



**National Laboratory
of the Rockies**

Control Room of the Future: AI Meets Digital Twin

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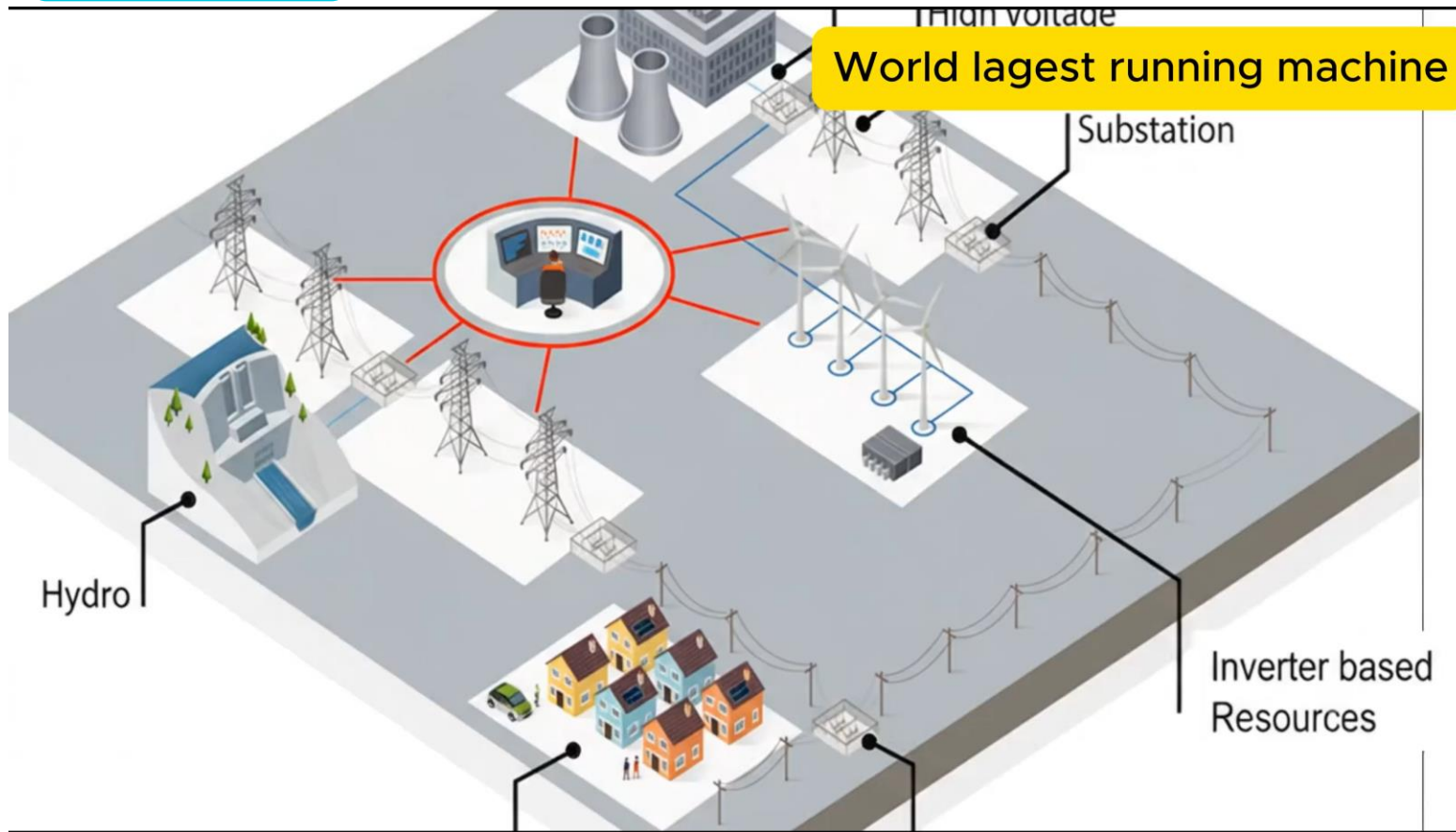
Control Room Operator: Brain of the Grid

FORECAST

SCHEDULE

DISPATCH

World largest running machine



System Reliability

- What happens if something goes wrong?

Stability

- Secure power flow to prevent abnormal grid conditions.

Affordability

- Achieve optimal cost through economic dispatch and scheduling.

Resilience

- Quickly restore service after faults or unexpected events.

COLLECT DATA | EVALUATE GRID STATE | TRANSFER POWER

Engineering

Training

IT

Cyber

Support

Software Breakthrough: Coding by Your Local AI

New chat

chat.openai.com/chat

NREL Pricing Tool theSOURCE Home... Instances | EC2 Ma... NAERM NREL Personal Partners Service Portal - IT S... Overview Amazon Web Servic... ECM NAERM

+ New chat

Find PI Wind Points.

Feasibility Study Definition

Find Wildfire Image Cased by

ChatGPT

Examples	Capabilities	Limitations
"Explain quantum computing in simple terms" →	Remembers what user said earlier in the conversation	May occasionally generate incorrect information
"Got any creative ideas for a 10 year old's birthday?" →	Allows user to provide follow-up corrections	May occasionally produce harmful instructions or biased content
"How do I make an HTTP request in Javascript?" →	Trained to decline inappropriate requests	Limited knowledge of world and events after 2021

Python code 5 custom text box symbols to send data to OSISOft Data Archive from PI Vision

[ChatGPT Feb 13 Version](#). Free Research Preview. Our goal is to make AI systems more natural and safe to interact with. Your feedback will help us improve.

