Synseer Update Meeting

SkyTerra Group

July 23, 2025

Agenda

1	Project Timeline & Action Items
2	Vendor Logistics Database
3	Custom Vendor Scoring
4	Compliance: WHOOP
5	Next Steps

Action Items From Last Meeting

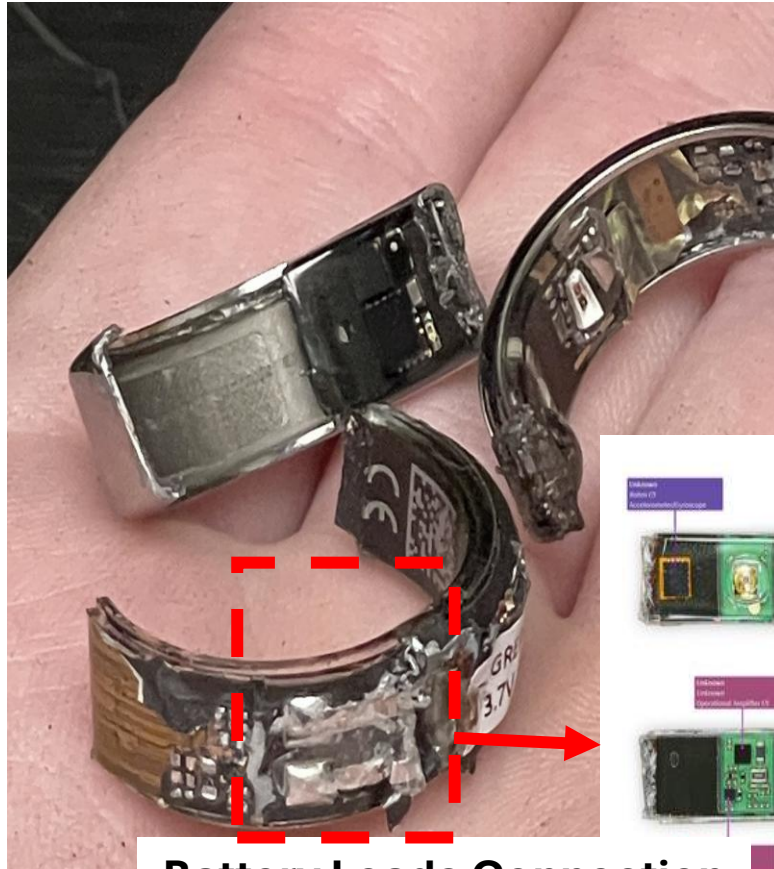| Owner	Item	Due Date	Completed
SkyTerra: Tom	Distribute meeting summary and slide deck	7/17/26	✔
SkyTerra: Tom	Add Scott Beatty to WhatsApp channel	7/17/26	✔
SkyTerra: Paawan	Share Notion access with Scott Beatty	7/17/26	✔
SkyTerra: Austin, Tom	Send Month 1 deliverables to synseer team	7/18/25	✔
SkyTerra: Austin	Build vendor logistics database covering lead time, shipping cost, and inventory for key ODMs	7/23/25	✔
synseer: John, Scott	Share RFI responses with SkyTerra team	8/1/25	Ongoing

Project Timeline (as of today)

JULY 23, 2025

SKYTERRA GROUP

4

Category	Month 1 (6/16-7/18)	Month 2	Month 3
Battery R&D	• **Battery Chemistry Matrix** `100%` • **Thermal Performance & Safety Database** `100%`	• **Battery Selection Report (Draft)** `50%` **RFI Needed** • **Thermal Performance & Safety Matrix (Draft)** `100%`	• **Battery Selection Report (Final)** • **Thermal Performance & Safety Matrix (Final)**
System Integration	• **Power-Usage Profiling (BLE / Wi-Fi / ANC / SLM)** `25%` **RFI Needed** • **BMP v1.0 Safety Envelope** `25%` **RFI Needed**	• **System Power Architecture Plan (Draft)** • **BMP v2.0 + AI Load Model**	• **System Power Architecture Package (Final)** • **Battery-Management Protocol v3.0**
Product Development	• **Partner & Vendor Database** `100%`	• **Partner & Vendor Down-selection and Map (Draft)** `40%` • **Risk-Benefit Matrix (e.g., Cooling, BMS)**	• **Partner & Vendor Map (Final)**

Competitor Example: Oura Ring

Oscilloscope Measurement
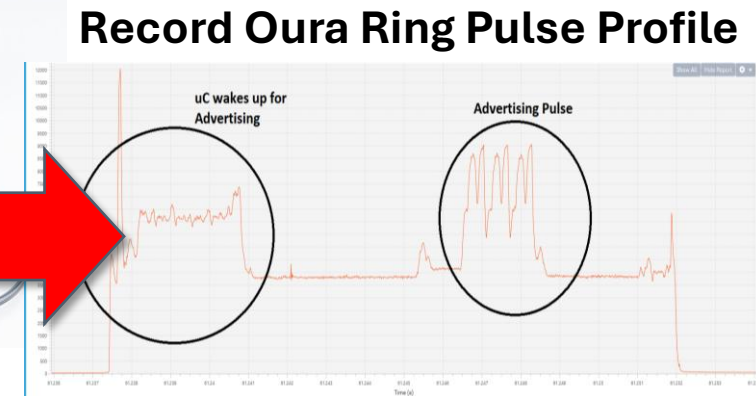
Oura Ring

Record Oura Ring Pulse Profile

uC wakes up for Advertising

Advertising Pulse

Battery Leads Connection

Apple Airpods (1ˢᵗ gen) Battery Configuration
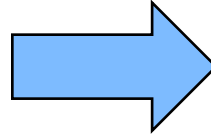
Earbud Specs
- **Form Factor**: cylindrical cell
- **Capacity**: 93 mAh
- **Voltage**: 3.7 V
- **Chemistry**: Likely LCO

