



The Company Realizing Zero-Accident, Zero-Downtime

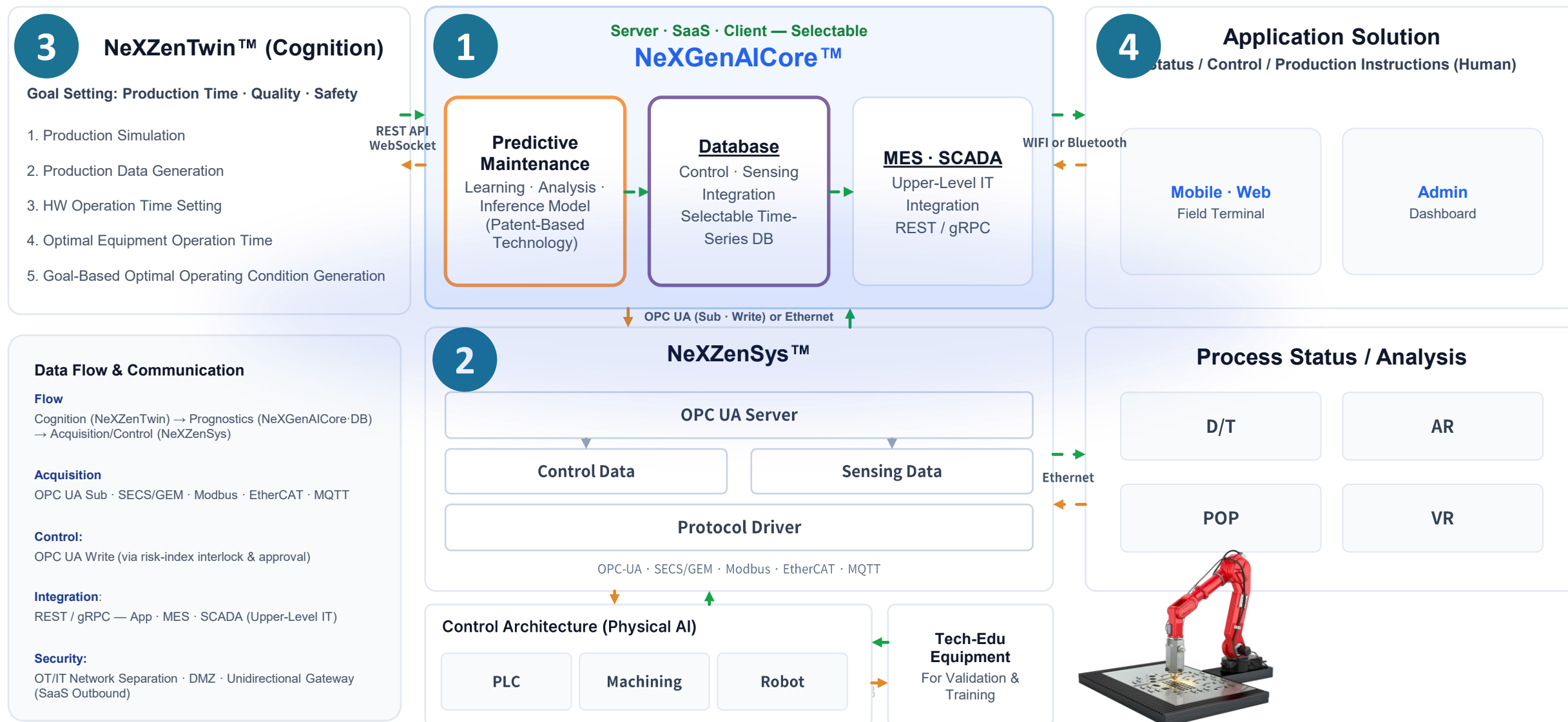
## Product Catalog

Experience the best performance  
in your business with

## Solution Architecture NeXGenAICore Predictive Maintenance Platform for Intelligent Smart Manufacturing

→ Status

→ Command



## Product Lineup Application Solutions at a Glance

### Application Solutions · Including Vehicle Diagnostics (In Development)

#### Semiconductor Equipment Control

SEMI-standard equipment/chamber-level control + AI ensemble predictive maintenance & RUL

#### Power Electronics

IGBT/DC-link/gate-driver RUL + power quality (THD, power factor)

#### Water & Cooling

Pump/heat exchanger efficiency & RUL + automatic operating condition optimization

#### Smart Logistics

Conveyor/sorter/AGV drive-unit RUL + real-time throughput & bottleneck analysis

#### Smart Farm

Integrated automatic control of nutrient solution, LED, CO<sub>2</sub>, HVAC + overall farm health score

#### Solar PV

String/inverter anomaly prediction + performance ratio (PR) analysis

#### ESS Battery

Cell-level SOH/RUL + 3D pack digital twin

#### Data Center

PUE/power efficiency monitoring + UPS/CRAH/CDU RUL & liquid-cooling leak prediction

## Product Portfolio NeXGenAICore: AI Predictive Analytics Solution

### Key Features

#### Ensemble ML Engine

Fuses LSTM, Transformer, XGBoost, and Random Forest into a single inference pipeline

#### Edge + Cloud Hybrid

On-premise edge deployment by default, with optional cloud sync and remote dashboard

#### Multi-Protocol Ingestion

Instantly supports OPC-UA, MQTT, Modbus TCP, EtherCAT, and RS-485 with no extra configuration

#### Predictive Maintenance & Risk Index

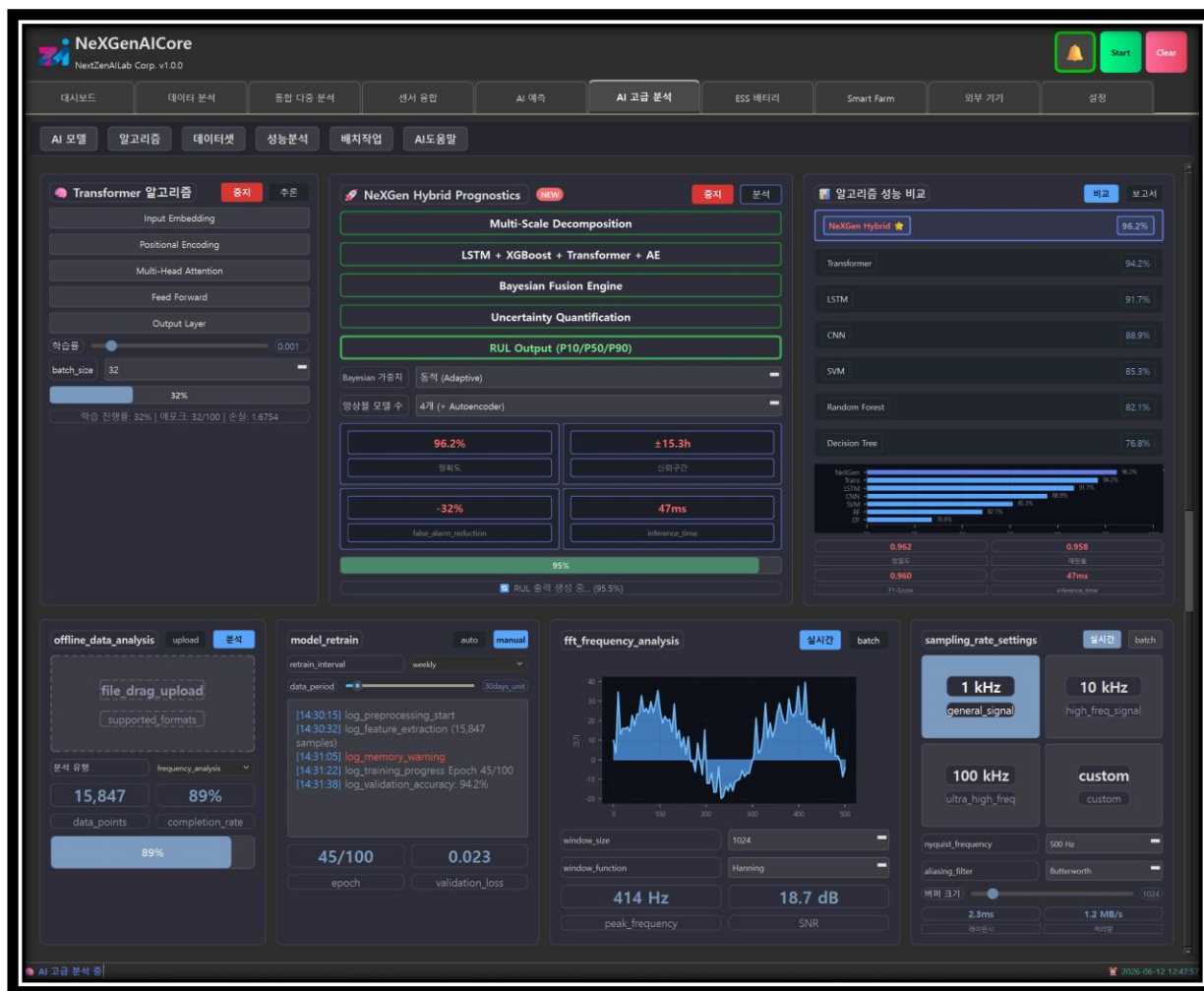
Predicts failures in advance through multimodal anomaly detection and component-level RUL calculation

### Technical Specifications

- Inference Latency < 50 ms (edge)
- Supported Protocols OPC-UA · MQTT · Modbus · EtherCAT
- Deployment Edge / On-premise / Hybrid Cloud

- API Interface REST API · Python SDK
- OS Support Ubuntu 20.04+ · RHEL 8+
- System Integration MES · SCADA · ERP Ready

## Product Portfolio NeXGenAICore: AI Predictive Analytics Solution



Actual Operation Screen — Manages and inspects AI model training/inference and Remaining Useful Life (RUL) prediction, the core of AI advanced analytics and predictive maintenance

### Key Features of This Screen

#### Transformer Algorithm

Embedding→Positional Encoding→Multi-Head Attention→Feed Forward→Output Layer architecture with learning rate/batch size settings, real-time monitoring of training progress and loss (currently 32%, loss 1.6754)

#### NeXGen Hybrid Prognostics

Multi-Scale Decomposition→4-model ensemble (LSTM+XGBoost+Transformer+AE)→Bayesian Fusion→Uncertainty Quantification→RUL output (P10/P50/P90) · 96.2% accuracy ·  $\pm 15.3h$  confidence interval · -32% false alarms · 47ms inference

#### Algorithm Performance Comparison

Benchmarks NeXGen Hybrid (96.2%) against Transformer (94.2), LSTM (91.7), CNN (88.9), SVM (85.3), Random Forest (82.1), and Decision Tree (76.8), proving superiority in accuracy/F1-score

- ✓ **offline\_data\_analysis:** File-upload-based batch analysis (15,847 points · 89% complete)
- ✓ **model\_retrain:** Periodic (weekly) retraining · maintains 94.2% validation accuracy
- ✓ **fft\_frequency\_analysis:** Frequency analysis (peak 414Hz · SNR 18.7dB)
- ✓ **sampling\_rate\_settings:** Sampling rate (1k–100kHz, custom) · Nyquist & anti-aliasing filter

## Product Portfolio NeXGenAICore: AI Predictive Analytics Solution

### Competitive Advantage

#### Ensemble vs. Single Model

Reduces both false positives and false negatives through fused LSTM/Transformer/XGBoost/RF inference

