

ATPESC 2022 – Hardware Track

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DOE HPC SYSTEMS



Argonne

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SURGE OF SCIENTIFIC MACHINE LEARNING

Simulations/ surrogate models

 Replace, in part, or guide simulations with Al-driven surrogate models

Data-driven models

- Use data to build models without simulations
- Co-design of experiments
- Al-driven experiments



Protein-folding

Design infrastructure to facilitate and accelerate AI for Science applications

Braggs Peak





Galaxy Classification



INTEGRATING AI SYSTEMS IN FACILITIES



Simulations

Data-driven Models



AI FOR SCIENCE APPLICATIONS



Cancer drug response prediction



Imaging Sciences-Braggs Peak





Protein-folding(Image: NCI)

Tokomak Fusion Reactor operations

and more..



ML HARDWARE

Cerebras (CS-2)

Graphcore

SambaNova









AGENDA – MONDAY, AUGUST 1, 2022

8:00AM Speaker check-in

8:30AM Vitali Morozov, ALCF: Introduction to Track 1 - Hardware Architectures

9:00AM Tom Papatheodore (papatheodore@ornl.gov)

The Oak Ridge Leadership Computing Facility's Summit & Frontier Supercomputers

9:30AM Samantika Sury (<u>s.sury@samsung.com</u>):

Memory Coupled Compute: Innovating the future of HPC and AI

10:00AM Break - 30 minutes

10:30AM Andrew Ling (aling@groq.com):

Software-defined Machine Learning with Groq's Tensor Streaming Processor

11:00AM Milind S Pandit (<u>mpandit@habana.ai</u>): Training Deep Learning Models on Habana Gaudi

11:30AM Urmish Thakkar (urmish.thakker@sambanovasystems.com):

SW/HW Innovations in Emerging DL Training Systems

12:00PM Richard Bohl (richardb@graphcore.ai): Graphcore IPUs: Accelerating Argonne's ML/AI Applications

12:30PM Lunch in cafeteria - 1 hour

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AGENDA – MONDAY, AUGUST 1, 2022

12:30PM Lunch in cafeteria - 1 hour

1:30PM Andy Hock (<u>andy@cerebras.net</u>): Accelerating AI and HPC for science at wafer-scale with Cerebras Systems

2:00PM Servesh Muralidharan (servesh@anl.gov)

An overview of Argonne's Aurora Exascale Supercomputer and its Programming Models,

2:30PM Keith D. Underwood (keith.underwood@hpe.com):

Considerations for programming Slingshot at scale

3:00PM Yuri Alexeev (yuri@alcf.anl.gov): Quantum computing trends

3:30PM Break - 30 minutes

4:00PM Q/A to all presenters - 1 hour

5:00PM Demos - Graphcore

6:30PM Dinner in cafeteria

7:30PM ATPESC after-dinner talk

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QUESTION AND ANSWER SESSION: 4 PM

Quick question –

please, ask after the talk

Long question or a discussion -

please, send to Vitali Morozov (morozov@anl.gov)