Case Specs
- **Form Factor**: pouch cell
- **Capacity**: 398 mAh
- **Voltage**: 3.81 V
- **Chemistry**: Likely LCO
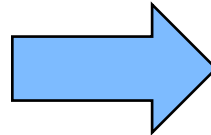
Apple Airpods (Pro 2) Battery Configuration

Earbud Specs
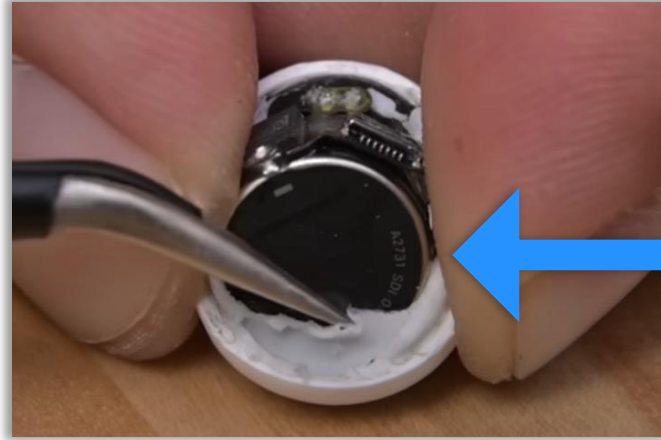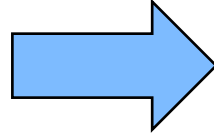- **Form Factor:** coin cell
- **Capacity:** 49.7 mAh
- **Voltage:** 3.7 V
- **Chemistry:** LCO
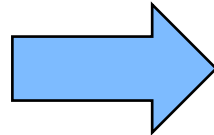
Case Specs
- **Form Factor:** pouch cell
- **Capacity:** 523 mAh
- **Voltage:** 3.81 V
- **Chemistry:** Likely LCO

Operational Challenges Overview

Challenge	Goal
Scattered Vendor Data	A vendor logistics database with **lead time, inventory, cost, and tariffs**
Unknown Supplier Readiness	Forecast-driven planning data, including **vendor capacity and supply variability**
Hidden Costs	Increased supplier costs hidden in vendor quotes and travel fees
Volatile Supply Chain	Adaptable database upon monthly review
No ODM Tradeoff Framework	Tool to evaluate speed/cost/risk tradeoffs across ODMs

Vendor Logistics Database

Vendor Logistics Database

Component → ODM Logistics Table: Tracks part-level costs, lead times, tariffs, and shipping from global vendors to ODMs to ensure timely, cost-effective product assembly.

Vendor Reliability
Vendor Name & Region

Total Time
Lead Time, Transit Time, Shipping Mode

Total Cost
Unit Price, Freight Cost, Tariff Rate

Supply Capacity
Monthly Capacity

Field	Example	Data Source	Why it's Needed
Component Name	Li-ion cell 302030	Vendor website	To know which part is being sourced
Vendor Name	Batreon	Vendor website	Primary vendor of the part
Vendor Region	South Korea	Vendor website	For tariff & transit time logic
Shipping Mode	Air	Vendor quote	Impacts cost & speed
Transit Time (days)	5	Vendor quote (ask for SLA)	Time to reach ODM
Lead Time (weeks)	3	Vendor quote	From PO to ready-to-ship at supplier
Quoted Unit Price (FOB)	$1.25	Vendor quote	Base part cost, ex-works or FOB
Freight Cost ($/unit)	$0.18	Freight forwarder quote (sometimes vendor quote)	Impacts landed cost synseer must often arrange freight directly
Tariff Rate (%)	6.5%	HTS database	Duty when part enters ODM's country
Total Landed Cost to ODM	$1.55	Calculated in database	Sum of unit + freight + tariff
Monthly Capacity	50,000	Vendor quote (may need NDA)	Supplier's production ceiling
ODM Destination	PDGV	synseer	Where the part needs to go
ODM Location	California, USA	ODM website	Enables transit time & freight cost calc
Last Verified	July 2025	Internal	Data freshness indicator

Vendor Logistics Database (cont.)

ODM → synseer Logistics Table: Captures shipping speed, cost, and fulfillment risk for finished products moving from ODMs to Synseer, enabling delivery planning and total landed cost modeling.