#### Component RUL & Uncertainty vs. Threshold Alarms

Enables proactive maintenance instead of reactive response by quantifying remaining life and uncertainty

#### Real-Time Edge vs. Cloud Dependency

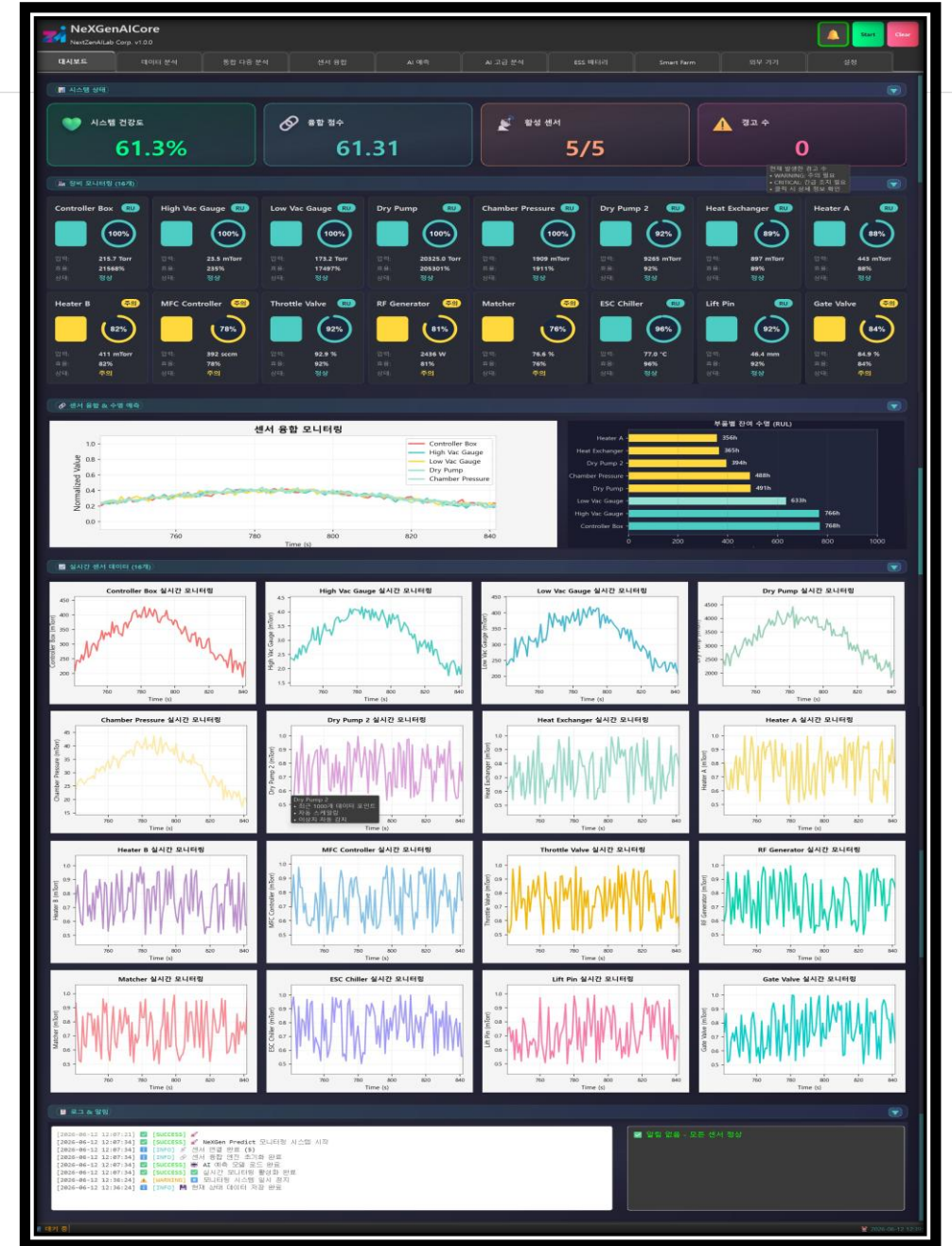
Immediate diagnosis and protection with under-50ms edge inference, supporting closed (on-premise) networks

### Key Features

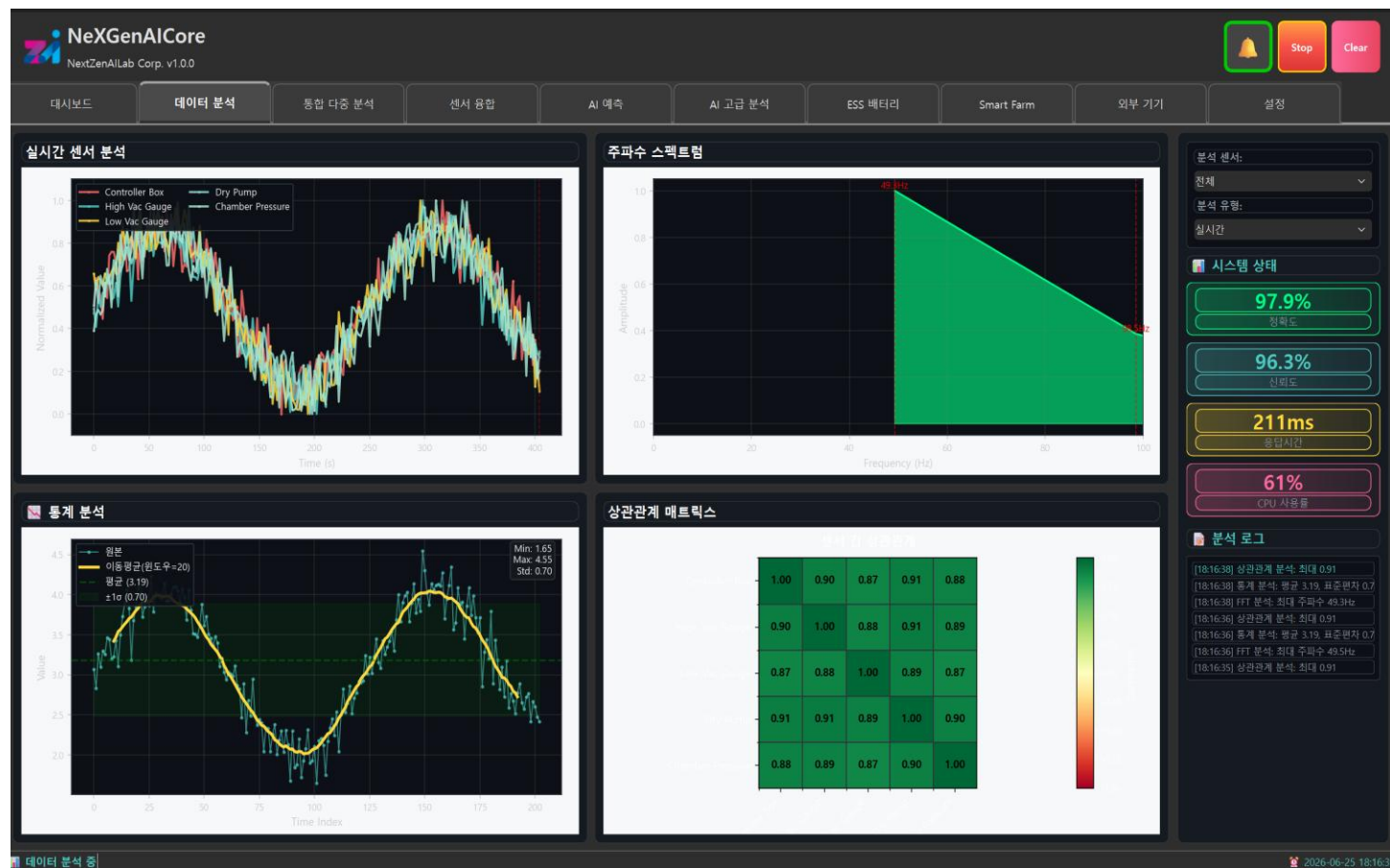
- ✓ 16-channel multi-sensor integrated monitoring · overall/per-equipment health score (overall 61.3% · 5/5 normal equipment)
- ✓ Component-level RUL and uncertainty (confidence interval) calculation
- ✓ Ensemble ML fusion inference (LSTM, Transformer, XGBoost, RF)
- ✓ Multi-protocol acquisition (OPC-UA, MQTT, Modbus, EtherCAT) + MES/SCADA integration

Actual Operation Screen — Integrated Dashboard · Overall Health Score/RUL

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## Product Portfolio NeXGenAICore: AI Predictive Analytics Solution



### Key Features of This Screen

#### Real-Time Sensor Analysis

Normalizes vacuum/pump sensor values for time-axis tracking (Controller Box, Vac Gauge, Dry Pump, Chamber Pressure)

#### Frequency Spectrum

Identifies rotating machinery/bearing anomaly frequencies via FFT spectrum

#### Statistical Analysis

Anomaly detection based on mean, standard deviation, and moving average ( $\pm 1\sigma$ ) bands

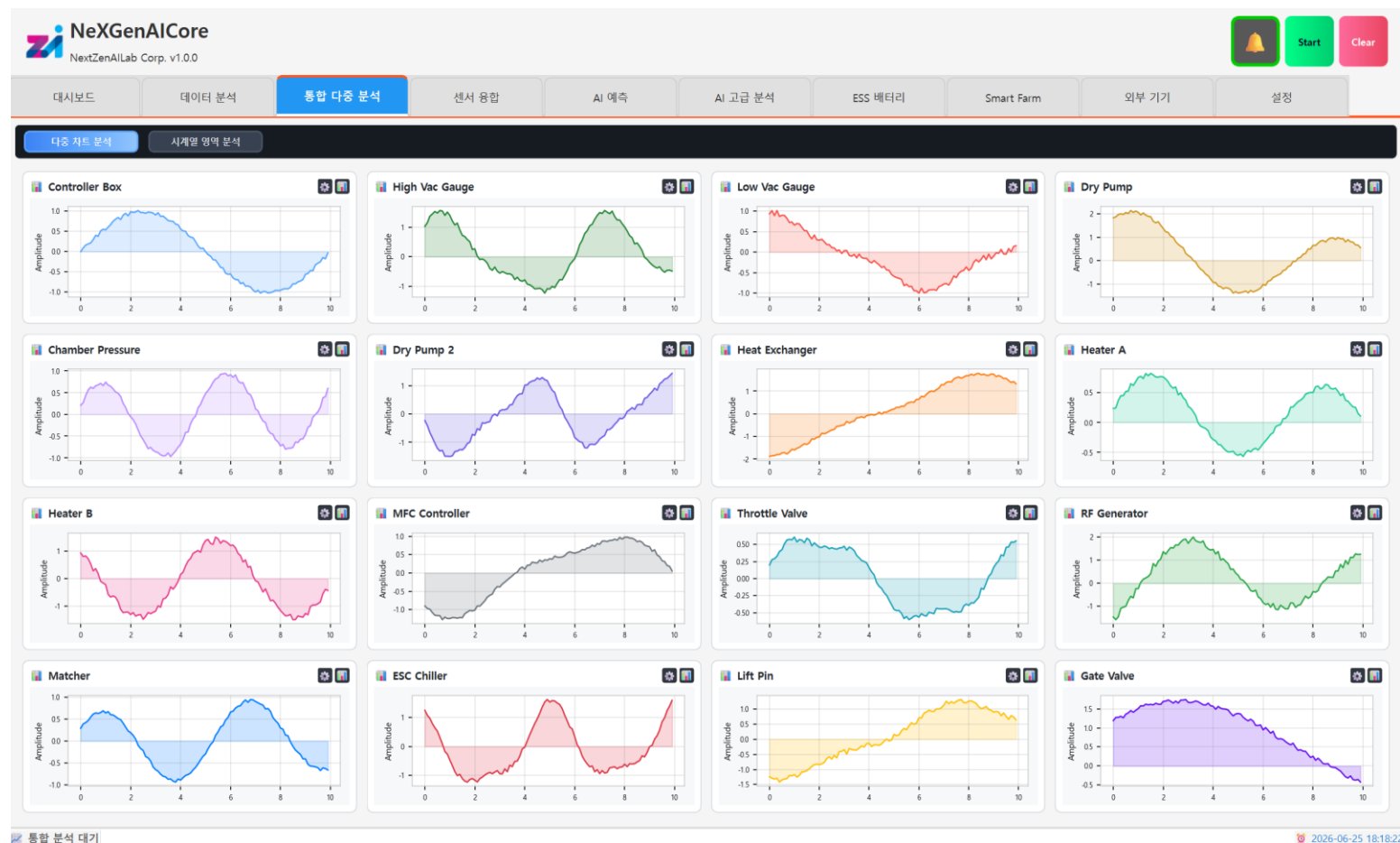
#### Correlation Matrix

Traces linked anomalies and root causes via inter-sensor correlation coefficients (0.87–0.91)

