

The Real-Time Digital Twin:

Object Recognition,
scan-free Logistics,
Realtime Location & Recognition
System (RTL&RS)

Introductory presentation

Real-Time Digital Twin

Track and recognize anything what is happening



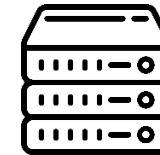
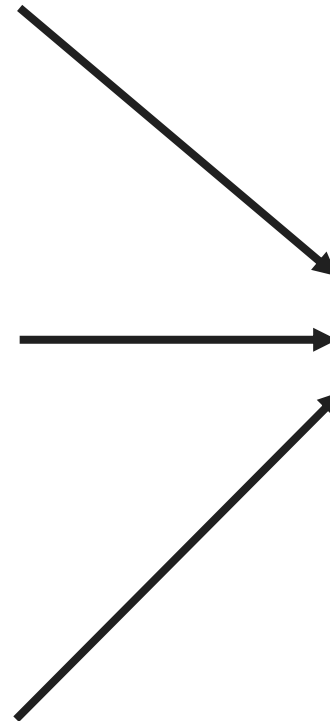
Recognition units mounted on the ceiling detecting any trained objects and their movements



Forklift or AMR with barcode scan camera for initial pallet identification

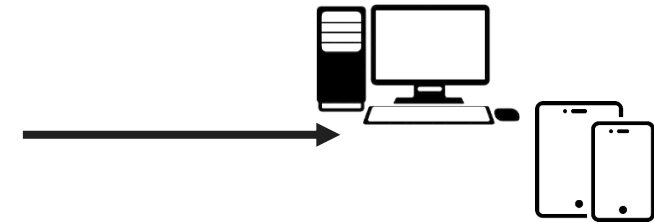


AI recognition & measurement gate and workplace for identification and measurement of products



W2MO Camera Server

- Consolidation of data
 - Matching dynamic data with infrastructure
- **Tracking of any trained objects movements**



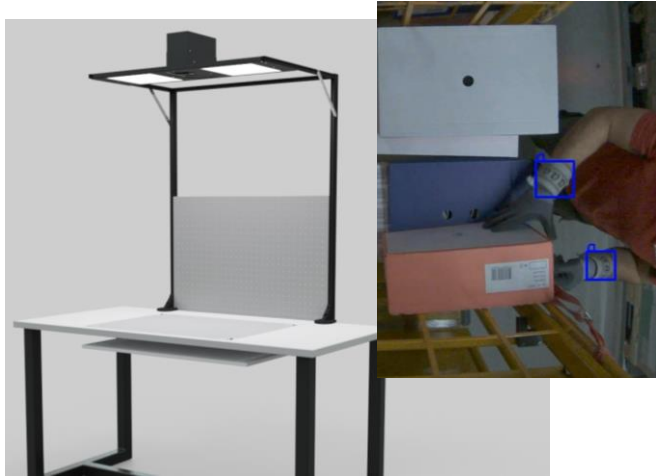
Interfaces

- Integration with ERP or WMS (e.g. SAP)

Digital devices

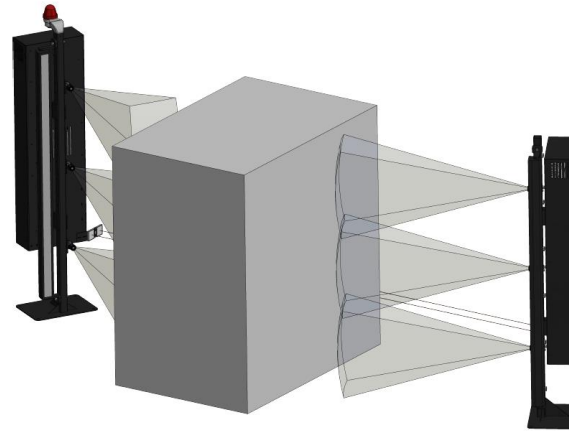
- Use of the digital twin via a browser interface
- GenAI for simple and fast evaluations

Agenda



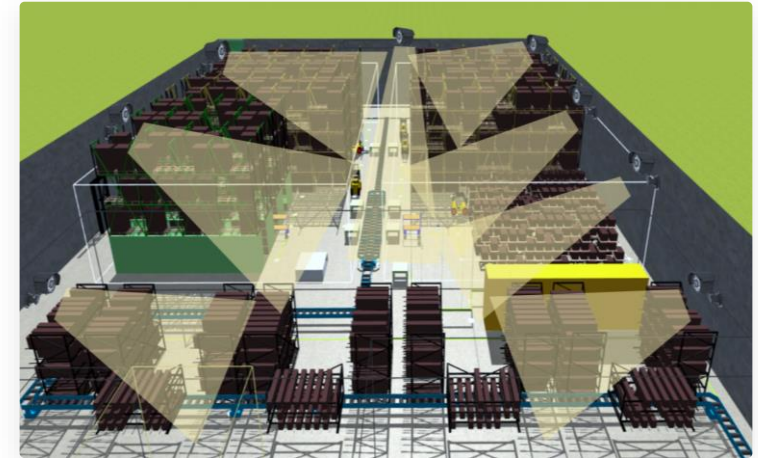
Product identification

- Measurement of master data
- 100% control – recognition of objects by their appearance
- Custom Implementations



AI recognition&measurement gate

- Reading barcodes and 2-D codes while driving through
- Cross-check via optical detection of the containers and other features



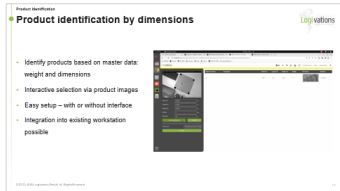
RTLS&RS

- Real-time tracking of goods and vehicles (any trained objects)
- Scan-free booking