ODM Reliability
ODM Name & Region

Speed
Lead Time, Transit Time, Shipping Mode

Total Cost
Freight Cost, Tariff Rate, Landed Cost

ODM Capacity
ODM Output, Buffer Stock

Field	Example	Why it's Needed
ODM Name	PDGV	Assembly source
ODM Region	California, USA	Starting point for outbound leg
Destination (Region)	Chicago, IL	Final delivery point
Shipping Mode	Ground Express	Fast or cheap decision logic
Transit Time (days)	3	Delivery time to customer/DC
Freight Cost ($/unit)	$0.50	Final leg shipping cost
Tariff Rate (if cross-border)	0%	Rare, but if from outside US
Total Landed Cost to Synseer	$0.50	Freight + tariff
Monthly ODM Output (units)	20,000	Can they scale with you?
Buffer Stock at ODM	5,000	Ready-to-ship inventory
Product SKU	SynseerBand v1	Tied to finished goods forecasts
Last Price Update	Jul-25	Data freshness indicator

Scoring Process Flow

Parameters/Metrics

Apply Weights (user)

Normalize to 0-1

🎧 **Partner and Vendor Database**

📚 Ecosystem   🔋 Battery Vendors   📊 Battery Vendor Scoring   ▦ All

▼ Battery Vendor

☰ Company Category   Aα Company   ☰ Relevance to Synseer   +

Battery Vendor
Battery Vendor
Battery Vendor
Battery Vendor
Battery Vendor
Battery Vendor
Battery Vendor
Battery Vendor
Battery Vendor

Vendor Scoring Interface

Parameter 1	Weight	Parameter 2	Weight
Parameter 2	Weight	Parameter 3	Weight

Vendor	Parameter 1	Parameter 2	Parameter 3	Score	Rank
Vendor A	100%	80%	80%	82%	🏆 1 ▲
Vendor B	50%	100%	100%	70%	↑ 2 ↗
Vendor C	67%	0%	60%	48%	3 3
Vendor D	33%	33%	36%	36%	4 4

Update Score   Last Updated: Jul 22, 2025

Vendor Ranking

Historical Trends

Scoring Engine

Vendor Ranking Equation

$$R_V = \sum w_p * S_{p,v}$$

Higher values represent better performance (0-1 scale)

Parameter Normalization

$$S_{p,v} = \frac{Max_{undesired} - Parameter}{Max_{undesired} - Min_{desired}}$$

Legend

R = Final vendor Rank

P = Parameter (e.g., price, lead time, capacity)

S = Normalized Score for parameter and vendor

V = Vendor

w = Weight assigned to parameter

Example Scoring Engine

Parameter	User Defined w_p
Price	0.5
Lead Time	0.3
Capacity	0.2

ⓘ **Example Calculation**

$$S_{Price, Vendor\ B} = \frac{2 - 1.8}{2 - 1.20} = \frac{0.2}{0.8} = \mathbf{25\%}$$

$$R_{Vendor\ B} = (0.5 * 0.25) + (0.3 * 1.00) + (0.2 * 1.00) = \mathbf{62.5\%}$$

Vendor	Price	Price Score	Lead Time	Lead Score	Capacity	Capacity Score	Final Score	Rank
V_A	$1.20	100%	2 Days	66%	30,000	50%	**80%**	🥇 1st
V_B	$1.80	25%	1 Day	100%	40,000	100%	**62.5%**	🥈 2nd
V_C	$1.60	50%	4 Days	0%	20,000	0%	**25%**	🥉 3rd
V_D	$2.00	0%	3 Days	33%	25,000	25%	**15%**	4th

Trend Analysis

Strategic Value for Synseer

Real-Time Vendor Performance

Track and compare supplier metrics as they evolve

Automated Risk Detection

Instantly identify cost increases, shipping delays, and stock shortages
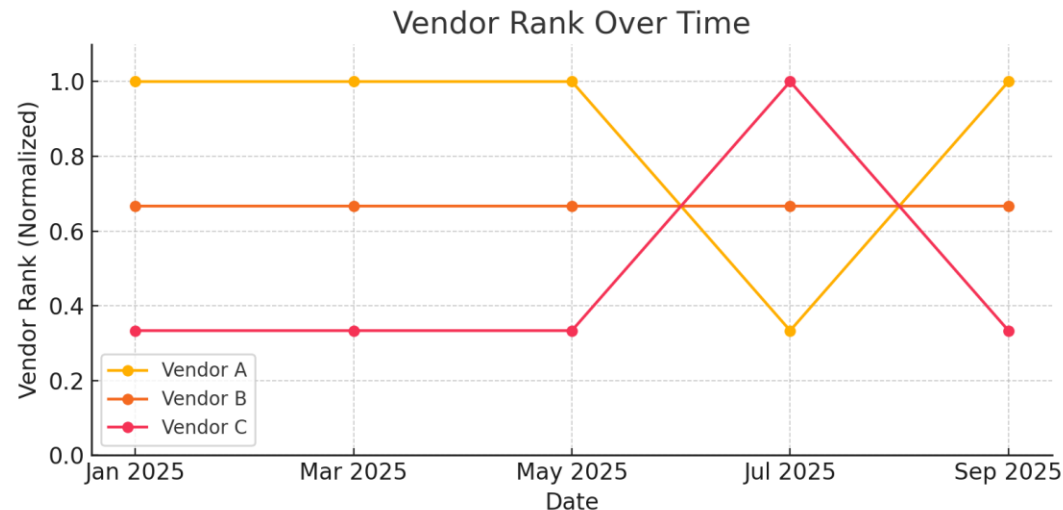
HealthBuds Ecosystem Selection

Optimize ODM & supplier selection for product development

Launch Readiness Assessment

Monitor supply chain preparedness for scale-up timing

Partner Risk Evolution

Track if vendors are becoming riskier or more cost-effective over time

Vendor Rank Over Time

Insight Example

- **Vendor A** led early but dropped in July
  - Shows high performance but some volatility March
- **Vendor B** held a steady 2nd place, signaling strong reliability.
- **Vendor C** peaked in July but couldn't sustain it – emerging option worth monitoring

Recommendation: Prioritize Vendor A for performance, backstop with B for stability, keep watch on C for future gains.

