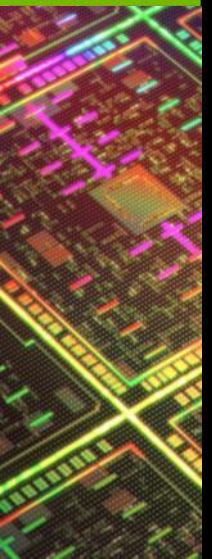
Academic Research Programs & Sponsored Research

David Luebke, Sr. Director of Research

research.nvidia.com


GPU TECHNOLOGY CONFERENCE
But first…
“What would you do with a petaflop supercomputer?”



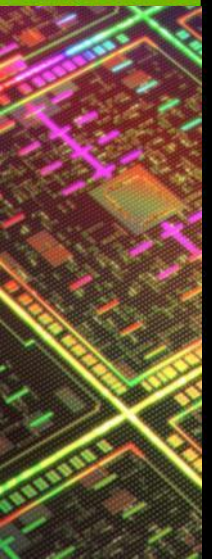
Petaflop Contest Winners

“Antiretroviral Therapies Against HIV-1”

Juan R. Perilla Ph.D., *University of Illinois at Urbana-Champaign*
Macromolecular Modeling and Bioinformatics Theoretical and Computational Biophysics Group

HIV-1 is increasingly acquiring new resistance to antiretroviral treatments. A petaflop supercomputer would help us see the complex dynamics that govern the space phase of the conical HIV capsid. The capsid protein plays critical roles in both late and early stages of the infection process and is widely viewed as an important unexploited therapeutic target that could offer the best hope of generating drugs that are active against all HIV-1 variants.

GPU TECHNOLOGY CONFERENCE

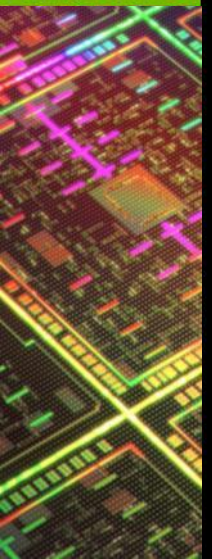


Petaflop Contest Winners

“Finding Biomarkers for Major Mental Disorders”

Stephen J. Glatt, Ph.D., *SUNY Upstate Medical University*
Director of Psychiatric Genetic Epidemiology & Neurobiology Laboratory (PsychGENe Lab)

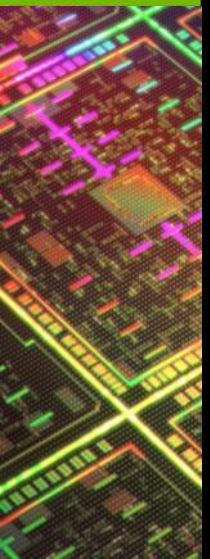
PsychGENe Lab is working to find better ways to diagnose and prevent major mental disorders like autism, schizophrenia, and many others. Discovery of additional risk genes and biomarkers for major mental disorders will, in turn, allow the development of personalized and more efficient treatments as well as earlier identification and prevention. A petaflop supercomputer would continually model existing and emerging datasets with more complex models that more likely resemble the true biological complexity underlying these insidious disorders.



Petaflop Contest Winners

“Tracking Oil Spills at Real-time for Immediate Clean-up Efforts”
Brandon Snow Richardson, *Jet Propulsion Laboratory and Stanford University*

During an average flight to track progress of the Deepwater Horizon Gulf oil spill in the Gulf of Mexico, AVIRIS, an in-flight NASA instrument, would generate more than 135GB of data which would take a week to process and create abundance maps in a CPU cluster. My research has shown that GPUs significantly accelerate spectral decomposition, and a petascale computer with GPUs will instantaneously produce abundance maps to give clean-up crew immediate response.