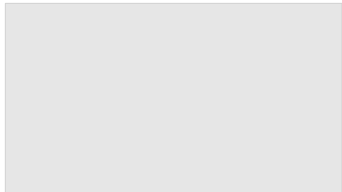
W2MO Product identification



Dimensional measurement of packages and pallets



Reading codes



Text Recognition



Recognition based on appearance, Counting



Scan-free picking



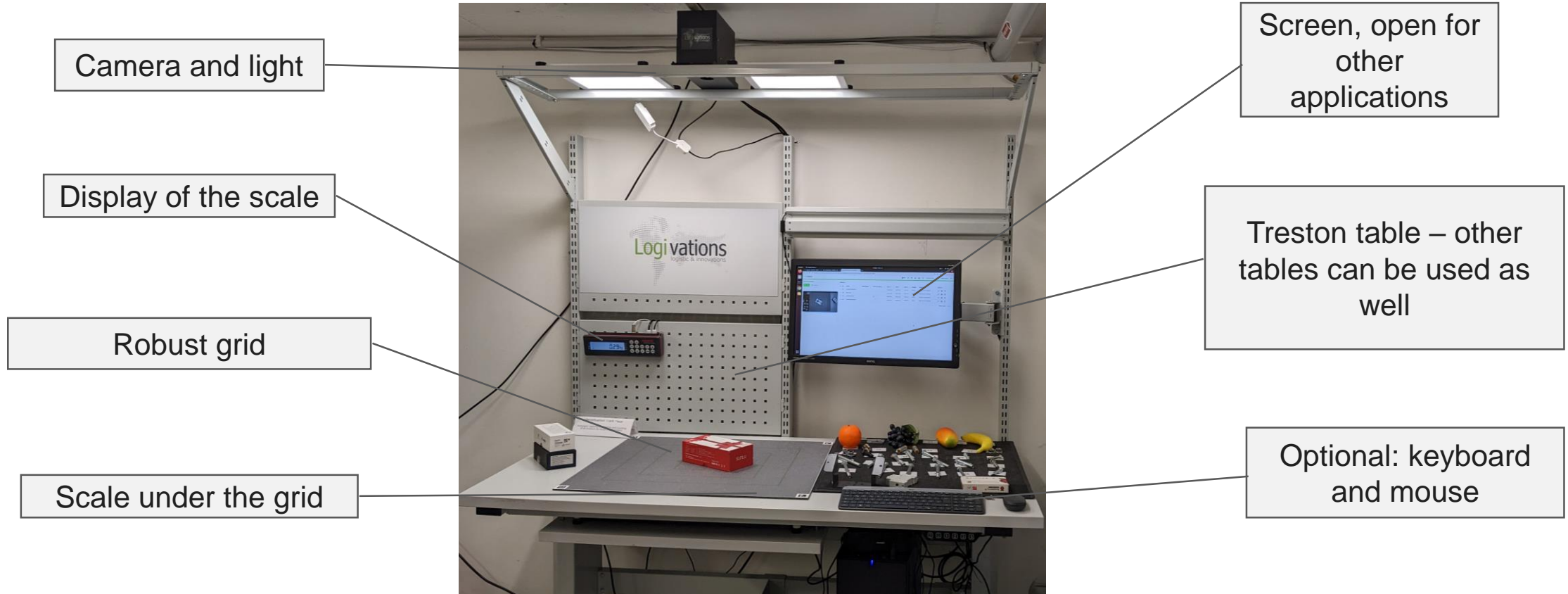
Dimension Measurement

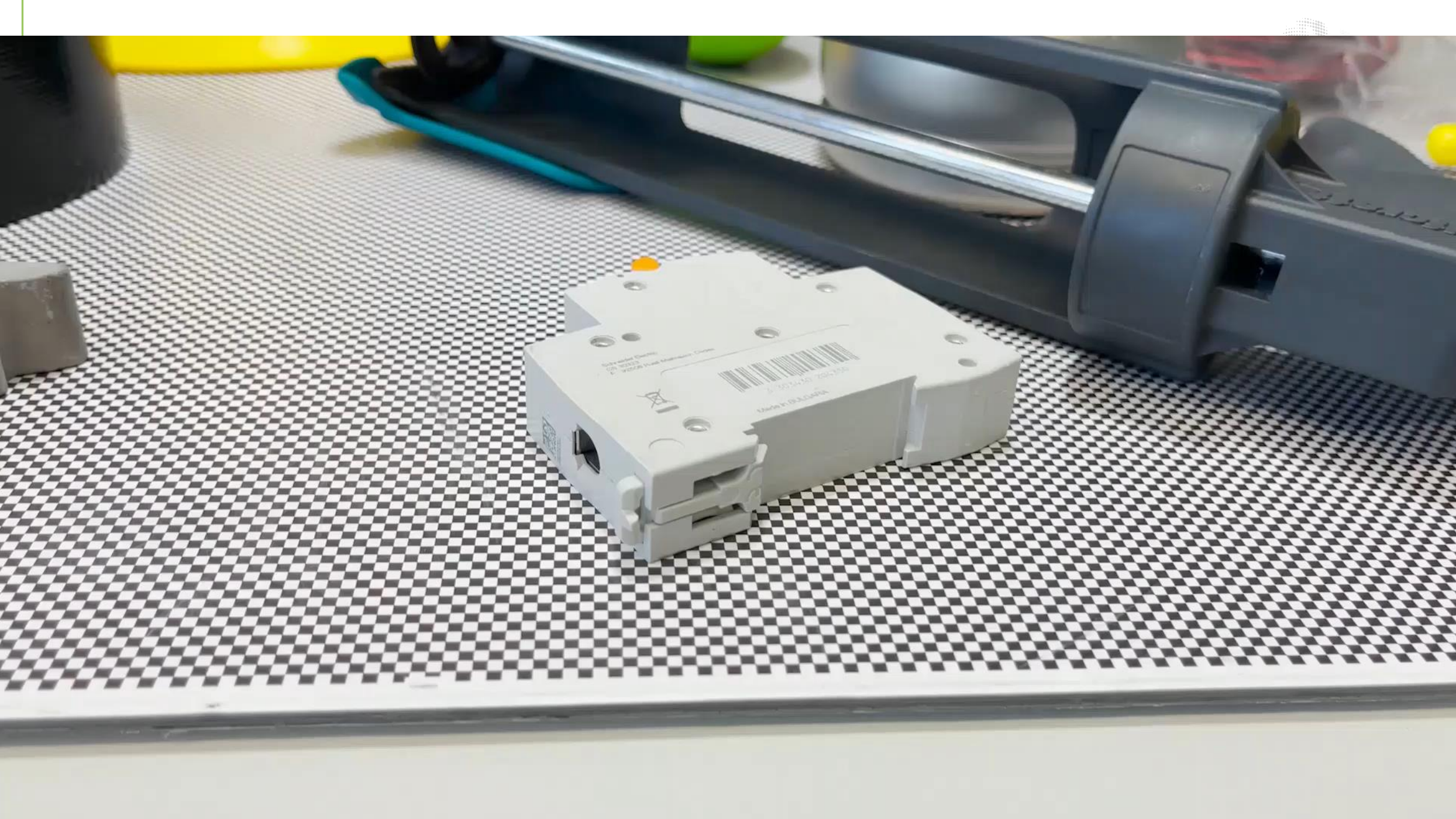
AI based master data measurements

- Measurement of dimensions and weight
- Integration in existing workstation
- Measurement of non-regular shaped products
- Saving product images
- Reading of barcodes/QR codes - directly integrated
- Optional: automatic counting, classification, detection



Exemplary configuration of a W2MO Goods Recognition, Counting & Measurement workplace





Solo e vendita Separata
CIN 950222
P. 950222 P. 950222 P. 950222

Barcode

Made in BELGIUM

Dimension Measurement

Accuracy and product sizes in standard configuration

Other sizes / precisions on request

Max. product height	200mm	300mm	400mm	500mm	600mm
Length	40mm – 580mm	40mm – 500mm	40mm – 420mm	40mm – 360mm	40mm – 300mm
Width	40mm – 460mm	40mm – 400mm	40mm – 320mm	40mm – 240mm	40mm – 180mm
Min. height	40mm				
Accuracy dimensions	3mm – 5mm				
Max. weight	32kg /60kg				
Accuracy weight	1g/2g				

Dimension Measurement

Possible Interfaces to the customer system

1. Independent solution

- Web application W2MO
- Local MySQL data base
- .csv export of product table
- .zip download of product images
- Independent of any existing infrastructure
- Particularly suitable for pilot projects

2. Simulated keyboard

- The identification workstation is connected to an existing PC as a keyboard
- Measured sizes can be passed on automatically or via a USB button
- No effort for complex IT interface
- The data processing workflow remains in place

3. Completely integrated solution

- Automated interface to ERP/WMS System
- SAP Connector
- Restful API
- Flexible solutions – will be adapted to customer needs

