



Störungsvorhersage und Qualitätssicherung mittels KI



DI Clemens Heistracher
Data Scientist

Establishing **data-driven** **decision-making** as the new way to work.

We strongly believe that **data-driven decision-making** is the best way to **optimize work processes and improve sustainability**. We empower companies to **make better decisions based on data** and therefore create **a good impact** for our customers, ourselves and the environment.

We enable companies to **make data actionable** and **take data-driven decisions**

craftworks excels at **leveraging and combining** various data sources with the goal to **provide data-driven insights** by developing **AI empowered solutions** on top.

How we ensure **reliable success** :



Establish an **actionable Data Infrastructure** connected to all relevant data sources.



Use **data engineering** and **AI** to gain valuable insights based on the collected data.



Draw data-driven conclusions using **customized dashboards**.



CONSULTING AND (CO-)DEVELOPMENT

We turn every collaboration into a success story

We take customer satisfaction seriously. We deliver on our commitment to provide **outstanding service** to our partners & customers.

Verbund

PORSCHE
INFORMATIK

blum

Post

SPRINGER®

ANDRITZ

Miba

Audi

voestalpine
ONE STEP AHEAD.

Fill

MAHLE

ÖBB

ENGEL

ALFA ROMEO

WIEN ENERGIE

Ottobock

We are craftworks

40+ experts

with backgrounds in mathematics, biomedical and natural sciences, aerospace, mechanical and automotive engineering, finance, energy, and more.

Founded in 2014, owner-managed and independent, based in Vienna and ISO 27001 certified.



Success Stories



FAILURE FORECASTING FOR DISTRICT HEATING SYSTEMS

Preventing downtime with Artificial Intelligence



Challenge

Wien Energie operates one of the biggest district heating systems in the EU including several thousand converter stations. Downtimes occur on a daily basis.

How can failures be predicted to accordingly plan maintenance routes?

Solution

We use historical sensor data such as temperature and pressure to determine anomalies and predict risk for downtimes with a forecast of **7 days to 1 month**.

Our **Model A**, a recurrent neural network (LSTM), takes the defined time span to predict whether a disruption will occur. Our **Model B**, a gradient boosting tree ensemble, predicts the type of fault in terms of warning priority.

Benefits

AUTONOMOUS

87% automatic detection alerting

SAVINGS

Improved resource planning and efficiency

DOWNTIME PREVENTION

Forecasts between 7 days and 1 month



Improved Acoustic Emissions Testing with Neural Networks

Increase reliability and speed of acoustic emission testing through the use of Neural Networks.

Challenge

The customer relies on expert evaluation to assess high-pressure tank safety using acoustic emissions testing. This manual process was **time-consuming**, **prone to errors**, and **lacked automation**. Additionally, they faced challenges in identifying key factors for assessing tank integrity.

Solution

We leveraged Machine Learning to **autonomously evaluate** acoustic testing results, ensuring efficient and accurate analysis. We developed a collection of **Neural Networks** using Python and Keras for data processing. Additionally, we created a web application to facilitate test data uploads, incorporate authentication features, and provide a summary of the model's outcomes.

Visual Inspection

Wood processing industry

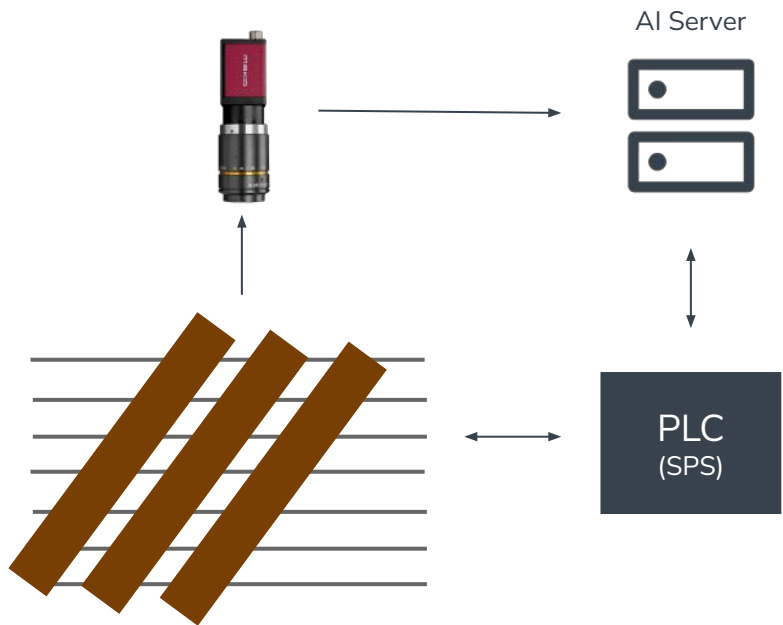
Challenge

Since wood is a natural material, no **two boards are alike**. During processing, issues frequently arise that require stopping the entire production line—or individual plant components.

