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We maximize the operational efficiency of enterprises

Vernaio overview

Leadership

Henry Monzon
CEO & Managing Director
25+ years Tech Executive & Entrepreneur

Christian Paleani
Chief AI Scientist & Co-Founder
20+ years deep-tech AI Researcher & Entrepreneur

nocturne Acquisition Corporation

Katena

Luminous Computing

BITFURY

Qualcomm

LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

Lukas Lentner
Chief Technology Officer & Co-Founder

Robert Meissner
Head of Solutions & Co-Founder

At a Glance

Founded in 2012, innovators of distinct AI, result of over a decade in R&D

Team of ~25 with several top-caliber PhD's in physics and math

AI based on quantum-math, addresses *limitations* of neural-network AI

aivis AI identifies *fingerprints* prior to complex anomaly/issue happening; understands by using automated *root cause* analysis; and recommends AI *counter measures* to prevent its occurrence.

Vernaio AI solution is superior vs industry:

1- Ability to work with *raw unlabeled data*, engage with process/quality engineers and operators, without the need for data scientist intervention or expertise;

2- *Lower sensitivity* to live data set variations;

3- Commercial solution runs effectively on *lower-cost CPU's (vs GPU's)*;

4- *Fastest* commercial deployment vs any neural-network AI solution

Product Portfolio: (1) AI engine(s) *aivis & kayros*; and (2) end-to-end solution *Process Booster* (AI-as-a-Service, SaaS) powered by *aivis*

Proven product-market fit, with completed successful use-cases in multiple industries such as: Heated Tobacco Products, Steel, Paper, Oil/Gas, Food & Beverage, Printing. More coming

Process Booster launched December 2023, multiple customers engaged: *Philip Morris International, Heidelberg, Freudenberg, Siemens, Clarios, Evonik*

Reputable strategic investors: Price Waterhouse (PWC) and Voith Holdings

New CEO joins to scale up business globally, targets: *USA, Europe and Asia*

Distinct AI innovation in Self-Supervised learning

Overcoming the limitations of neural-networks

Requirements	Supervised learning	Unsupervised learning	Self-supervised learning
Unlabeled & unfiltered data [1]	✗	✓	✓
High explainability [2]	✗	✗	✓
Goal definition [3]	✓	✗	✓

[1] Must **not require prior injection of domain knowledge, nor data cleaning, filtering, labeling** or restructuring
[2] Must fully unveil all found patterns and relationships for full traceability & transparancy
[3] Must allow to set a specific goal

aivis® uses a novel approach* to **Self-Supervised Learning** leveraging **Contrastive Learning**

- powered by **Stochastic Differential Geometry.**

Process Booster, powered by aivis AI

Identifies fingerprints, performs automated root cause analysis, and generates AI countermeasures

Process Booster
End-to-End SaaS Solution

E2E SAAS SOLUTION

powered by AI engine

aivis®

aivis ®

Distinct AI engine

*Vernaio's AI identifies (**fingerprints**, conditions), understands (**automated** root cause analysis, explainability), and solves (**AI countermeasures**) the **most complex** issues. And we can do it the **fastest**.*

Bring your most complex unresolved issues

Exceptionally low effort to get started, valuable insights and results within days to a few weeks

STEP 1

Define Your Goal

Specify the metric(s) or KPI(s), identify and understand root-cause of event/anomaly to prevent

STEP 2

Time-Series Data

Access to your raw unlabeled historical process data, in CSV or Parquet format

STEP 3

Results & Insights

Vernaio AI generates key insights, and AI countermeasures

Fastest PoV *, automated root cause analysis and AI countermeasures within days! **

***PoV = Proof of Value; ** With compliance to simple qualification guidelines**

Proven Use Cases, Examples

Proven market validation on the most complex issues, across multiple industry sectors

Industry	Use Case Complex Issue	Cost Savings/€
Heated Tobacco Product	Moisture & grammage quality inconsistencies	140M
Paper	Sheet break	Up to 979K per machine
Steel	Slopping	9M
Food & Beverage	Tailbacks and jams in a bottle filling line	1M+ per line
Vacuum Pump Production	Unoptimized production planning.	50% reduction in production planning time, 10% increase in productivity
Carbon Fiber	Reduce quality variations	75% reduction

*This use case was powered by Vernaio kayros AI, all other use cases listed powered by aivis AI

Reference – Use case

PROCESS INDUSTRY

Control quality parameters in heated tobacco industry

About our customer

Market leader in its sector, scaling up their operations due to market demand (double digit CAGR growth).

Vernaio's team closely collaborated with customer's data science team, and process/operator engineers.

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The problem

During the conversion of tobacco leaves into heated tobacco products, various quality metrics were not consistently met by the customer's own efforts.
Specifically, moisture, thickness and grammage were not within their specified production limits. This led to a significant impact (€€€) on their operations overall and downstream processes as they scale up their operations.