Potential Features

- Time-range selector for detailed period analysis
- Parameter contribution breakdown view
- Anomaly detection highlighting
- Correlation with external market events

WHOOP Recent FDA News

July 14, 2025: FDA issued a warning letter to WHOOP, Inc. stating that its **"Blood Pressure Insights" feature violates the FD&C Act:**

Whoop marketed BPI as a general wellness product claiming:

- "daily systolic and diastolic blood pressure estimations, offering members a new way to understand how blood pressure affects their performance and well-being."

- "delivering medical-grade health & performance insights"

FDA states "[Blood pressure measurement] is not intended to 'maintain' or 'encourage' a healthy lifestyle" as required for general wellness products

BP measurement qualifies as a Class II medical device per section 201(h)

Project Timeline (as of today)

Complete
In-Progress
To-Do

Category	Month 1	Month 2	Month 3
Battery R&D	• **Battery Chemistry Matrix** 100% • **Thermal Performance & Safety Database** 100%	• **Battery Selection Report (Draft)** 50% • **Thermal Performance & Safety Matrix (Draft)** 100%	• Battery Selection Report (Final) • Thermal Performance & Safety Matrix (Final)
System Integration	• **Power-Usage Profiling (BLE / Wi-Fi / ANC / SLM)** 25% **RFI Needed** • **BMP v1.0 Safety Envelope** 25% **RFI Needed**	• System Power Architecture Plan (Draft) • BMP v2.0 + AI Load Model	• System Power Architecture Package (Final) • Battery-Management Protocol v3.0
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What are your top priorities? → | **Vendor Database** | **Prototyping Testing** | **Certification** |

Happy Birthday Scott!

Month 1 Deliverables for synseer
(Slide Format)

Key Points of Battery Findings

1. Summarizes Month 1 battery chemistry and safety results
2. Provides cross-functional comparison of leading chemistries
3. Evaluates cycling performance, thermal behavior, integration constraints
4. Ranks candidates by energy, cycle life, charge rate, temperature, flexibility
5. Highlights synseer priority levels: Best, Better, OK
6. Details heat rise, impedance, venting, skin-contact under peak loads
7. Guides battery selection and heat management design decisions

Battery Chemistry Matrix

Candidacy: `BEST` `BETTER` `OK`

Chemistry Name	Synseer Priority	Key Points	Cycle Life (cycles)	Grav. Energy Density (Wh/kg)	Vol. Energy Density (Wh/L)	Max Charge (C-rate)	Max Discharge (C-rate)	Operating Temp. Range (°C)	Flexibility (pouch)
Lithium-ion Silicon-Carbon (Si-C)	High	- High vol. energy & cycle life. - Supports smaller wearables. - Commercial in WHOOP 4.0 fitness band.	1000-2000	260-450	750-950	3C	5C	-10 - 50	Moderate
Lithium Nickel Manganese Cobalt Oxide (NMC)	High	- High vol. energy & cycle life. - Good for buds & charging case. - AirPods Pro use NMC.	1000–2000	150–220	500-700	1C	1.5C (8C pulse)	−20 – 60	Moderate
Lithium Titanate (LTO)	Moderate	- Ultra-long cycle; rapid charge capability. - Lower energy; larger cells required. - Niche IoT/wearables needing >10k cycles.	3000–7000	50–80	110-180	10C	10C	−30 – 55	Low (rigid)
Lithium Cobalt Oxide (LCO)	Moderate	- Moderate vol. energy; common in earbuds. - Moderate cycle life; longevity concern. - Used in AirPods & Huawei Watch Buds.	500–1000	150–200	370-410	1C	2C	0 – 45	Low (rigid)
Solid-State Lithium (Li-metal)	Moderate	- Highest energy; moderate cycle life. - Emerging microbatteries for wearables. - Samsung targeting Ring/Buds/Watch adoption.	~600	~375	600-1000	3C	4C	−30 – 45	Low (rigid)

Battery Chemistry Matrix

Candidacy: `BEST` `BETTER` `OK`

Chemistry Name	Synseer Priority	Key Points	Cycle Life (cycles)	Grav. Energy Density (Wh/kg)	Vol. Energy Density (Wh/L)	Max Charge (C-rate)	Max Discharge (C-rate)	Operating Temp. Range (°C)	Flexibility (pouch)
Lithium-ion Polymer (Li-poly)	**Low**	- Thin, shapeable; dominant in wearables. - Typically 300-600 full cycles; below target. - Used in Fitbit, Oura, many smartwatches.	300-600	~200	250-350	5C	5C	0–60	Moderate
Silver–Zinc (Ag–Zn)	**Low**	- High volumetric energy; good discharge rates. - Limited cycle life; requires daily recharge regimes. - Used in ZPower rechargeable hearing aids.	150–300	100–150	340-510	1C	10C+ (pulse)	0–50	High
Lithium Iron Phosphate (LFP)	**Low**	- Excellent safety; 2000+ cycle potential. - Lower energy; bulk suits charging case modules. - Growing interest for durable consumer devices.	2000-7000	90–120	220-450	1C	3C (5C pulse)	−20–60	Low (rigid)
Lithium Nickel Cobalt Aluminum Oxide (NCA)	**Low**	- Very high energy; temperature-sensitive management. - Cycle life modest in small formats. - Generally unsuitable for long-life wearables.	~500	200–260	650-720	1C	~3C	0–50	Low (rigid)
Sodium-Ion (Na-ion)	**Low**	- Lower cost, abundant materials; emerging tech. - Flexible aqueous Na-ion prototypes shown. - Early-stage; not yet for small wearables.	1000+	130–160	200-300	5C	~5C	−20–85	Low (rigid)