✓ Manufacturing equipment real-time sensor values → statistical deviation → frequency anomaly → inter-sensor correlation analysis (primary diagnostic screen for failure prediction)

Actual Operation Screen — Data Analysis · Frequency/Statistics/Correlation

## Product Portfolio NeXGenAICore: AI Predictive Analytics Solution



### Key Features of This Screen

#### 16-Channel Simultaneous Comparison

Monitors 16 channels of vacuum, pump, heating, gas/plasma, and mechanism trends on a single screen

#### Per-Channel Deviation Detection

Instantly identifies channels deviating from normal range bands or showing trend drift

#### Multi-Chart Analysis

Captures cascading signs through inter-channel sync/phase comparison, with switch to time-series area analysis

Actual Operation Screen — Integrated Multi-Analysis · 16-Channel Simultaneous Comparison

## Product Portfolio NeXGenAICore: AI Predictive Analytics Solution



### Key Features of This Screen

#### Normal/Caution Range Bands

Displays real-time deviation against learned two-tier normal/caution range bands

#### Automatic Anomaly Interval Detection

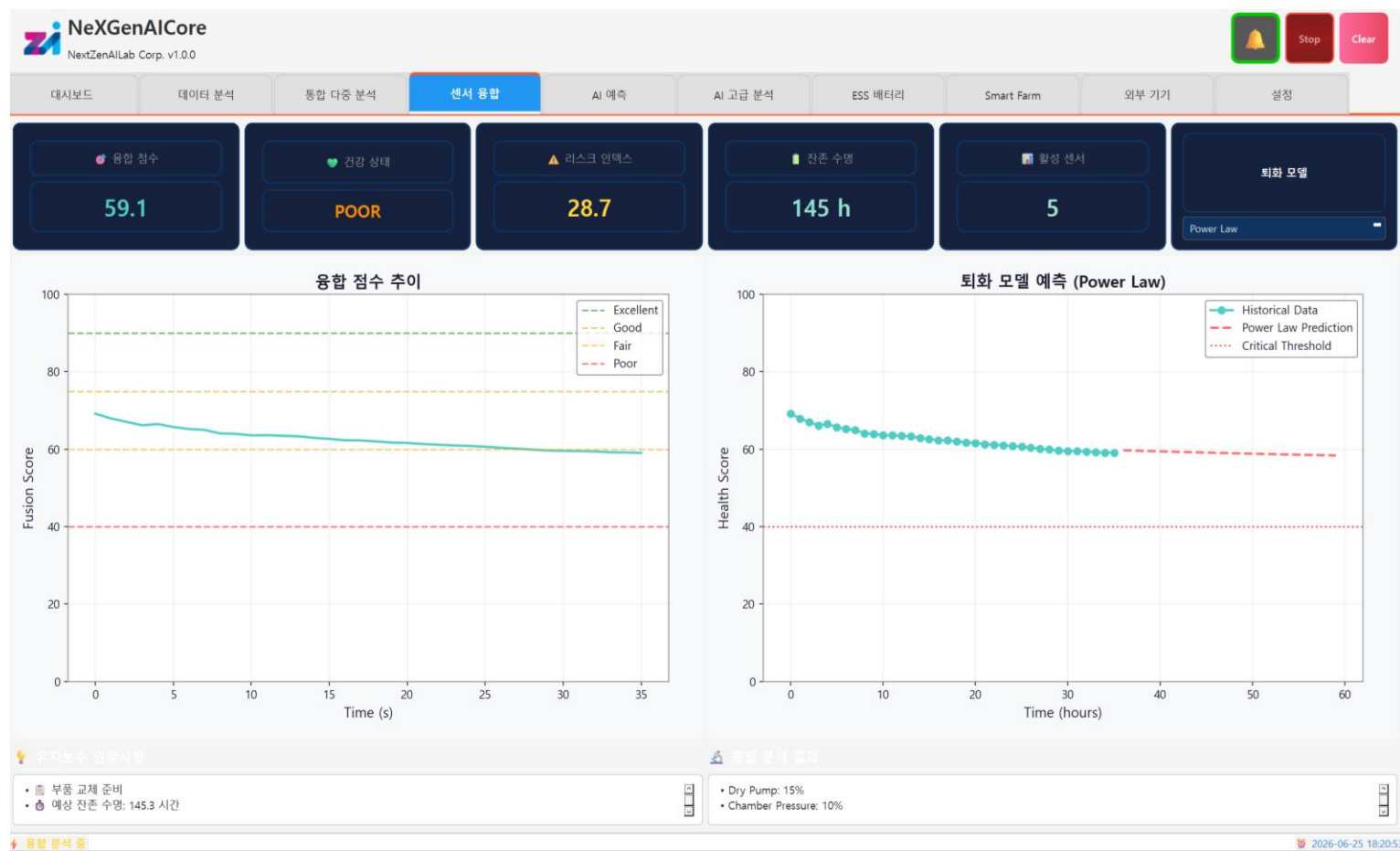
Automatically marks the timing, deviation, and status (normal/caution) of range violations

#### Confidence Interval Visualization

Enables early risk awareness through real-time display of measured value, mean, and deviation (99.3% confidence)

Actual Operation Screen — Time-Series Area Analysis · Normal/Caution Range Bands

## Product Portfolio NeXGenAICore: AI Predictive Analytics Solution



### Key Features of This Screen

#### Fusion Health Score

Calculates overall health and status via multi-sensor fusion (fusion score 59.1 · POOR)

#### Risk Index & RUL

Simultaneously calculates risk index (28.7) and Remaining Useful Life (RUL 145h)

#### Power Law Regression Prediction

Predicts replacement timing via Power Law degradation curve regression (contributors: Dry Pump, Chamber Pressure)

Actual Operation Screen — Sensor Fusion · Fusion Score/RUL Regression Prediction

## Product Portfolio NeXGenAICore: AI Predictive Analytics Solution



### Key Features of This Screen

#### Ensemble Model Consensus

Consensus prediction from 6 models: LSTM, XGBoost, Transformer, RF, SVM, and NeXGen Hybrid

#### Failure Probability & Confidence

Calculates failure probability (24.7%), estimated time (636h), and prediction confidence (86.9%)

#### Key Failure Modes

Derives failure modes and risk levels (LOW/MED/HIGH) by component

Actual Operation Screen — AI Prediction · Ensemble Failure Probability/Confidence

## Product Portfolio NeXZenSys

### Key Features

#### Multi-Sensor DAQ

Simultaneous acquisition of up to 512 channels including vibration, temperature, pressure, current, and voltage

#### Historical Data Lake

Time-series data storage with high-speed replay and export (CSV/Parquet)

#### PM Integration

Automatically reschedules maintenance in response to NeXGenAICore risk events

#### Real-Time Dashboard

Real-time KPIs, trend charts, and heatmaps no extra setup needed after equipment onboarding

#### Ensemble Scheduling

Optimal equipment operation and maintenance scheduling based on multi-model consensus

#### Constraint Engine

Integrates production targets, maintenance windows, and workforce availability into a single solver

### Technical Specifications

- **Sampling Rate** Up to 25.6 kSps per channel
- **Max Channels** 512 (expandable)
- **Data Retention** Configurable (default 2 years)
- **Dashboard Latency** < 1-sec refresh
- **Alarm Types** Threshold · Rate-of-change · Pattern
- **Export Formats** CSV · Parquet · JSON

- **Scheduling Range** 24 hours – 90 days
- **Optimizer** Ensemble (GA + RL + LP)
- **Reschedule Triggers** Risk index · Manual · Cron
- **Applicable Equipment** Semiconductor · Display FAB
- **Output Formats** Gantt · Calendar · API JSON
- **MES Integration** REST push/pull

## Product Portfolio NeXZenSys: Data Storage · Time-Series DB Selection

Select a time-series database option to match your operating environment hot-swap the backend via a common interface, automatic install detection, and persistent configuration (implemented)

