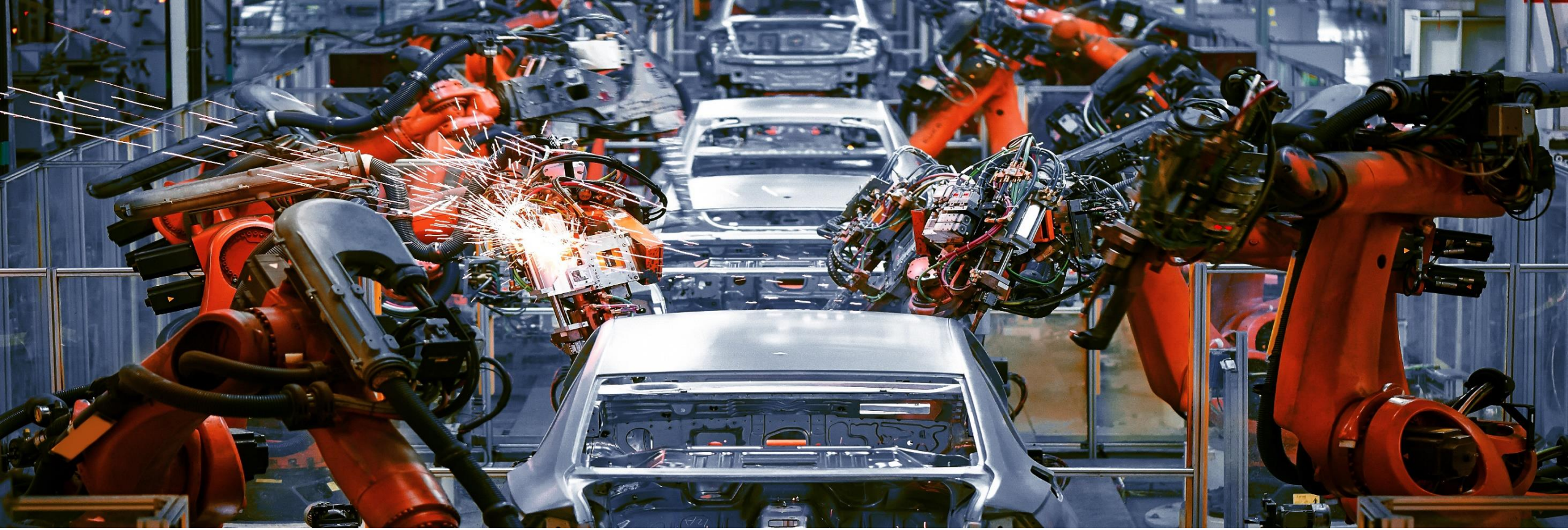


AI@work – How AI is transforming Industry

Creating the Metaverse of the Industrial World

March 2022

Confidential

industry.AI

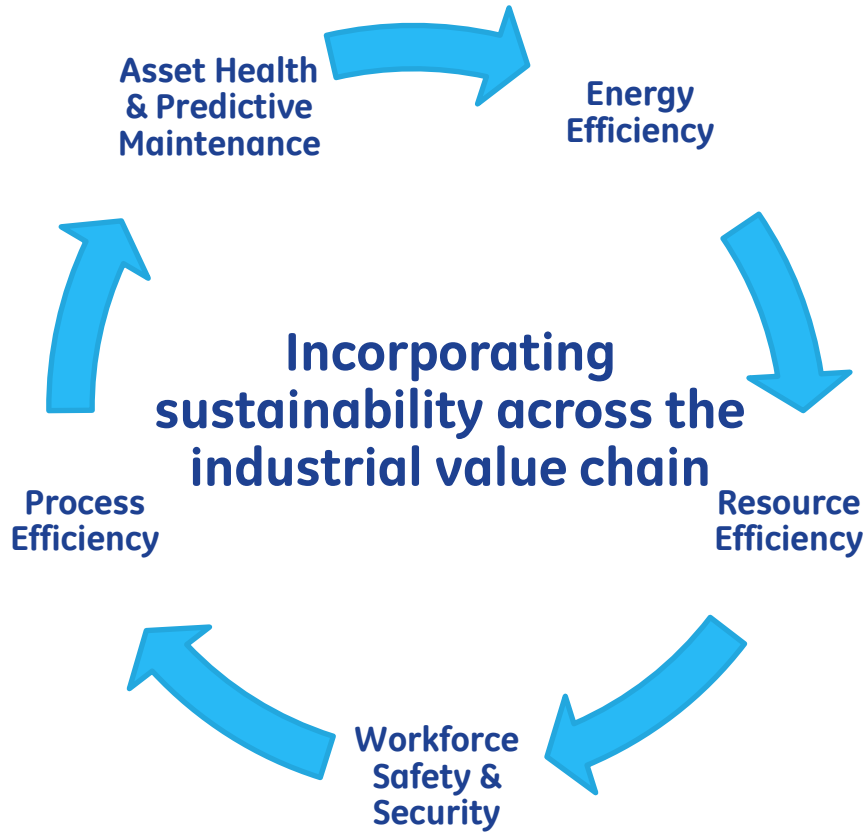
BLP Group Company

Solving the Sustainability challenge with AI & IoT

industry.AI

Sustainable manufacturing – creating a world of manufacturing with no waste

Leveraging AI and Big Data to drive sustainability



1. International Society of Automation 2. World Economic Forum

Applicable across sectors

Wide domain expertise across industries

industry.AI

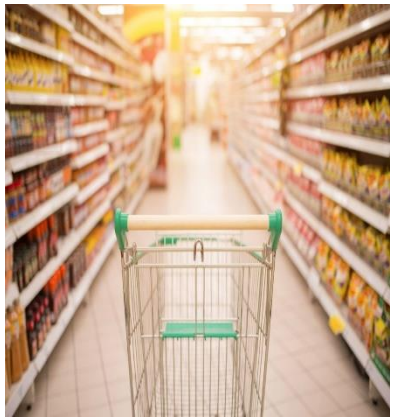
Renewables

Transportation

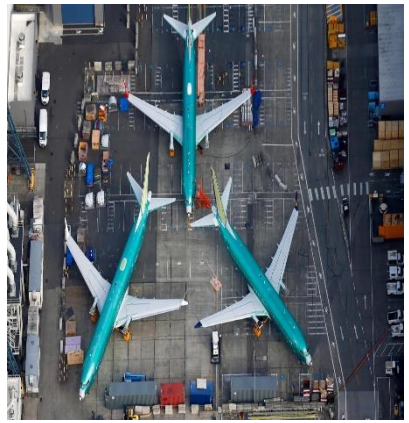
Ports & Shipping

Oil & Gas

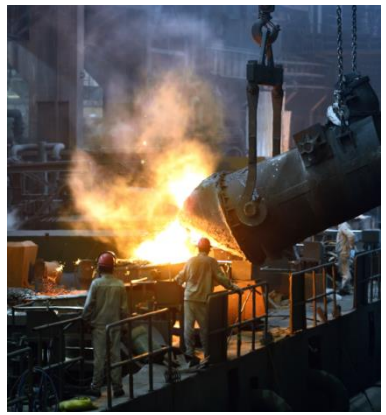
Manufacturing



FMCG



Aviation



Steel

Automotive

Real Estate

AI can be applied to solve industrial challenges industry.AI

AI Product suite

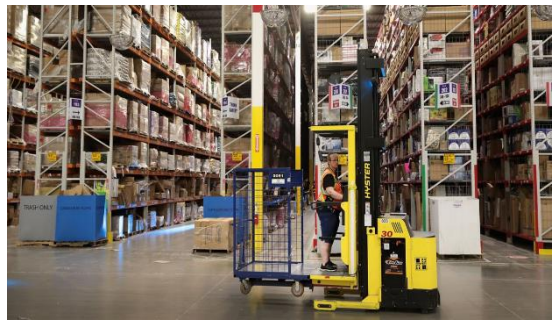
Predict.AI - Asset Health & machine performance – wind turbines & solar farms

Track.AI - Supply Chain Optimization and performance monitoring – Train, Trucks, Container

Conserve.AI - Smart Buildings – Healthy Buildings - Increasing the value of buildings

Smart Factory – Reliability & Predictive maintenance

Port.AI - Smart Port – cranes to containers



Spot.AI - Asset Tracking, Inventory Management, & Workforce management – Factories, Warehouse, Buildings

Conserve.AI - Energy Efficiency & Sustainability - Factories & Buildings

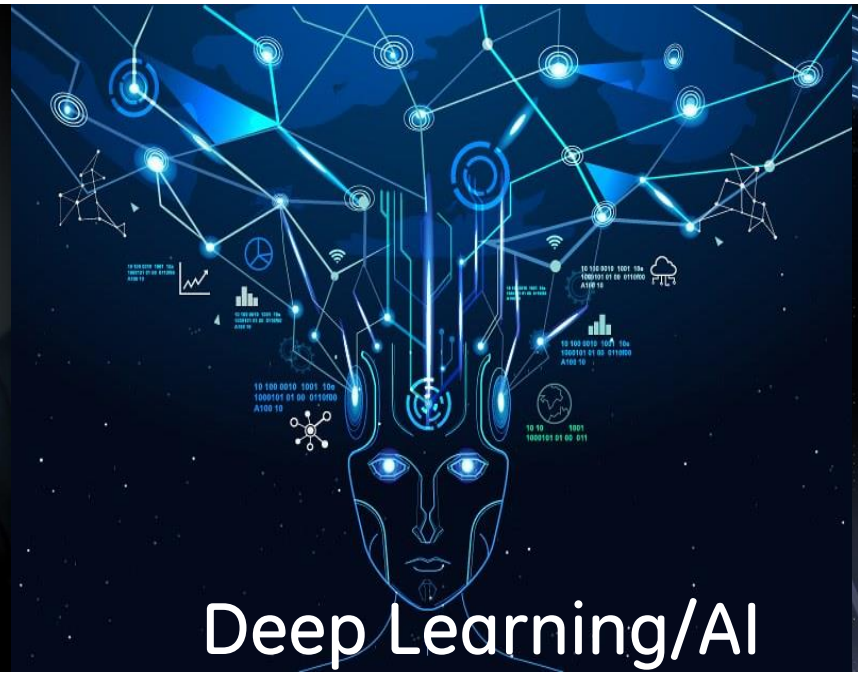
Trust.AI - Visual Analytics – Quality, defect detection, Safety, Security

Technology

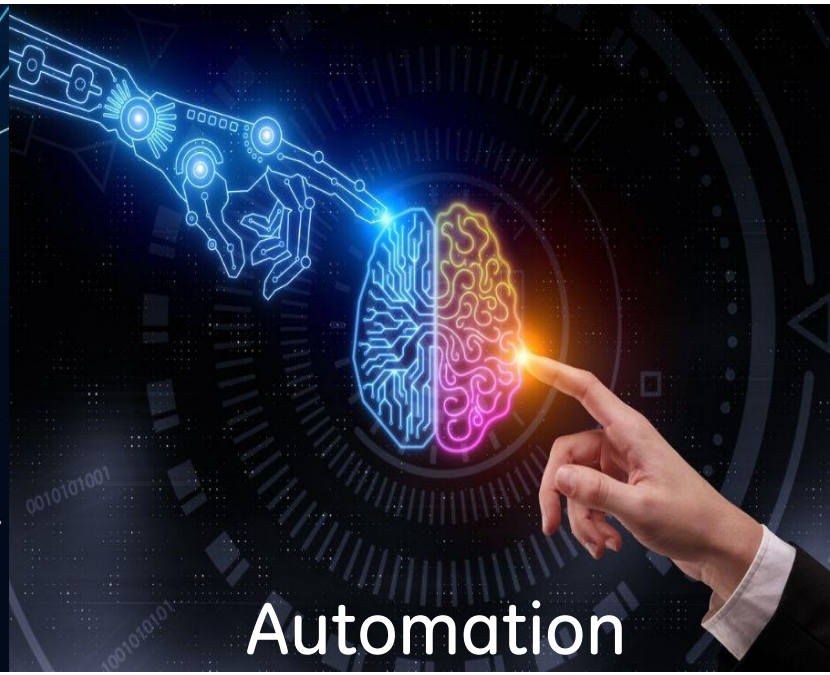
industry.AI

Full-stack Orion platform for real-time connectivity, intelligence, and automation.

