

A background of a complex network of blue nodes and lines, resembling a neural network or data connections, set against a dark grey gradient.

Han PHI

Advanced Pattern
Recognition Solution

HanAra
S o f t w a r e

HanAra

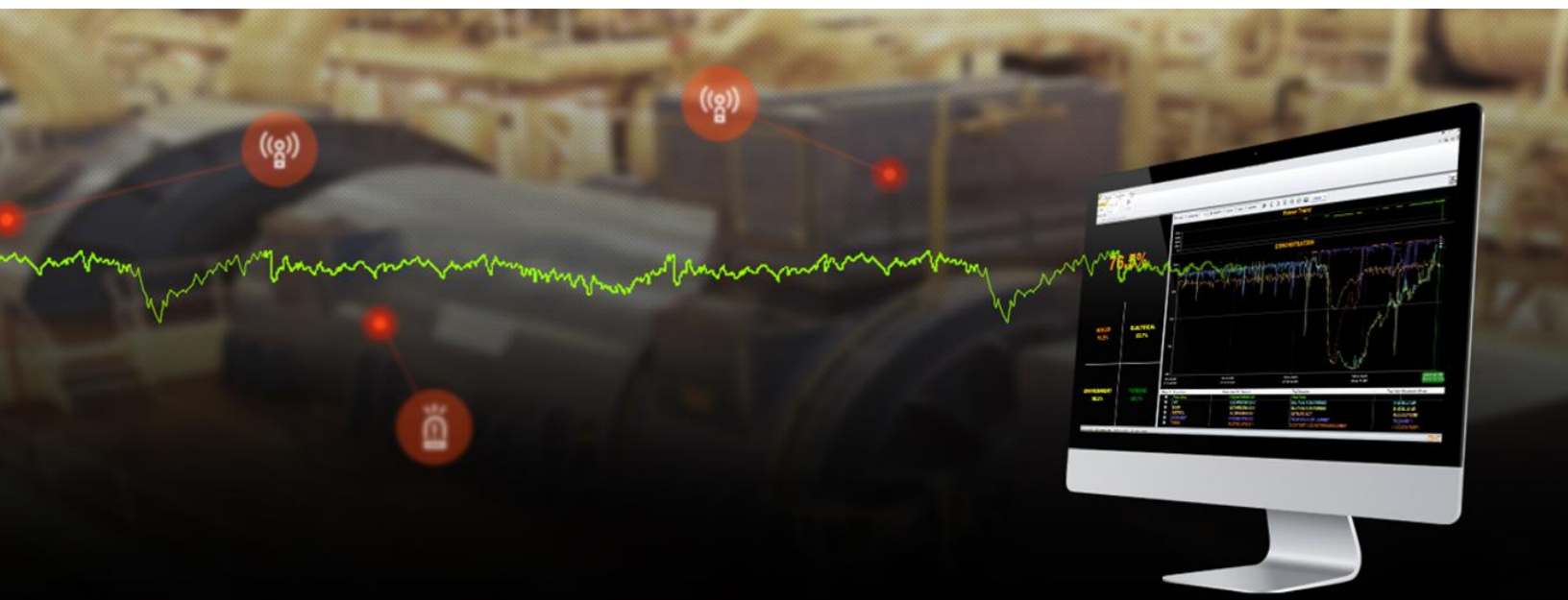
BREAK THROUGH THE LIMITATIONS

A predictive analytics solution that identifies potential plant and equipment failures in advance

HanPHI® is a predictive analytics system that recognizes abnormal data patterns in advance to provide early warnings of potential and hidden failures. It uses machine learning technology to warn you of potential failures that can develop into catastrophic failures. HanPHI compares real-time values to expected values developed using empirical learning model technique and past normal plant

operation data. If HanPHI detects a difference, it sends you an early warning.

With HanPHI, you can eliminate potential operational risks, extend equipment life cycles, increase asset reliability, and reduce maintenance costs.



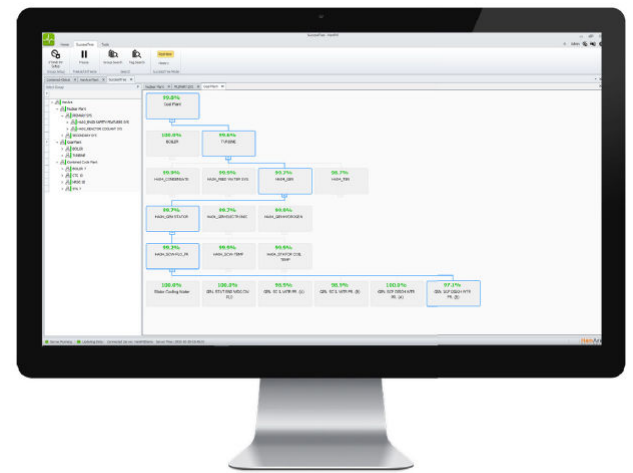
Overall Plant Health Condition

- View a real-time health index of your whole plant and main processes
- Identify anomalies across the process through automatic and dynamic early warnings
- Predict critical equipment failures accurately
- Monitor equipment and asset anomalies continuously to reduce unscheduled downtime risk