Battery Chemistry Matrix

Candidacy: BEST   BETTER   OK

Chemistry Name	Synseer Priority	Key Points	Cycle Life (cycles)	Grav. Energy Density (Wh/kg)	Vol. Energy Density (Wh/L)	Max Charge (C-rate)	Max Discharge (C-rate)	Operating Temp. Range (°C)	Flexibility (pouch)
Nickel–Metal Hydride (NiMH)	Low	- Lower energy vs lithium; heavier packs. - Cycle life ~500-1000 typical medical packs. - Generally unsuitable for mini wearable formats.	~500	60–120	140-350	1C	2C	−20–50	Low (rigid)
Lithium–Sulfur (Li–S)	Low	- Very high specific energy; tech immature. - Cycle life improving; still <1400 mainstream. - Not yet practical for client wearables.	1000–1500	450–550	300-540	0.2C	0.5C	-120	Low (rigid)
Zinc-Ion (Zn-ion)	Low	- Safer aqueous chemistry; moderate energy density. - Textile integration demonstrated experimentally. - Promising for washable sensor socks prototypes.	~200	80–135	100-150	1C	2C	−20–50	Moderate

Thermal Performance & Safety Matrix

Legend:
- ▢ *No Safety Concern*
- ▢ *Minor Safety Concern*

Calculated for 200 mA peak current

Chemistry Name	Key Safety Considerations	Surface Temp Increase (°C)	Heat Generation Rate (mW)	Thermal Impedance (°C W^{-1})	Venting / Leakage Severity	Skin-Contact Safety
Lithium Iron Phosphate (LFP)	• 0.02 °C rise; negligible heating. • Low-pressure vent; electrolyte still flammable. • Barrier film prevents solvent wetting.	Low (0.02 °C)	Moderate (12 mW)	Moderate (63)	**Moderate** Low-pressure vent; organic solvent still flammable.	✅
Lithium Nickel Manganese Cobalt Oxide (NMC)	• Flammable vent jet; rigid containment required. • 0.03 °C rise; skin comfortable. • Avoid hot irons; runaway hazard.	Low (0.03 °C)	Moderate (4.8 mW)	Moderate (63)	**High** Energetic gas/solvent jet; fire risk.	✅
Lithium-ion Polymer (Li-poly)	• Pouch may weep; multilayer barrier needed. • 0.13 °C rise; comfort safe. • Design strain-relief; avoid creasing failures.	Low (0.13 °C)	Moderate (6.0 mW)	Moderate (64)	**Moderate** Soft-pouch weep; limited spray.	✅
Lithium-ion Silicon-Carbon (Si-C)	• Pouch swelling; add expansion pocket. • High vent risk; isolate from skin. • 1.2 °C rise; add heat spreader.	Minor (1.2 °C)	Moderate (7.2 mW)	Moderate (63)	**High** Swelling stresses pouch; solvent ejection.	⚠️
Silver–Zinc (Ag-Zn)	• Sealed aqueous; low fire risk. • Alkaline seep may irritate skin. • 0.02 °C rise; thermally safe.	Low (0.02 °C)	Low (0.8 mW)	Low (3.8)	**Low** Sealed aqueous; alkaline seep only.	✅

Expansion pocket: A small mechanical buffer that allows a battery pouch to swell slightly during charge/discharge. Commercial Si-C cells like Group14 or Sila don't include it by default; it's built into the earbud housing as a 0.3–0.5 mm gap or soft silicone ring around the cell.

Heat spreader: A thermally conductive layer that distributes heat from the cell to reduce hotspots. While Si-C pouches may ship with a PET/Al liner for handling, true heat spreaders are added by the manufacturer, typically graphite foil [20–40 µm], adhesive, then the outer shell.

Thank You!

Contact Information

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SkyTerra Group

Using authentic connections as an intelligent tool to drive industry forward

Dr. Jonathan Scharf
Founder and CEO

Dr. Mahmood Tabaddor
Strategy and AI Advisor

Dr. Thomas Fabian
System & Compliance Advisor

Joe Narváez
BESS & AI Technical Director

Paawan Desai
Data & AI Analyst

Dr. Austin Paul-Orecchio
Technical Energy Advisor

Our Partners

CLEANTX

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KEYFIVE

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gwc green workforce collaborative

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IFELSE

TMG - CONSULTING ENGINEERS
High Performance | High Quality

LAURY GRID DEFENDERS TMG

Expert Profiles

SkyTerra Leadership Team

SkyTerra Group's leadership brings world-class expertise in energy storage, renewable energy, and AI-driven solutions.