Connect people, things & Processes (IoT) – Collect the Data – Data Engineering & Contextualisation



Real Time Intelligence (AI) – Develop AI Models - Analyze

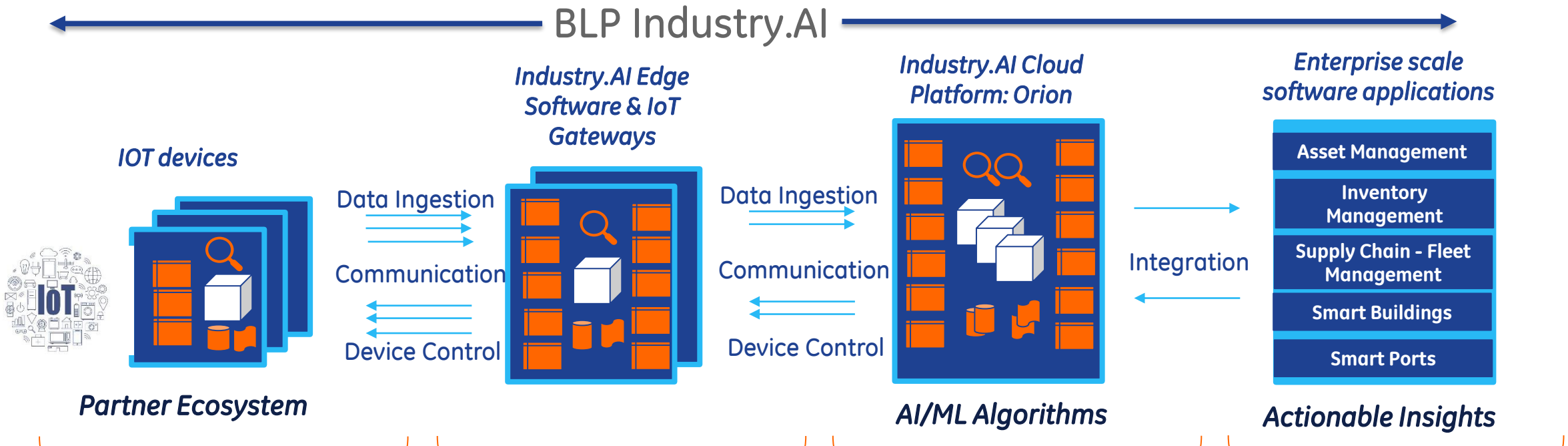


Automate processes – Deploy AI Models - Act

End to end solutions..IoT to insights

Product + Service capabilities. "Orion" – operating platform for IoT and AI

industry.AI



BLP Industry.AI audits, does the engineering & architecture design, and installs 3rd party IoT devices in factories/ buildings/assets.

Proprietary Edge software connects all IoT protocols. BLP works with a number of 3rd party gateway suppliers.

"Orion" – BLP Industry.AI's proprietary industrial digital platform for IoT and AI. Cloud agnostic – Google, AWS, Azure

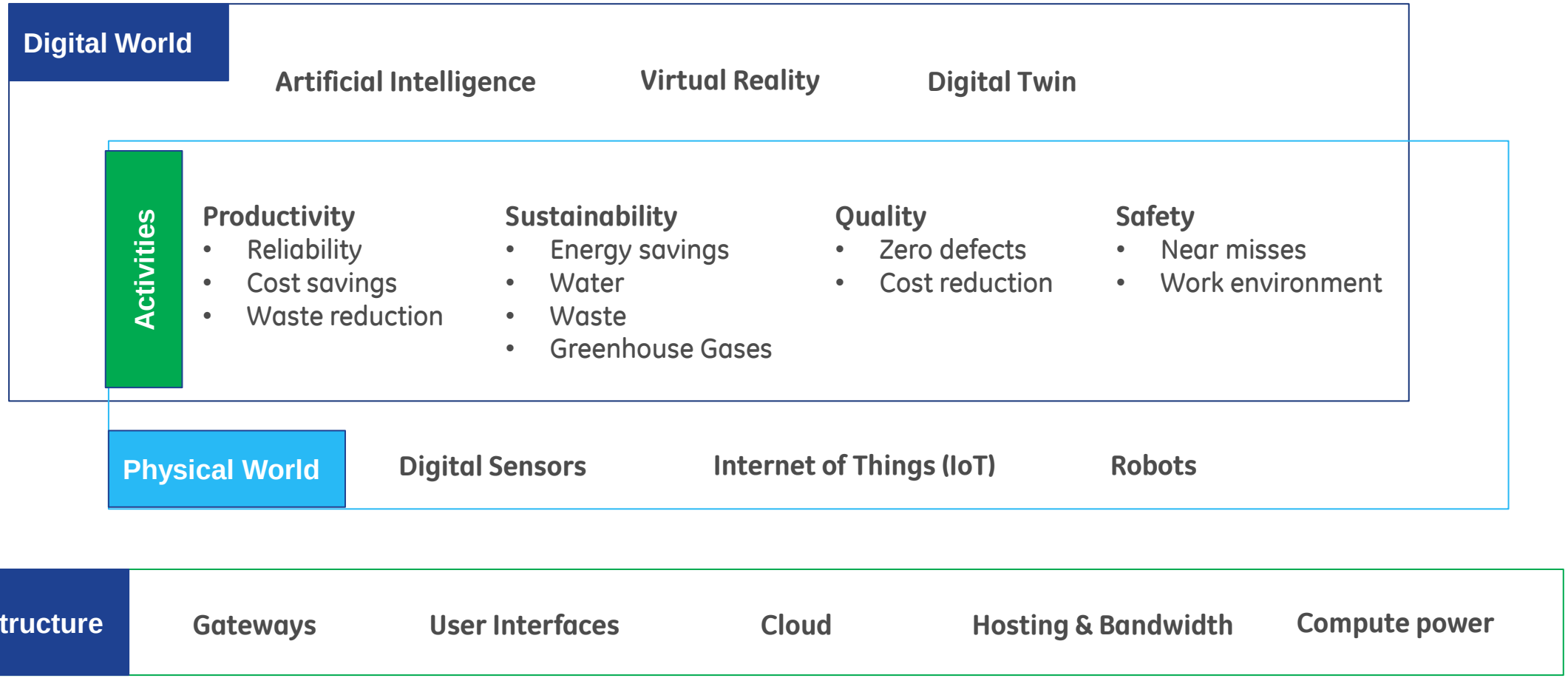
Enterprise scale AI software products customized for a number of industries.

Confidenti

The Metaverse of the industrial world

industry.AI

Creating the metaverse of the industrial world to transform industry & manufacturing



What makes us different?

industry.AI

People + Culture. Data Security & Privacy. Product + Service company - SaaS, PaaS, AI@service

Global Partnerships – Google Cloud, Apple, PWC, etc.

End To End Solutions

Installation of hardware/IoT – Data Aggregation – AI Analytics - Insights

AI Insights – 80+ algorithms

80+ proprietary algorithms developed in-house focused on industrial productivity

Innovation Culture

R&D lab + RoC in Bengaluru + High Frequency Data + 5G

Frugal Manufacturing

Orion IoT/AI platform aligned with frugal manufacturing to drive Quality and Reliability

Industrial eco-system – Open Architecture

Platform to bring all stakeholders together – OEMs, Telco, Cloud, Customers, IoT manufacturers etc.

Application- Core AI – Orion Platform - Industrial Digital Platform - Providing industrial intelligence to improve productivity and quality

AI/ML Techniques in Action

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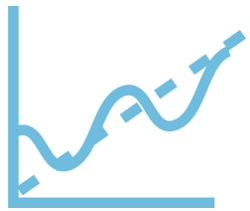
Following are typical algorithms being used for developing various solutions

Tree Based / Ensemble

CART
ID3
Random Forest
Bagging
Boosting
AdaBoost
C4.5 / C5.0
CHAID
Decision Stump / M5
Weighted Average (Blending)
Stacking
GBM
GBRT

Time-Series

ARMA
ARIMA
SARIMA
SARIMAX
Holt Winters

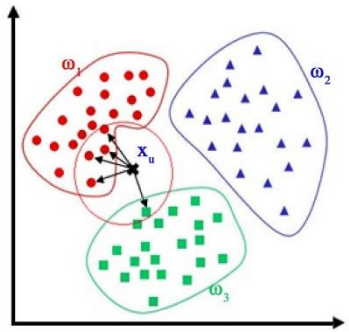


Classification

AODE
BBN
BN
LARS
Naïve Bayes
Gaussian Naïve Bayes
Multinomial Naïve Bayes

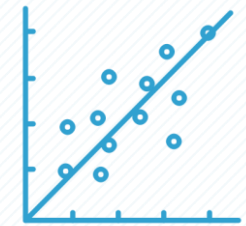
Clustering

k-means
kNN
EM
LVQ
SOM
Ranking SVM
one class SVM
Hierarchical Clustering
Locally Weighted Learning
Affinity propagation



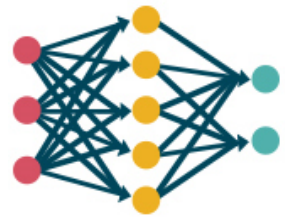
Regression

Logistic Regression
Linear Regression
Ridge Regression
LASSO
Elastic Net
LARS



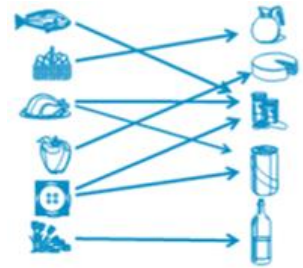
Neural Nets

LSTM
MLP
Back Propagation
Hopfield Network
RBFN
Stochastic Gradient Descent



ARM

Collaborative-Filtering (CF)
Apriori Algorithm
ECLAT



AI/ML Capabilities

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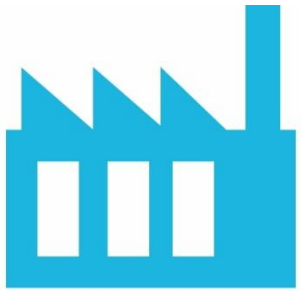
Over 80 algorithms developed over 6 years for more than 20 Industrial segments

Industries



- Wind Energy
- Solar Energy
- Oil & Gas
- Chemicals
- Tire
- Glass
- Steel
- Aluminum
- Cement
- Refractories
- Thermal Power Plants
- Automotive Spare Parts
- Aviation
- Supply Chain Management
- Transportation (Rail/Road)
- Shipping
- Ports
- Electrical Goods & Appliances
- FMCG
- Sugar
- Ceramic Tile
- Commercial Buildings

Failure Prediction

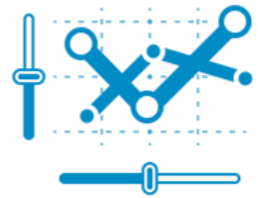
Predicting failures in advance with the help of advanced AI model trained & tested on historical data and validated on live data

Anomaly Detection

Identification of deviations far away from the normal behavior and suggesting the impact and risk exposure

Recommendations

A prescriptive approach to suggest actionable insights for implementation on the field by frontline resources

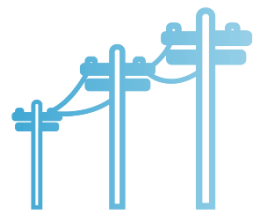


Dynamic Threshold

A tailored approach to address highly sensitive specialized issues based on the current level of operations given the historical exposure and behavior

Asset Health Prediction & Diagnostic

Learning from the past events and historical behavior and predicting the reliability of the equipment / entire process



