordinator, and represented students at the annual Board of Visitors meeting.

2012-2015 **Tutor**, *Holy Cross's Calculus Workshop*
Worked as a calculus tutor for fellow students.

2012 **Noyce Scholar**, *Nativity School of Worcester*
Taught and mentored underprivileged middle school students during an internship at the Nativity School of Worcester.

Presentations

Contributed Talks

2018 **High Performance Computing Symposium, SCS Spring Simulation Multi-Conference**
Parallel in Time Algorithms for Multiscale Dynamical Systems using Interpolation and Neural Networks.

2018 **Student Forum Series, Institute for Computational Engineering and Sciences**
Parallel in Time Algorithms for Multiscale Dynamical Systems using Interpolation and Neural Networks.

2015 **Joint Mathematics Meeting, Statistics Special Session**
Hotelling Trace Criterion as a Figure of Merit for the Optimization of Chromatogram Alignment.

2014 **Brown University Summer Research Symposium**
On Globally Defined Solutions of the Generalized Constantin-Lax-Majda Equation.

2014 **Leadership Alliance National Symposium**
On Globally Defined Solutions of the Generalized Constantin-Lax-Majda Equation.

Poster Presentations

2015 **Joint Mathematics Meeting, MAA Undergraduate Poster Session**
On Globally Defined Solutions of the Generalized Constantin-Lax-Majda Equation.

2014 **Holy Cross Summer Research Symposium**
On Globally Defined Solutions of the Generalized Constantin-Lax-Majda Equation.

2014 **Joint Mathematics Meeting, MAA Undergraduate Poster Session**
Linearly Stable Relative Equilibria Utilizing a Dominant Mass.

2013 **Holy Cross Summer Research Symposium**
Linearly Stable Relative Equilibria Utilizing a Dominant Mass.

Workshops

Teaching Preparation Series — **Austin, TX**
University of Texas at Austin — *2019*

Argonne Training Program on Extreme-Scale Computing — **Saint Charles, IL**
Argonne National Lab — *2017*

Multiscale Problems: Algorithms, Numerical Analysis and Computation — **Bonn, Germany**
Hausdorff Research Institute for Mathematics — *2017*

Scientific Computing in Python — **Austin, TX**
Texas Advanced Computing Center — *2016*

Integrating Dynamics and Stochastics — **Providence, RI**
Brown University — *2015*

Teaching

Experience

Graduate Courses

2019 **Teaching Assistant**, *Introduction to Mathematical Modeling in Science and Engineering*, University of Texas at Austin

Undergraduate Courses

2013-2015 **Teaching Assistant**, *Data Structures*, College of the Holy Cross
2015 **Teaching Assistant**, *Multivariable Calculus*, College of the Holy Cross
2015 **Teaching Assistant**, *Linear Algebra*, College of the Holy Cross

Pedagogical Training

TIDES: Concentration in Teaching and Mentoring — UT Austin
The program is comprised of four semester-long requirements that foster fundamental teaching strategies and explore integrated course design principles.

- **Evidence-Based Teaching**, TIDES — *Spring 2018*
  Focuses on the ability to: select instructional topics based on common challenges and misconceptions, develop appropriate assessments and learning objectives, and explore active learning strategies.

- **Inclusive Teaching**, TIDES — *Fall 2018*
  Learn to appreciate the range of student diversity and backgrounds, recognize that implicit bias and stereotype threat are solvable problems in student retention, propose approaches to leverage diversity to enhance learning experience. identify, and explore strategies for making classrooms more inclusive.

- **Lesson Plan Development**, TIDES — *Spring 2019*
  Focuses on the ability to create a lesson plan using backward design.

- **Instructional Practice**, TIDES — *Fall 2019*
  Implement a unique lesson plan in an on-ground STEM course, and reflect on your lesson based on assessments and feedback.

Teaching Preparation Series — UT Austin
Seminar series to learn about, observe, practice, receive feedback on, and reflect upon classroom teaching techniques.

Technical Skills

Programming Languages
C, C++, Python, Fortran, Bash, MATLAB, HTML/CSS

Software Design Principles
Documentation: *Doxygen, Sphinx*
Version Control: *Git, Svn, Mercurial*
Testing: *Unit Tests, Verification Tests, lcov/Code Coverage, Travis CI*
Profiling: *Tau, VTune, grof, cProfile/snakeviz*
Build Systems: *Make, Autotools*
Optimization: *OpenMP, MPI, Cuda*
Design Concepts: *Object-Oriented Design, Inheritance, Factory design, Dynamics programming, Abstract classes/(pure) virtual functions*

Computer Science
High Performance Computing, Computer Architecture, Unix/Linux, Data Structures, Machine Learning/Classification techniques, Algorithms and Complexity, basic Networking.

Science, Engineering and Mathematics
Modeling and Simulation, Optimization, Numerical Linear Algebra, Numerical Partial Differential Equations, Probability and Statistics, Fluid Mechanics/Turbulence Modeling, Molecular Dynamics, basic Quantum Mechanics and Density Functional Theory, basic Inverse Problems and Uncertainty Quantification.

Professional Organizations

Society for Industrial and Applied Mathematics
American Physical Society