### Pluggable Time-Series Storage

#### SQLite Built-in

Lightweight embedded DB · zero-config default storage

#### CSV File

File-based storage/export · lightweight and portable

#### TimescaleDB Time-Series

PostgreSQL-based large-scale time-series DB

#### QuestDB Edge

Ultra-fast edge time-series DB

#### TDengine Industrial IoT

High-compression time-series DB for industrial IoT

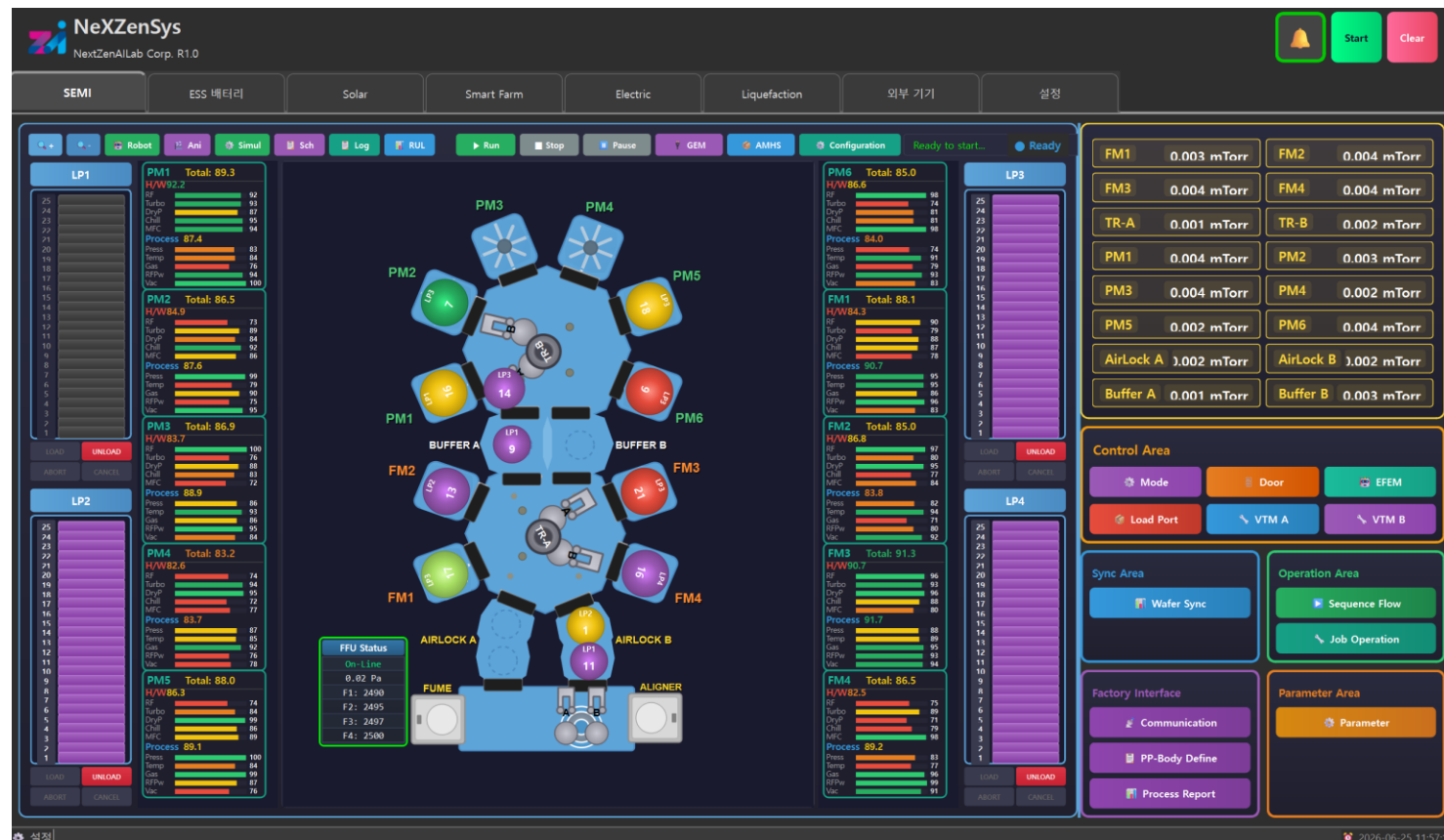
#### Apache IoTDB Industrial IoT

Apache time-series DB for industrial IoT

### Key Characteristics

- ✓ Hot-swap the backend via a common interface (connect/write/query/close) no application code changes
- ✓ Automatic install detection (● installed / ○ not installed) · guided setup when not installed, no app downtime
- ✓ Select the optimal storage per environment: edge · large-scale time-series · industrial IoT · embedded
- ✓ Select from the settings screen → configuration persists (db\_config.json)
- ✓ Built-in SQLite/CSV work instantly with zero configuration (write/query verified)

## Product Portfolio NeXZenSys: Semiconductor Equipment Control



Actual Operation Screen — SEMI-Standard Equipment Control UI — Chamber-Level Real-Time Status/Pressure Control

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Clicking the screen opens a control pop-up. Language and background color are configurable options.

### Competitive Advantage

#### Component RUL Prediction vs. Threshold Alarms

Standard equipment monitoring (SPC, threshold alarms) is mostly reactive → chamber/component-level RUL prediction proactively prevents unplanned stoppages

#### AI Ensemble vs. Single Rule-Based

Reduces both false positives and false negatives via multi-model ensemble instead of a single threshold/rule

#### Dynamic Risk-Index Maintenance vs. Fixed PM

Improves uptime and yield with dynamic, risk-index-based maintenance instead of fixed calendar-based PM

### Key Features

- ✓ SEMI-standard chamber-level real-time status/pressure control
- ✓ AI ensemble predictive maintenance · component RUL calculation
- ✓ Intelligent automated control scheduler (operation, maintenance, recipe)
- ✓ Risk-index interlock · bidirectional MES/SCADA integration

## Product Portfolio NeXZenSys: Semiconductor Equipment Control



### Key Features of This Screen

#### Chamber Recipe Control

Gas/RF/temperature recipe settings with real-time Run/Stop control

#### Precision Pump/Valve Control

Precision control of turbo/dry pumps, pendulum valve, and chamber pressure

#### H/W Health Score

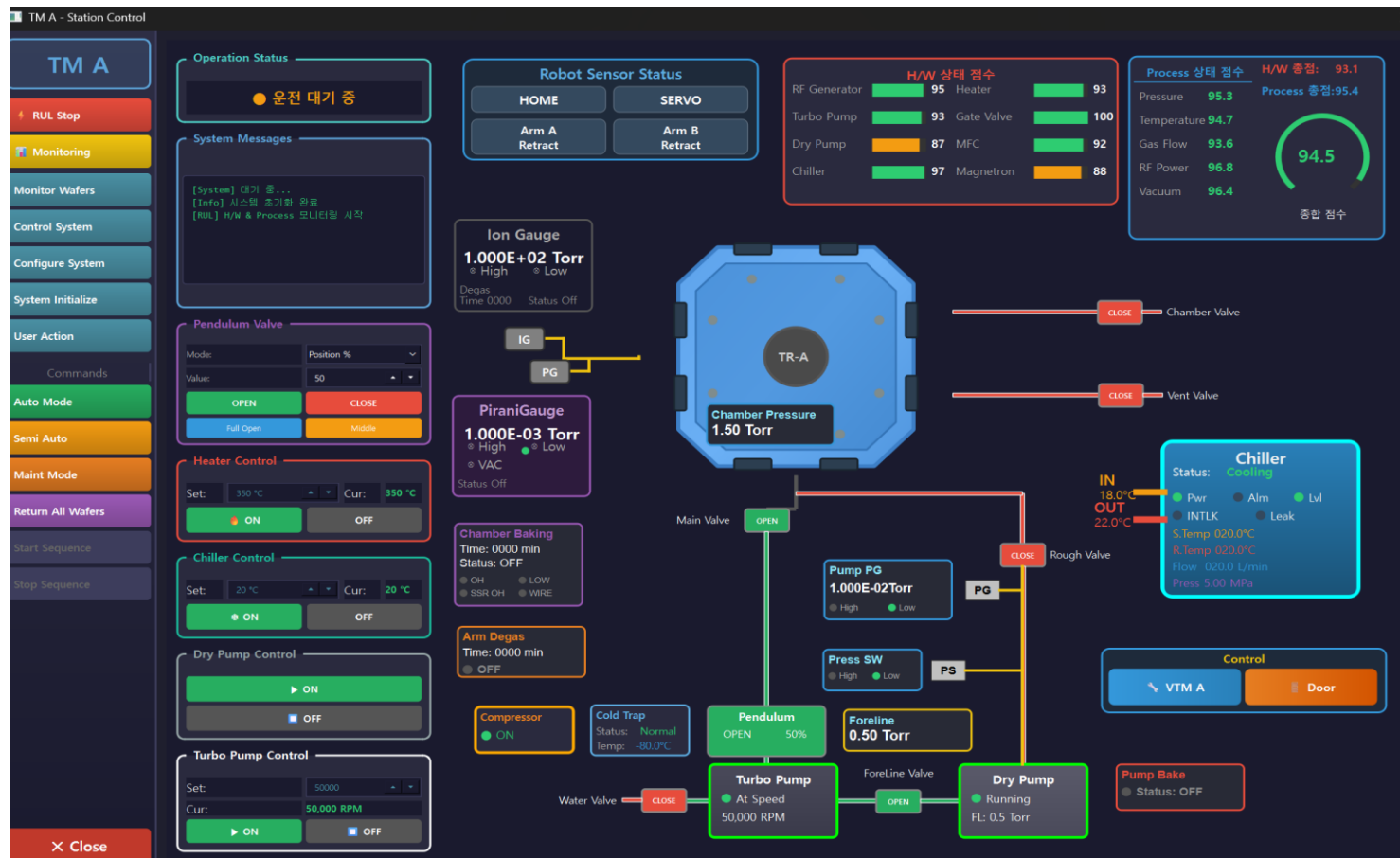
Real-time health scoring by component including RF, pumps, and chillers

Actual Operation Screen — FM1 Chamber Station Control — Precision Recipe/Pump/Valve/Pressure Control

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## Product Portfolio NeXZenSys: Semiconductor Equipment Control



### Key Features of This Screen

#### Transfer Robot Control

TM/robot arm status and sequence control (HOME, SERVO)

#### Vacuum/Pressure Control

Precision control of Ion/Pirani gauges, valves, and chamber pressure

#### Component Health/RUL

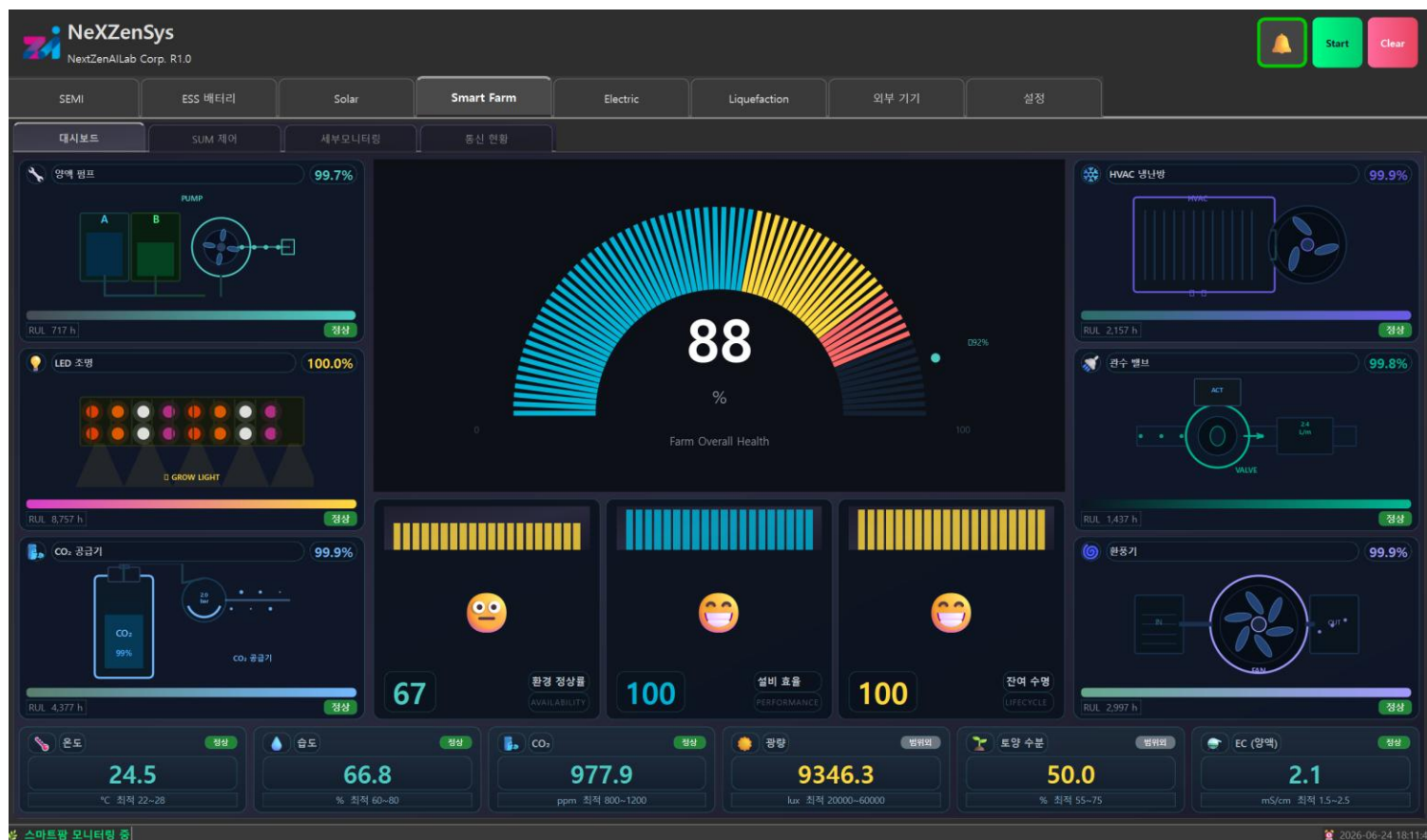
Component health scoring with RUL-threshold-linked protection

Actual Operation Screen — TM Transfer & Vacuum Control — Robot Sequence/Gauge/Valve Control

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## Product Portfolio NeXZenSys: Smart Farm



Actual Operation Screen — Smart Farm Environment Control — Integrated Dashboard for Temperature/Humidity/CO<sub>2</sub>/Nutrient Solution & Equipment Health

Clicking the screen opens a control pop-up. Language and background color are configurable options.