Dark mode

Updates & FAQ

Log out

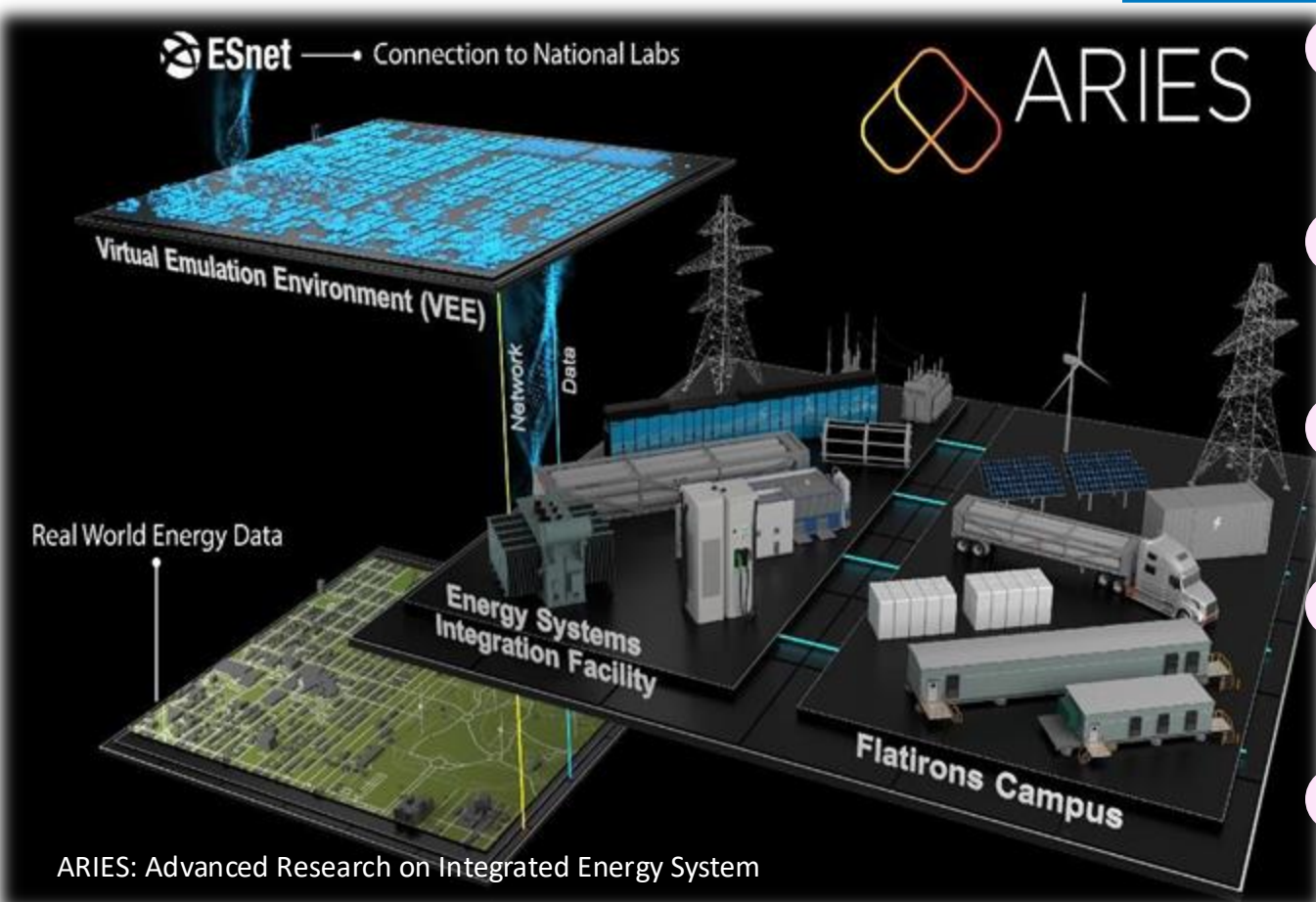
Feb. 2023

eGridGPT Alarm (SEA-IT) Dashboard



SEA-IT: SCADA Enhanced Alarm Intelligence Tool, running on-premise AI model with Department of Energy funding
eGridGPT: electric Grid Generative Pre-trained Transformer

The Role of AI in the Control Room: 5 A's



ARIES: Advanced Research on Integrated Energy System

- 1 **Accurate Result:** By Learning Physical Laws
- 2 **Assist Operator:** By providing real-time guidance and support
- 3 **Automate Process:** By reducing repetitive tasks and optimizing workflows
- 4 **Augment Data:** By contextualizing raw data and prescribing insights
- 5 **Alignment with Stakeholders:** By synchronizing broader business and stakeholder objectives



eGridGPT: Trustworthy AI in the Control Room

Seong Lok Choi,¹ Rishabh Jain,¹ Patrick Emami,¹



Generative AI for Power Grid Operations

Seong Lok Choi,¹ Rishabh Jain,¹ Cong Feng,¹

Diagnosing Hurdles Between AI and Grid Operation

- Grid Industry**
- **Software** Limitation: No parallel processing (CPU vs GPU)
 - **Data** Limitation: No AI training data (NDA protected)
 - **Hardware Cost** Limitation: Utility investment base on rate cases

- AI Industry**
- **Accuracy**: Grid follows the physical laws, not probabilistic outcomes
 - **Resiliency**: Extreme or edge cases AI never trained before
 - **Adoptability**: Which is comfortable, Waymo or Uber?

- Highly Reliable Organization**
- **Reluctance to simplify**: Reliability is the prerequisite for innovation
 - **Commitment to resilience**: Utility respect NERC CIPs. No cloud
 - **Deference to Expertise**: Does AI follow NERC certification?

eGridGPT: Control Room of the Future



Thank You.

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