Process Booster solved the issues. It enabled significant improvements ensuring that all quality parameters were consistently met.

Our solution

Process Booster was able to suggest optimal settings during the production to decrease waste from 4% to 1%.

Our impact

€30m+ in cost savings*

€110m+ extra margin*

* Assuming 50% of reduced waste is sellable, secondary process has 20% of cost of primary process. Rollout on all lines.

Reference – Use case

PROCESS INDUSTRY

Preventing sheet breaks in papermaking (1 of 2)

About our partner

The Voith Group is a global market leader in key industry sectors: turbo, hydro, and paper making machines. Voith sets global standards energy, paper, raw materials, transport & automotive.

The problem

Disruptions in paper manufacturing are referred to as "***sheet breaks***". This is a known problem that Voith and other companies have been trying to solve for decades. The disruptions occur at any time and without warning. Once a disruption takes place, a series of cleaning and retreading procedures were necessary before production could be resumed. They estimated cost of sheet breaks and fiber losses is 1,125,000€ per machine per year (=~1.5K cost per occurrence x 3 times per day on avg x 250 operating days per year).

Vernaio aivis AI engine solved this complex issue.

Up to 87% costs per machine are reduced with aivis AI, for an estimated savings of up to €979K per machine per year.

Our solution

aivis AI engine decreased sheet breaks by up to **87% per day per machine**, within **60 min prior** to incident occurring. And on average 55% reduction per day.

Our impact

Estimated cost savings up to €979K per machine per year

Reference – Use case

PROCESS INDUSTRY

Preventing sheet breaks in papermaking (2 of 2)

About our partner

The Voith Group is a global market leader in key industry sectors: turbo, hydro, and paper making machines. Voith sets global standards in selected markets: energy, paper, raw materials, transport & automotive.

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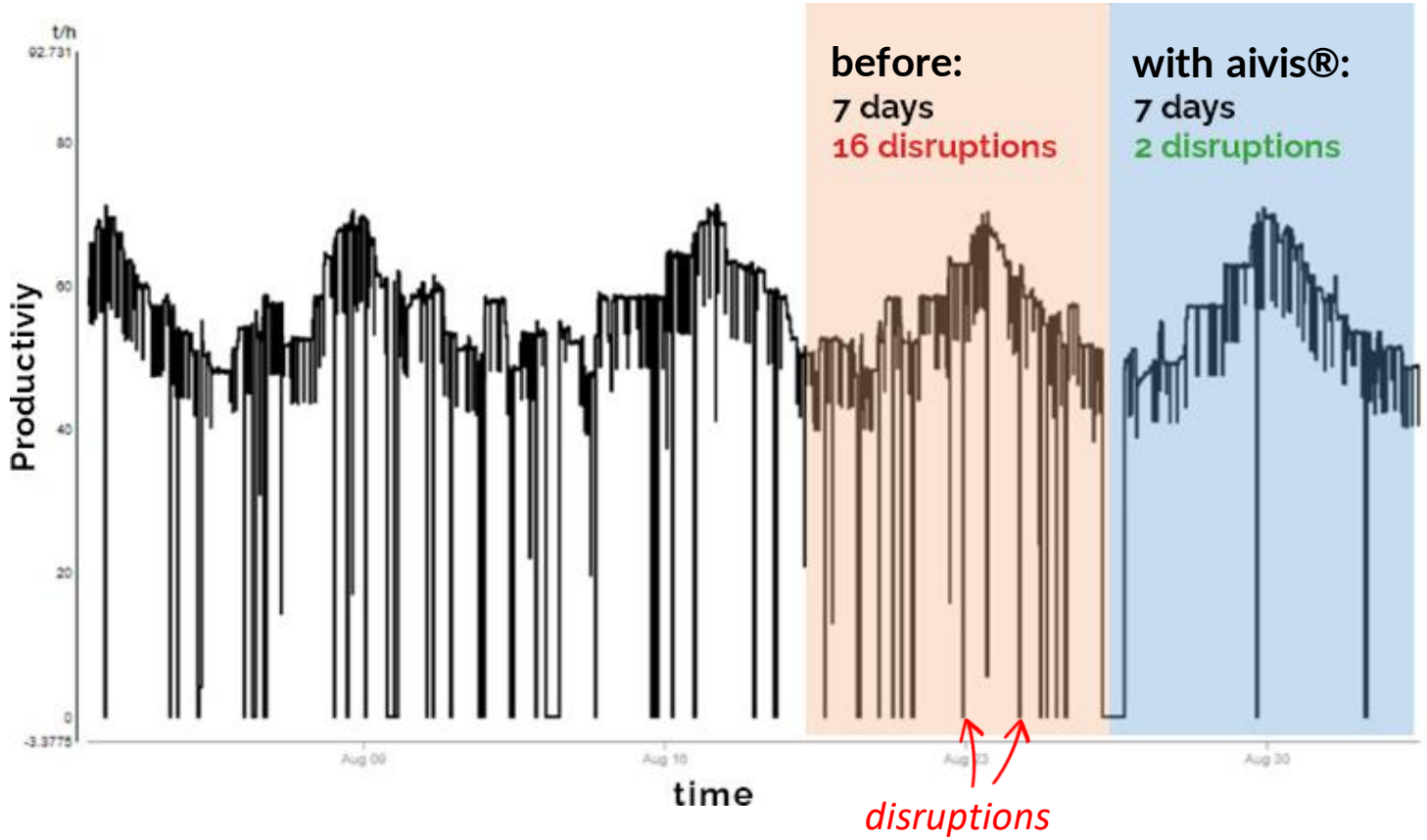
Successfully preventing 87% of paper breaks!

