Tanim Islam

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Objectives

Advisory role on evaluating DOE weapon systems and concepts: contribution to utility computing frameworks, client tools, and scientific frameworks leveraged towards distributed computing.

Experience

Lawrence Livermore National Laboratory
7000 East Avenue
Livermore, CA 94551
Design Physicist
April 2011 – present

Three unclassified sets of projects:

- **The STARBRIGHT platform for high X-ray efficiency sources**: I am the lead designer and co-lead PI for a platform that provides a laser driven high efficiency target for nuclear ground coupling and asteroid defense experiments.
  - Three experiments fielded to demonstrate this platform works: two on the LLNL laser facility, one at the University of Rochester laser facility.
  - Outreach talks given at various venues, such as at Northwestern University.
  - Several papers, and follow-on experiments, are in progress.
  - Feeds into software tool development for X-ray diagnostics and a campaign to enhance the physics functionality of the physics code for modeling and designing the experiment.
- **Prompt Diagnostics of Fast Events**: lead on efforts to perform prompt neutron and gamma diagnostic forward modeling of fast (sub-microsecond and nanosecond) legacy experiments. Work has involved applications to issues of interest to the DOE complex, development of newer analysis tools built upon transport codes used to model these problems, mentoring summer students to explore areas of research here, and the development of unique techniques to address these problems.
- **Modeling high altitude nuclear explosions using physics codes**: Involves algorithmic implementation of enhanced collisional, chemical, ionic, and electronic physics; understanding of interesting physical phenomena in high altitude nuclear explosions with applicability to more general physics and to problems in national defense; and the enhancement of code functionality for standardized, scriptable usage, and independent data analysis.
- **High energy density ReShock experiment**: modeling and help in the design of experimentally accessible, and experimentally significant, hydrodynamic experiments launched on the National Ignition Facility and Omega.

Multiple classified projects for which I am the main point of contact, or effectively programmatic leader.

University of California Santa Cruz UARC
NASA Ames Reseach Center
Moffett Field, CA 94035

- Development of aircraft simulator for research, behavior congruent to FACET, designed for concurrency and portable to utility computing frameworks.
- Common object model for aircraft weather data reader, built upon

References provided upon request

Software Engineer III
February 2008 – April 2011

Netcdf-Java. Functionality for variety of different scientific data products.

- Significant improvements to Future Advanced Concepts Evaluation Tool (FACET), air traffic control software.

University of Virginia
Department of Astronomy
Charlottesville, VA 22903
Teaching Assistant
May 2003-December 2004
Education

- Development of coursework and lectures for introductory and summer astronomy courses, with grading duties. Example course websites located here.
- Tutoring students in astrophysics, mathematics homework.

- University of Virginia
  Ph.D., Astrophysics, GPA: 4.0
  Thesis: Transport And Stability Analysis of Dilute Magnetized Accretion Flows.
- California Institute of Technology
  B. S., Physics, GPA: 3.7
  Thesis: Parity Violation in B → $\gamma K\pi\pi$ Decays.

Qualifications

- Proficient in Java, C, C++, Shell, Python, High Performance Computing.
- Some familiarity with Database Programming (SQL language).
- C/C++ distributed and GPU programming (MPI/PVM, CUDA).
- Proficient in Fortran, Python, and Visualization skillset geared towards high performance computing.
    - Numpy/Scipy and scientific python frameworks (IPython, Continuum, Jupyter and Jupyter notebooks), visualization, python C/C++/Fortran wrapping.
    - SLURM/Moab HPC job scheduling with Python design patterns.
    - VisIt visualization toolkit with scripting and data input, and tools to interface with VisIt and VisIt visualization output.
    - Tools for data analysis and post-processing of Mercury particle transport code and PMESH mesh generating tool.
- Many examples of my public code can be found on my Github page: https://github.com/tanimislam. Two main examples are,
    1. IVE_TANIM: self-contained Python utilities for image, video, and technical email generation.
    2. COVID19_STATS: tools to process and generate summaries of COVID19 infections and deaths in the United States and its territories; current demonstration of its functionality lies in the COVID19 Running update website.

Research

- "The Collisional Magnetoviscous-Thermal Instability," Islam, T., ApJ **787**, 53 (2014).
- "Axisymmetric Waves and Nonlinear Structures in Hall Plasmas," Islam, T., Phys. Plasmas **19**, 062903 (2012).
- "The Magnetoviscous-Thermal Instability," Islam, T., ApJ **746**, 8 (2012).
- "The Axisymmetric Magnetoviscous Instability With Magnetic Tension," Islam, T. & Balbus, S., ApJ **633**, 328-333 (2005).
- "Analysis of Airspace Tube Structures," Sheth, K. Islam, T., & Kopardekar, P., AIAA Digital Avionic Systems Conference, AIAA, St. Paul, MN, October 2008.
- "Design and Simulation Methodology to Improve the Performance of Airspace Tube Networks," Sridhar, B., Islam, T., and Gupta, G.,

References provided upon request

AIAA Guidance, Navigation, and Control Conference, AIAA, Toronto, ON, Canada, August 2010.

Outreach and Community Service	[LLNL public article summarizing my informal mentorship efforts at LLNL and externally](.). - Yearly or twice-yearly outreach to these high schools: - Irvington HS in Fremont, CA - American HS in Fremont, CA - Maggie Walker HS in Richmond, VA - Outreach on LLNL High Energy Density (HED) internship program to Columbia University Applied Physics Department, the University of Virginia (on multiple occasions), and [Northwestern University](.). - Occasional informal outreach to scientists on research I do at LLNL. - LLNL HED mentor to undergraduate and graduate students: 2015, 2016, 2017, 2018, 2019, 2023. [Many hours of code lectures on Python programming](.) to the Sacramento Python Users Group, Python Richmond VA Users Group, and the Python Charlottesville VA Users Group. - Recorded videos, presentations, and several Github repositories of presentations included.
Affiliations	American Physical Society, American Nuclear Society