### Competitive Advantage

#### Predictive Maintenance vs. Reactive Response

Standard environmental controllers mainly rely on threshold alarms → equipment health/RUL predicts failures in advance

#### AI Auto-Optimal Control vs. Manual Settings

Automatic optimal control learned from crop and environmental data, instead of manual setpoint tuning

#### Integrated Monitoring vs. Distributed Measurement

Integrated control of temperature, humidity, CO<sub>2</sub>, nutrient solution, and equipment on a single screen

### Key Features

- ✓ Real-time overall farm Health Score calculation
- ✓ Integrated automatic control of nutrient solution, LED, CO<sub>2</sub>, and HVAC
- ✓ Early warnings for equipment RUL and anomalies
- ✓ Zero-config multi-protocol sensor data acquisition

## Product Portfolio NeXZenSys: Smart Farm



### Key Features of This Screen

#### Precision Nutrient Solution Control

Automatic control of nutrient pump EC/pH targets

#### Light Environment Management

Precise LED intensity and lighting schedule settings

#### Component Wear Tracking

Degradation tracking based on pump/valve operating hours

Actual Operation Screen — Smart Farm Environment Control — Integrated Dashboard for Temperature/Humidity/CO2/Nutrient Solution & Equipment Health

Clicking the screen opens a control pop-up. Language and background color are configurable options.

## Product Portfolio NeXZenSys: Smart Farm



### Key Features of This Screen

#### Real-Time Trends

Real-time analysis of KPI and time-series trends

#### Anomaly Detection

Automatic detection and alerting for deviations from normal patterns

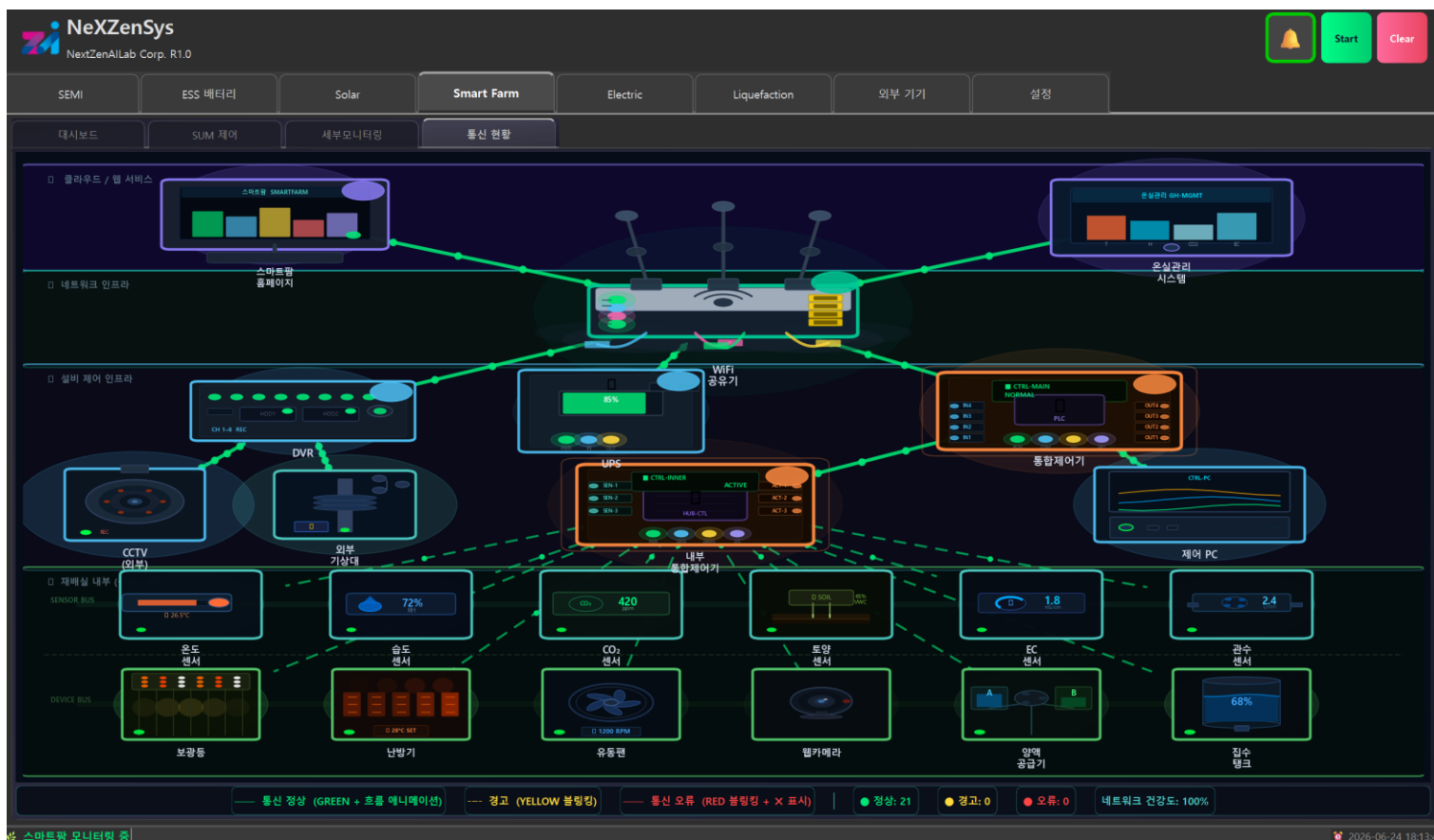
#### Data Utilization

Data lake replay and CSV/Parquet export

Actual Operation Screen — Smart Farm Environment Control — Integrated Dashboard for Temperature/Humidity/CO<sub>2</sub>/Nutrient Solution & Equipment Health

Clicking the screen opens a control pop-up. Language and background color are configurable options.

## Product Portfolio NeXZenSys: Smart Farm



### Key Features of This Screen

#### Equipment Linkage Map

Integrated visualization of equipment connections and status

#### Cascade Impact Analysis

Identifies anomaly propagation paths and bottleneck sections

#### Remote Control

Remote status monitoring and control of field equipment

Actual Operation Screen — Smart Farm Environment Control — Integrated Dashboard for Temperature/Humidity/CO2/Nutrient Solution & Equipment Health

Clicking the screen opens a control pop-up. Language and background color are configurable options.

## Product Portfolio NeXZenSys: Power Electronics Monitoring & Control



Actual Operation Screen — Power Electronics Control — Integrated Dashboard

Clicking the screen opens a control pop-up. Language and background color are configurable options.

### Competitive Advantage

#### Component RUL vs. Simple Alarms

Goes beyond overcurrent/overheat threshold alarms to predict RUL for IGBTs, capacitors, and gate drivers

#### Real-Time Edge vs. Cloud Latency

Immediate protection and control action via under-50ms edge inference

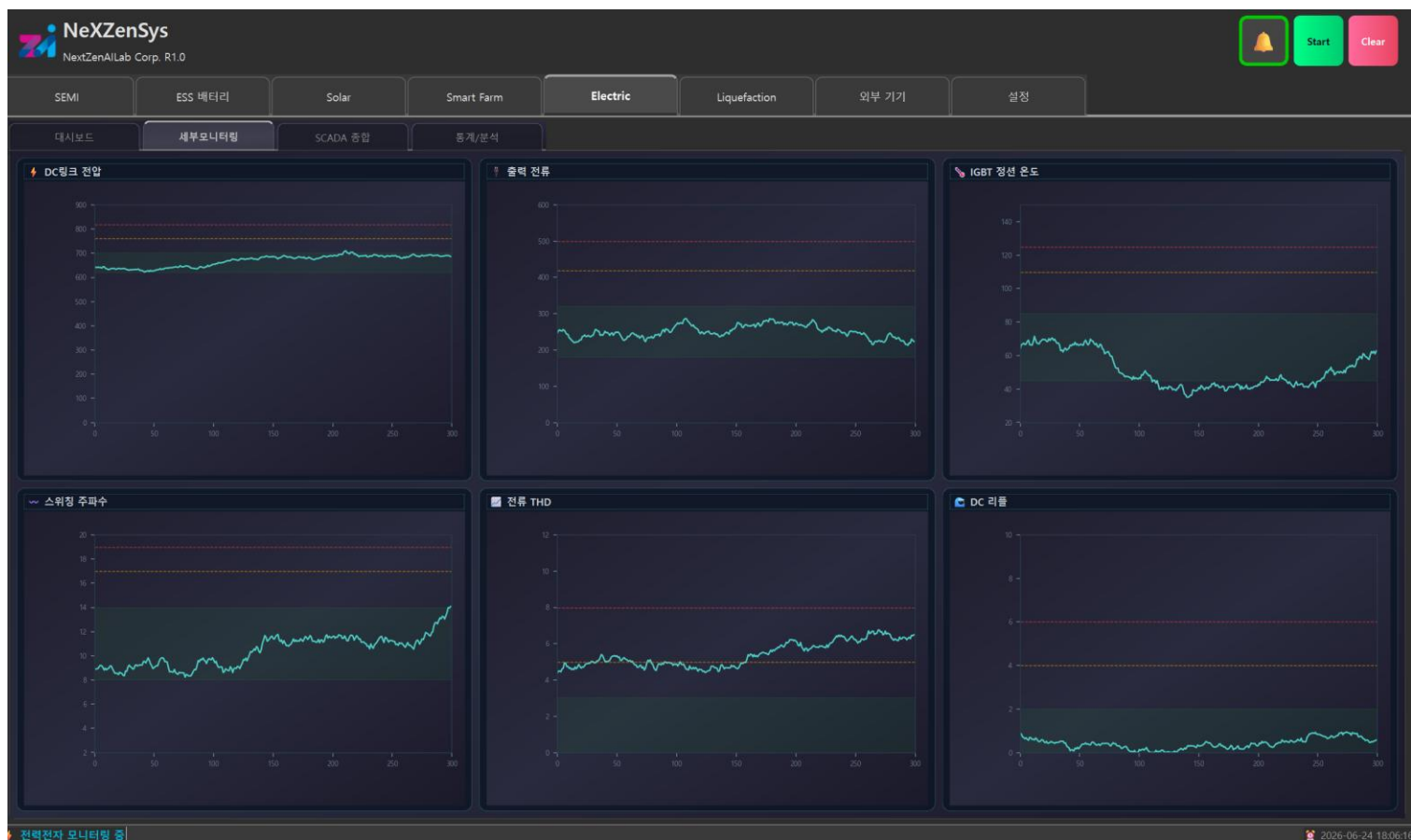
#### Predictive vs. Scheduled/Reactive Maintenance

Optimizes maintenance timing based on risk index

### Key Features

- ✓ Power quality analysis including voltage, current, THD, and DC ripple
- ✓ RUL prediction for IGBTs, capacitors, and gate drivers
- ✓ Early detection of harmonic, overheating, and switching anomalies
- ✓ Integrated SLD system/power factor · SCADA/MES integration

## Product Portfolio NeXZenSys: Power Electronics Monitoring & Control



### Key Features of This Screen

#### Multi-Channel Monitoring

Simultaneous monitoring of power trends across multiple circuits

#### Load Pattern Analysis

Learns load variation patterns and identifies anomalies

#### Anomaly Interval Highlighting

Automatically highlights threshold-violation intervals

Actual Operation Screen — Power Electronics Control — Integrated Dashboard

Clicking the screen opens a control pop-up. Language and background color are configurable options.

