Unlocking the Potential of Artificial Intelligence

Swathi Vallabhajosyula & Hari Subramoni
Central Ohio's One-day Hackathon For High Schoolers
18th November’23

http://icicle.ai
Hari Subramoni
Assistant Professor
The Ohio State University

Swathi Vallabhajosyula
Graduate Research Assistant, Ph.D Student,
The Ohio State University
Write an essay on “Alien Invasion.”

Can you solve for “x”?

Tell me a “Fall” joke.

How can AI help farmers with field scouting and detecting crop stress using drones?

How can AI-powered camera traps assist in detecting poachers and alerting park rangers?

ICICLE: DEMOCRATIZING AI

Digital Agriculture

Animal Ecology

Process data & act

Land Rover

HPC Systems & Data Centers

Clouds

Hybrid Cloud
Collaboration

Participation:
14 Organizations, 33 faculty, 41 staff, (58 PhD, 16 MS, 16 undergrad, 6 K-12) students & many Collaborators
Emergence of the Computing Continuum

1. Scientific Computing
2. Big Data & Data Science
3. Artificial Intelligence

HPC Systems & Data Centers

Hybrid Cloud
On-Premise
Cloud

Edge & Near Edge

On Field Sensors

HPC Systems & Data Centers

Computing Continuum
Societal Challenge (Example #1): Agriculture

**Food security/sustainability in 2050**

- 9.8B people, climate; 0.5x arable land per cap vs 1985
- Wide gains in crop management needed  (typical yields fall 3X below best practice)

**Sustainable agricultural workforce**

- The next generation of agriculture professionals will include engineers, computer scientists, data scientists

**Democratization of digital agriculture capabilities**

- Autonomous unmanned aerial vehicles, self-driving tractors and sprayers, fertilizer and seed recommendations
- Big and small farms, staple and specialty crops, underrepresented communities
- Privacy and ethical considerations

**What Can we achieve?**

- Cyberinfrastructure for fully autonomous aerial systems
- Simplify deployment of unmanned aerial vehicles (UAV) in real fields to capture common crop health conditions
ARTIFICIAL INTELLIGENCE IN AGRICULTURE

DHAVAL JADAV

Digital tool for:
- Visualization
- Crop growth analysis
- Monitoring spatial field variability
- In-season management maps
- Yield prediction

Satellite imagery

Artificial Intelligence (AI)

Ground data: Soil and plant analysis

https://ccag.tamu.edu/research-project/digital-agriculture/


AI-Driven Digital Agriculture
Societal Challenge (Example #2): Animal Ecology

**Basic science:** The focus of Animal Ecology is understanding the functioning and behavior of animals individually and in groups *in the context of environment* and evolution.

**Science + translational:**
- Monitoring, understanding, and protecting biodiversity of the planet
- Monitoring and understanding the impact of changing habitats on animals that live in them

**Translational:** biodiversity conservation and mitigating the impact of climate change
Demo

Autonomous navigation policy for sUAS

A Framework for Autonomic Computing for In Situ Imageomics

Jenna Kline
Graduate Research Assistant, Ph.D. Student
That ONE Story: Sahil Samar

“Discovering ICICLE through the REHS program, I collaborated with Dr. Mary Thomas on Jupyter Notebooks and developed ICICONSOLE. The experience provided my first exposure to official software testing, release, and conferences. ICICLE paved the way for early career insights, teamwork, and High-Performance Computing exposure, shaping my college internship readiness.”

Software Developer @ San Diego Supercomputer Center’s REHS program and ICICLE Del Norte High School

Now: Freshmen @ Georgia Institute of Technology BSCS, Computer Science
That ONE more: NextGens – Students within ICICLE

ICICLE NextGens (Michael Ray[K-12], Sahil Samar[K-12], Swathi Vallabhajosyula [grad], Pouya Kousha[Grad]) @PEARC23 with Dr. Mary Thomas and Dr. Beth Plale.
That ONE more: NextGens – Students within ICICLE
That ONE more: NextGens – Students within ICICLE
Don’t hold back!

Questions?

https://firefly.adobe.com/inspire/images

Well, I ASKED AI, so now you too!

DEMO TIME!

Steer Low and Enjoy!
Scan the QR code for the website and more

http://icicle.ai

https://icicle.osu.edu/education-and-outreach

More info in flyers.