|	**Dr. Jonathan Scharf** **Founder and CEO**	**Dr. Mahmood Tabaddor** **Strategy and AI Director**	**Dr. Thomas Fabian** **System & Compliance Director**
Expertise	Battery systems, AI-driven diagnostics, renewable energy, and energy storage strategy.	Enterprise AI/ML, digital transformation, regulatory strategy, and advanced technology integration.	Polymer science, flammability testing, material compliance, additive manufacturing, regulatory strategy
Experience	Former Senior Engineer at Tesla and Energy Storage SME at Accenture. Founder of SkyTerra Group and State Membership Committee Co-Chair at CleanTX.	20+ years leading high-impact AI and digital transformation initiatives at Accenture and as co-founder of Plinnovate. Led global teams on critical investigations (e.g., Boeing 787 battery fires); shaped industry standards (UL 4600, NTSB).	25+ years in materials R&D and commercialization, UL Solutions Global Leadership
Education	PhD, NanoEngineering (UC San Diego) MS, NanoEngineering (UC San Diego) BS, Electrical Engineering (UMass Amherst)	PhD, Engineering Mechanics (Virginia Tech) Postdoc, Business Management (Yale School of Management) Executive Leadership (Yale, MIT)	Ph.D. in Polymer Science, University of Connecticut Technical & Operations Leadership Program, MIT Sloan
Achievements	Led $650M battery deployment strategy at Accenture Published in Science and Nature Nanotechnology on battery and AI innovations	Multi-million-dollar AI solutions for Fortune 500 clients Patented innovations and published research (CFD, AI-driven simulation) and frequent keynote speaker at major industry forums	Developed and led UL certification strategies for advanced battery and storage materials Award-winning contributor to NFPA and ASTM standards

SkyTerra Support Team

SkyTerra Group's leadership brings world-class expertise in energy storage, renewable energy, and AI-driven solutions.
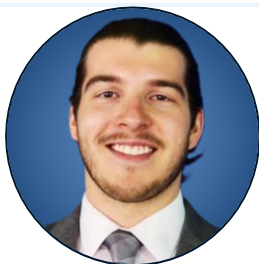
Dr. Austin Paul-Orecchio
Technical Energy Advisor

Paawan Desai
Data & AI Analyst

Mae Lackey
Marketing & Administrative Developer

Expertise		
Advanced battery materials, lithium-metal anodes, fast-charge electrolytes, materials characterization	ML (XGBoost, CatBoost, TensorFlow), energy forecasting, embedded systems, post-quantum crypto accelerators, Python/SQL analytics	Communications strategy, audience engagement, multimedia storytelling, social media & newsletter management
Experience		
Evaluated 200+ storage concepts, licensing 52 battery technologies to partners
Invented indium-alloy anodes for 6-minute charging, doubling cycle life
Optimized cells using ToF-SIMS, XPS, XRD and EIS	Built multi-fuel demand models
Engineered Verilog accelerators for ML-DSA crypto
Developed SMB revenue tracker, securing critical funds for TEDxYouth@Austin backing	Audience-engagement roles at The Texas Tribune, The Charlotte Observer and Passionfruit
Education		
M.S. Chemistry, The University of Texas at Austin, 2022
B.S. Chemistry, The University of Texas at Austin, 2025
B.S. Chemistry, Bethany College, 2019	B.S. in Electrical and Computer Engineering, The University of Texas at Austin
*Minor in Entrepreneurship	2025*	B.J. in Journalism, The University of Texas at Austin (2024) Minor in Chinese
Achievements		
6+ papers in *Advanced Materials* and *ACS Energy Letters*
Authored licensing agreements and strategy papers for battery start-ups	1st Place – Energy AI 2025 Hackathon
Post-Quantum Crypto Accelerator
NASDAQ Forecasting w/ Bayesian/Prophet models	Launched multi-platform campaigns that grew readership and social following
Produced multimedia features that strengthened brand voice and reach

Dr. Jonathan Scharf

Founder & CEO
Professional Resource Officer

Professional Summary

- **Expertise:** Advanced battery technologies, electrode manufacturing, materials characterization, and next-generation Li-ion battery systems.

- **Publications: Peer-reviewed articles in Science and Nature:**
  - *"Carbon-Free High Loading Silicon Anodes Enabled by Sulfide Solid Electrolytes for Robust All Solid-State Batteries" (Science, 2021).*
  - *"Bridging Nano and Micro-scale X-ray Tomography for Battery Research by Leveraging Artificial Intelligence" (Nature Nanotechnology, 2021).*

Education

- **PhD (2021):** NanoEngineering, UC San Diego Jacobs School of Engineering
- **MS (2017):** NanoEngineering, UC San Diego Jacobs School of Engineering
- **BS (2016):** Electrical Engineering, University of Massachusetts Commonwealth Honors College

Functional Expertise

- Project and Program Management
- Battery Materials and Chemistry
- Li-ion Cell and Electrode Manufacturing
- Solar Cell Development and Testing
- Data Analysis and Modeling
- DOE Design and Characterization Techniques
- Programming Skills (MATLAB, Python, ML/AI)

Industry Expertise

- Business Development and Market Expansion
- Technical Consulting and Strategic Advisory
- Product Development
- Collaborative R&D with Industry Leaders
- Regulatory Compliance & Sustainability
- Electrochemical Diagnostics
- Emerging Technology Evaluation

Selected Relevant Experience

Business Development Experience

- **Market Entry Strategies**: Delivered over **$650M in cost savings** through optimized energy storage supply chains and material innovations.
- **Strategic Partnerships**: Built alliances with EPCs, OEMs, energy operators, and renewable energy sectors as **Chair of State Membership Committee at CleanTX**, driving technology adoption and market expansion.
- **Technology Commercialization**: Evaluated and implemented high-value battery solutions for multi-million-dollar projects.
- **Thought Leadership**: Published white papers influencing energy storage adoption strategies.