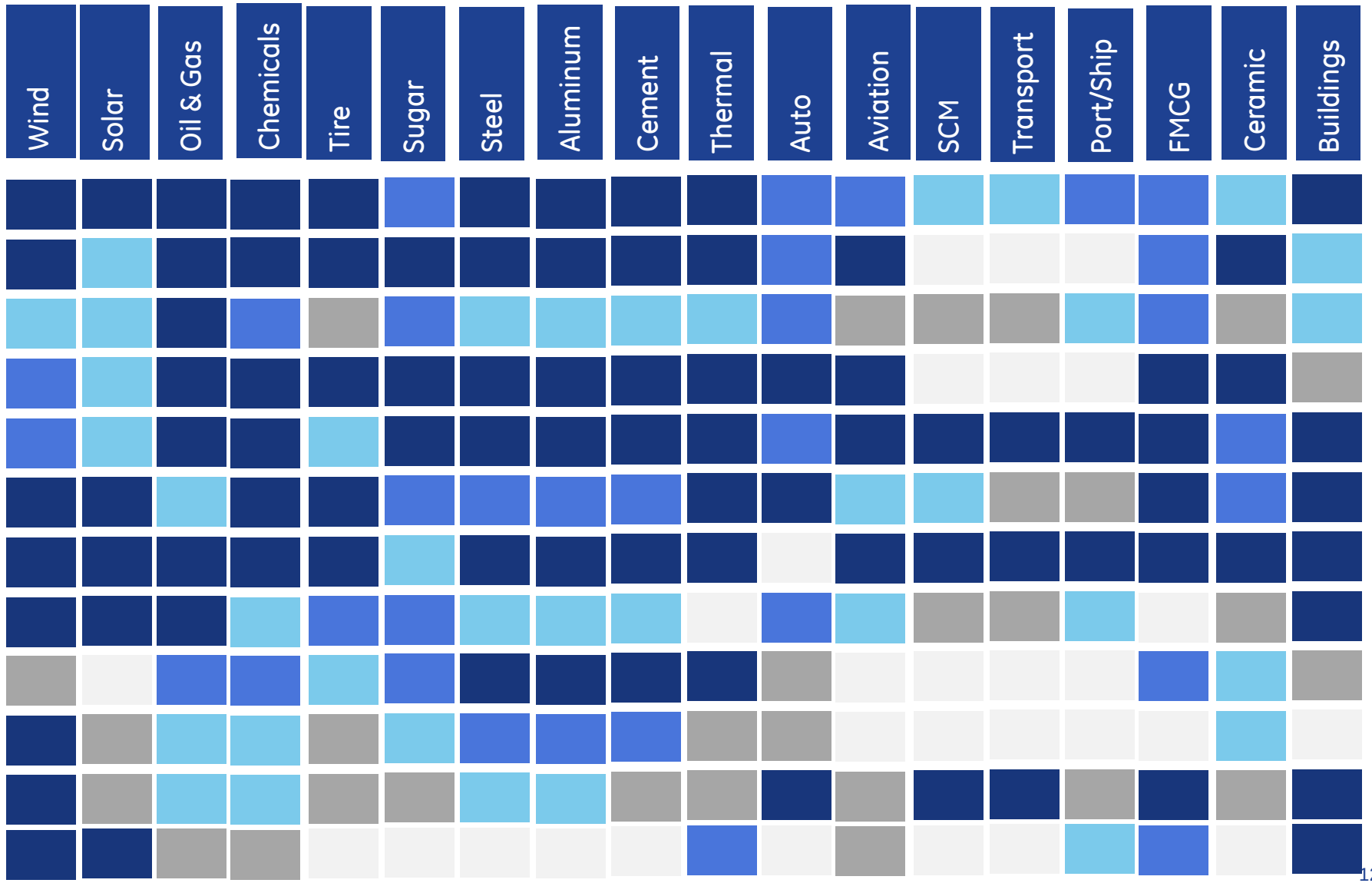
Energy Analytics

Applying deep knowledge of domain and data science to address challenging issues causing high specific energy consumption

Industry.AI algorithms & applications

industry.AI

Heat Map Scale

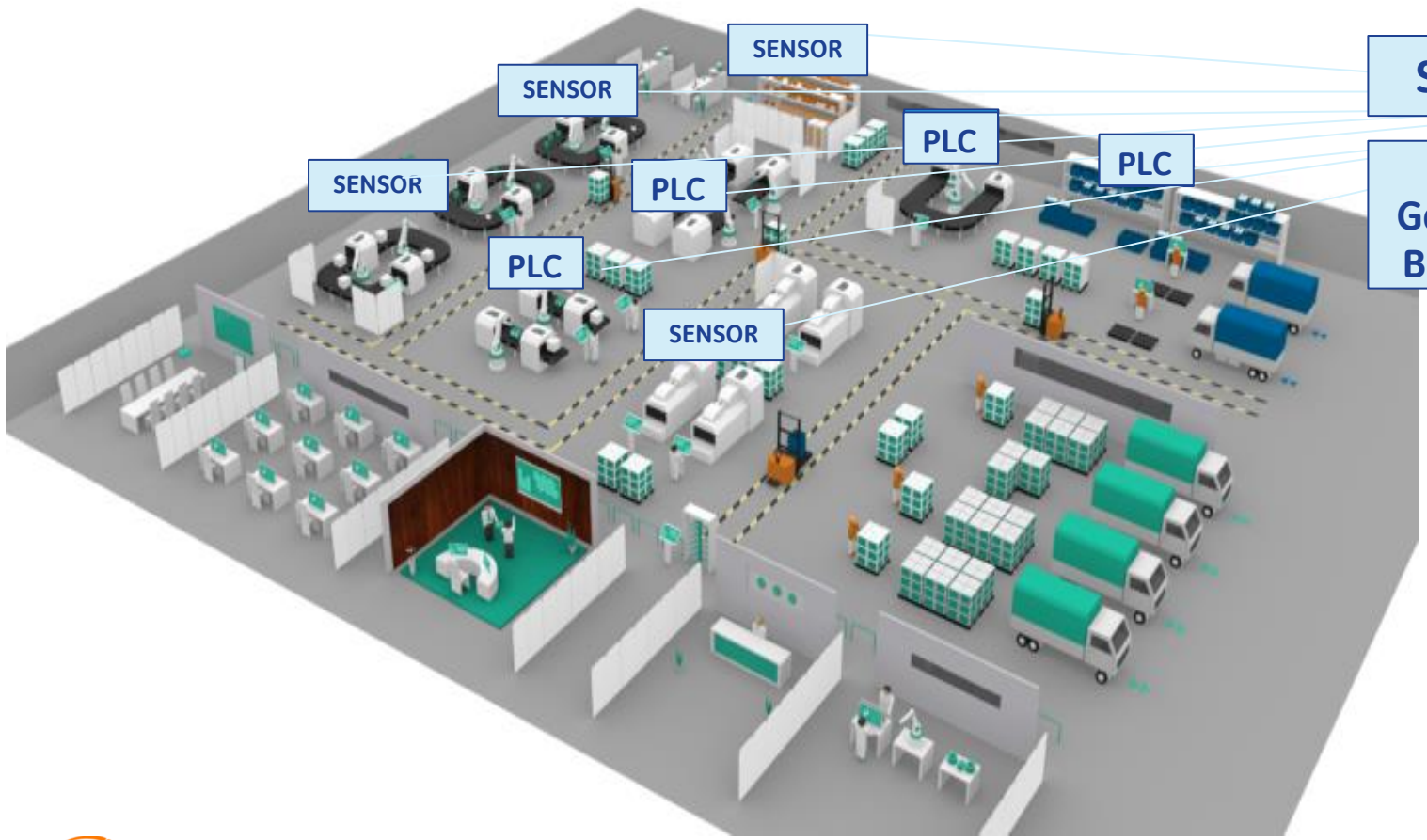


Application – Predict.AI - Smart Factory – Plant Digitalization. APM. OEE

How does it work?

industry.AI

The Industry.AI IoT team installs the IoT devices and connects them through BLP Edge. The platform is compatible with all protocols and therefore helps scale and deploy IoT applications seamlessly.



SCADA

IIoT Gateway/ BLP Edge

Orion

Advanced Analytics

WEB APPLICATION

MOBILE APPLICATION

E-MAIL NOTIFICATION

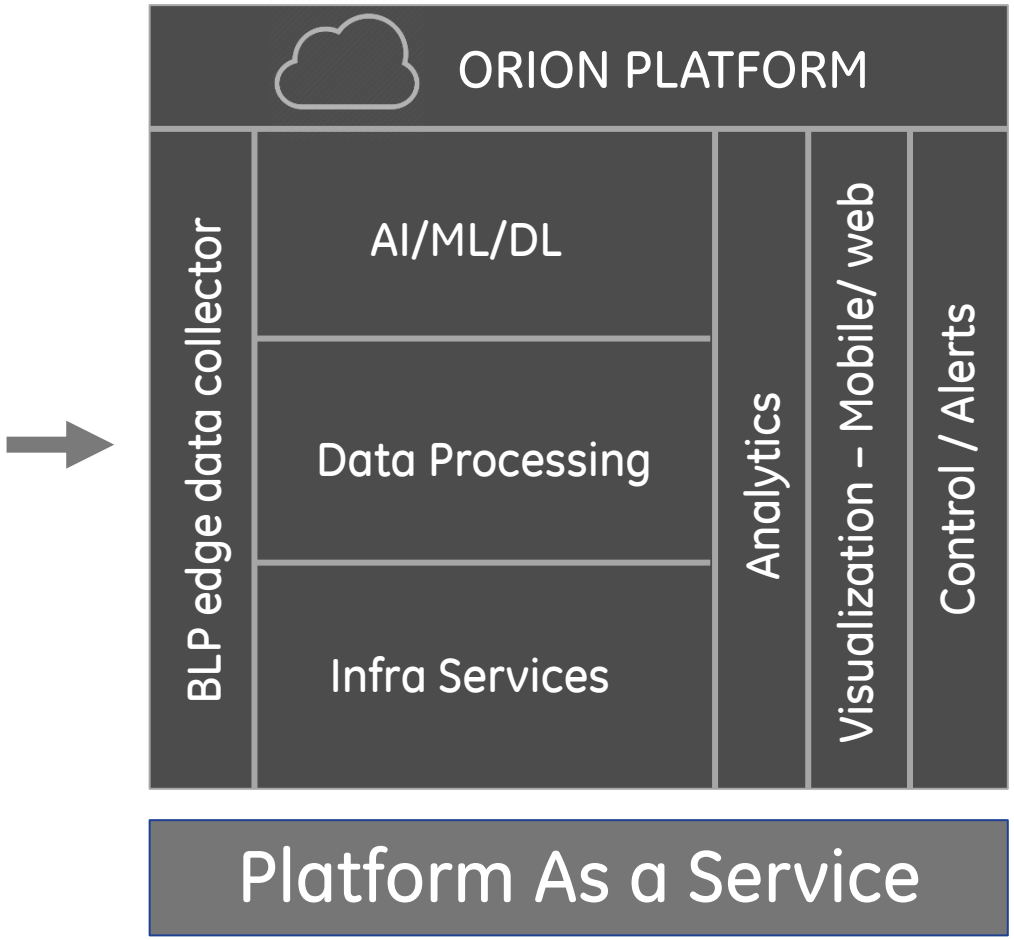
Architecture

An integrated solution – from data input to insights. Detect, Improve, Automate

industry.AI

Data Sources

- Maintenance Data/Failure Data
- Enterprise systems
- Zone and Territory level Sales Data
- Store Info and Credit History
- Sensors/SCADA/PLC – Vibration, Temperature, Flow etc
- Weather data
- Camera/CCTV



