

# New sensing technologies provide insight inside batteries

Peter Vancorenland  
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“The next wave of AI is physical AI. AI that understands the laws of physics...”

Computex, Taipei



 **NVIDIA**  
Jensen Huang  
Founder &  
CEO

# SigmaSense core technology in existing products

1<sup>st</sup> with ID thru touch



"SigmaSense created a breakthrough in sensing technology with an innovative approach that makes exciting new product designs possible."

—Lars Reger, CTO

1<sup>st</sup> with "touch AI"



"As the global leader in enterprise-grade mobile computing solutions, we are excited to work with SigmaSense to bring this new AI-enabled touchscreen-sensing technology to market."

—Julie Johnson, SVP & GM

1<sup>st</sup> in large ruggedized displays



"The ONLY large format display touch controller that works with or without gloved hands in any combination of outdoor environments: rain, snow, direct sun or shade."

—Bill Dunn, CEO

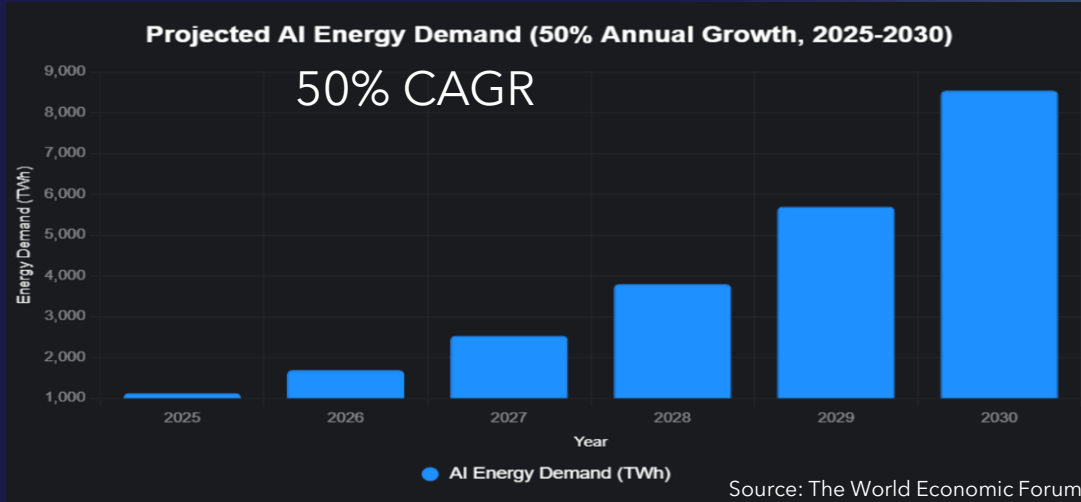
# Problem: Today's AI lacks data insights inside energy systems

- **Relies on inaccurate and stale data** to assure energy availability
- **Unpredictable life** or performance of batteries as they degrade
- **No visibility into risk** of fire or explosions due to thermal runaway
- **Lacks data** to preserve battery health while fast charging



# Battery systems for AI data centers are rapidly expanding

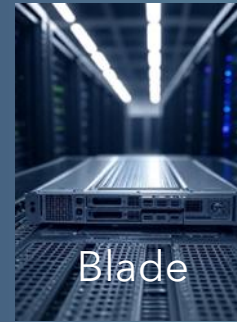
Back-up units (BBU/BESS) have unknown state of health, safety, and performance



Intense heat, power spikes & unpredictable power:

- Can cause cascading failures in AI server clusters
- Can damage AI-GPU assets (~\$4M /rack)
- Can halt processes worth millions (\$)
- Can amplify grid impact or blackouts

BBU/UPS



Blade



Rack



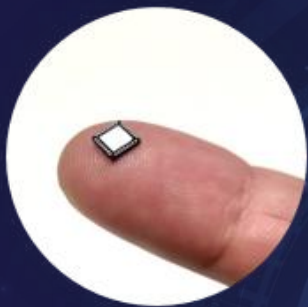
Container

BESS



Grid Scale Energy Storage

# SigmaEIS™ chip and AI modeling tools optimize energy systems



Predictable

Reliable

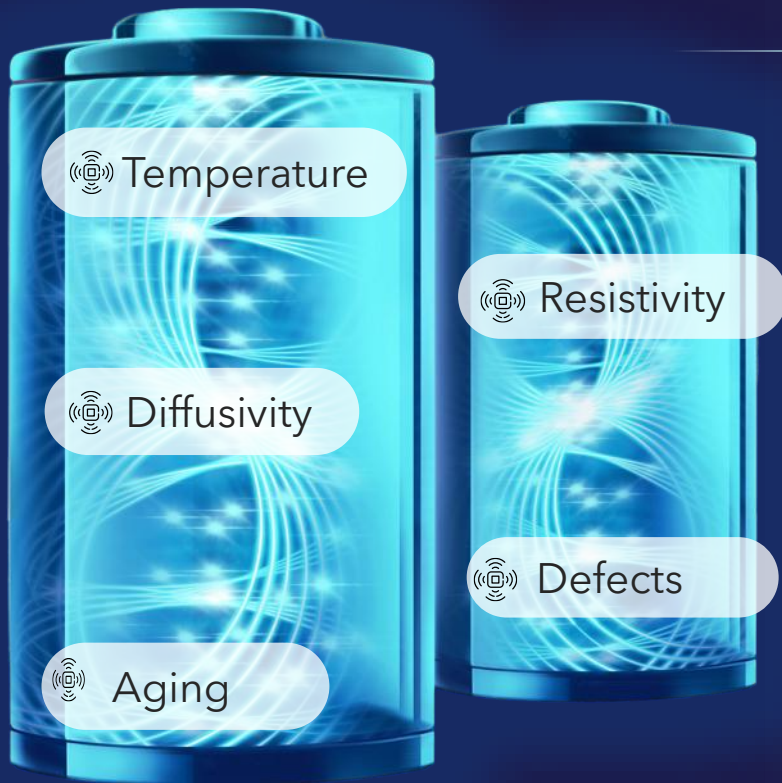
Resilient



- **Extend battery life** by determining optimal charging cycles and minimizing battery degradation  
**Benefit:** longer life & lower total cost
- **Maximize battery safety** and reliability throughout its lifespan by Identifying electrochemical changes to predict failure mechanisms  
**Benefit:** less risk of battery issues & liabilities
- **Accelerate battery charging** cycles without degrading battery performance by accurately measuring internal temperatures and physics  
**Benefit:** Faster charging without harm

# Continuously capture insights inside the battery

SigmaEIS matches \$10K-\$30K laboratory testers...in-situ



- Accurate internal temperature improves AI risk prediction
- Physics-based measurements predict remaining useful life
- Informed AI models deliver a faster, safer charge
- Detects internal defects for safety
- EIS insights improve total costs



# SigmaEIS captures precise, repeatable impedance data

## Low-impedance profile data reveals deep battery insights

Accurate in-situ frequency sweeps continuously improve AI models



**# 1**

Efficient in-situ  
AFE\* Architecture

**#2**

Current Mode EIS  
is ultra-sensitive to  
variations

**#3**

Measures low  
impedance  
batteries

**#4**

DSP architecture  
enables low  
power...high SNR

**#5**

Full EIS frequency  
range builds  
complete profiles

\*AFE - Analog Front End

# Thank You

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