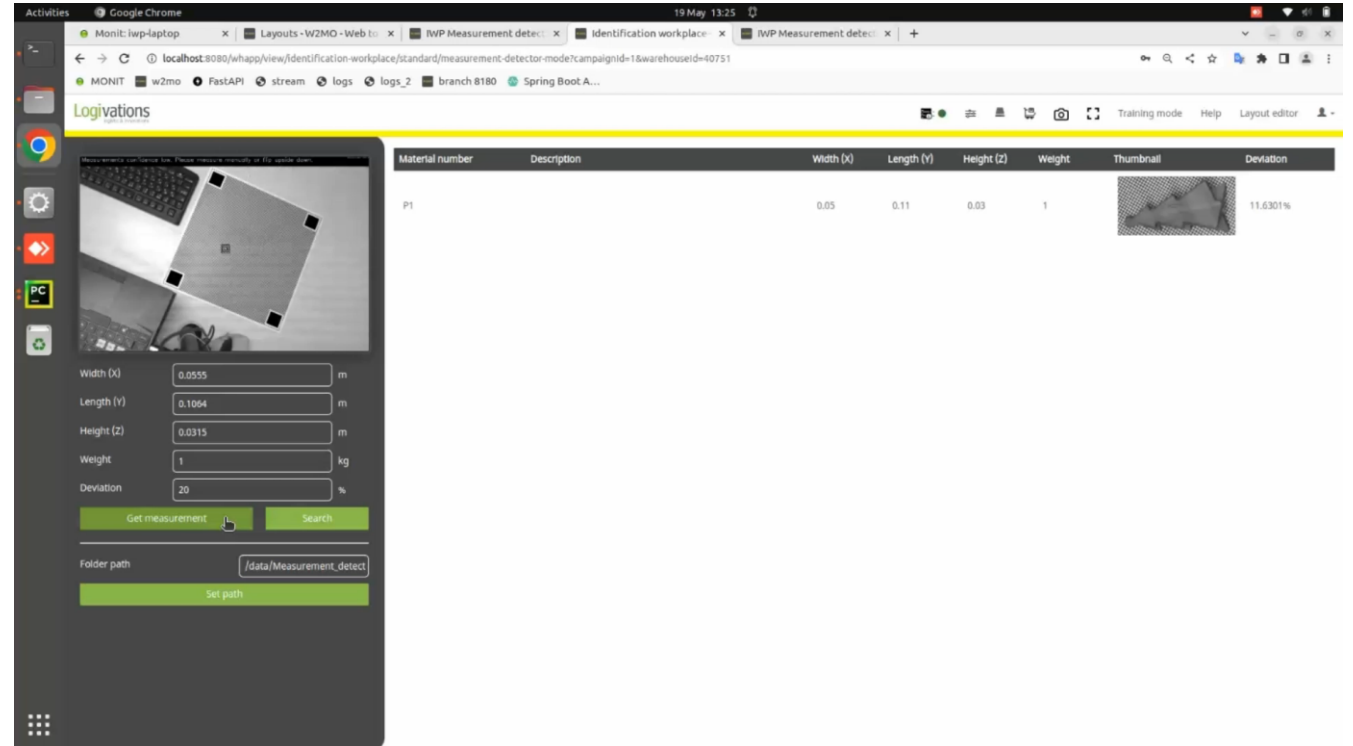
Dimension Measurement

Different options



Product identification by dimensions

- Identify products based on master data: weight and dimensions
- Interactive selection via product images
- Easy setup – with or without interface
- Integration into existing workstation possible

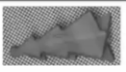


The screenshot displays the Logivations web application interface. On the left, a measurement tool is active, showing a camera view of a laptop with a bounding box. Below the camera view, input fields are filled with the following values:

Parameter	Value	Unit
Width (X)	0.0555	m
Length (Y)	0.1054	m
Height (Z)	0.0315	m
Weight	1	kg
Deviation	20	%

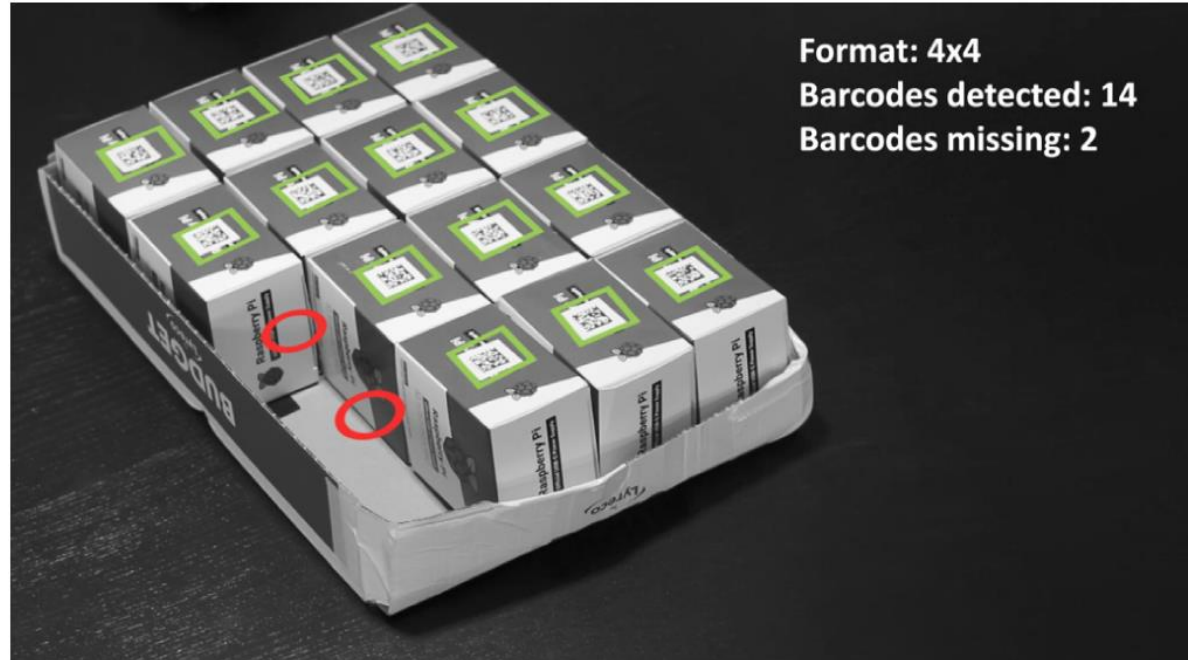
Buttons for "Get measurement" and "Search" are visible. Below the input fields, a "Folder path" field contains "/data/Measurement_detect" and a "Set path" button.

On the right, a table displays the identified product data:

Material number	Description	Width (X)	Length (Y)	Height (Z)	Weight	Thumbnail	Deviation
P1		0.05	0.11	0.03	1		11.6301%

Product identification by reading codes

- Reading 1D and 2D barcodes
- Data matrix codes
- QR codes
- Combination of code reading with other applications
 - Control of the packing process including 3D packing proposal
 - Pattern recognition
 - Cross-checks whether all labels have been read correctly



Reading codes - control of the packing process






Overview

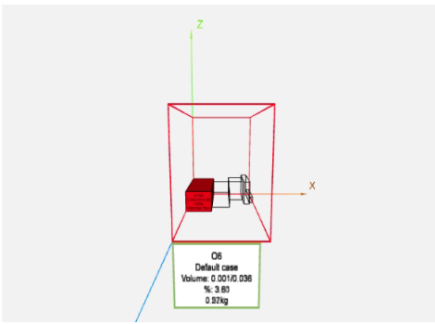
- Reading barcodes/QR Codes/Data Matrix Codes
- Recognition of several codes at the same time
- Recognition of products based on their appearance after a simple teach-in process
- Using a pre-computed packing scheme
- Video documentation of the packing process

Logivations Order ID = 6 Case type name = Default case

Case Pack status: [Icons]