Problems such as **overlapping, misaligned, or damaged boards** are difficult to reliably detect with traditional sensors.



Technical Implementation



Approach

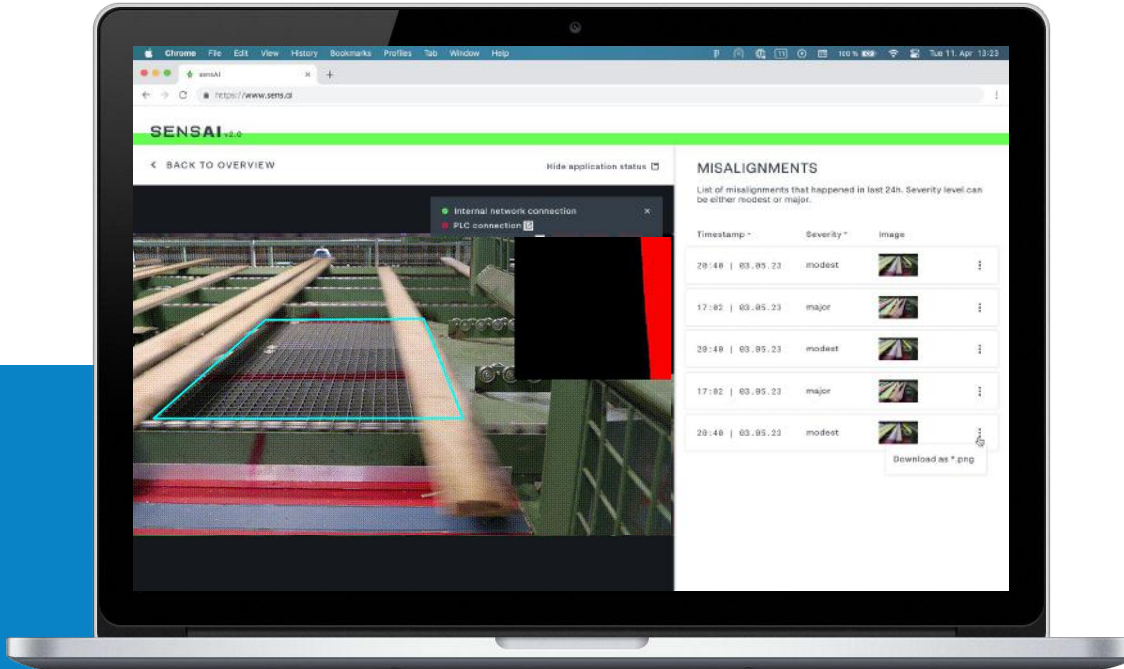
By adding a camera-based intelligent visual sensor, machines **are enabled to see**.

Machine data is combined with **visually captured features** (Instance Segmentation and Object Tracking) and returned as **control parameters to the PLC** (Programmable Logic Controller).



Advantages over traditional sensor technology

- End 2 End in 20 - 60ms (use case dependent)
 - From image capturing to PLC command
- Fail Safe & Robust
- Constant Results & Improvements (Retraining)
- Traceability & Explainability



Results

Users can **monitor**, **configure**, and visually **validate** the results of the implemented solution in real-time.

By recording machine and image data, users can **replay past events**.

Available modules

- Virtual light barrier
- Alignment detection and correction
- Separation and troubleshooting

Challenge

The indication and estimation if an advanced ML System brings actual business value is not always straightforward. Especially for visual inspection/quality use cases that maybe also require hardware etc.