Applications

1. Sales forecast & Planning
2. Predictive Maintenance
3. Asset Performance

Unit-1: Site Visuals

1. Line-02 Rough Press Machine

industry.AI

Data Frequency : 5 Seconds

Front View

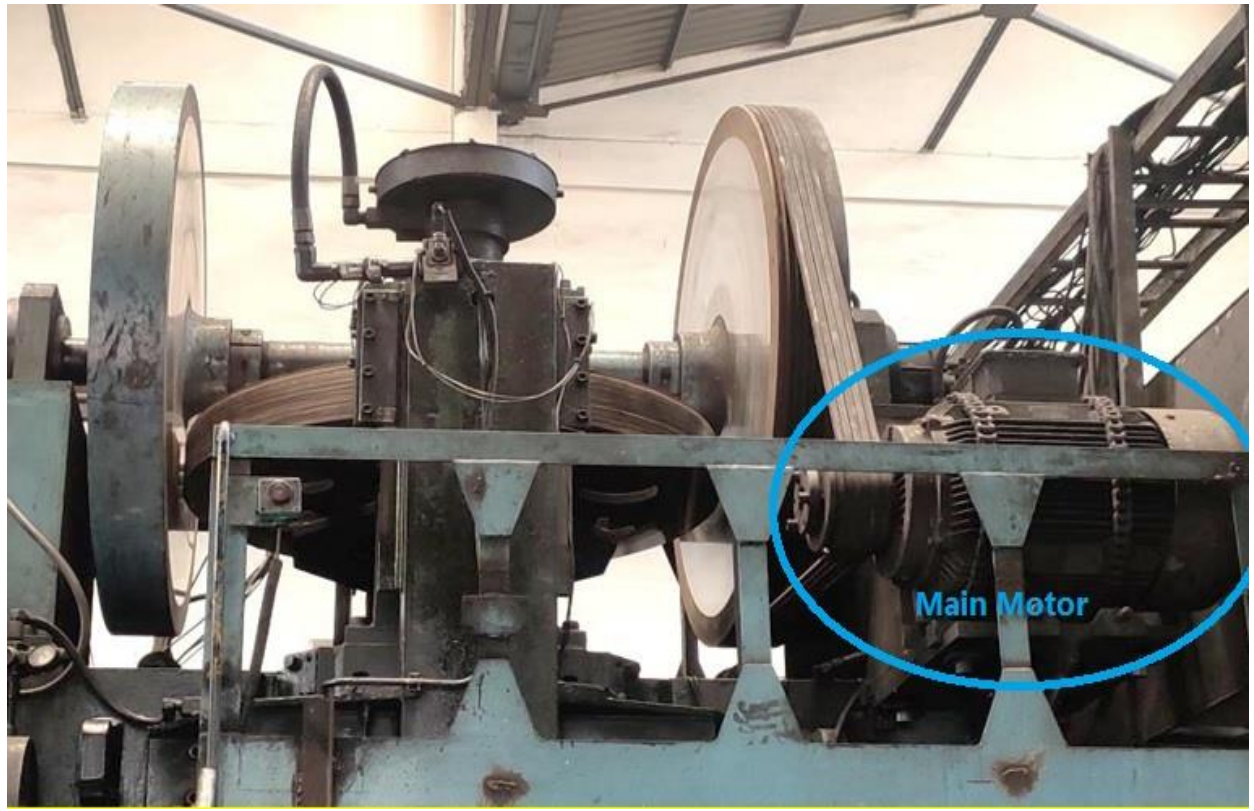
Left Side View

Back Side View

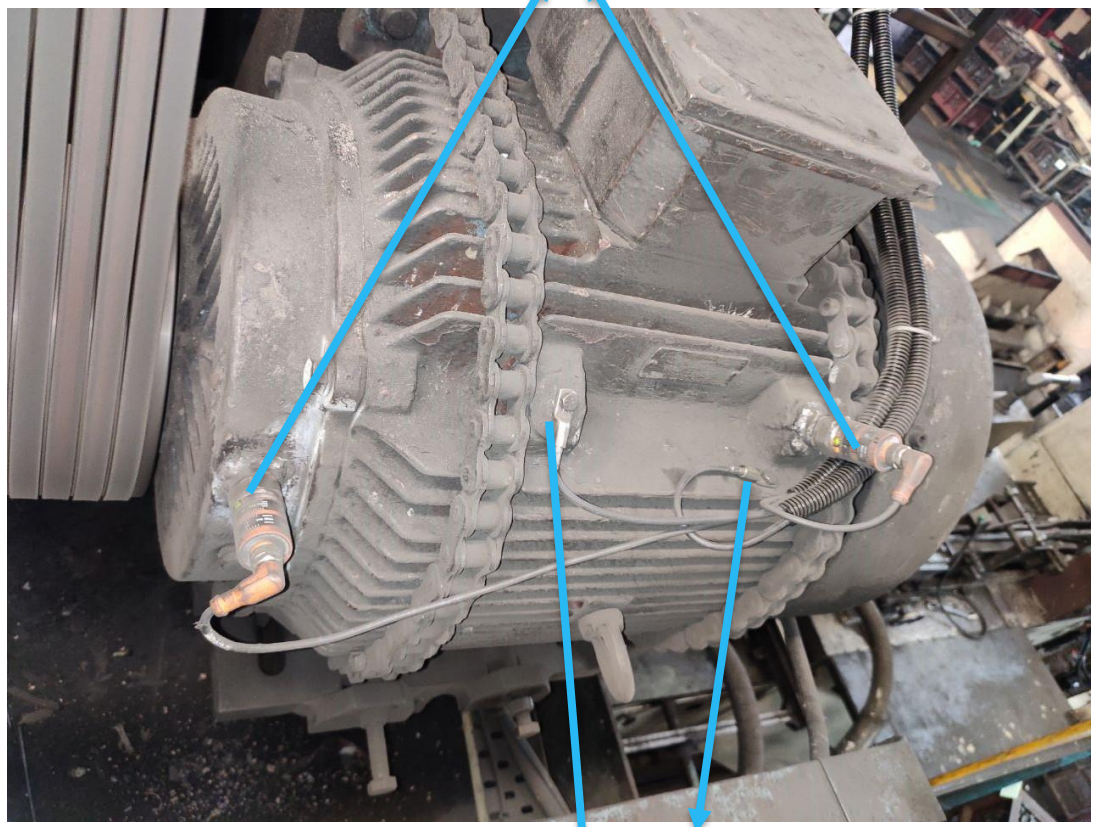
Unit-1: Site Visuals

Main Motor vibration and temperature monitoring

industry.AI



Vibration Sensors for collecting data from Non-Driving and Driving End Of the Motor.

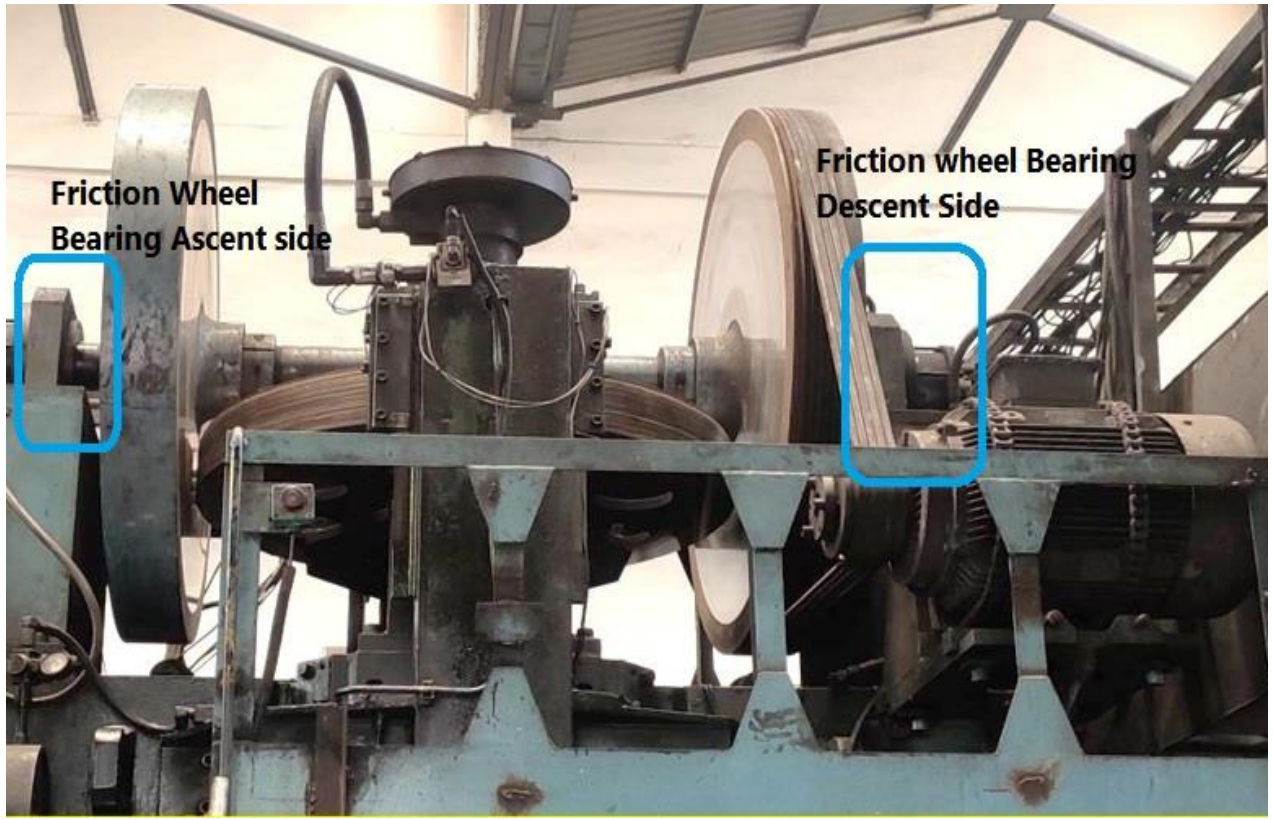


Temperature Sensors for collecting data from Non-Driving and Driving End Of the Motor.

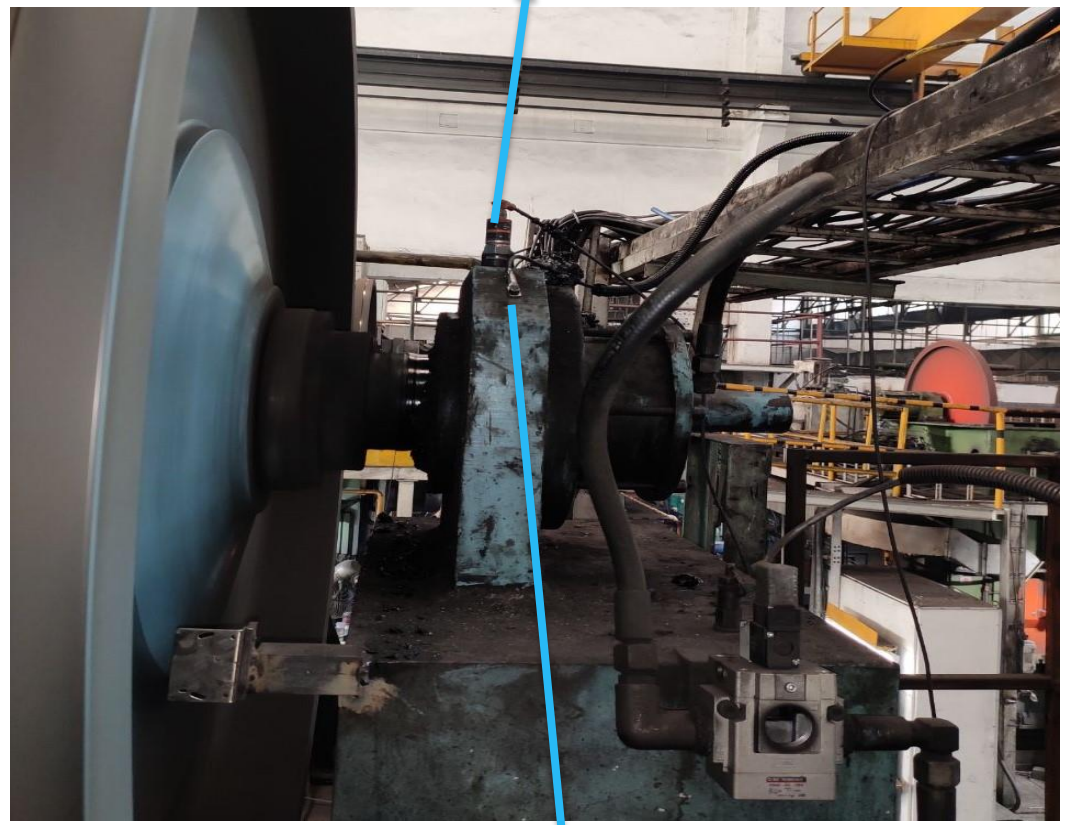
Unit-1: Site Visuals

Friction Wheel bearing vibration and temperature monitoring

industry.AI



Vibration Sensor for collecting data from descent/ascent friction side of the bearing wheel.



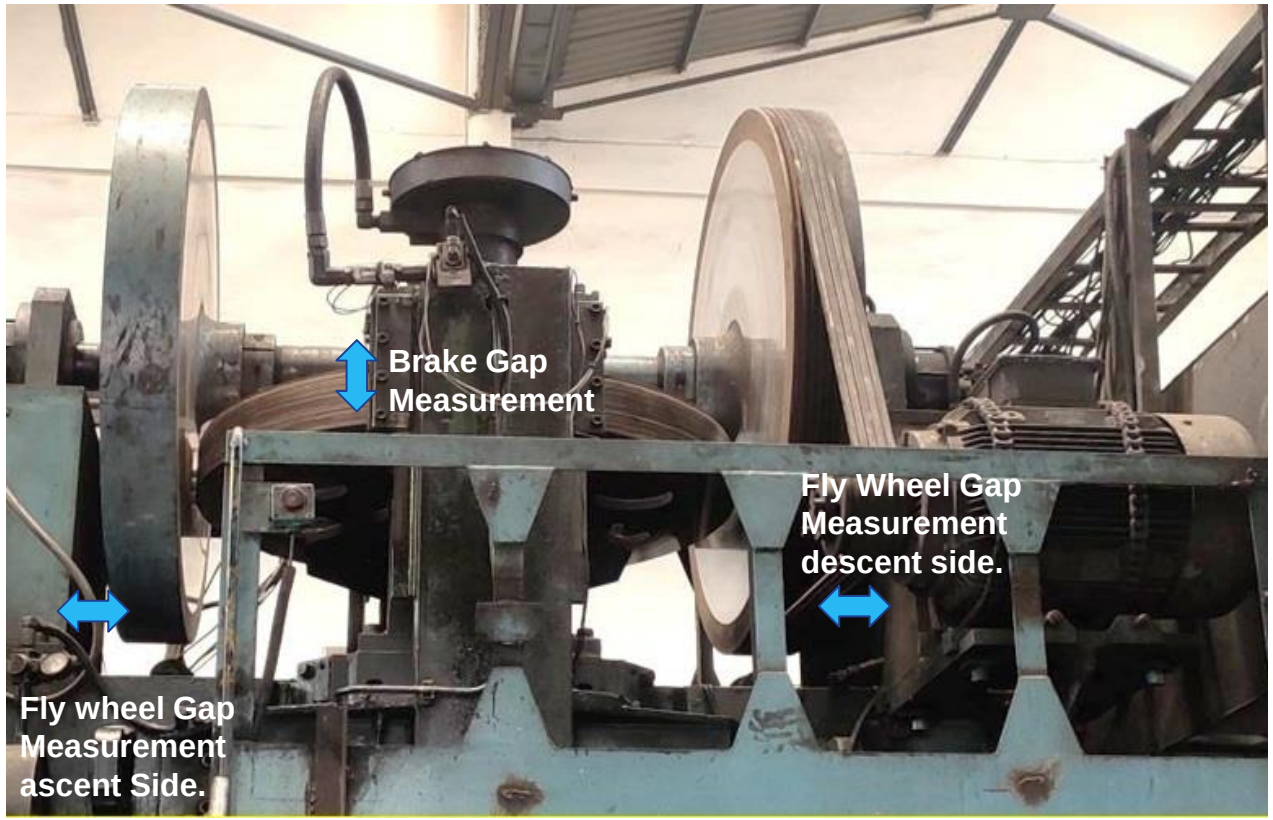
Temperature Sensor for collecting data from descent/ascent friction side of the bearing wheel.