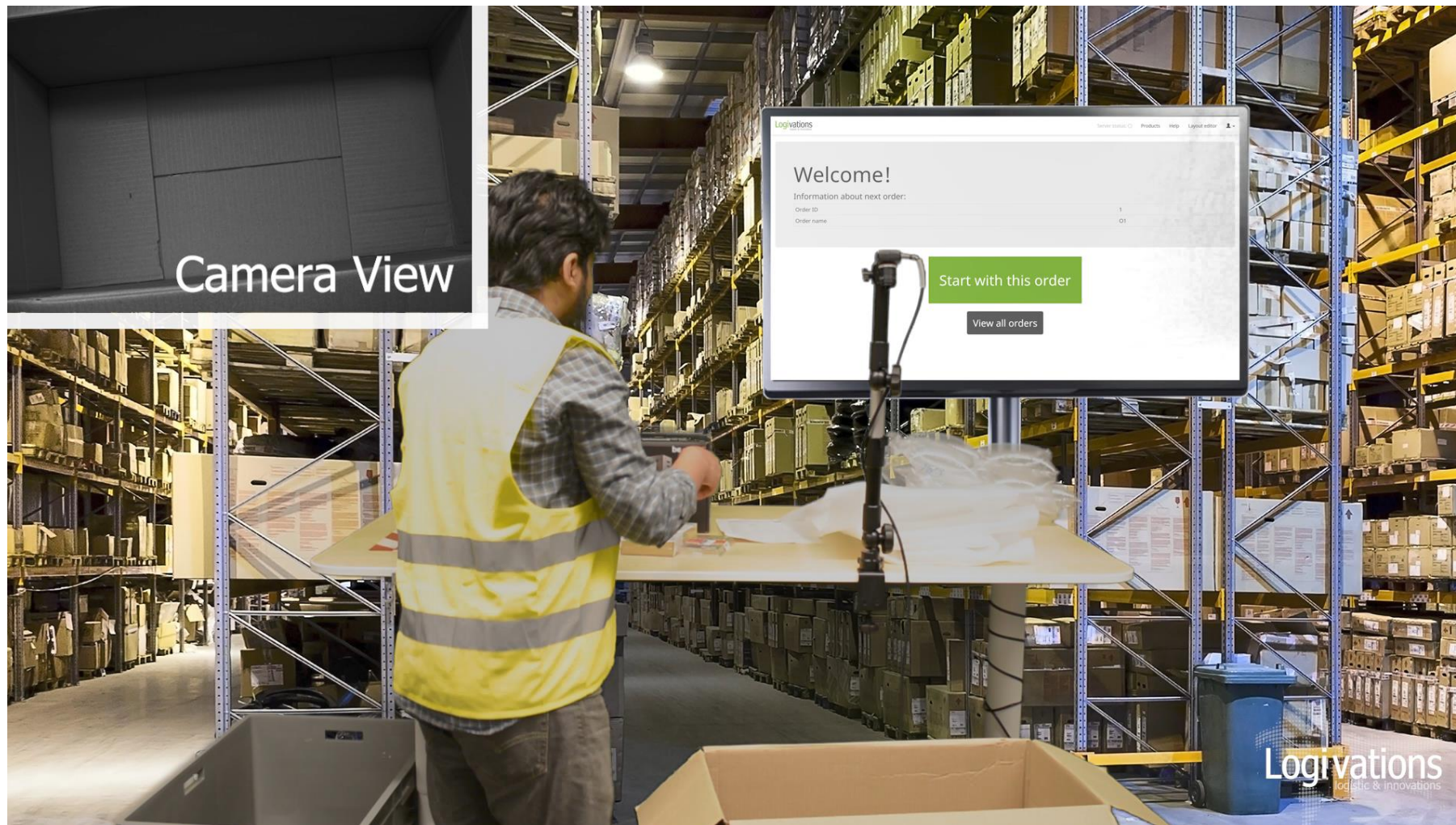
Training mode Help Layout editor

Products to pack							Already packed						
#	Product name	Product image	Product description	Size of product	Tracked object bin	Number of Items	#	Product name	Product image	Product description	Size of product	Tracked object bin	Number of Items
1	Unify Cloud Key			0.08 x 0.16 x 0.05 [m]		1	1	3d Pen			0.11 x 0.20 x 0.06 [m]		1
2	Goldmais			0.07 x 0.08 x 0.07 [m]		1	<div style="display: flex; gap: 10px;"> Confirm order Order video Orders </div>						
3	Raspberry Pi Cam			0.08 x 0.13 x 0.03 [m]		1							
4	Kartoffelstampfer			0.02 x 0.11 x 0.02 [m]		1							



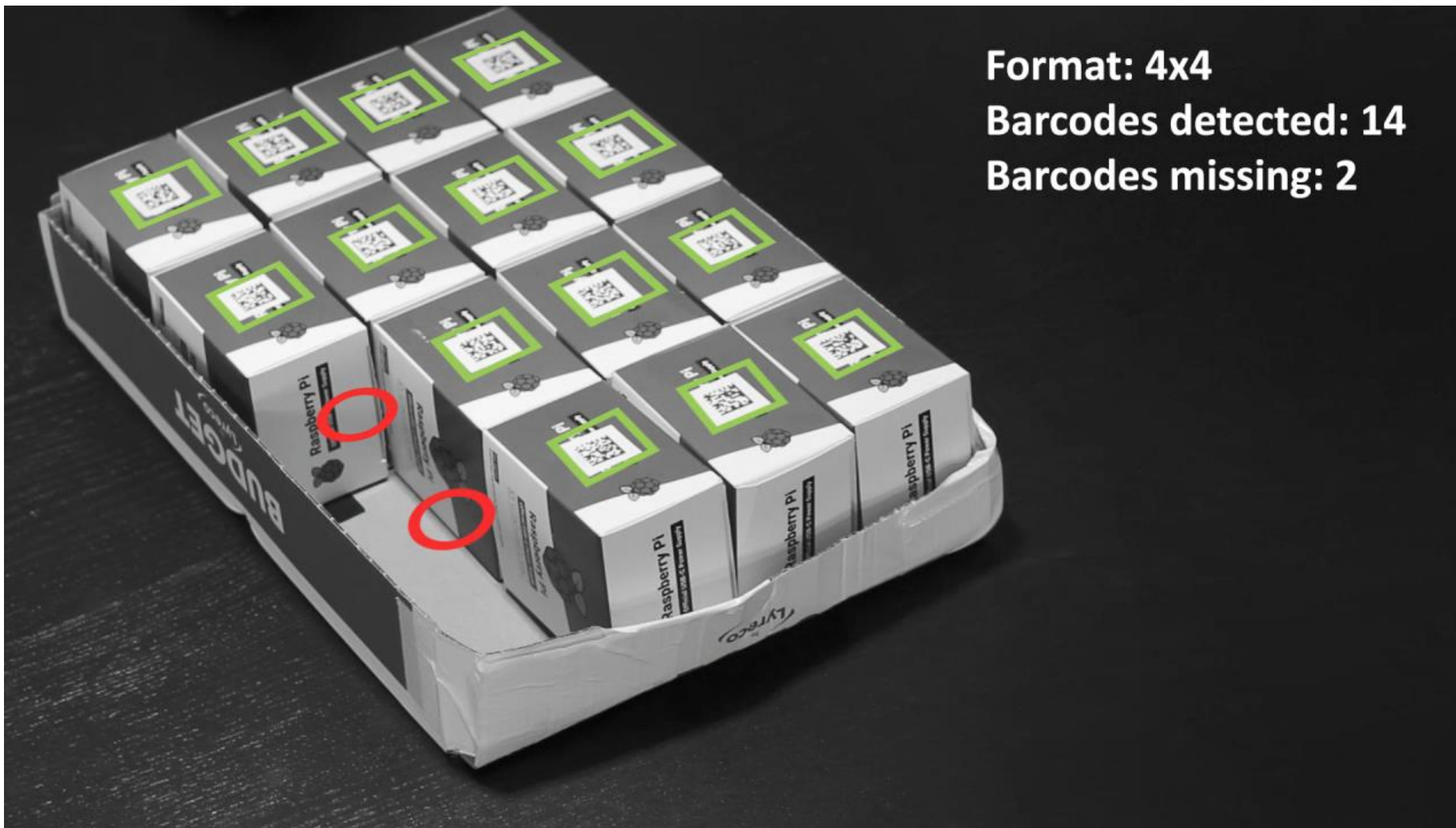
Code reading - control of the packing process