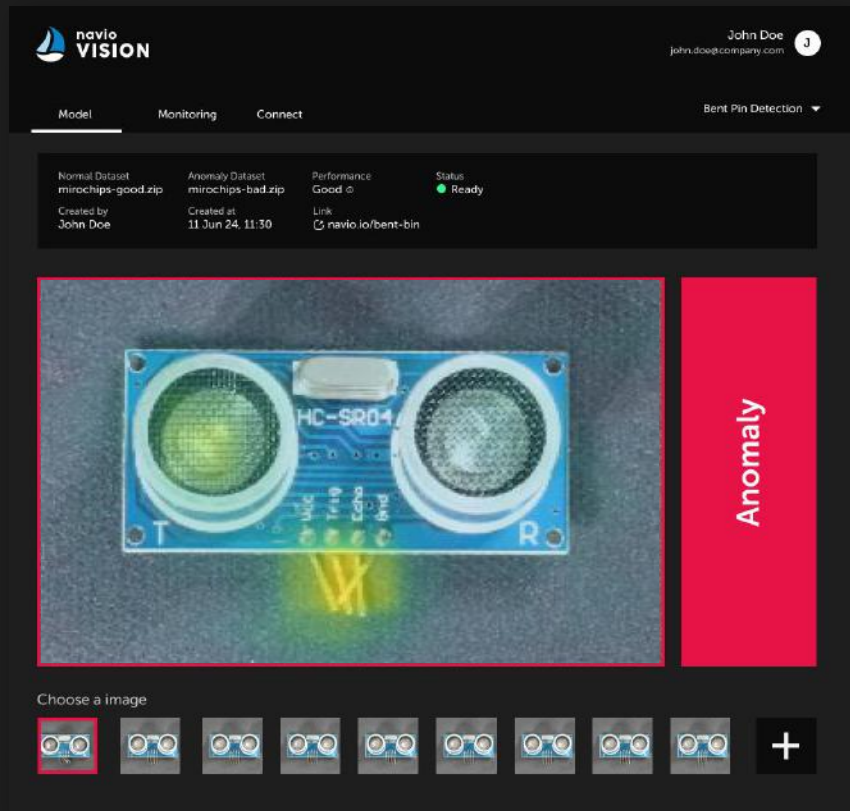
Initial estimates usually take weeks, including data collection, data labeling, modeling, etc.

Solution

craftworks developed a automatic anomaly detection app, that (1) reads ok/nok data, (2) automatically trains a use-case specific anomaly detection model on the data and (3) provides results and the possibility to use the trained model directly.

This reduces the time to get a first estimate from weeks to days and in some cases the model performance is already sufficient to be used in a PoC.

craftworks.ai/products/navio-vision





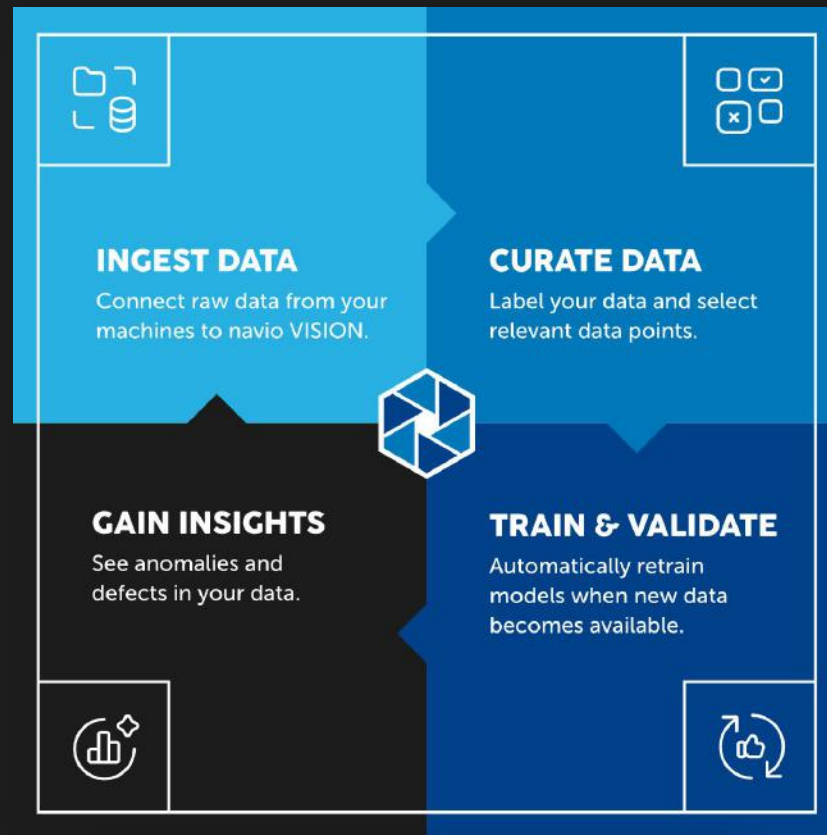
navio VISION



Why?

