VIKRAM V. GARG

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https://vikramvgarg.github.io/

SUMMARY

Experienced software engineer and mathematician seeking challenging problems to solve.

AREAS OF EXPERTISE

Software Engineering, Computational Modeling, Statistics

WORK HISTORY

OLogic Robotics (staffing Google DeepMind) April 2022 - Present
Senior Software Engineer

libMesh, a C++ Finite Element library (`libmesh.github.io`) September 2017 - March 2022
Open Source Contributor

Esgee Technologies February 2019 - March 2020
Member of the Technical Staff

Massachusetts Institute of Technology, then UT Austin September 2012 - August 2017
Postdoctoral Associate

EDUCATION

The University of Texas at Austin 2007-2012

PhD, Computational and Applied Mathematics
Graduate School Continuing Fellowship

The University of Texas at Austin 2003-2007

Bachelor of Science, Aerospace Engineering
Bachelor of Science, Pure Mathematics
GPA: 3.97/4.00

WORK EXPERIENCE & ACHIEVEMENTS

Google Robotics
Data Efficiency *April 2022 - Present*

I have made impactful contributions to the data efficiency initiative at Google Robotics. I led the development of a robot workcell metrics system. The workcell metrics system generates utilization data and obtains realtime feedback from the robot operators. Based on the workcell metrics, I proposed and implemented improvements to Google Robotics's data collection and policy evaluation infrastructure.

Business Impact:

- Double digit percentage improvement in workcell productivity, saving operator costs.
- Realtime operator feedback enabled better robot, task and workflow design.
- Workcell data provides critical benchmarks for future operator vendor contracts.

Previous successful projects at Google included automatic operator guidance generation for task randomization, and a new robot control system to expand the range of achievable tasks with the robot.

Massachusetts Institute of Technology, UT Austin, libMesh
Mathematical Modeling and Simulation *September 2012 - March 2022*

Adjoint technology (also known as backward propagation or 4DVar) greatly enhances simulation platforms, by providing accurate gradients at a negligible cost. As a researcher, I developed novel algorithms for adjoint computations. Concurrently, I developed software to make efficient adjoint computation accessible to the scientific community. The adjoint infrastructure I developed has been used in multiphysics optimization libraries, doctoral research and top-tier publications.

Community Impact:

- Thermal Exergy-Based Analysis of the Generic Hypersonic Vehicle, AIAA Scitech Forum, 2024
- MAST: An Open-Source Computational Framework for Design of Multiphysics Systems, AIAA Structures, Structural Dynamics, and Materials Conference, 2018.
- Three-Dimensional Adaptive Mesh Refinement in Stress-Constrained Topology Optimization, Structural and Multidisciplinary Optimization, 2020
- Model Adaptivity for Goal-Oriented Inference using Adjoints, Computer Methods in Applied Mechanics & Engineering, 2018.

Publications & Conference Presentations:

- Local Enhancement of Functional Evaluation and Adjoint Error Estimation for Variational Multiscale Formulations, Computer Methods in Applied Mechanics & Enginering, 2019.
- Enhanced Functional Evaluation for the Penalty Finite Element Method, Computers & Mathematics with Applications, 2019.
- Implementing Generalized Adjoint Capabilities in libMesh, 14th USNCCM, 2017
- Adjoint Consistent Formulations for Coupled Electroosmotic Flow Systems, AMSES, 2014.
- Local Sensitivity Derivative Enhanced Monte Carlo, SIAM CSE, 2013.

SKILLS

Computer Languages	C++17, Python, MATLAB, R
Software & Tools	Github, Tecplot, Paraview, LaTeX

PROFESSIONAL SERVICE

- Reviewer for 'SIAM Journal on Scientific Computing', 'Computer Methods in Applied Mechanics & Engineering' , 'Computers & Mathematics with Applications' and 'Numerische Mathematik'. - Co-organized mini-symposium "Adjoints in Computational Software" at USNCCM 2017.

Visa Status: U.S. Permanent Resident.