In detail



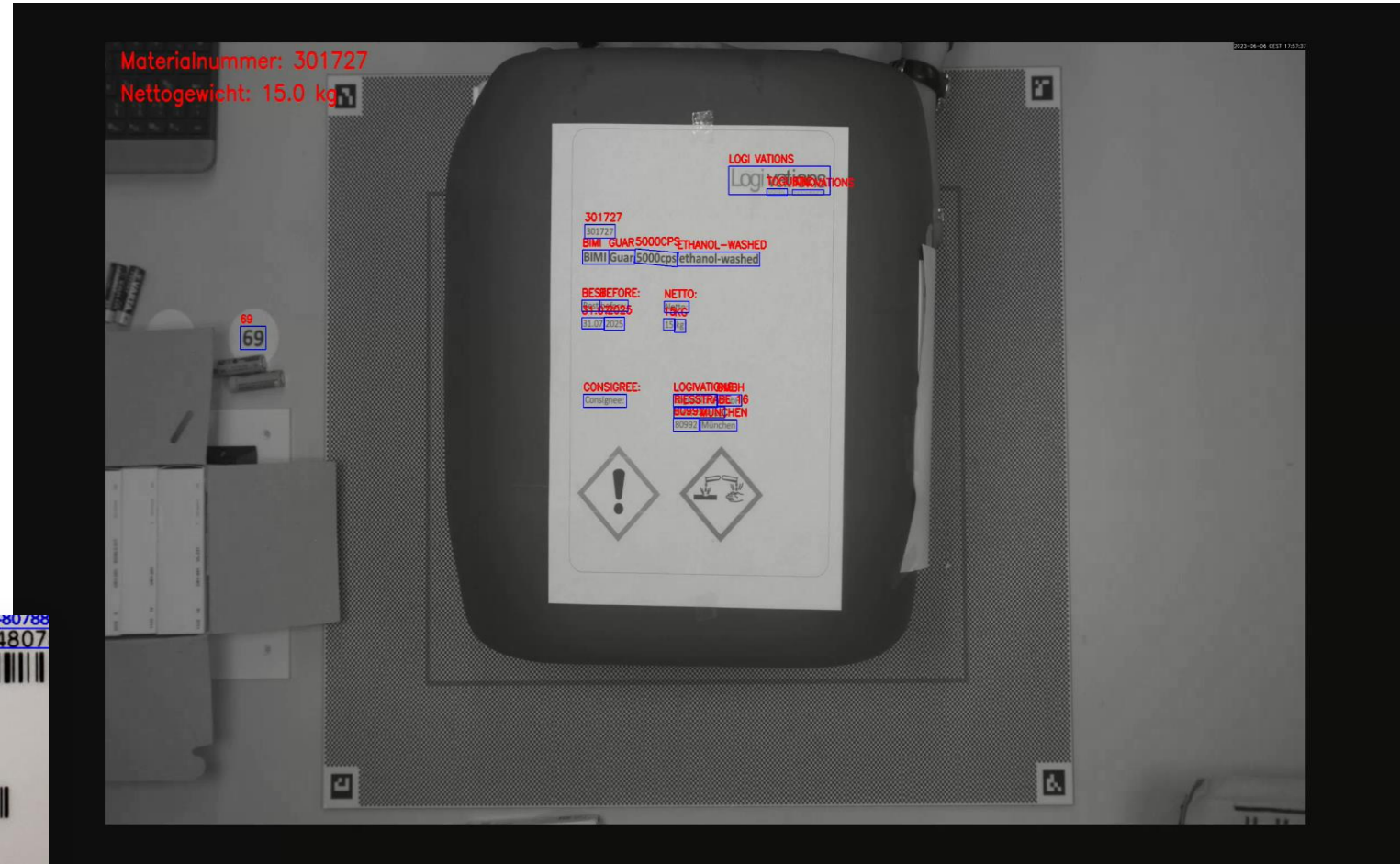
Code reading - pattern recognition

Customer example



Text Recognition

- Text can be read without prior training
- Best practice: Read text should be checked against previously known data to avoid reading errors caused by minor damage to the label
- An assignment of the text to special fields, e.g. serial numbers, can be set up on the basis of customer-specific labels



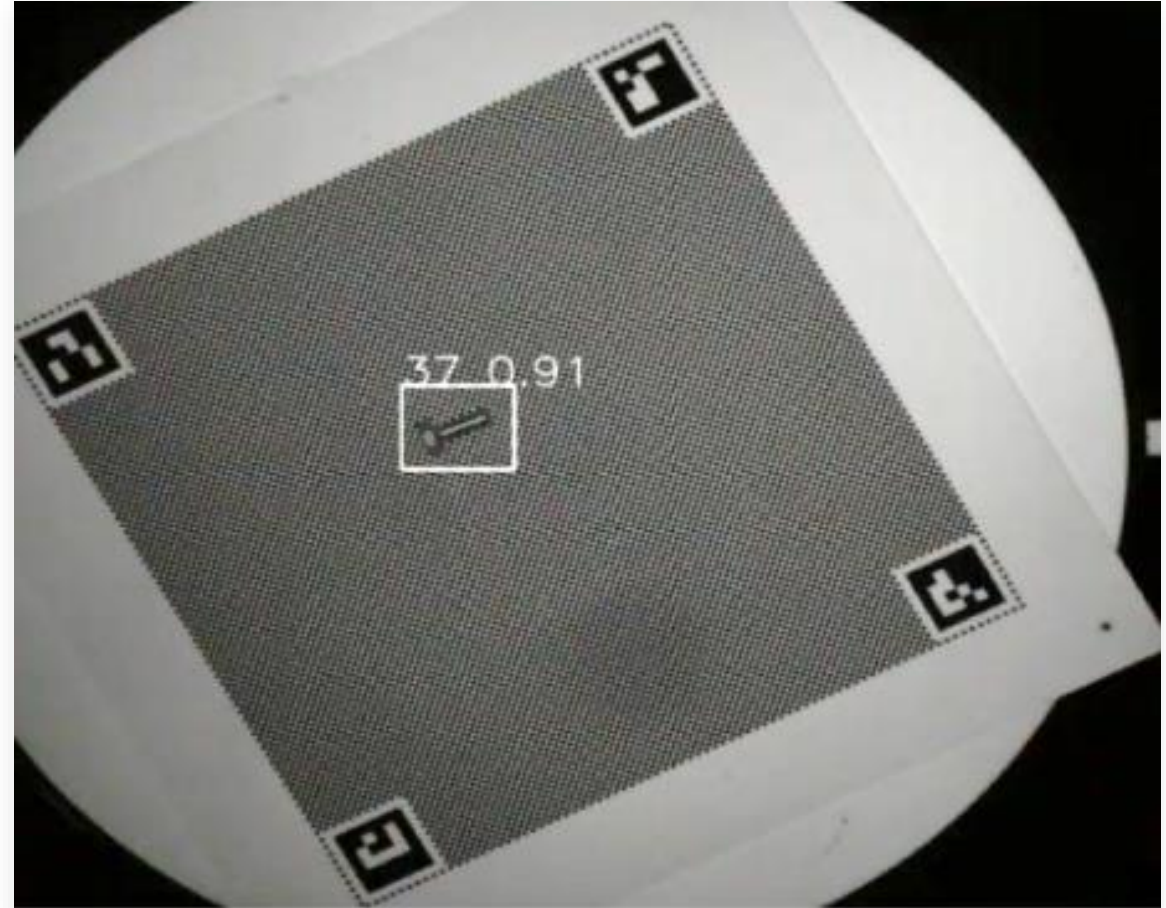
Example: Combination of Barcode reading and Text Recognition

- Customer case: Crates move on the conveyor belt below the camera
- Goal: Identify products
- If barcodes are visible, read them
- If there are no barcodes, read text and compare it to the product list to find the most suitable products.