## Product Portfolio NeXZenSys: Power Electronics Monitoring & Control



### Key Features of This Screen

#### Power Quality Analysis

Analyzes quality metrics such as harmonics and power factor

#### Efficiency Diagnosis

Early detection of efficiency degradation and loss intervals

#### Channel Comparison

Per-channel performance comparison and deviation analysis

Actual Operation Screen — Power Electronics Control — Integrated Dashboard

Clicking the screen opens a control pop-up. Language and background color are configurable options.

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## Product Portfolio NeXZenSys: Power Electronics Monitoring & Control



### Key Features of This Screen

#### Long-Term Trend Analysis

Tracks long-term trends in time-series power data

#### Prediction Visualization

Displays forecasted load and anomaly intervals

#### Early Warning

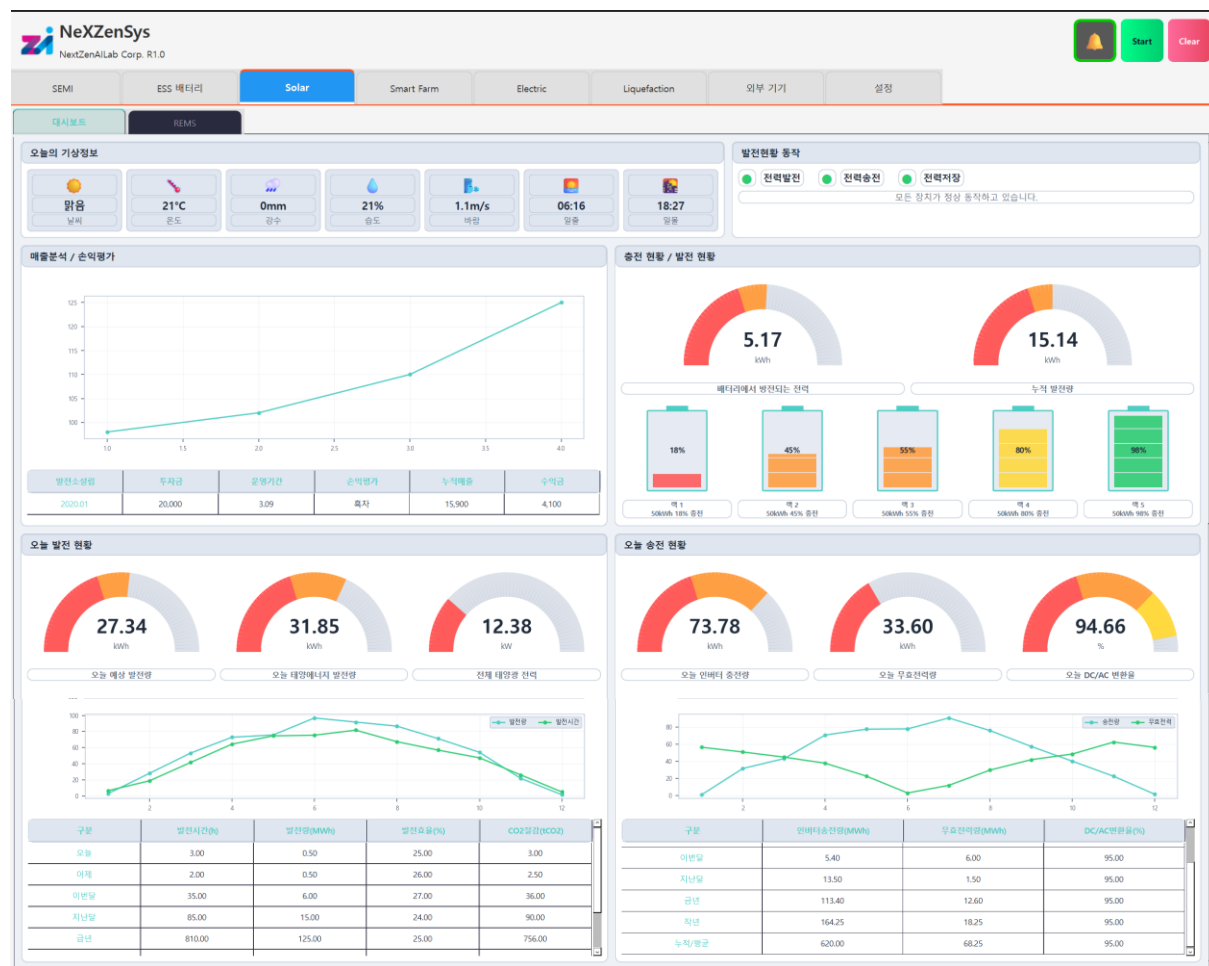
Pre-emptive alerts before threshold breaches

Actual Operation Screen — Power Electronics Control — Integrated Dashboard

Clicking the screen opens a control pop-up. Language and background color are configurable options.

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## Product Portfolio NeXZenSys: Solar PV Monitoring & Control



### Competitive Advantage

#### String/Inverter Prediction vs. Output Display

Goes beyond generation monitoring to predict string/inverter degradation and failure

#### Early Loss Diagnosis vs. Reactive Inspection

Early identification of generation loss from shading, soiling, and degradation

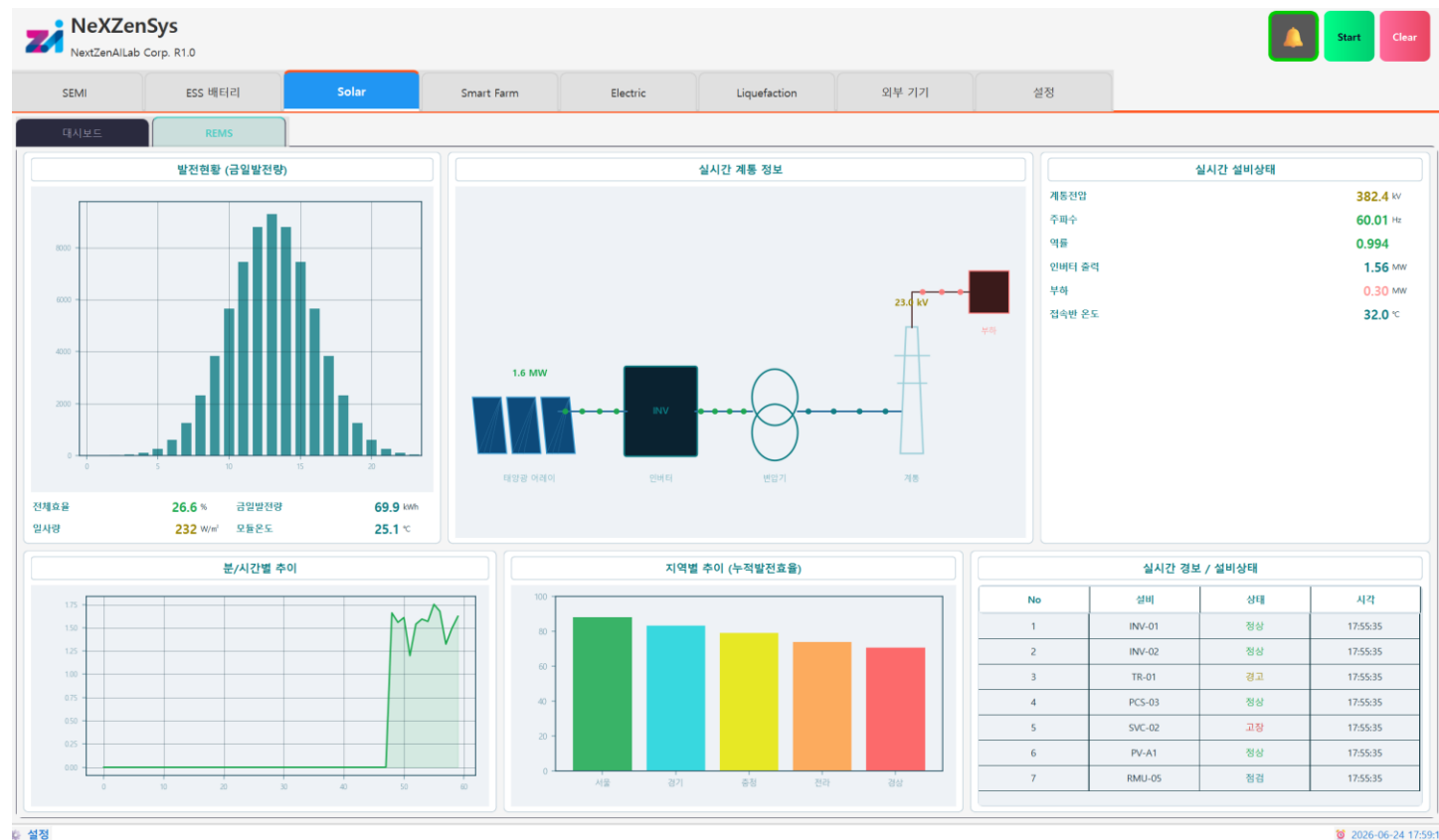
#### Risk Index vs. Simple Alerts

Automatically prioritizes maintenance via equipment risk index

### Key Features

- ✓ Real-time monitoring of output and efficiency
- ✓ Early diagnosis of inverter/string anomalies
- ✓ Performance ratio (PR) analysis relative to irradiance
- ✓ Equipment RUL and maintenance priority calculation

## Product Portfolio NeXZenSys: Solar PV Monitoring & Control



### Key Features of This Screen

#### Generation Distribution Analysis

Analyzes generation distribution and deviation by string

#### Underperformance Detection

Automatically identifies underperforming or anomalous strings

#### Environmental Correlation

Correlates analysis with environmental variables such as irradiance and temperature

## Product Portfolio NeXZenSys: Water & Cooling System Monitoring & Control



### Competitive Advantage

#### Rotating Equipment Predictive Maintenance vs. Reactive Repair

Predicts pump/heat exchanger efficiency degradation in advance

#### Process-Linked Analysis vs. Single Alarms

Analyzes cascading effects across systems via causal networks

#### Efficiency Optimization vs. Constant-Speed Operation

Energy savings through AI-based operating condition optimization

### Key Features

- ✓ Real-time monitoring of flow, pressure, and temperature
- ✓ Pump/heat exchanger efficiency and RUL diagnostics
- ✓ Early detection of cooling performance degradation
- ✓ Automatic operating condition optimization

Actual Operation Screen — Water & Cooling System Monitoring & Control

Clicking the screen opens a control pop-up. Language and background color are configurable options.