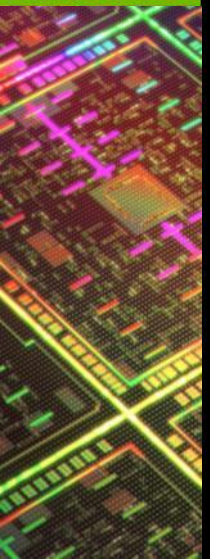
Academic Program Goals

Engage with external researchers

Learn from emerging research ideas

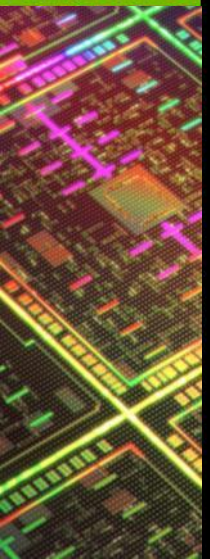
Guide researchers working on important problems

Ignite disciplines with the power of GPUs and CUDA



NVIDIA Research Academic Programs

- Hardware Donations
- NVIDIA Academic Partnership
- CUDA Centers
  - CUDA Research Center
  - CUDA Teaching Center
  - CUDA Center of Excellence
- CUDA Fellows
- NVIDIA Graduate Fellowship



Academic Hardware Donations

Open to professors & researchers worldwide doing GPU-powered research

Requirements:

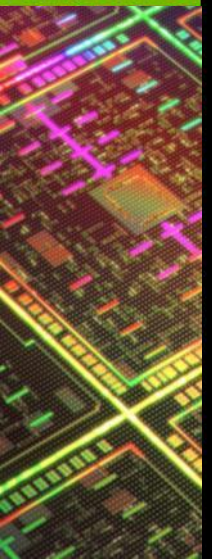
- Faculty at post-secondary institutions
- University-affiliated research institutions: case-by-case

Benefits:

- Board seeding of 1-2 GPUs to help start a research project

CUDA Centers

- All Centers receive:
  - Priority for early access to hardware and software
  - Inclusion in GPU seeding program for each major NVIDIA GPU architecture
  - Special pricing on NVIDIA equipment