Recognition by appearance

- After prior training, products can be recognized based only on their appearance
- Very precise differentiation is possible, for example, between screws of different types but the same size
- A combination of recognition and counting is possible
- User support is provided through an intuitive user interface for capturing training images



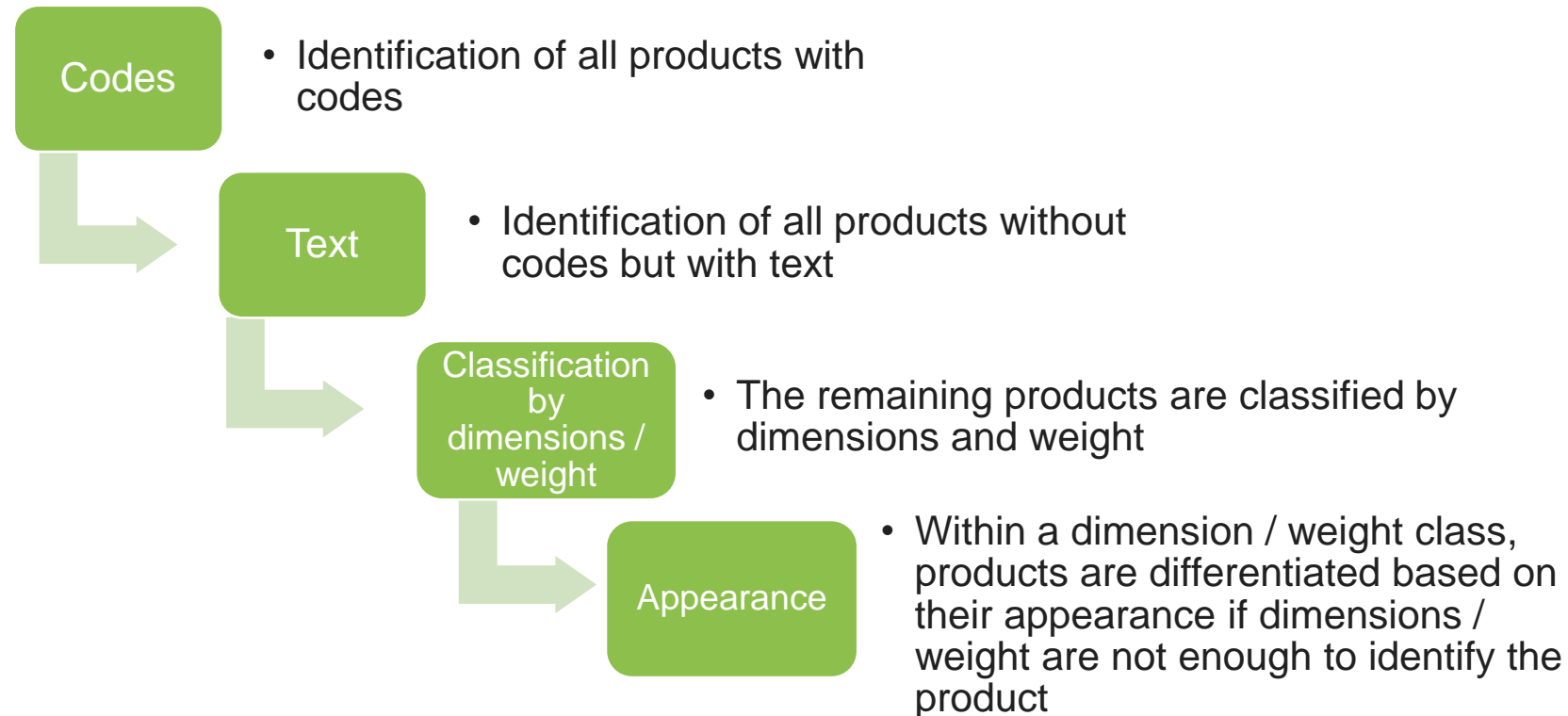
Recognition by appearance

Example



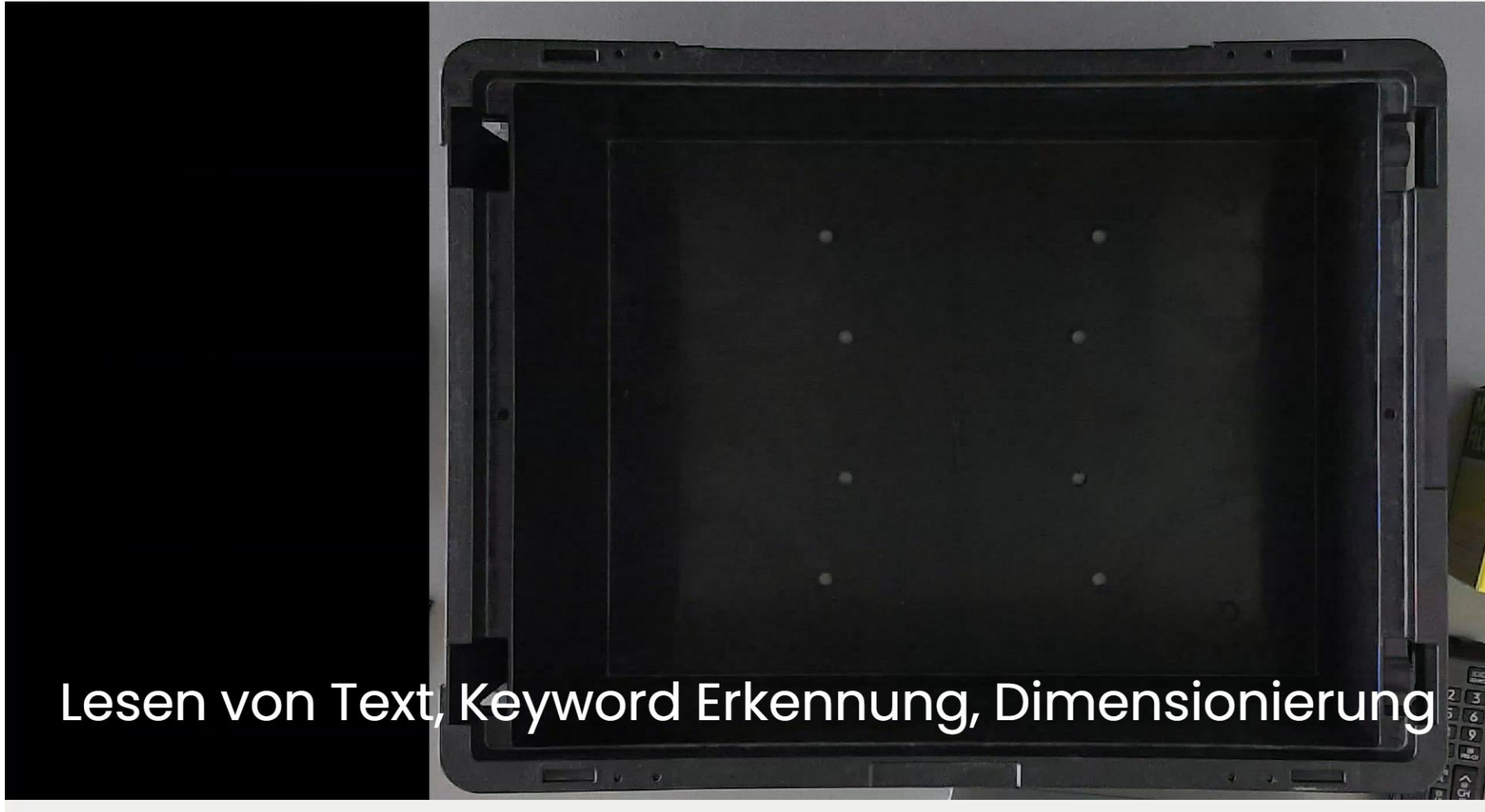
Product Identification - Summary

A combination of the approaches presented is used to identify products in large product ranges:



