Job Description for post-doctoral position for Research in Energy of Computing in Artificial Intelligence and Scientific Applications in different computing architectures @SLAC National Laboratory/Stanford

Postdoctoral position focused in computing hardware-algorithms-software from Machine Learning/AI algorithms running different applications including Natural Language Processing, Computer Vision, Time Series on multiple architectures (examples include CPUs, GPUs, ASICs, FPGAs and other emerging architectures).

SLAC is moving into a leadership lab in the area Microelectronics by its active participation in several initiatives related to the US Department of Energy and the White House. This position is dynamical as it is to work within SLAC and with DOE to articulate an exciting and interdisciplinary vision in Microelectronics and Computing and is contributing to publications by NIST/SRC and the DOE of Roadmaps on Energy Efficient Computing, Sustainability in Microelectronics. The following are the expectations of the job. The research will consist of estimating energy used in computing of putting together new hardware systems and estimating energy in hardware with different machine learning algorithms based on published data and also those in research. The potential research associate should have a background in physics, or electrical or computer engineering and computer science.

Position Overview:

We are currently seeking a postdoctoral scholar to support research efforts in developing estimates of energy consumed by compute-intensive algorithms including the applications ranging from crypto coin mining, machine learning/Artificial Intelligence algorithms including driverless cars: Natural Language Processing in major online platforms; Machine Learning for high end scientific applications such as including simulations of chemistry, materials, protein folding, etc.; high-performance computing simulations of fluid flow, weather changes etc.; molecular dynamics and atomic simulations. The candidate is expected to be proficient in a few of the algorithms used in scientific computing, machine learning/AI methods. Familiarity with algorithm and computational complexity, algorithm implementations for machine learning for various scientific simulations such as molecular dynamics, Monte Carlo methods in different computer architectures. Familiarity with the various higher-level and lower-level programming languages used in large-scale simulations is considered helpful for this position. As part of a new initiative undertaken by the Department of Energy's EES2 (Energy Efficiency Scaling every two years for two decades)[1], this effort will complete a systematic analysis of multiple large-scale algorithms and software, assess their energy estimates for computations of applications, and compare that with the existing benchmarks. Successful candidates are expected to conduct systematic literature and report reviews, propose and implement methodologies for estimating energies used for simulations in applications across different areas. Postdoctoral researchers are responsible for authoring reports, presenting findings, and supporting proposal writing efforts

[1] https://www.energy.gov/eere/articles/department-energy-announces-pledges-21-organizations-increase-energy-efficiency

for building larger efforts. Specific responsibilities include but are not limited to: Expand and build upon the existing analysis for the different applications; Understanding of advanced Machine Learning and AI algorithms and their implementations including in newer applications such as driverless cars; Understanding of sensing algorithms used in devices at the extreme edge; Understand and scope the basic operations in different algorithms; Ability to bridge the different algorithms with different architectures; Develop, test and document large scale models, simulations, and implementations in different system architectures; Maintain and update documentation as needed; Work with the current and potential with the Department of Energy's AMMTO collaborators and industrial community to discuss and develop systematic benchmarks and analysis for the different applications.

Minimum Qualifications:

- Ph.D. in computer, or computational sciences, or advanced numerical methods, or electrical engineering, or statistical methods especially in assessing algorithmic complexity/scaling on different architectures.
- Experience using machine learning, statistical analysis, and optimization.
- Experience in modeling and simulating large-scale scientific simulations
- Demonstrated ability not only to learn, but master, new techniques quickly
- Proficient programming skills
- Ability to work independently and in a team environment; and communicate effectively with a diverse population in both face-to-face and remote / virtual settings.
- Effective written and verbal communications skills.

Preferred Qualifications:

- Experience with higher level programming languages such as Python or Julia
- Interest in environmental impact of computing and sustainability

What we offer you:

A constant stream of new things to learn. This is a new and exciting thrust in SLAC and Stanford and trying to address sustainability in computing. We're always expanding into new areas, bringing in new projects and developing new technologies in the areas of computing.
Growth and mentorship from exceptionally talented engineers and scientists from SLAC and Stanford University, plus an opportunity for you to mentor new students and staff. A mission-driven, stable, collaborative, highly interdisciplinary, and supportive work environment.

Job location is in Silicon Valley, in SLAC National Laboratory, Menlo Park, California.

Interested candidates should submit a cover letter with CV to Stephanie Carlson (scarlson@slac.stanford.edu).