GPU TECHNOLOGY CONFERENCE

CUDA Research Centers

56 Current CUDA Research Centers, will be announcing several more in June

GPU TECHNOLOGY CONFERENCE

CUDA Teaching Centers

105 Current CUDA Teaching Centers, will be announcing several more in June

CUDA Centers of Excellence

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

Georgia Institute of Technology

HARVARD School of Engineering and Applied Sciences

Institute of Process Engineering, Chinese Academy of Sciences

The Johns Hopkins University Baltimore 1876

Technische Universität Dresden

Tokyo Tech Pursuing Excellence

Tsinghua University 1911

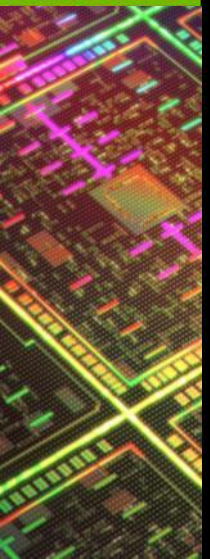
University of Cambridge

Illinois University of Illinois at Urbana-Champaign

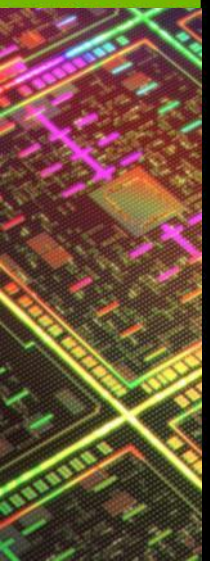
University of Maryland 18 56

ICL UT Innovative Computing Laboratory The University of Tennessee

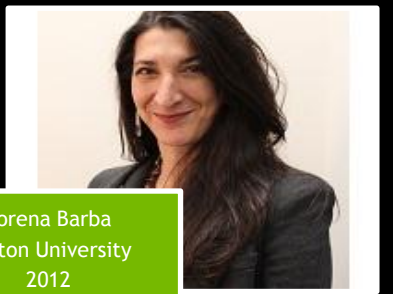
The University of Utah



9 CUDA Fellows Worldwide



Takayuki Aoki
Tokyo Tech
2012



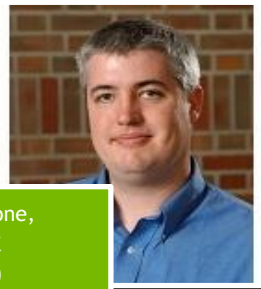
Lorena Barba
Boston University
2012

Mike Giles
Oxford University
2008

Scott LeGrand
Amazon Web Svc.
2011

PJ Narayanan
IIT, Hyderabad
2008

Dan Negrut
University of Wisconsin
2010



John Stone,
UIUC
2010

Manuel Ujaldon
University of Malaga
2012

Ross Walker
SD Supercomputing Center
2010

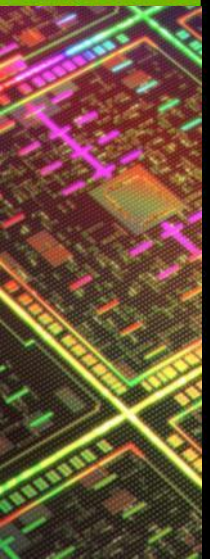
~~9~~ 11 CUDA Fellows Worldwide

Announcing 2 new CUDA Fellows today…

Massimo Bernaschi
National Research Council
2012

John Owens
UC Davis
2012

Graduate Research Fellowships



Graduate Research Fellowships

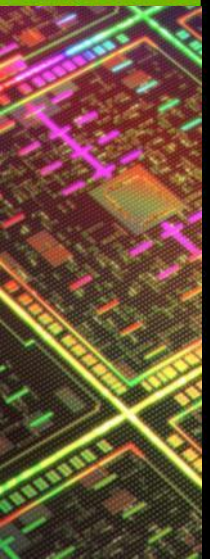
Funding for Ph.D. students revolutionizing disciplines with the GPU

Eligibility/Application Process:

- Ph.D. candidates in at least their 2nd year
- Nomination by Professor/Advisor
- Provide 1-2 page research proposal

Selection Process:

- Committee of NVIDIA scientists and engineers review applications
- Applications evaluated for originality, potential, and relevance



Congratulations to the 2011 & 2012 Graduate Fellowship Winners!

106 Graduate Fellowships have been awarded $2.65M since program inception in 2002

2012 Grad Fellows:

Albert Sidelnik, University of Illinois at Urbana-Champaign

Ashwin Aji, Virginia Tech

Belen Masia, Universidad de Zaragoza / MIT Media Lab

Dominik Grewe, University of Edinburgh

Haicheng Wu, Georgia Institute of Technology

Jason Clemons, University of Michigan

Meng Zhang, Duke University

Peng Li, University of Utah

Steven Dalton, University of Illinois at Urbana-Champaign

Wilson Wai Lun Fung, University of British Columbia

Yunsup Lee, UC Berkeley

2011 Grad Fellows:

Albert Sidelnik, University of Illinois at Urbana-Champaign

Daniel Johnson, University of Illinois at Urbana-Champaign

Dominik Grewe, University of Edinburgh

Etienne Vouga, Columbia University

Keon Jang, KAIST

Michael Bauer, Stanford University

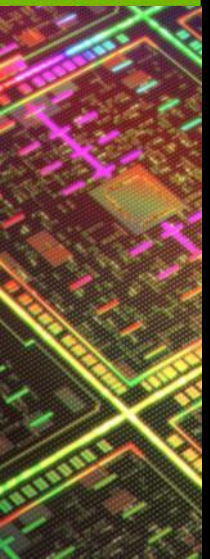
Michael Rubinstein, Massachusetts Institute of Technology

Pinar Muyan-Ozcelik, University of California, Davis

Sertac Karaman, Massachusetts Institute of Technology

Weibin Sun, University of Utah

Wen Zheng, Stanford University



Graduate Fellowship Fast Forward

11 talks

2 minutes each