Product Identification - Summary

Combination of Barcode Reading, OCR and Dimensioning



Recognition by appearance - counting

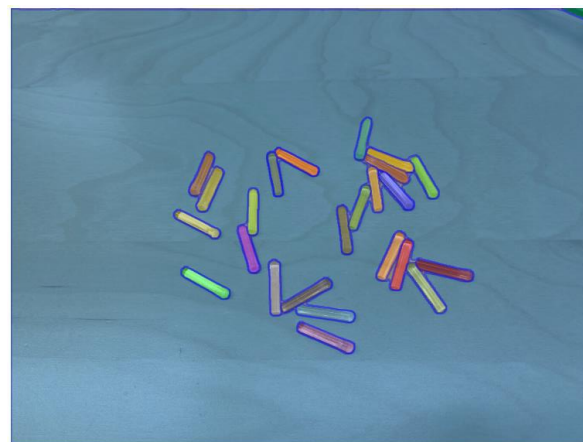
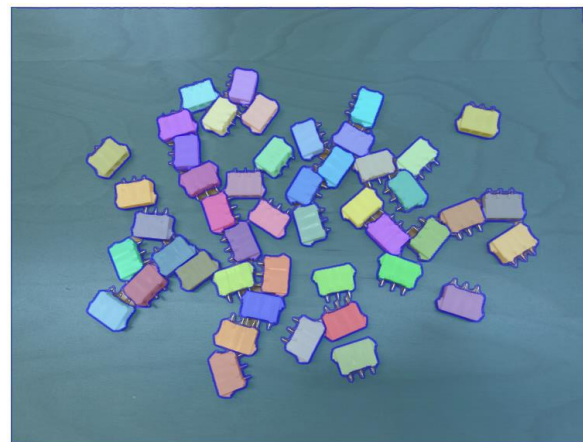
Customer example



Segment Anything

Finding any objects in images

- Segmentation model without additional training
- Open source model from Meta AI (Facebook)
- No time-consuming annotation process is required for most applications
- Can be used for semi-automatic annotations
- Works for all types of objects
- Ideal for counting objects
- Training for "new" objects/parts not necessary



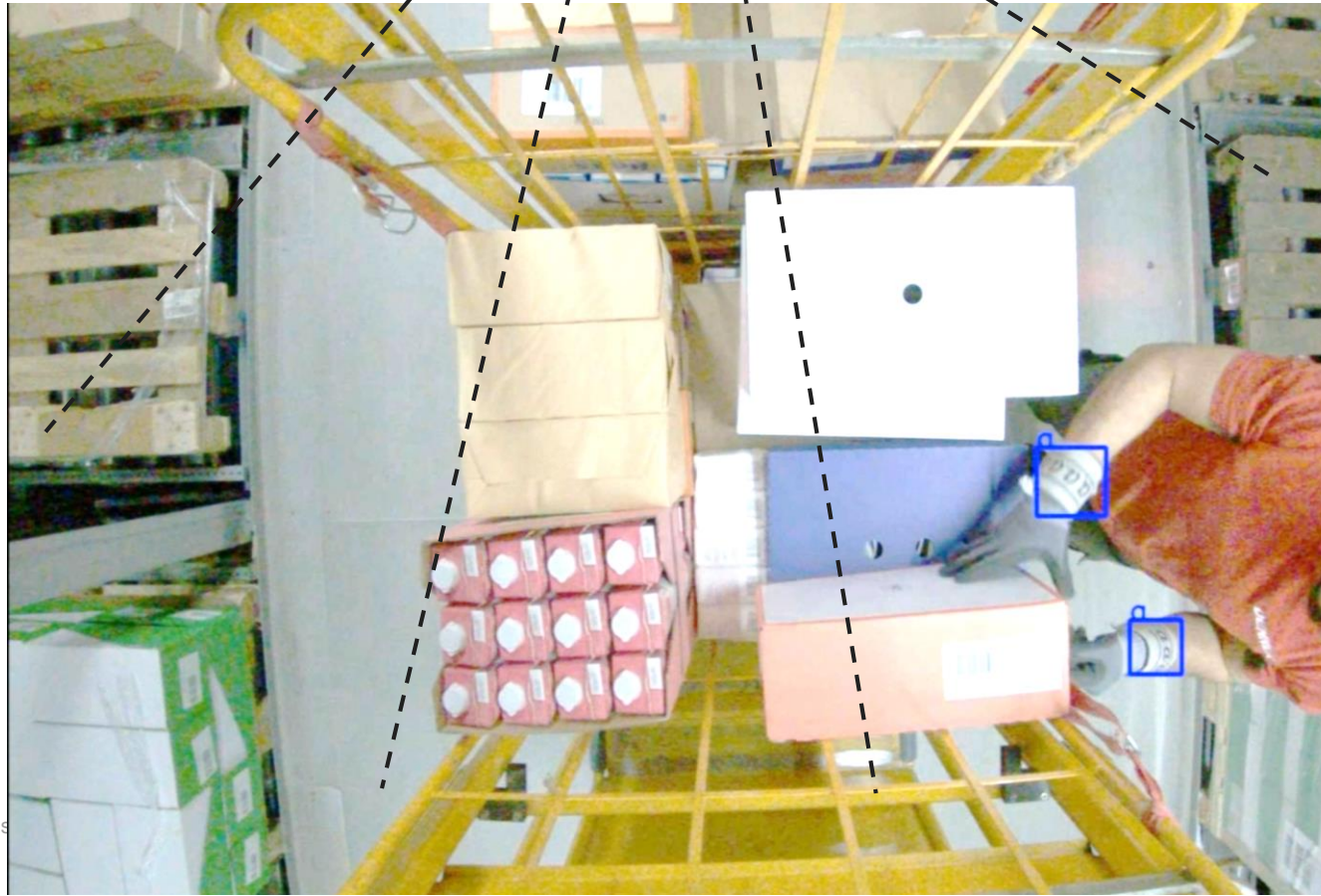
Scan-free Picking (1)

A terminal shows what to pick.

The arm movement is tracked – this makes it known from where (=what) something is taken and where it is placed.

With the help of the 3D camera, the volume is determined, before and after the pick.

From this, the number of items can be calculated.