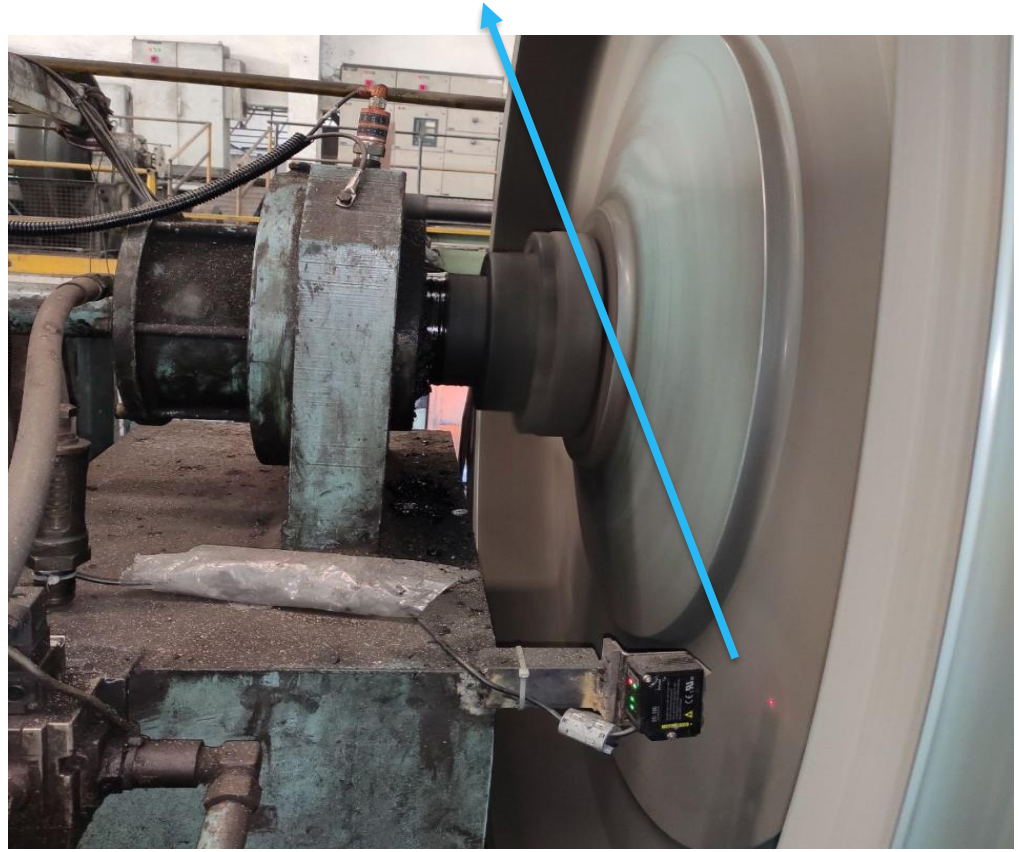
Unit-1: Site Visuals

Friction Wheel/Break Pad Gap monitoring during forging & Idle time

industry.AI

Gap Measurement using Laser sensor on ascent side of the Flywheel.





Application – Conserve.AI - Smart Buildings - Energy Efficiency - Sustainability

Connected Buildings

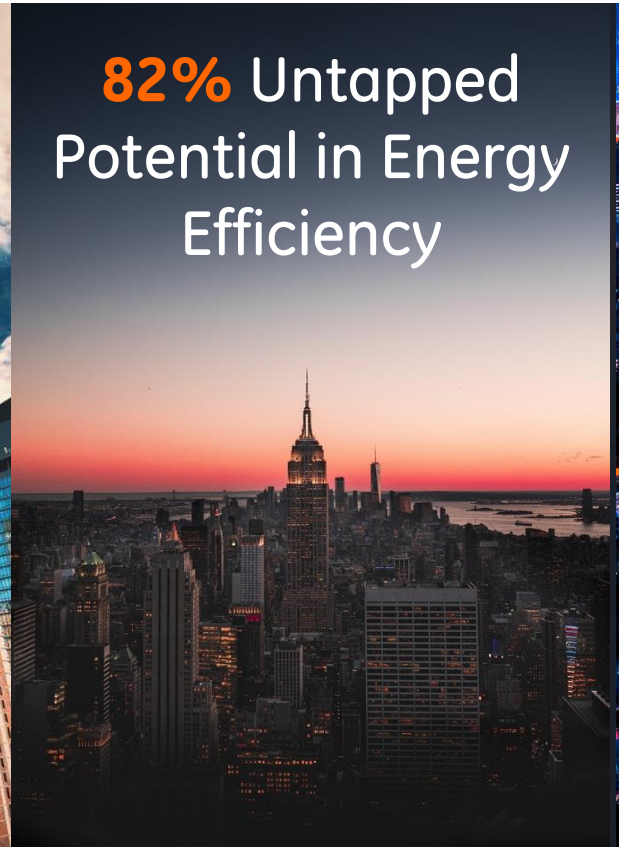
IoT is driving efficiency and sustainability

End to End digitization solving modern problems

industry.AI

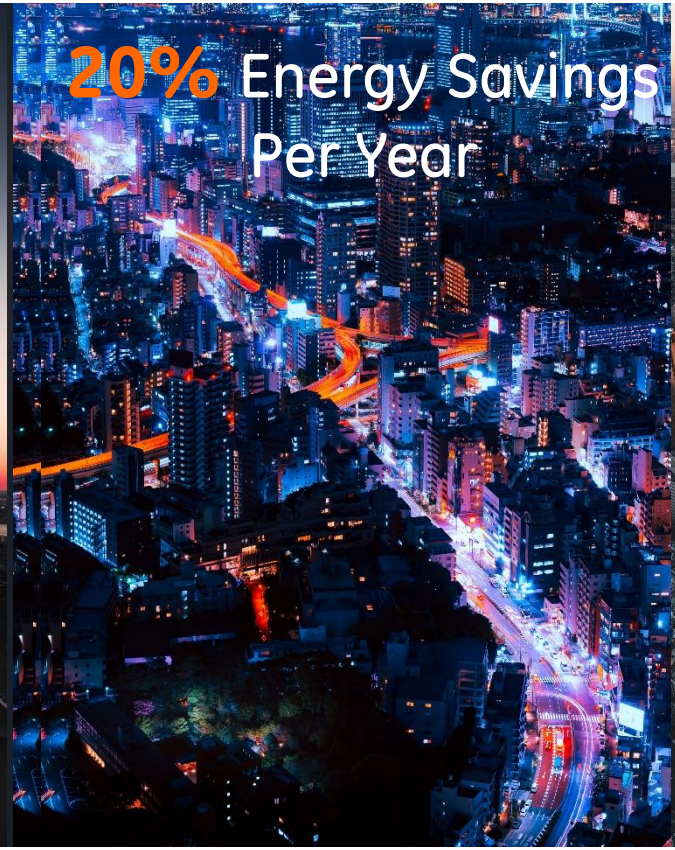
Standardization

Standardization, reusability, and mobile technology mean less effort in engineering and deployment



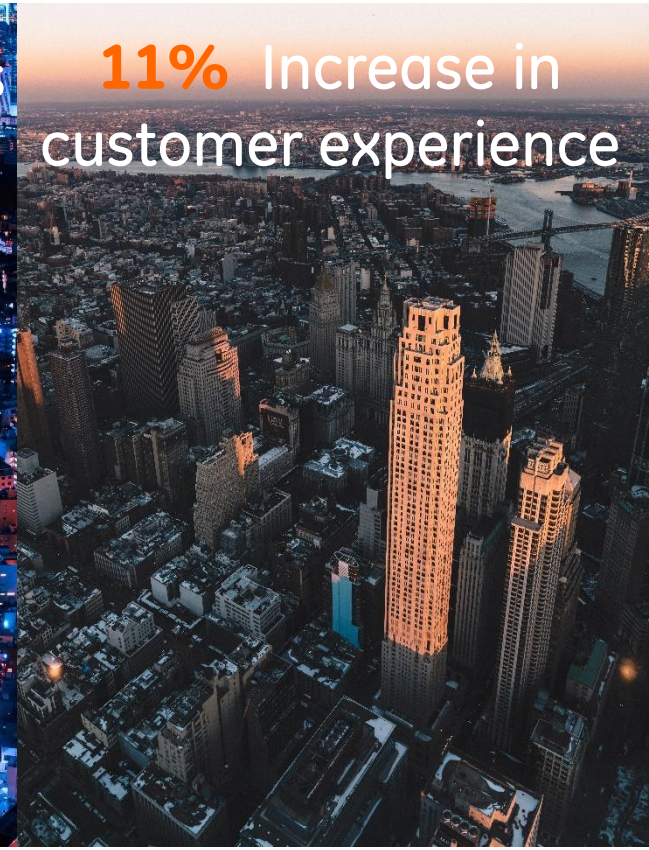
Energy Efficiency

Buildings have the highest untapped energy efficiency potential by sector



Connected IOT

Predictive maintenance enabled by IoT and artificial intelligence



Customer Experience

A more personalized, comfortable experience drives productivity

Digitization drives Sustainability

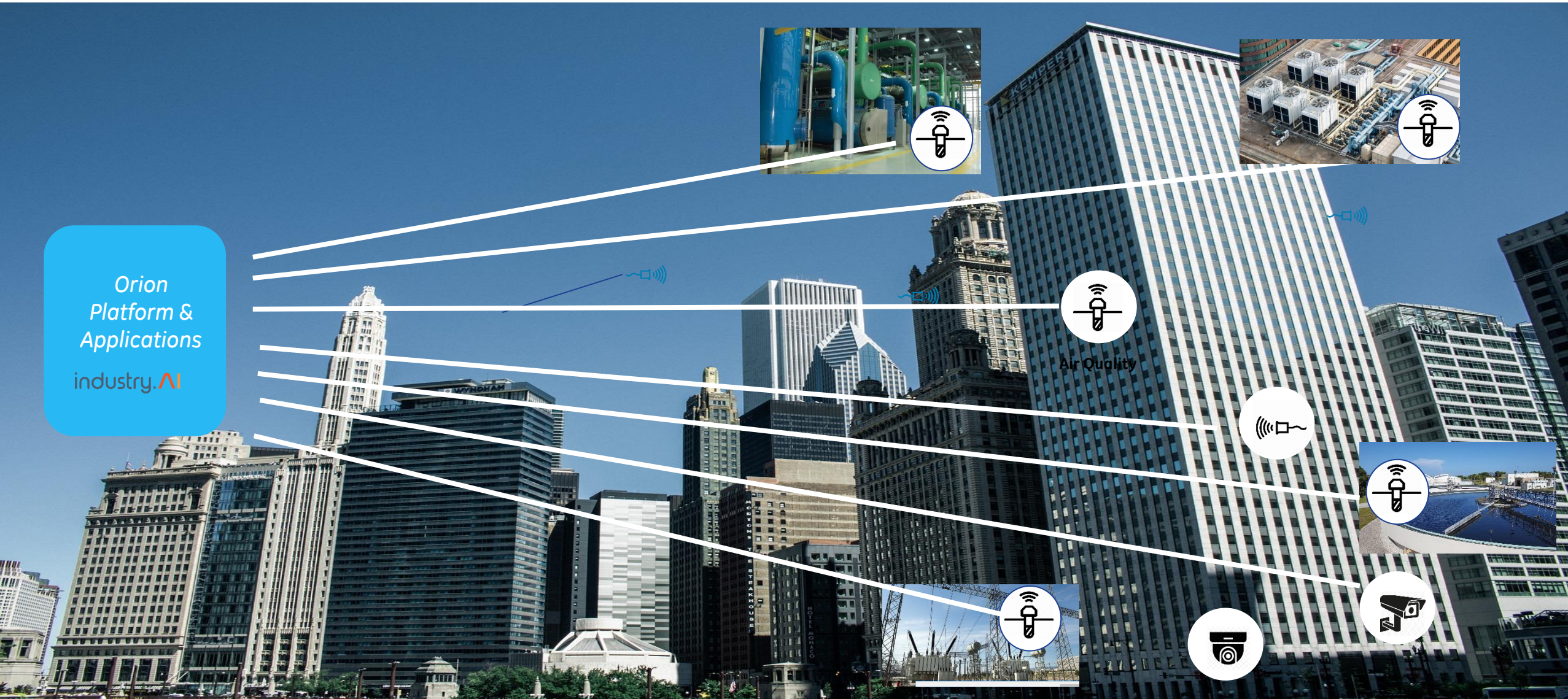
Benefits

industry.AI

01	**Measure**	• Need connectivity of all key equipment regardless of manufacturer. Install additional IoT devices if required
02	**Transparency**	• Provides insights into the building and factory operations
03	**Traceability**	• Identify areas for savings
04	**Connect people to the building**	• Mobile and connectivity provides greater cohesion