Professional Experience

Energy Storage Development

- **Electrode Innovation:** Optimized silicon-rich anodes and sulfur cathodes, enhancing battery performance and lifespan.
- **Manufacturing Leadership:** Advanced dry electrode processing and quality control for large-scale Li-ion production.
- **Material Analysis:** Conducted electrochemical and AI-driven studies to refine battery material formulations.

Renewable Energy Integration

- **Solar R&D:** Developed high-efficiency silicon photovoltaic cells and assessed performance degradation.
- **Sustainability Insights:** Created strategies to evaluate the environmental impact of energy storage systems.

Consulting Leadership

- **Technical Consulting:** Advised global firms on deploying advanced battery technologies.
- **Collaborative Execution:** Bridged engineering, operations, and business teams to implement scalable solutions.

Dr. Mahmood Tabaddor

Founding Board Member

Strategy and AI Advisor

Professional Summary

- **Expertise:** AI/ML technologies, predictive modeling, digital transformation strategy, and regulatory frameworks for business innovation.
- **Leadership and Advocacy:**
  - Led the **UL global team** investigating Boeing 787 battery fires, presenting at NASA and FAA.
  - Advanced industry-first **Machine Learning Algorithm Reproducibility service**.
  - Key contributor to **NTSB, UL 4600,** and **AI Governance Standards**.
  - Speaker and Steering Committee Member for **NAFEMS Americas**.

Education

- **Postdoc:** Business Management, Yale School of Management
- **PhD:** Nonlinear System Dynamics, Virginia Tech
- Executive Leadership Program, **Yale University,** Technical Leadership Program on AI, **MIT**

Functional Expertise

- AI Deployment and Predictive Modeling
- Regulatory & Product Safety Standards
- Strategic Planning & Business Innovation
- Program Leadership & Execution
- Advanced Simulation & Modeling
- Digital Transformation Strategy

Industry Expertise

- Advanced Manufacturing & Engineering(Industry X)
- Testing, Certification & Risk Management
- Higher Education & Research Advisory
- Enterprise AI Strategy & Governance
- Innovation & Entrepreneurship
- Cross Sector AI Application

Business Development Experience

- **Enterprise-Scale AI Program Leadership -** Spearheaded **multi-million-dollar AI transformation programs** at Accenture and UL, aligning technical with business growth.
- **Client-Facing Strategy & Innovation -** Developed AI/ML-based compliance and product testing solutions that opened **new revenue channels** and **accelerated client acquisition**.
- **Thought Leadership for Market Expansion -** Regular keynote speaker at **NAFEMS**, **SEMI-THERM**, and regulatory forums to **senior stakeholders across sectors**.
- **Sales Enablement & GTM Strategy -** Developed data-driven solutions and internal tools that supported GTM strategies across tech and compliance markets..

Professional Experience

AI and Advanced Technology Integration

- **AI Deployment & Strategy**: Led enterprise-scale implementations of generative AI and large language models (LLMs) across manufacturing, compliance, and product development domains.
- **Digital Twin & Modeling**: Applied advanced modeling and simulation techniques to replicate complex engineering systems for safety, performance, and certification.

Regulatory Compliance and Product Certification

- **Virtual Testing Leadership**: Pioneered machine learning tools to virtualize regulatory testing processes, accelerating product certification and market readiness.
- **Standards & Frameworks**: Contributed to global standards including UL 4600 and ISO/IEC SC 42 for AI governance and system safety.

Strategic Consulting and Leadership

- **Technical Advising**: Advised Fortune 500 companies on AI strategy, risk modeling, and compliance optimization.
- **Academic and Nonprofit Engagement**: Served on academic boards and technical committees (e.g., NAFEMS, Oakland University) shaping future AI and engineering curriculum.
- **Innovation Enablement**: Co-founded Plinnovate, offering online programs in Systematic Inventive Thinking and Design Thinking to upskill the next generation of innovators.

Dr. Thomas Fabian

System & Compliance Advisor
Professional Resource Officer

Professional Summary

- **Expertise:** Polymer science, material safety, flammability, certification strategy, additive manufacturing, and global regulatory compliance.

- **Awards: Recognized by ASTM and NFPA for leadership in standards and public safety research.**
  - *ASTM Award of Recognition* (2015): Honored by ASTM International for leadership in developing the E2957 fire-resistance test standard.
  - *Ronald K. Mengel Award* (2013): Presented by the NFPA's Fire Protection Research Foundation for outstanding research on cooking fire prevention.

Education

- **Ph.D. (1997):** Polymer Science, University of Connecticut
- **B.S. (1991):** Chemical Engineering, Carnegie Mellon University

Functional Expertise

- Material Flammability & Fire Science
- Regulatory Strategy & Compliance
- Additive Manufacturing Materials Certification
- Polymer Testing & Characterization
- Technical Standards Development
- Scientific Communication & Thought Leadership

Industry Expertise

- Advanced Materials for Energy Systems
- Product Certification & Compliance Strategy
- Global Standards (NFPA, ASTM)
- Additive Manufacturing Regulations
- Public Safety & Environmental Health Integration

Selected Relevant Experience

Business and Regulatory Leadership

- **Certification Strategy:** Developed **UL certification pathways** for additive manufacturing and advanced battery materials, enabling customer market access.
- **Market Expansion:** Led creation of new **testing programs** and service offerings, including global regulatory compliance services generating **six-figure revenues** in year one.
- **Standards Impact:** Recognized by **NFPA** and **ASTM** for spearheading updates to **safety testing** methodologies and codes.
- **Entrepreneurship:** Founded Blue Sky Polymer Consulting to guide companies through polymer R&D, compliance, and testing for **energy storage** and **3D printing**.