## Product Portfolio NeXZenSys: Water & Cooling System Monitoring & Control



### Key Features of This Screen

#### System Monitoring

Integrated control of cooling/water system flow

#### Equipment Status Tracking

Tracks valve/pump operating status and degradation

#### Abnormal Flow Detection

Early detection of abnormal flow and pressure

## Product Portfolio NeXZenSys: Water & Cooling System Monitoring & Control



### Key Features of This Screen

#### Linked Flow Visualization

Integrated visualization of flow linkages between systems

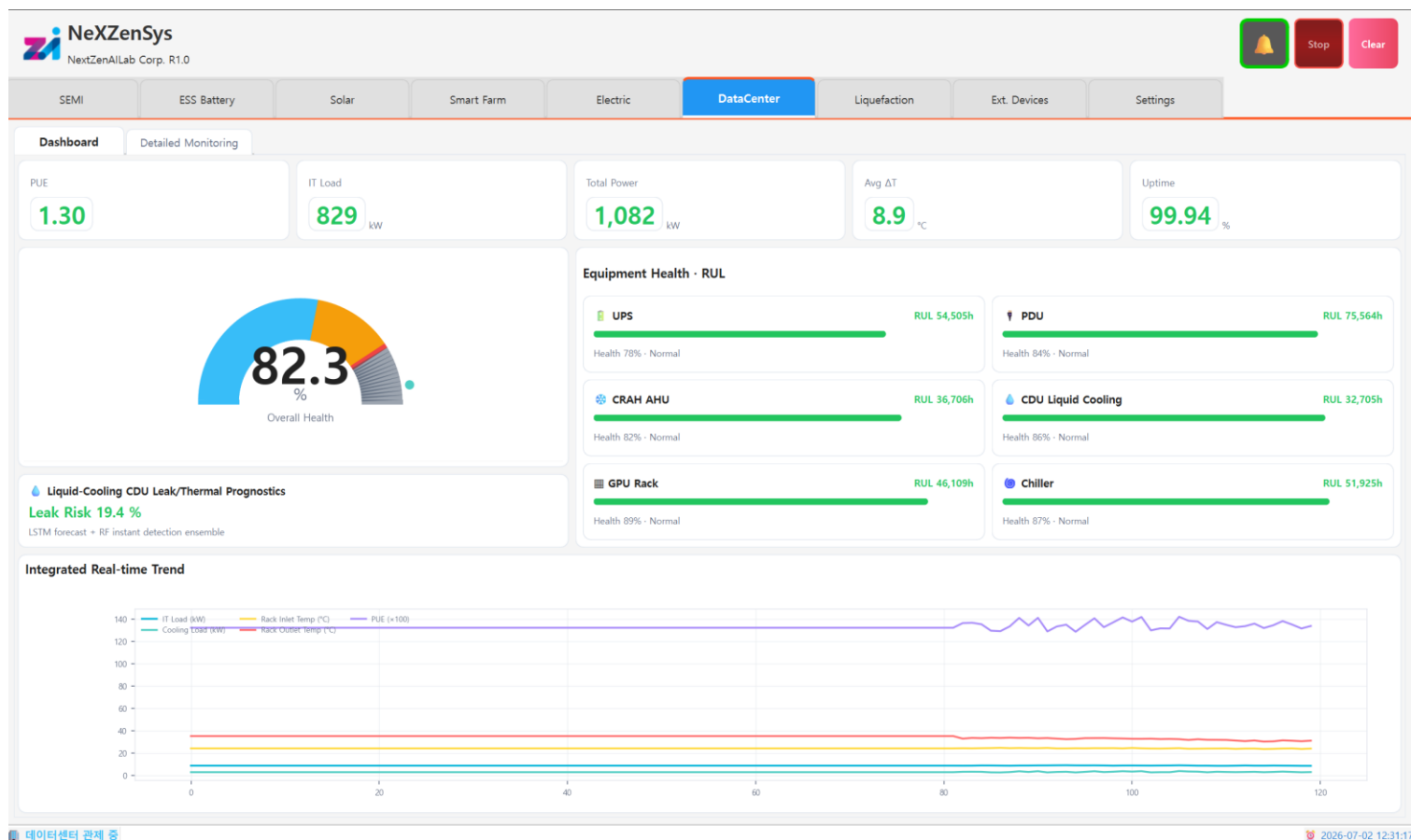
#### Load Distribution Analysis

Analyzes system load distribution and balance

#### Efficiency Zone Identification

Identifies efficiency-degraded zones for priority response

## Product Portfolio NeXZenSys: Data Center Monitoring & Control



### Key Features of This Screen

#### PUE & Power Efficiency Metrics

Real-time metrics for PUE, IT Load, total power, ΔT, and uptime

#### Equipment Health & RUL

RUL prediction for UPS, PDU, CRAH, CDU, GPU racks, and chillers

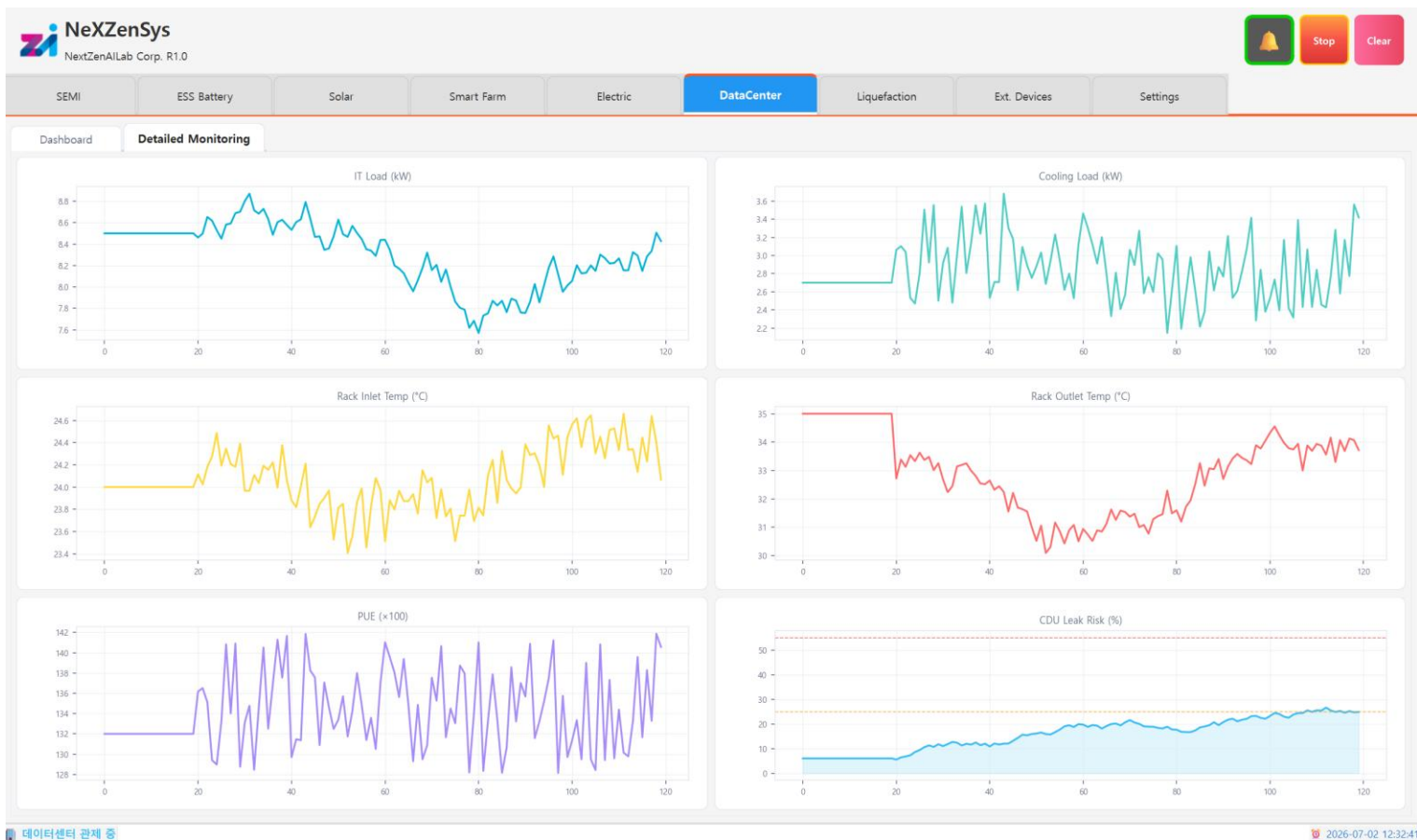
#### Liquid Cooling Leak & Thermal Prediction

CDU leak risk and thermal anomaly prediction (LSTM+RF)

Actual Operation Screen — Data Center Power & Cooling Integrated Monitoring (PUE · Health/RUL · Leak Prediction)

Clicking the screen opens a control pop-up. Language and background color are configurable options.