Conserve.AI - Integrating all operational parameters of a building onto one platform – energy, water, waste, fire, security, DG, air quality, etc

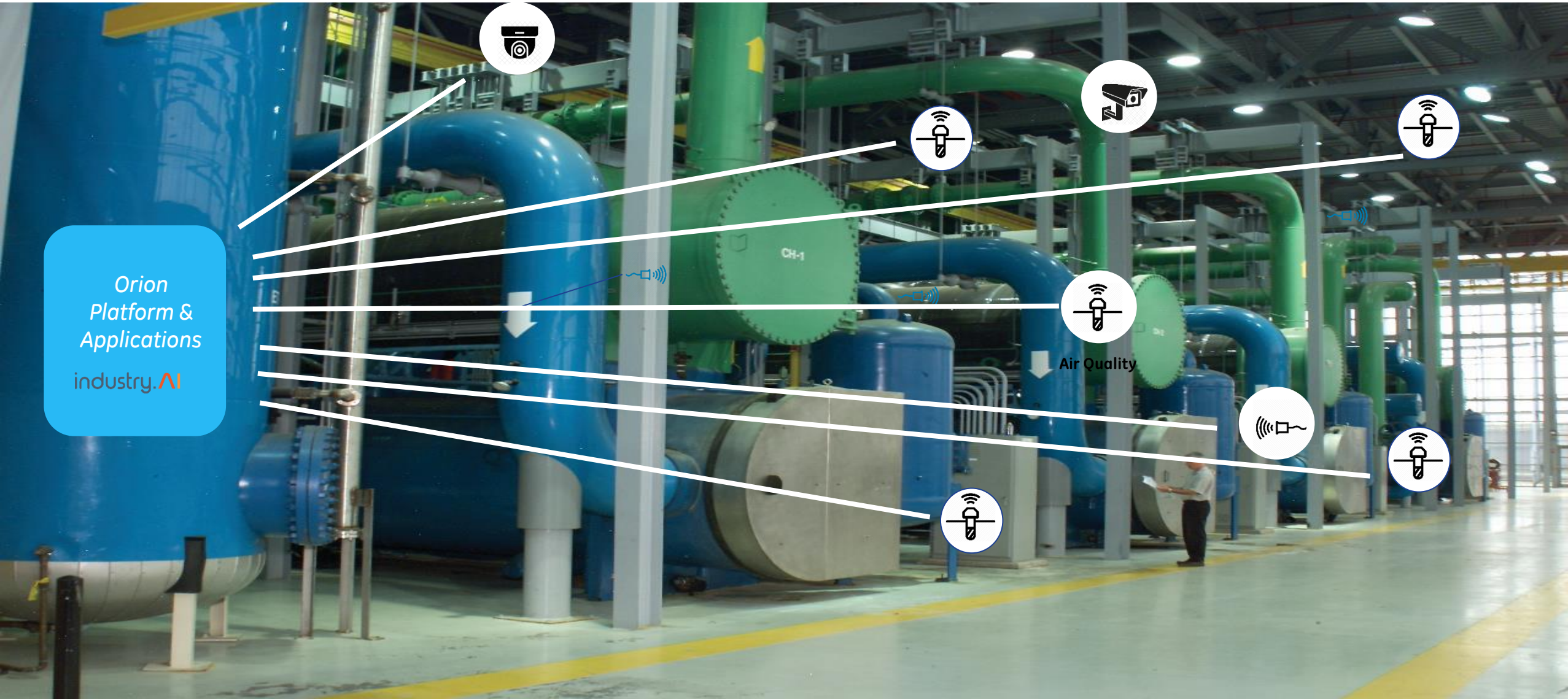
Using AI and IoT to improve operational efficiency and transparency



Conserve.AI - Integrating all operational parameters of a factory onto one platform – Process heating, motors, compressor, boiler, energy, water, waste, DG, etc.

industry.AI

Using AI and IoT to improve operational efficiency and transparency



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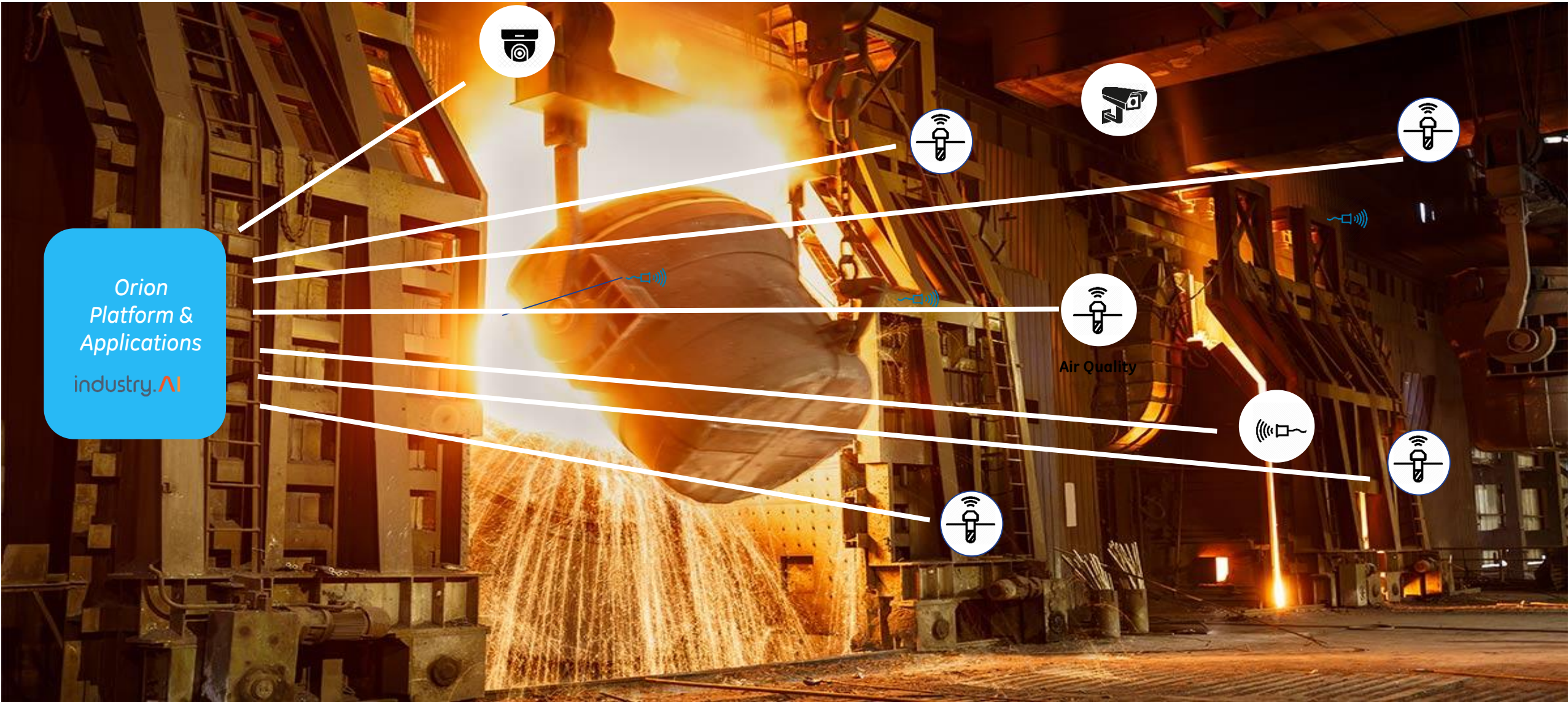
industry.AI

Using AI and IoT to improve operational efficiency and transparency



Application – Trust AI – Video Analytics for real time event detection - – Safety, Security and Quality

Visual Analytics Platform

Delivering High Return on Investment

industry.AI

Hospitals, Hotels & Schools

Retail Stores

Commercial Buildings

Transportation/ Supply Chain

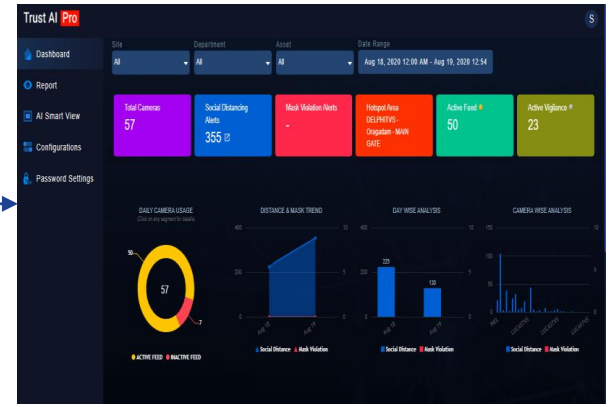
Manufacturing/ Warehouses

Existing Camera Feed Stored in Local Servers

Orion Platform
In-House Algorithms

Advanced Analytics

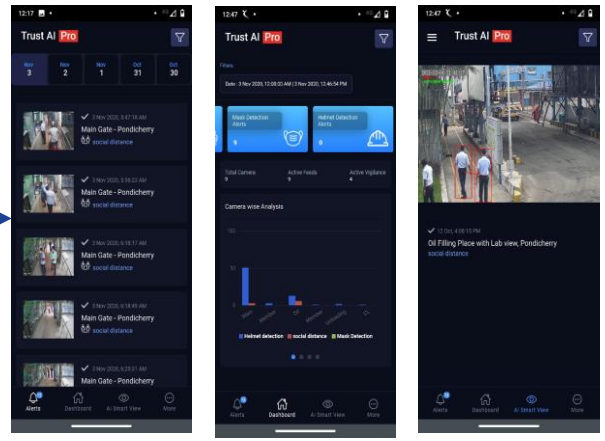
Orion Cloud Platform



Predicative Analytics

+

Real Time Data

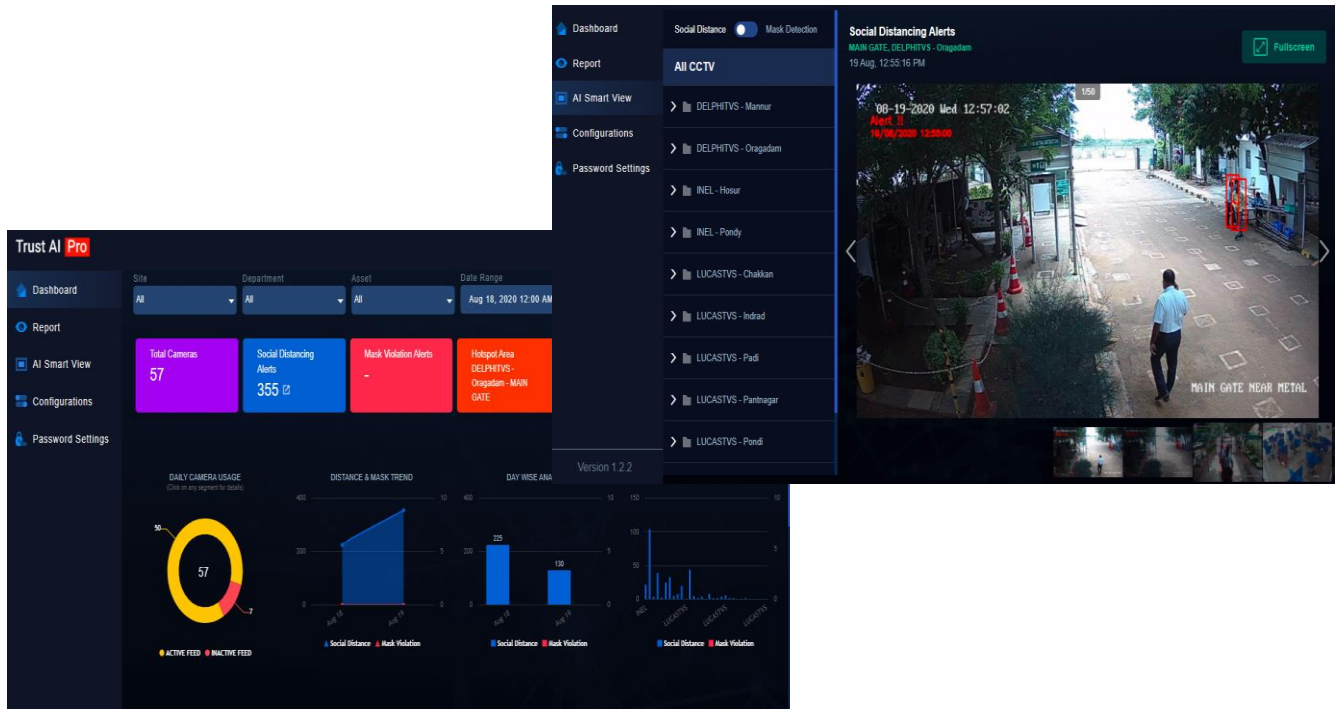


AI Application - Visualization

Transforming video feed into actionable insights

industry.AI

ANALYTICS INTERFACE
Analytics Dashboards with Real-Time Metrics



IN-DEPTH MONITORING
Ability to monitor each individual camera

Data Metrics and Parameters

industry.AI

Occupancy
Count People and Vehicles Entering and Exiting

Age, Gender, Emotions
People Demographics

Intrusion
Reliably detect intrusion into your facilities

Dwell /Loitering
Time people spend in specific zones

Queue Management
How long are employees/ customers waiting in line?