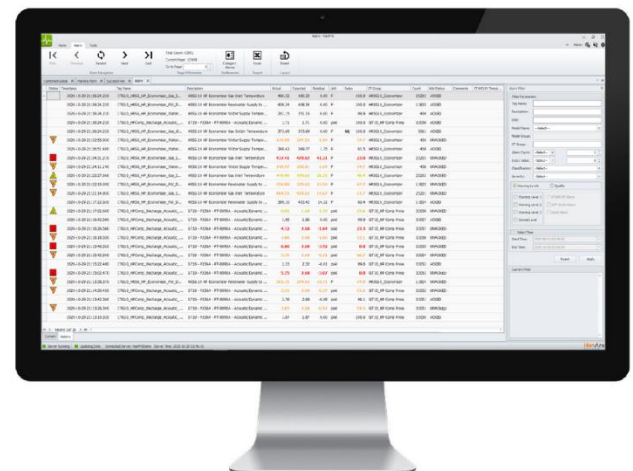
Real-Time Anomaly Tracking

- Trace anomalies automatically in real time
- Maintain health index accuracy by adjusting values based on relative importance
- Improve reliability of your whole process and equipment in real time



Early Warning Management and Analysis

- Analyze past early warnings and manage real-time warnings
- Manage warning frequency and early warning properties based on the risk level
- Export the alarm list into an Excel or PDF report



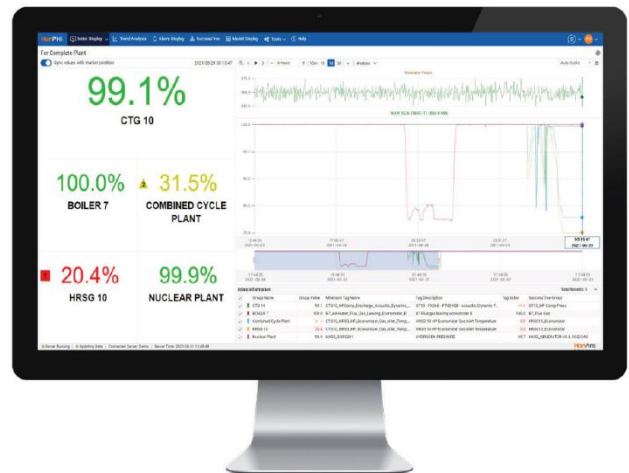
Instantaneous Anomaly Detection

- Analyze residuals of the expected vs. real-time values for the plant and major equipment
- Search similar past patterns automatically and compare with current patterns
- Review automatically similar or repetitive historical data patterns
- Compare data trends at different times
- Investigate abnormal patterns occurring each cycle



Improved Insight with Web Access

- Monitor unexpected anomalies through the web-based service anytime and anywhere
- Manage plant health conditions 24/7
- Review early warning details through a tablet or smartphone



Accurate Predictive Models

- Calculate accurate predictive values by modeling normal, fault-free data
- Adjust predictive modeling by asset type and event traits
- Group points with similar patterns automatically
- Test accuracy of predictive models based on past experiences



HanPHI Technical Overview

Engineering Process

- Get the site database in CSV or Excel format
- Get historical data (if available)
- Get plant system/equipment hierarchy
- Prepare HanPHI database
- Prepare models from historical data
- Prepare data interface and install on site
- Verify incoming data and results
- Finetune the models

HanPHI Results

- Usually runs each model at an interval of 100 milliseconds or a configurable interval based on the change in the sensor values

- Calculates the expected value of each configured tag/signal and stores into the database
- Calculates the health index of all tag/signals as an index from 0% to 100%
- At 0%, the plant is not operating as expected; while at 100%, the plant is operating as expected
- Displays the index in a hierarchical order (called the SuccessTree) of the plant systems/equipment so that the overall health can be known at a glance on a single screen
- Generates alarms for bad health sensors and details the source of the sensor and the related equipment
- Users act based on the early warnings through detailed analysis using historical trends and early warnings



Server Capability	
Number of Servers in a Plant	Unlimited
Tag/Signals per Server	10,000 tags maximum
Data Storage Space	Unlimited
Number of Models	32 systems or pieces of equipment (e.g. boiler, turbine)
Modelling Modes	As per plant's operation mode and custom defined mode
Model Execution Interval	< 100 milliseconds
Number of Clients	Typically 20
Data Collection	
Event Data	Minimum 1 millisecond
Analog Data	Minimum 10 milliseconds
Data Sources	DCS, OPC Server, Modbus, custom protocols, etc.
Data Response	
Storing Mechanism	Dead-band/hysteresis method, data block 1 day
Client Response	Less than 200 milliseconds



About HanAra Software

HanAra helps its customers achieve operational excellence by providing innovative technology backed by years of experience in machine learning, advanced pattern recognition, data management, predictive maintenance, and customer care. All combined to create software solutions that maximize operational returns and help organizations break through the limitations.

HanAra software solutions help organizations move towards digitalization and viewing data as a corporate asset. By turning data into actionable intelligence, organizations reduce costs, improve efficiencies, and increase safety. HanAra delivers each solution with training and care programs, supporting customers every step of the way and beyond.

HanAra is the North American Headquarters of South Korean-based BNF Technology. Since 2000, BNF Technology has been developing intelligent software across multiple industries. By utilizing advancing technologies, BNF has assisted more than 250 facility sites across two continents in optimizing operational management.



HanAra Software
Tel. +1.737.209.9220 Email. info@hanarasoft.com

www.hanarasoft.com

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Austin, Texas, United States