

Supporting Tools and Systems

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Pete Beckman




Previous Projects:

- Parallel C++ & Original Iway
- TeraGrid Dir. Of Eng. & Chief Arch
- Director of Argonne Supercomputer Center (ALCF)
- ZeptoOS Linux for Supercomputers
- Co-PI NSF *Array of Things*


Current Projects:

- BDEC2 International Workshops
- PI of *Waggle* project: Open Sensor Platform
- PI of ARGO: Exascale low-level memory software
- PI SAGE: MSRI: Edge Computing for Sensors

Extreme Linux
www.extremelinux.org

- Workshop #1, Feb 98, 25 people
 - Industry: Alta Tech, Compaq/Digital, DCG, PGI, Paralogic, Red Hat, Myricom
 - Labs: Sandia, LANL, NASA, Fermi, RWCP, etc
- Extreme Linux presentation at Linux Expo 98
- DOE labs and industry scientists met with Linus to discuss kernel improvements for large parallel machines and clusters.
- Extreme Linux Track at Linux Expo 99
- Workshop #2, with USENIX, June 99
 - Industry: Alta Tech, Compaq, Red Hat, PGI, Paralogic, Metrowerks, MSTI, SGI, Metrolink, Myricom
 - Labs: most
 - The workshop is full, and overflowing at 150

Pete Beckman Advanced Computing Laboratory 24
Los Alamos National Laboratory 

New Workflow: AI@Edge

Continuum Programming

Sensors



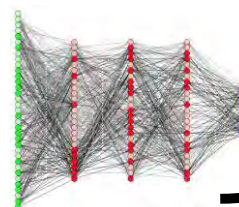
Facilities



Actuators



Powerful Parallel Edge Computing



Semantic Output

Edge computing and deep learning with feedback for continuous improvement

Reduced, Compressed data

New inference (model)
Adaptive steering

HPC



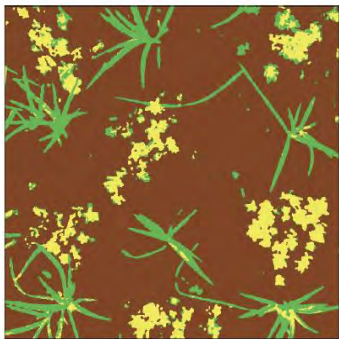
Deep Learning Training
Simulation / Forecast

AI@Edge: Yields most valuable data & enabled autonomous control

Wildfires: detecting smoke



Plant Species



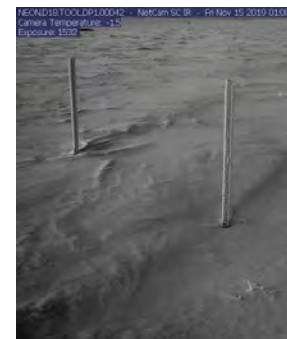
Pedestrian Flow



Drone detection



Snow Depth



Urban flooding



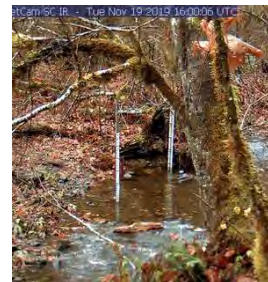
Traffic Flow



Wildlife



Cloud Coverage



Water Depth

California Wildfire:

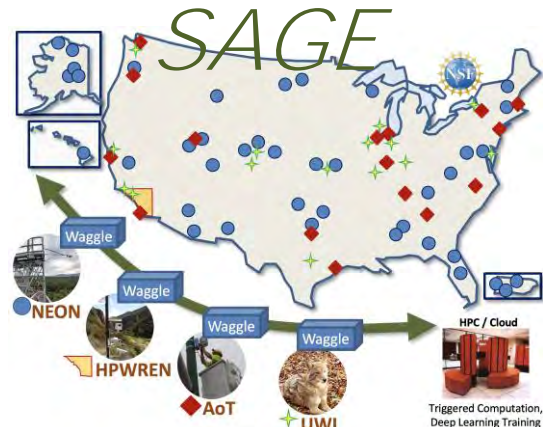
AI@HPC + AI@Edge = Intelligent Forecast & Sensing



Image from HPWREN tower, where Sage will deploy AI@Edge to assist real-time fire detection

UCSD/SDSC WIFIRE project runs HPC simulation to predict wildfire

Courtesy HPWREN, UCSD, SDSC Ilkay Altintas, Frank Vernon



Sage will move Pan-Tilt-Zoom cameras to suspected outbreaks using AI@Edge to search for fire



NSF NEON & Sage

AI@HPC + AI@Edge = Intelligent Forecast & Sensing



NEON: National Ecological Observatory Network. Multi-decade project to understand changing ecosystem

81 field sites, 100K data samples each year.

Sage will deploy AI@Edge to link with AI@HPC and detect interesting phenomenon and notify scientists in real time

From bats to migrating animals to clouds...

New Workflow: Sage Cyberinfrastructure From Edge to Cloud and Back