Smoke/Fire Detection
Visually detect fire and smoke in camera views.

Security
Object and people detection models to ensure safety

Heat Maps
Visual representation Of Zone Data

Throughput
Detect objects crossing specified edges of the zone

Walk By
Managing walk in's

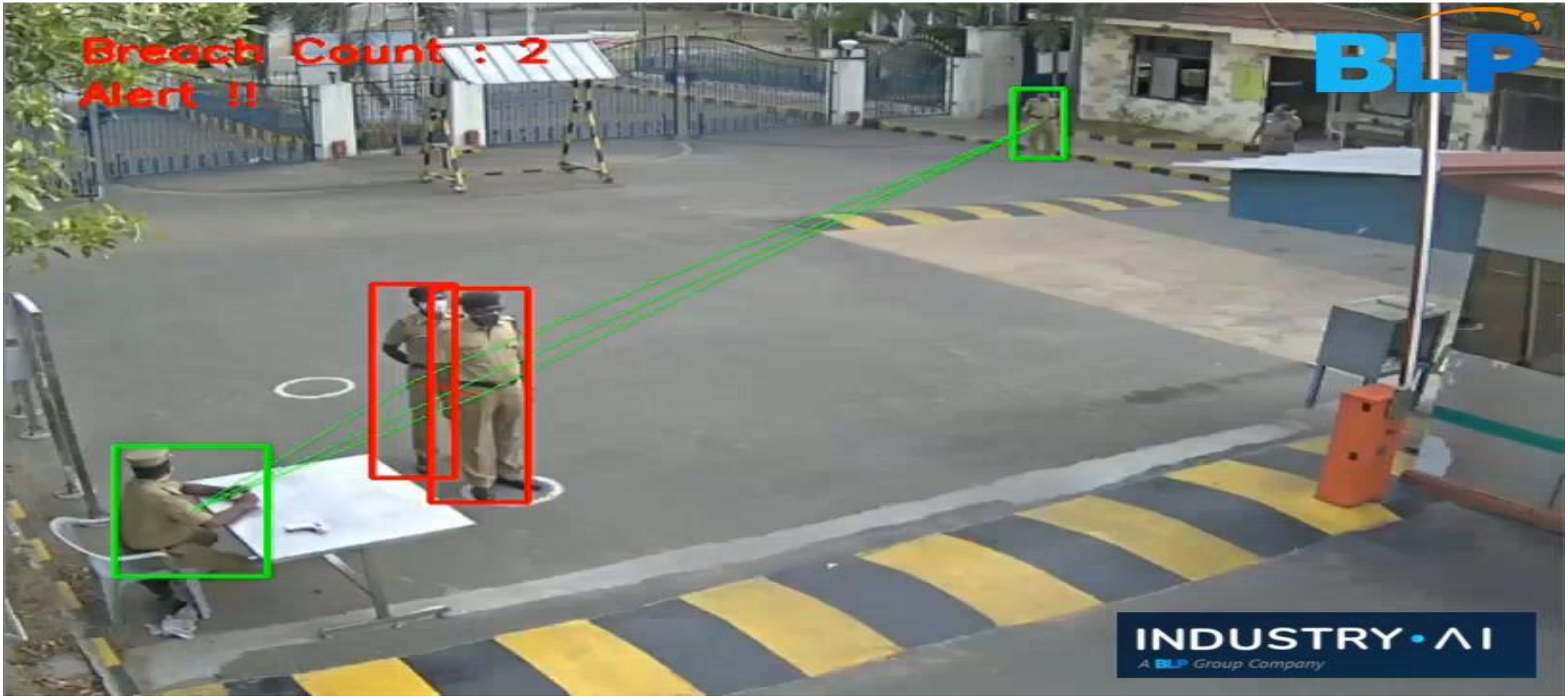
Alerts
Maintenance & Security Alerts

Parking Management
Vehicle Analysis

Safety – Track usage of PPE and compliance of safety norms

Safety - Social distancing using computer vision models

industry.AI



Safety – Mask Detection using computer vision models

industry.AI

Use Cases – Trust.AI…the future

industry.AI

Automation - video feed ingestion, enrichment & structuring

Quality –Track manufacturing defects on a production line correctly.

Safety - Visual inspection for PPE compliance in factories & ports. Monitor worker behavior in construction sites

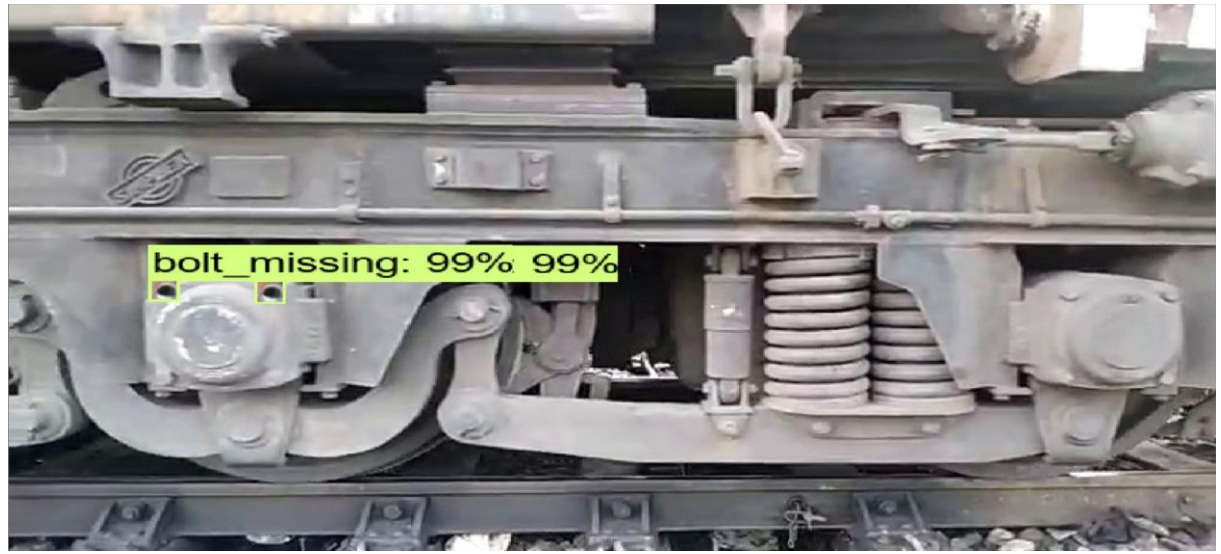
Security - Real Time vehicular traffic monitoring

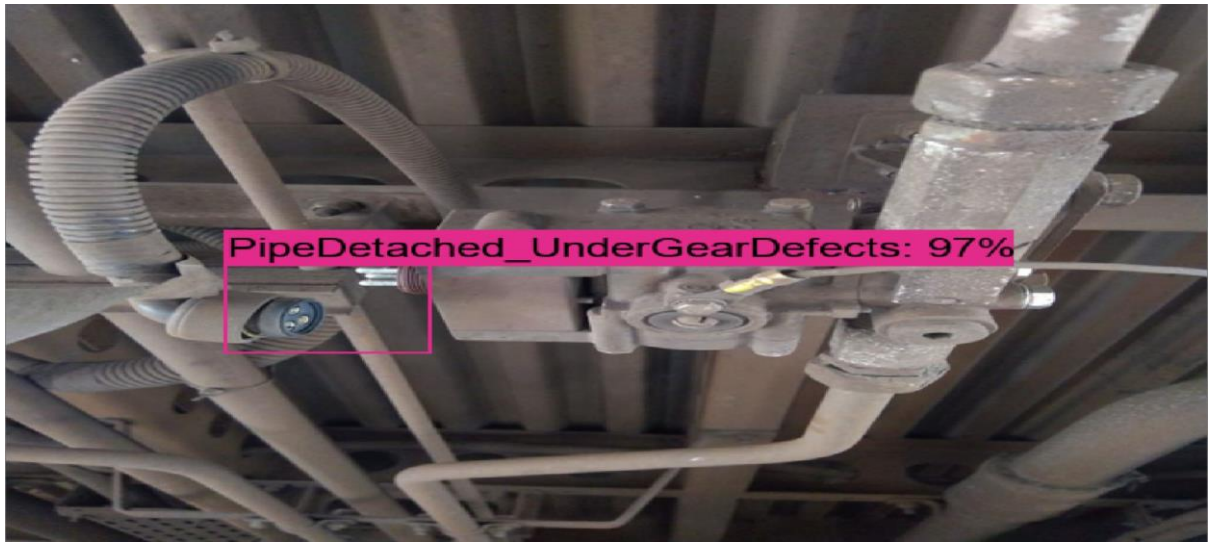
Visual auditing - Ensuring compliance of trucks, trains or windmills out in the field

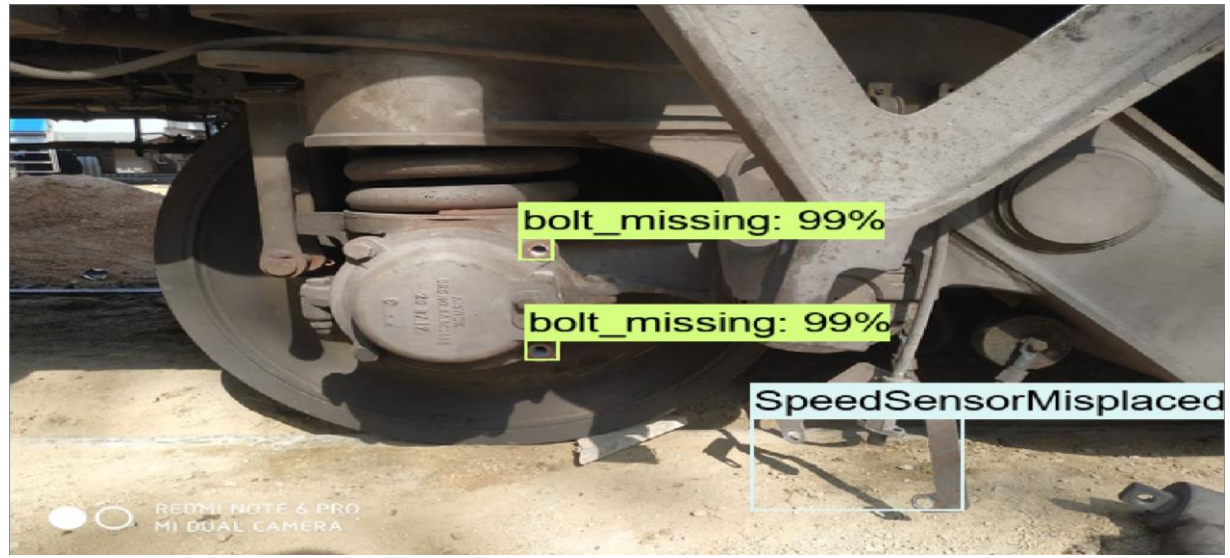
Retail - Use a travel image to find retail suggestions in that area etc.