Each vertical line shows a sudden drop in productivity, indicating a paper break. With aivis®, previously unknown relationships and root causes were discovered out of thousands of signals which immediately enabled a **disruption reduction of 87%!**

Produced paper volume over time



Reference – Use case

PROCESS INDUSTRY

Avoiding slopping in steelmaking

About our customer

One of Europe's largest steel makers, producing a wide range of high-quality quality strip steel products for demanding markets such as construction, automotive, and machines.

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The problem

In basic oxygen steelmaking (BOS), the critical problem of slopping occurs when the foaming slag exceeds the height of the vessel and overflows. This causes metal losses, process disruptions, environmental pollution, and poses a threat to employees' safety. The factors that lead to slopping are quite complex, even for experienced operators.

With **Process Booster**, we enabled our customers to be proactive (vs reactive), utilizing our AI counter measures to prevent slopping events going forward. Vernaio was not only able to solve the customer's problem, but a major industry issue of slopping.

Our solution

Process Booster increased ability to proactively identify and resolve slopping events by **54%**

Our impact

€9m in cost savings*

* Assuming rollout on 5 lines, production slowdown for countermeasure is 0.8% and 1.5t steel is lost during slopping event

Reference – Use case

PROCESS INDUSTRY

Avoiding disruptions in a bottle-filling line

About our customer

Our customer is an internationally active manufacturer of filling and packaging systems for the beverage, food, and non-food industries. The company employs around 5000 people and generates annual sales of more than 1.2 billion euros.

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The problem

Our customer had recurring lead machine-related problems in a bottle-filling plant. They did not know what caused these disruptions and how to fix them. Therefore, the goal was to analyze the raw production data of a bottling plant to:

1. Identify the TOP 5 malfunctioning machines with the TOP 5 malfunction causes for the lead machine
2. Show the influencing variables on the malfunctions

Our solution

Effective prediction and monitoring of disruptions with timely countermeasures.

Identifying the actual causes of failure: intrinsic failure at the inspector or at the washer due to overload or overhanging bottles.

Our impact

Immediate impact on production

€1M of potential savings per bottle filling line per year*

* Assuming a reduction from 12% to 8% in faults (30% decrease) with a production capacity of 48k bottles per hour and 0.1€ cost per unproduced bottle.

Reference – Use case

PRODUCTION PLANNING

Improving on-time delivery in complex production planning

About our customer

The German company Vacom is one of Europe‘s leading component and measurement technology suppliers for vacuum applications. Their target markets include high-tech fields of analytics, optics and semiconductors.

The problem

Order planning must take into account a large number of variables: capacities, qualifications, machine setup times, and more. This process is time-consuming and error-prone. In addition, these variables are dynamic and can change constantly.

Our AI engine Kayros makes production planning effortless.

Post preliminary planning with SAP tools by the customer, Kayros automatically optimized the entire detailed production plan. Thus, Kayros cognitive planning* is ultimately responsible for machine allocation of the individual production orders.

Our solution

Kayros calculates a production plan including 28.000 work steps on 700 machines on a usual PC in less than 1 hour.

Kayros was able to reduce production planning time by **50%**.

Our impact

Immediate impact on production.

> 10% increase of productivity due to better planning.

*Cognitive planning refers to the usage of AI powered production planning

Reference – Use case

DISCRETE MANUFACTURING

Reduction of quality fluctuations in composite parts

About our customer

Voith Composites specializes in carbon fiber-reinforced composites and has been recognized for innovation, winning the JEC Innovation Award for technologies like their automated Voith Roving Applicator.

The problem

During the development of a new and complex carbon fiber composite product which is the first of its kind, high quality fluctuations occurred between the different versions during production, which stood in the way of market approval for the product.

The challenge was to identify the causes of the quality fluctuations from a large number of process parameters including still hidden correlations and explain them in such a way that fluctuations could be reduced to a minimum, or at least below the threshold required for market approval.

Our solution

"*Vernaio's analysis has helped us to reduce the variation in quality characteristics of composite structural components* ***by 75%*** *through the optimization of manufacturing parameters.*"

Carolin Cichosz, CTO Voith Composites

Our impact

Massively accelerated time to market.