Akarsh Simha

+1 (858) 349 5920 • ✉ akarsh@utexas.edu • 🌐 asimha.net • ⊙ kstar
Work Authorization: U.S. Green Card

Education

The University of Texas at Austin   **Austin, TX, USA**
Ph.D. in Physics, 3.87/4   *2010 – 2017*

Indian Institute of Technology Madras   **Chennai, India**
B.Tech. in Engineering Physics, 8.52/10   *2006 – 2010*
Minor: Theoretical Computer Science.

Relevant Experience

Apple Inc.   **Cupertino, CA**
Senior Machine Learning Research Engineer   *October 2022 – November 2023*

- Led efforts on a framework to deploy machine learning models on edge devices.
- Optimized memory, compute and storage efficiency of model metadata and post-processing pipelines

Machine Learning Research Engineer   *September 2019 – October 2022*

- Major contributions to cutting-edge user experiences in iOS and macOS powered by machine learning technologies
- Developed a classifier model for the subject lifting flagship feature in iOS 16 premiered in WWDC 2022
- Developed an image classifier to weed-out utility content for the iOS 15 "Shared With You" feature premiered in WWDC 2021
- Developed data pipelines, performed robustness/failure analysis to prepare models for the real world
- A 3-month rotation in a team working on optimization passes for an LLVM-based GPU driver, with positive impact on real-world shader performance on Apple GPUs.

Machine Learning Compilers and Systems Engineer   *October 2017 – September 2019*

- Key contributor to a deterministic ML compiler system for rapid prototyping of ML models.
- Conceived and developed a model-in-the-loop annotation tool for a complex annotation problem

The KDE Project   **Remote**
Solving problems of scale for fun   *May 2007 – Present*
Contributor to KStars, cross-platform open-source astronomy software written using C++ and Qt.

- Reduced the time taken to compute celestial object positions by 45% by caching expensive computations.
- Improved the performance and accuracy of core positional-astronomy routines and introduced rigorous tests against IAU standards.
- Derived and implemented a novel mathematical formula to correctly match the orientation of the sky as seen in a telescope, and designed a convenient UI to use the feature.
- Currently working on cross-matching, ingesting and rendering a 300 million star database without compromising performance

Google Summer of Code   **Remote**
Mentor for The KDE Project   *Summers of 2009 – 2013, 2015 – 2016*
Mentored/Co-mentored many students working on GSoC projects with KStars, an open-source astronomy software under KDE.

- Laid out project ideas for students, provided software design guidance and performed code reviews.
- Projects supervised include: an improved GUI for astronomical observation planning, a relational database for storing astronomical data, using OpenGL for drawing, and optimization of the computation pipeline in KStars.

Student Developer for The KDE Project   *June – August 2008*

- Used a space-partitioning tree and LRU cache to render a 100 million star catalog in the astronomy software KStars using less than 200MB of total memory at any given time.
- Implemented an optimized binary data format for fast lookup of stars in a spatial region compressing the whole catalog into 1.4GB.

The University of Texas at Austin   **Austin, TX**
Graduate Student Researcher   *June 2011 – August 2017*
Key part of a team that succeeded in making a measurement of Brownian motion with unprecedented temporal and spatial resolution.

- Used optical tweezers to track a few-micron-sized particle in liquid to verify the tenets of statistical physics by directly measuring the particle's microscopic motion. The results were published in the prestigious *Science* journal.
- Developed a software system to aid with alignment of crucial optical elements, and for characterizing the frequency response of photodetectors, thus enabling removal of detector artifacts from the data signal

○ Developed a new mathematical framework to approximate solutions to the equations of fluid mechanics in various geometries, thereby bringing rigorous mathematical footing to a previously ad-hoc approximation method. Applied our method to the theory of Brownian motion in liquids.
○ Skills acquired include optics, interfacing with hardware, software engineering, design and development of electronics, mathematical modeling.

Selected Publications

○ Observation of Brownian Motion in Liquids at Short Times: Instantaneous Velocity and Memory Loss
S. Kheifets, <u>A. Simha</u>, K. Melin, T. Li, M. G. Raizen; **Science** 28, Vol. 343 No. 6178 pp. 1493-1496 (2014)
○ Unsteady Stokes flow near boundaries: the point-particle approximation and the method of reflections
<u>A. Simha</u>, J. Mo, P. J. Morrison; **J. Fluid Mech.**, Vol. 841, pp. 883–924 (2018)
○ An algebra and trigonometry–based proof of Kepler's First Law
<u>A. Simha</u>; **Am. J. Phys.**, Vol. 89, Issue 11, pp. 1009-1011 (2021)

Relevant Skills

Proficient: C++17, Python (numpy, Flask, tensorflow), Qt, Linux, git, Objective-C
Working Knowledge: LLVM, bash scripting, CMake, CUDA

Selected Coursework

Undergraduate: Algorithmic Graph Theory, Quantum Information and Computing, Formal Logic, Formal Language Theory
Graduate: Quantum Mechanics, Nonlinear Optics and Lasers, Nonlinear Dynamics, Quantum Optics, Complex Analysis, PDEs