Professional Experience

Material Science & Fire Safety

- **Polymer Research Leadership:** Directed global R&D programs at **UL Solutions** to standardize fire safety testing for plastics, 3D printed parts, and building components.
- **Innovation Initiatives:** Delivered new assessment methods with **eight-figure revenue** potential and introduced predictive tools for compliance testing.
- **Applied Research:** Led multimillion-dollar research on fire barriers, deck boards, and upholstery flammability **influencing safety codes and regulations**.

Testing & Certification Development

- **Product Development Support:** Designed and validated novel test equipment and processes for evaluating polymer **flammability and mechanical properties**.
- **Material Safety Standards:** Contributed to the authorship of **ASTM and NFPA standards** through committee leadership and technical advocacy.
- **Regulatory Solutions:** Bridged science and compliance by launching **marketing claims** verification services and **international regulatory advisories**.

Dr. Austin Paul-Orecchio

Senior Technical Consultant
Professional Resource Officer

Professional Summary

- **Expertise**: Advanced energy storage, lithium metal batteries, electrolytes, fast-charging technologies, and materials characterization.

- **Publications**: 6+ peer-reviewed papers in *Advanced Materials* and *ACS Energy Letters*.
  - *"Alloying Indium Additive Enables Fast-Charging Lithium Metal Batteries"* (2023)
  - *"In Situ Engineering of Inorganic-Rich Solid Electrolyte Interphases via Anion Choice"* (2024)

Education

- **B.S.** (2025) - Chemistry, *University of Texas at Austin* (Focus: *Fast-Charging Batteries*)
- **M.S.** (2022) - Chemistry, *University of Texas at Austin* (*Li-ion Battery Electrolytes*)
- **B.S.** (2019) - Chemistry, *Bethany College* (*Photovoltaics*)

Functional Expertise

- Battery Materials & Cell Chemistry
- Electrochemical Data Analysis
- Materials Characterization Techniques
- Market Analysis & Business Development
- Intellectual Property & Licensing
- Technical and Strategic Communication

Industry Expertise

- Material optimization and cost reduction strategies
- Translating technical insights into actionable business recommendations
- Identifying opportunities and technologies in sustainable energy markets

Selected Relevant Experience

Business Development Experience

- Managed **52 advanced battery technologies**, developing licensing bundles for industry partners.
- Evaluated **200+ technologies** for market opportunities and emerging trends.
- Drafted **licensing/test agreements** to facilitate early-stage industry evaluation.
- Guided startups on **business model strategies**, producing detailed whitepapers.

Professional Experience

Energy Storage Experience

- Designed **indium alloy protective layers** for lithium metal anodes, enabling:
  - **6-minute charging** with >200% lifespan improvement (*ACS Energy Letters*).
- Created **dendrite-free lithium metal batteries** using SEI engineering and metal-nitrate additives.
- Conducted **quantitative battery data analysis** (voltage profiles, impedance, overpotentials) to uncover critical **composition-performance relationships**.

Material and Device Testing

- Applied advanced characterization techniques (**ToF-SIMS, XPS, XRD**) to analyze electrode-electrolyte interphases.
- Diagnosed **electrochemical device failures** using electrochemical (EIS, LSV) and morphological (SEM) data correlations.

Paawan Desai

Data & AI Analyst

Technical Energy Advisor

Professional Summary

- **Expertise**: AI-driven energy forecasting, cryptographic hardware acceleration, time-series modeling, and embedded systems.

- **Publications**: Hardware Accelerator for Module-Lattice-Based Digital Signature Algorithm (ML-DSA) – 2025

Education

- **B.S.** (2025) - Electrical and Computer Engineering, *University of Texas at Austin* (Focus: Software and Data Analysis)

Functional Expertise

- Forecasting & Time-Series Modeling
- Embedded Systems & Hardware Acceleration
- Machine Learning (XGBoost, TensorFlow)
- Data Analysis & Visualization (Python, SQL, Tableau)
- Cryptographic Systems (ML-DSA)

Industry Expertise

- Grid Optimization & Demand Forecasting
- Technical Strategy for Startups
- Quantum Secure Cryptographic Hardware Design
- Urban Data & Infrastructure Analytics
- EdTech & Accessible Interfaces

Selected Relevant Experience

Business Development Experience

- Built full-stack revenue tracking platform for small businesses (Python, SQL) (Fundare Finance)

- Secured $30k+ in sponsorships and helped organize TEDxYouth@Austin, the world's largest TEDxYouth event

- Led team finances, outreach, and service as captain of UT's Punjabbawockeez, raising funds for cancer research

Professional Experience

Energy Forecasting

- Designed time-series ML models (XGBoost, CatBoost) for predicting hydraulic fracturing energy needs

- Integrated uncertainty modeling and hyperparameter tuning for robust performance across fuel types

- Analyzed NASDAQ data using Prophet and Orbit to reveal volatility and intermarket signals

Hardware & Embedded Systems

- Engineered Verilog accelerator modules (NTT, random bit gen) for ML-DSA cryptographic protocols and C-based driver for hardware-software integration;.

- Designed deployable seismic-resilient frames at UT's Human-Centered Robotics Lab (MATLAB, LabVIEW)