Safety - Railways – identification of defects with Visual analytics

industry.AI







Safety – Geo Fencing

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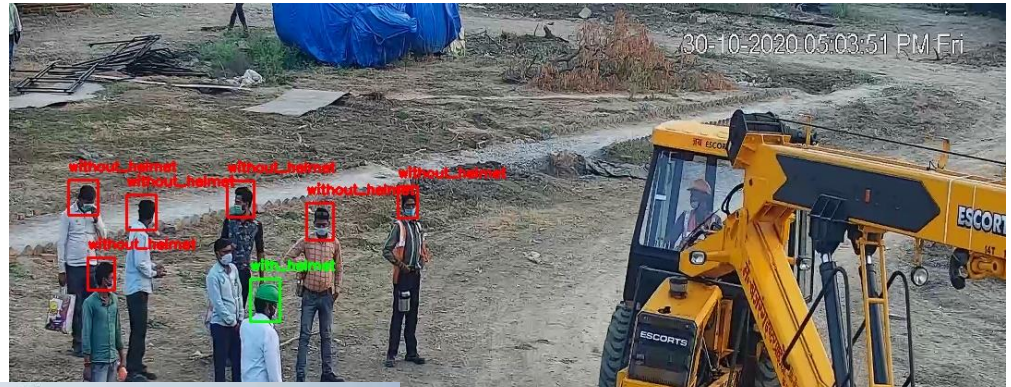
Manufacturing Defects – Quality Improvements

Improve quality control by detecting defects using real time video processing

Safety – Construction Industry

Ability to scan large construction sites

industry.AI



Safety – Fire/Smoke

Substations

Security – Warehouses

Real time alerts using Visual Analytics

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Application – Improving machine performance and uptime - Wind and Solar Farms

Transforming Operations & Maintenance

industry.AI

Creating the Digital power plant, reducing maintenance expenses

Plant Digitization → IoT → Big Data Analytics/AI → Operations & Maintenance driven by Deep Learning

Digital Strategic KPI

Objectives and Benefits

Using Automation and sensors to extract live and historical data	Network of devices connected, remote operations with IoT cloud	Big Data Analytics & AI Data Analytics, predictive maintenance, AI, machine learning and cognitive computing	• Predictive Maintenance • Optimisation of Maintenance • Operational efficiency • Optimisation of maintenance costs • Maximisation of energy availability • Optimisation of energy production • Improvement of Safety

Benefits

IoT/ Infrastructure	Data Standardization	Data Reliability	End to end Digitization	Increased Performance

Comprehensive AI and ML Algo's

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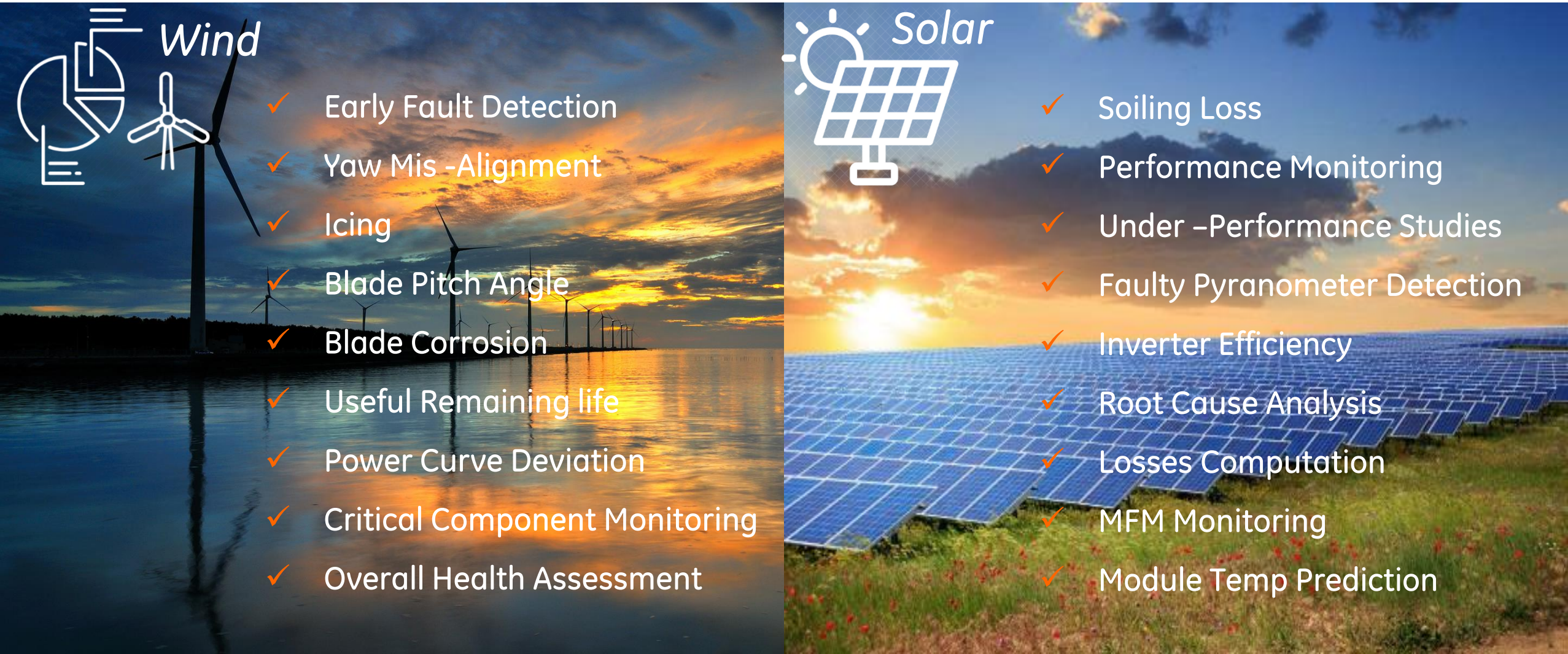
The Orion Platform includes a suite of inhouse algorithms and analytics to increase competitive advantage and increase revenue



Wind

- ✓ Early Fault Detection
- ✓ Yaw Mis -Alignment
- ✓ Icing
- ✓ Blade Pitch Angle
- ✓ Blade Corrosion
- ✓ Useful Remaining life
- ✓ Power Curve Deviation
- ✓ Critical Component Monitoring
- ✓ Overall Health Assessment

Solar

- ✓ Soiling Loss
- ✓ Performance Monitoring
- ✓ Under –Performance Studies
- ✓ Faulty Pyranometer Detection
- ✓ Inverter Efficiency
- ✓ Root Cause Analysis
- ✓ Losses Computation
- ✓ MFM Monitoring
- ✓ Module Temp Prediction

Visor Installation

Ability to capture data from 300 wind turbines

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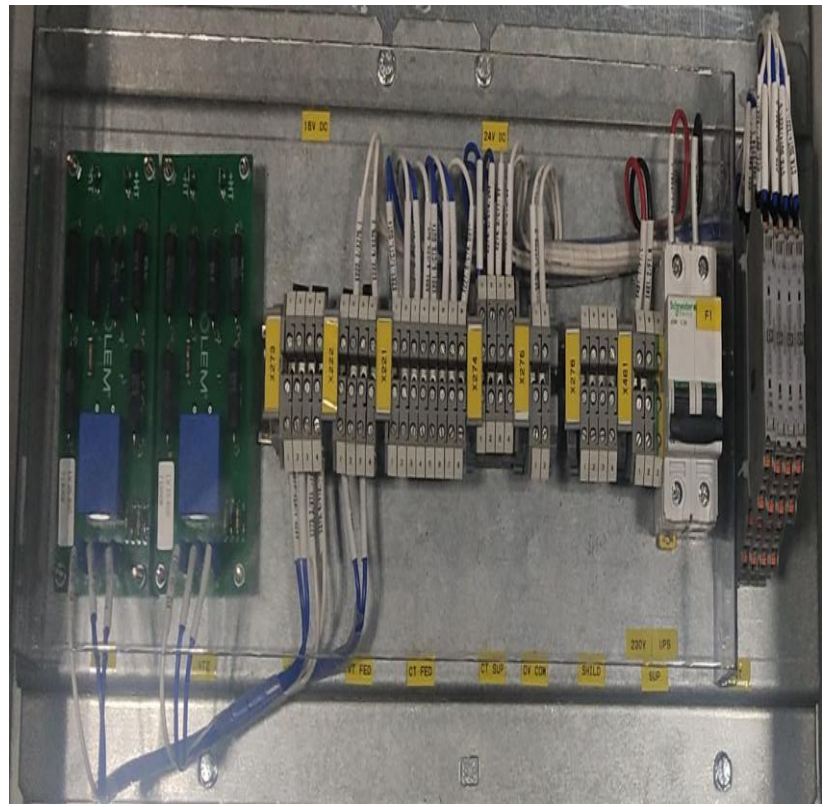

Sensor Installation

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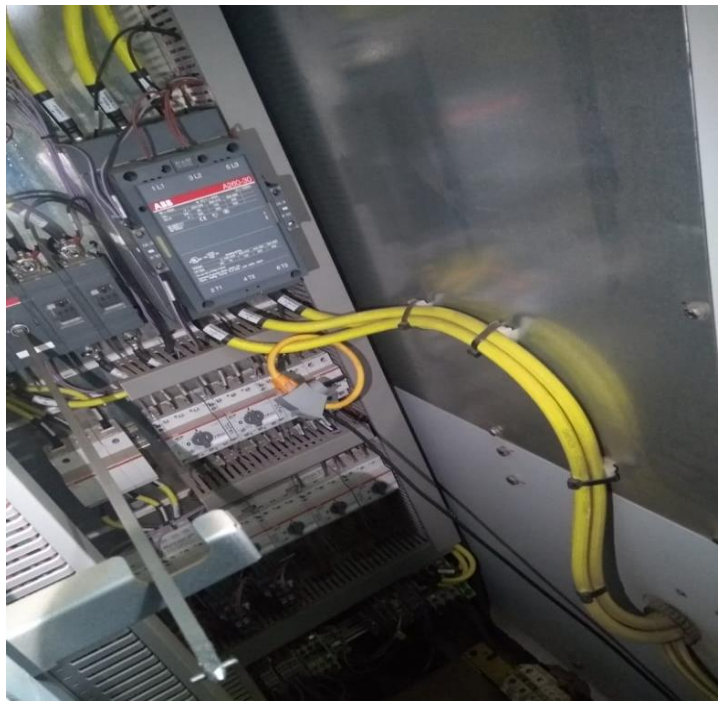
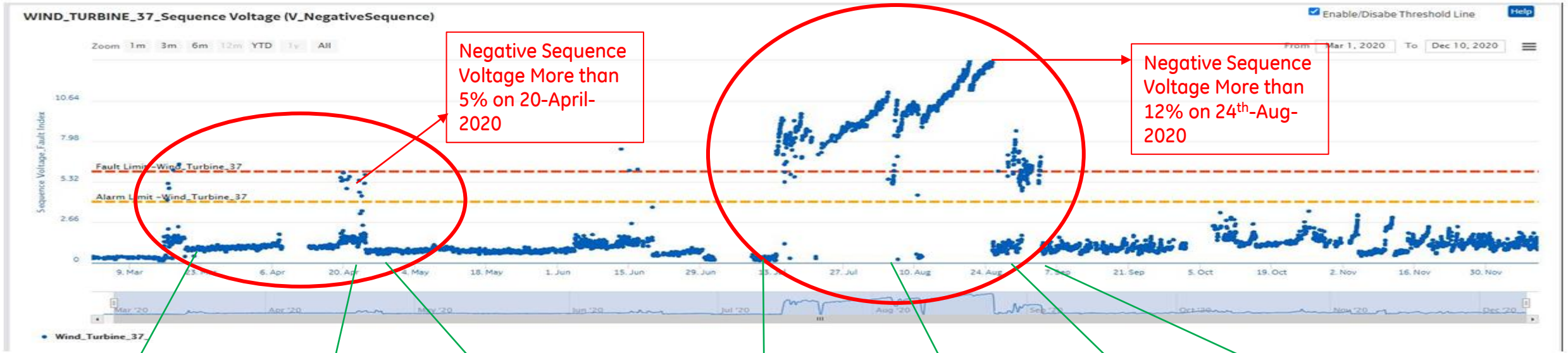
Ability to install sensors in all the rotating parts like Generators, Gearbox, Motors, and Bearings. The Image below shows the installation of sensors to detect electrical output in the rotor.



Results … Case Study

Early detection of Anomaly on Negative sequence voltage resulted in prevention of generation losses and a potential major failure



Negative Sequence Voltage More than 5% on 20-April-2020

Negative Sequence Voltage More than 12% on 24th-Aug-2020

Found Anomaly on TGP-37 first intimation given on 30th March

Found Anomaly on TGP-37 Second intimation given on 30th April

Got feedback from customer that Site team replaced the earthing carbon brush.

Found critical Anomaly on TGP-37 third intimation given on 16th July

Found the same anomaly continuing on the same Turbine and fourth intimation given on 4th August

24th August – 12% above the fault limit

Corrective action taken by customer and after 3rd Sep the turbines look normal and both running fine

Summary

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- ✓ End to end solution. Digitize Operations through IoT solutions. Dedicated IoT team to install the devices and ensure connectivity
- ✓ Orion - Industrial digital ecosystem bringing together machine OEM's, telco, cloud, customers and IoT providers
- ✓ Integrated approach - Identify & capture data, analyse & visualize the data, and provide actionable insights through AI based applications
- ✓ Increase productivity through big data analytics….improve returns, and drive sustainability
- ✓ Improve competitiveness through digital transformation

Thank You

Contact: Navraj Bhandari M: +91 9821 6788 41 T: +91 124 4982000 Email: blp@blp.co.in; navraj@blp.co.in

Video : https://www.youtube.com/watch?v=ZdSYaWYo0pM Website: www.blp.co.in; https://industry-ai.com/; https://industry-ai.com/covid-19/