## Product Portfolio NeXZenSys: Data Center Monitoring & Control



### Key Features of This Screen

#### Power & Load Trends

Time-series trends of IT Load and Cooling Load

#### Rack Inlet/Outlet Temperature

Time-series tracking of rack inlet/outlet temperature

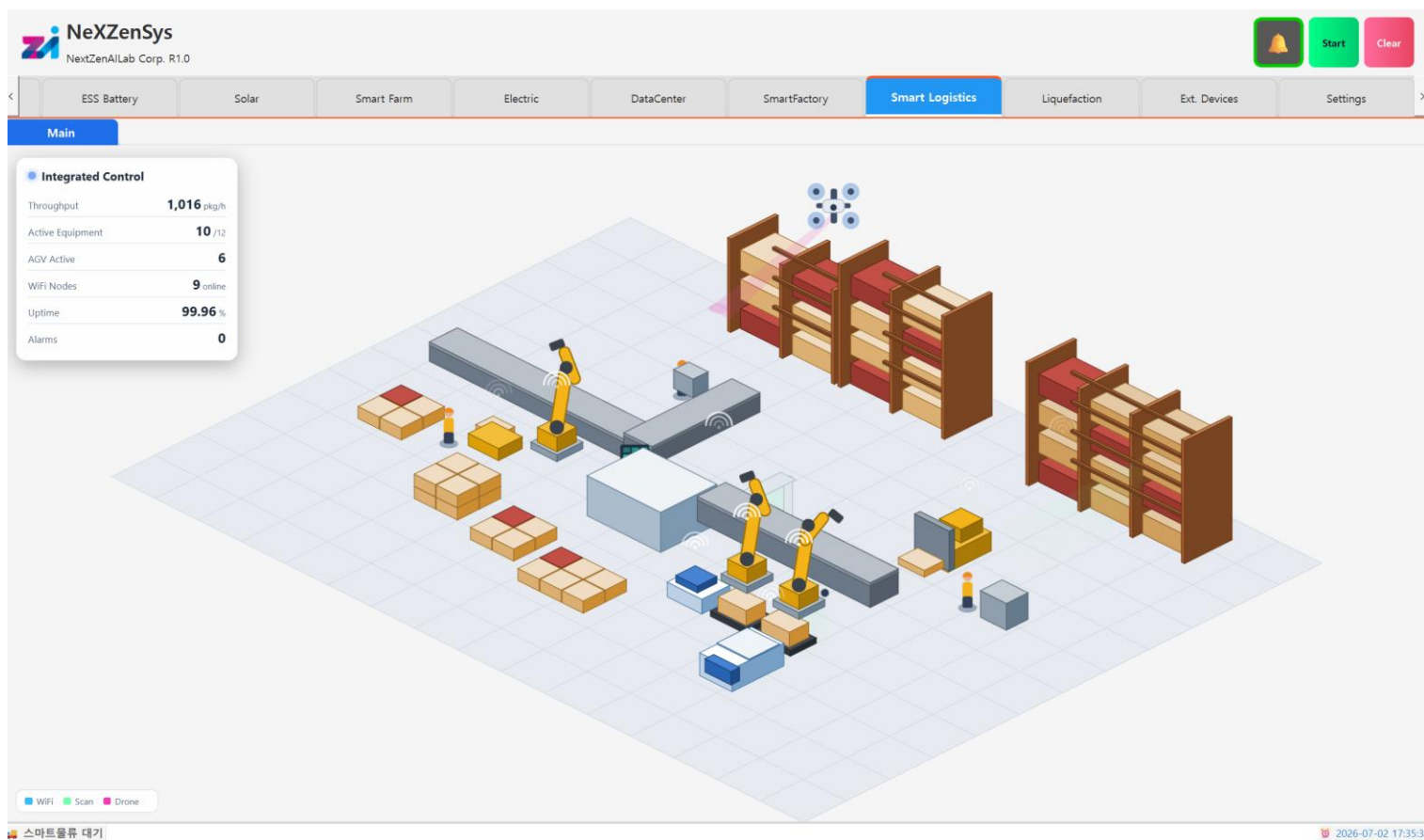
#### PUE & Leak Risk Trends

Time-series trend analysis of PUE and CDU leak risk

Actual Operation Screen — Data Center Detailed Trends (Power/Load/Rack Temperature/PUE/Leak Risk)

Clicking the screen opens a control pop-up. Language and background color are configurable options.

## Product Portfolio NeXZenSys: Smart Logistics



### Key Features of This Screen

#### Throughput & Equipment Integrated Control

Real-time metrics for throughput, active equipment, AGVs, and uptime

#### Conveyor, Robot & AGV Predictive Maintenance

RUL and early anomaly detection for drive units (motors, reducers, belts)

#### 3D Logistics Digital Twin

Real-time 3D visualization of warehouse equipment layout and logistics flow

Actual Operation Screen — Smart Logistics Integrated Control (Throughput/AGV/Conveyor/Robot Predictive Maintenance · 3D Digital Twin)

Clicking the screen opens a control pop-up. Language and background color are configurable options.

Product Portfolio    NeXZenSys: ESS Battery Monitoring & Control



Actual Operation Screen — ESS Battery Cell-Level Monitoring — RUL Prediction, 3D Pack Digital Twin

Clicking the screen opens a control pop-up. Language and background color are configurable options.

Key Features

- ✓ Cell-level SOH and Remaining Useful Life (RUL) prediction
- ✓ Early detection of voltage imbalance and abnormal cells
- ✓ 3D pack digital twin status visualization
- ✓ Charge/discharge pattern analysis and operational optimization

Competitive Advantage

**Cell-Level RUL Prediction vs. Voltage/Temperature Protection**

Standard BMS mainly monitors and protects cell voltage/temperature → predicts cell-level SOH and RUL in advance

**Early Thermal Runaway Warning vs. Reactive Shutdown**

Learns abnormal cell and thermal signs to proactively warn of thermal runaway risk

**3D Digital Twin vs. Simple Numeric Display**

Intuitively visualizes cell-level status through a 3D pack digital twin

## Product Portfolio NeXZenSys: Vehicle Diagnostic Inspection (In Development)

### Real-Time Camera AI Diagnostic Assessment

#### Advantage Over Alternatives

Objective, consistent precision diagnosis via AI camera, compared to visual/manual inspection at repair shops

When an actual vehicle is photographed, AI instantly recognizes it, detects abnormal areas, and performs diagnosis.

Precisely diagnose vehicles using a smartphone camera.

AI performs precise diagnosis of everything from scratches to accident history.



## Product Portfolio NeXZenTwin

### Feature Roadmap (Phased Rollout)

#### Self-Evolving Model

The digital twin autonomously updates its physical and ML models using real-time sensor data

#### Causal Network Engine

Identifies failure propagation paths across processes throughout multi-stage Fab operations

#### Cascade Failure Forecast

Predicts downstream cascade failures before they reach critical production equipment

#### Target Specifications

- **Twin Fidelity** Physics-based ML hybrid
- **Causal Graph Depth** Up to 10 process stages
- **Model Update Cycle** Continuous (real-time)

### Real-Time Linkage

Real-time data synchronization keeps physical equipment and the digital model aligned within 0.1 seconds

Supports closed-loop automation of prediction, control, and simulation

### Key Features

- ✓ Real-time virtual monitoring through process/equipment digital twin implementation
- ✓ Supports optimal decision-making through What-If scenario analysis
- ✓ Virtual validation system prior to introducing new processes/equipment
- ✓ Automatic operating condition optimization and parameter tuning

### Impact

Minimizes failure risk through 100% virtual validation of new processes

65% reduction in testing cost, 80% shorter validation time

Optimized resource utilization and 15% improved energy efficiency

## Intellectual Property Patent Applications · Patents (All Under Examination)

### Patent Applications (4 Filed · Under Examination)

#### ① Intelligent Predictive Maintenance

10-2025-0162147 · Oct 31, 2025 · Under Examination

AI-Based Intelligent Predictive Maintenance System and Method for Semiconductor Manufacturing Equipment

#### ② AI Ensemble Automated Control Scheduler

10-2025-0162600 · Oct 31, 2025 · Under Examination

AI Ensemble-Based Intelligent Automated Control Scheduler System and Method for Semiconductor/Display Manufacturing Equipment

#### ③ Self-Evolving Digital Twin

10-2025-0162703 · Nov 1, 2025 · Under Examination

Self-Evolving Digital Twin System and Method for Cascade Failure Prediction Based on Inter-Process Causal Networks

#### ④ Risk-Index Constrained Optimization Process Control

10-2025-0191700 · Dec 5, 2025 · Under Examination

Constrained Optimization Process Control System and Method Using a Predictive-Maintenance-Based Risk Index

#### 4 Patents Filed (2025)

Self-owned Core IP

Secures predictive maintenance, ensemble, digital twin, and constrained-optimization core algorithms as proprietary intellectual property

#### Direct Product Integration

Applied to Products

Directly implements and applies patented technology in the NeXGenAICore, NeXZenSys, and NeXZenTwin products

## Capabilities & Certifications

### Company

Incorporated July 1, 2025 ·  
 NextGen AI Lab Inc. (AI  
 Predictive Maintenance  
 Specialist)

### Venture · Innovation

Certified as an innovation-type  
 technology venture officially  
 recognized technology  
 competitiveness and R&D  
 capability

### Startup · SME

Certified Startup and SME (Small Business)

### Core Competency

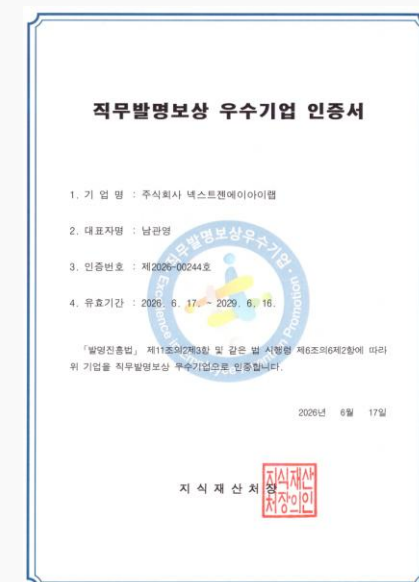
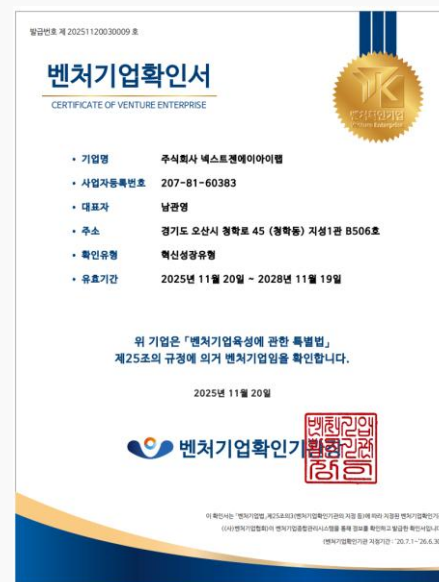
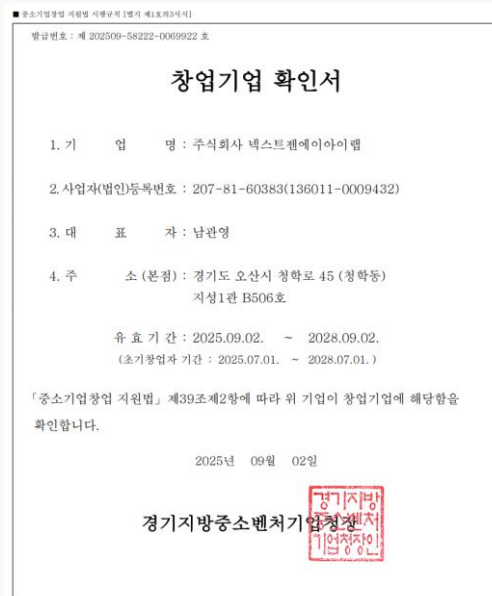
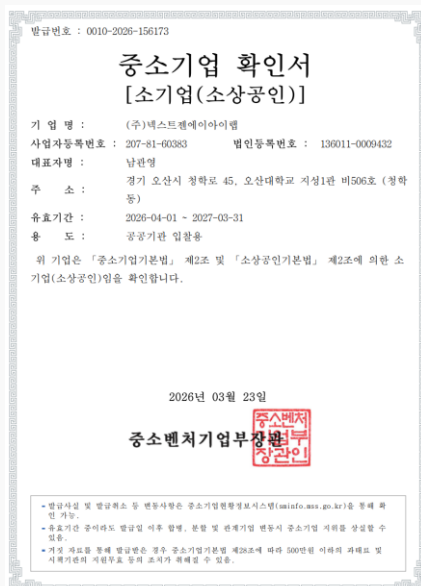
In-house solution development based on 20 years of experience in AI predictive  
 maintenance, embedded systems (C), and data engineering (Python)

### R&D Center

Certified in-house R&D  
 department proprietary AI engine  
 and algorithm development

### Employee Invention Award

Certified Excellent Employee  
 Invention Compensation Company  
 officially recognized employee  
 invention and R&D reward system





NextZenAI Lab realizes Zero-Accident, Zero-Downtime,  
leading sustainable growth in advanced  
manufacturing

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If you're interested in technical collaboration or partnership, feel free to reach out anytime.  
Let's solve industrial challenges together and build the future of smart manufacturing.