- **AI-Powered Quality Control:** navio VISION, built on our navio MLOps platform, simplifies industrial quality control with AI-driven visual anomaly detection.
- **Easy Integration:** Seamlessly integrates with your existing data sources.
- **Customizable Learning:** Label images to curate data, enabling the model to learn your specific production process's defects and acceptable variations.
- **Real-Time Anomaly Detection:** Analyzes new images in real time, providing instant alerts about potential quality issues.
- **Minimize Waste, Maximize Efficiency:** Proactive quality control minimizes waste, optimizes production, and drives manufacturing excellence.

craftworks.ai/products/navio-vision





navio
VISION

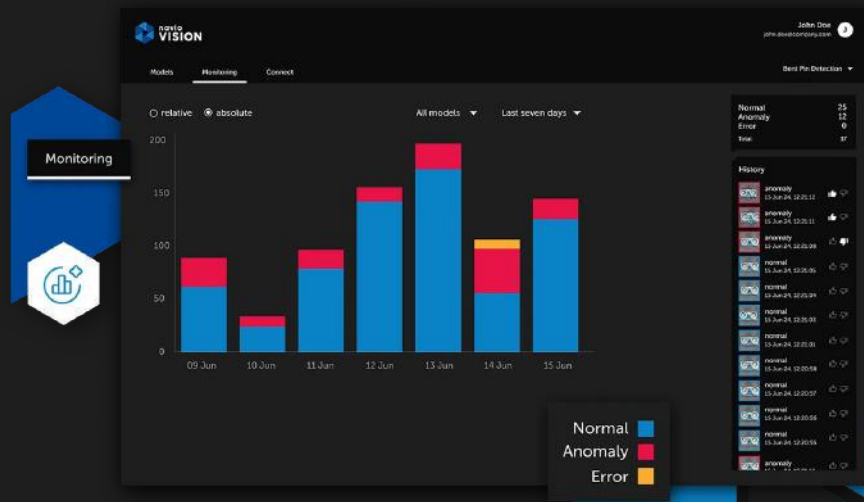


Challenge

Metal processing struggles with inconsistent quality due to reliance on manual inspection, **leading to high scrap rates, costly downtime, and labor-intensive processes.** Limited data insights hinder process optimization and productivity.

Solution

navio VISION automates quality control by analyzing images in real-time. **This enables early defect detection, predictive maintenance, and reduced labor costs.** Comprehensive data insights drive continuous improvement and optimize production efficiency.



Recent Developments

AI Agents?

- What are AI Agents?
- Where can we use them?
- Where should we use them?

Agents are tools that **perceive their environment and can **interact** with it.**

Many tools **already in production** are agents

Recent developments in **Large Language Models** made a new type of **AI Agents** feasible



AI Agents use **LLMs**
for decision making



AI Agents work well on
text (and images)



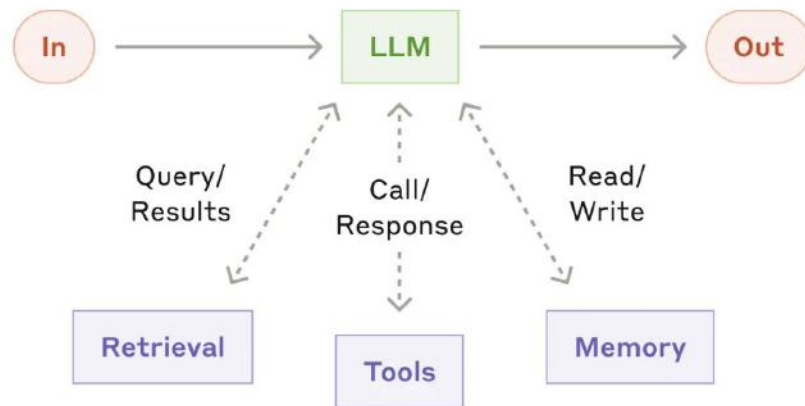
Most AI Agents are
actually **predefined**
workflows

What is an AI Agent?

New AI Agents are **LLMs + Tool Calling**

Challenges

- Hallucinations
- How to deal with numerical problems?
- Autonomy vs Control?
- Systematic Evaluation?



Findings for **Maintenance** and **Quality**

- AI Agents work well for **simple** text or image based **tasks**.
- AI Agents can model data **without supervision**, but results are **inconsistent**.
- AI Agents work best with **large LLMs**, which are costly.
- Control requires work:
 - **Agent Tools** give control, but need to be implemented
 - **Predefined workflows** increase control but reduce flexibility

→ Currently, AI Agents (LLMs) can be used as components in larger frameworks



Successful growth is a decision. Driven by data.



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