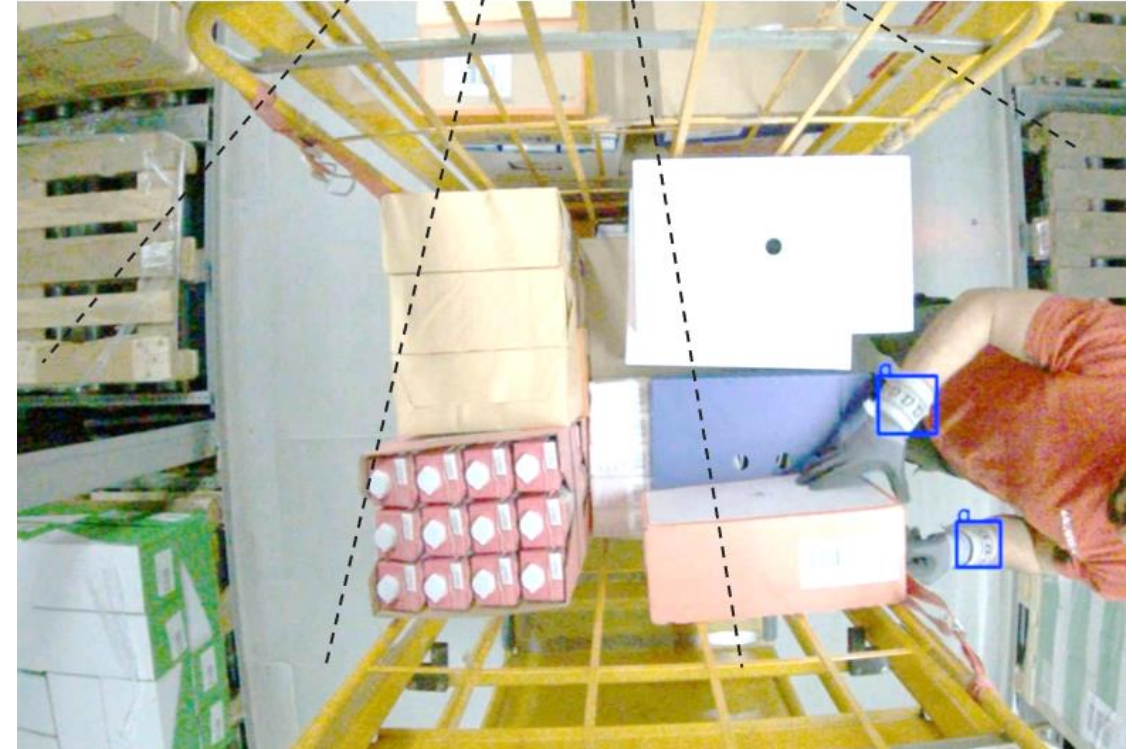
Scan-free Picking (2)

Advantages:

- There is no need to scan – but still a 100% check.
- Approx. 20% to 35% productivity gain
- Depending on the general conditions, performance bonuses can be determined for the picked weight per picker

Efforts:

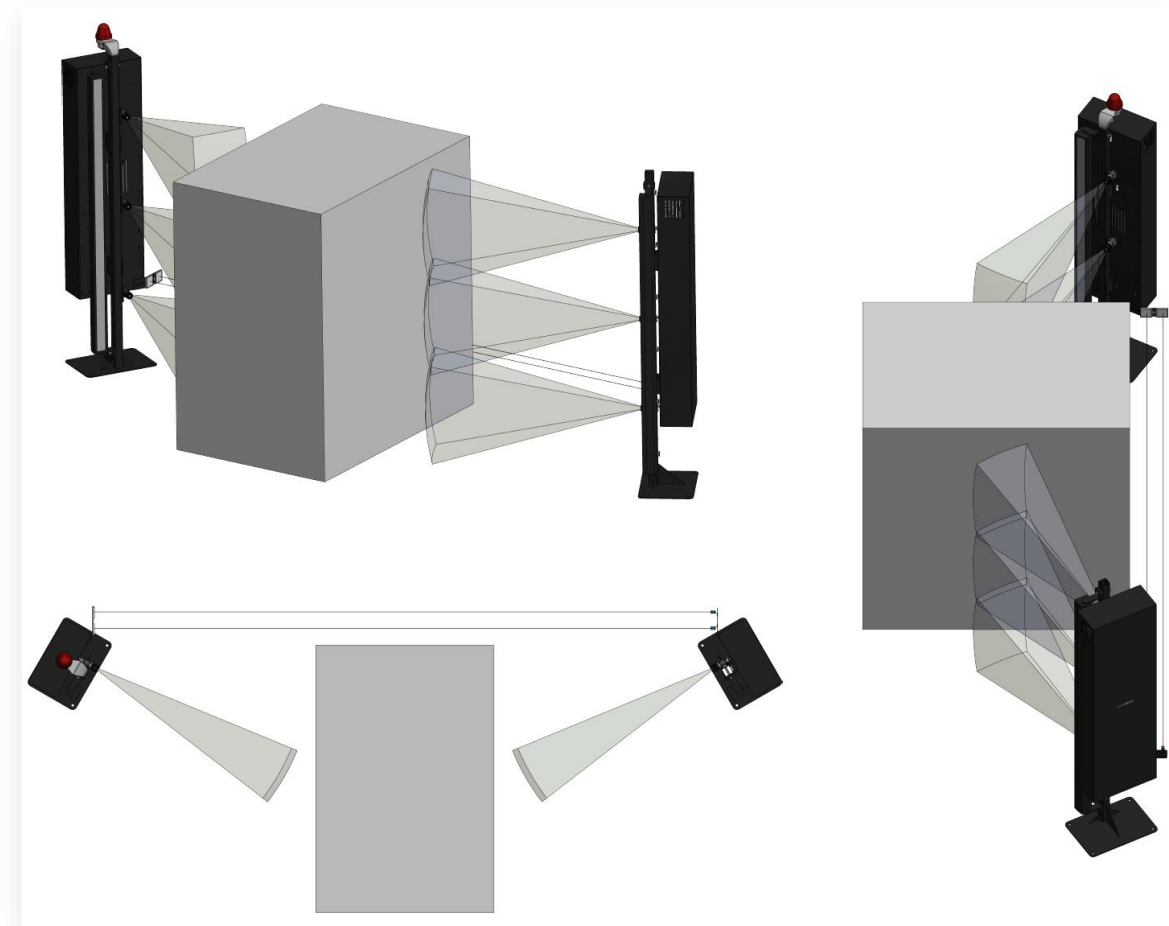
- 3D camera
- Industrial camera
- NVIDIA Jetson Orin
- Mounting on the industrial truck
- Approx. 2,800 € hardware costs per workstation
- Wi-Fi, central server
- Software approx. 7,800 € for the first workstation



AI recognition & measurement gate

Drive-Thru detection gates with camera modules on all required sides

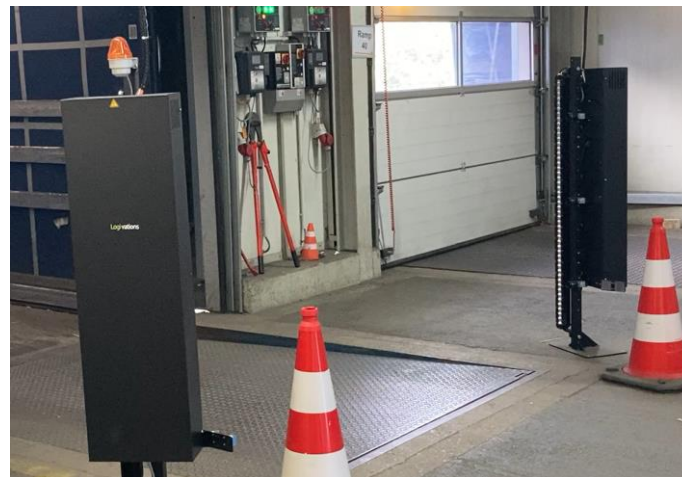
- Reading 1D and 2D barcodes as you drive through
- Consistency check checks whether a code has been recognized for each package
- Coverage height depends on the distance and barcode configuration, can be individually expanded thanks to the modular design
- In the event of an error, alarms (audio or visual) can be configured
- Combination with W2MO RTL&RS possible, this enables completely scan-free logistics



AI recognition & measurement gate

Standard modules configurable depending on pallet size and label position

- The processing unit compiles the images from all cameras.
- Then a neural network recognizes the pallets, labels, and barcodes and assigns barcodes and labels to pallets.
- In this way, pallets without labels or unreadable labels are detected.
- The gate modules are attached to each side of a dock.
- A module covers a height of approx. 1 - 1.4m.
- Modules can stand on the floor or be attached to the wall
- Automatic booking into WMS
- Driving speeds up to 4 m/s



AI recognition & measurement gate

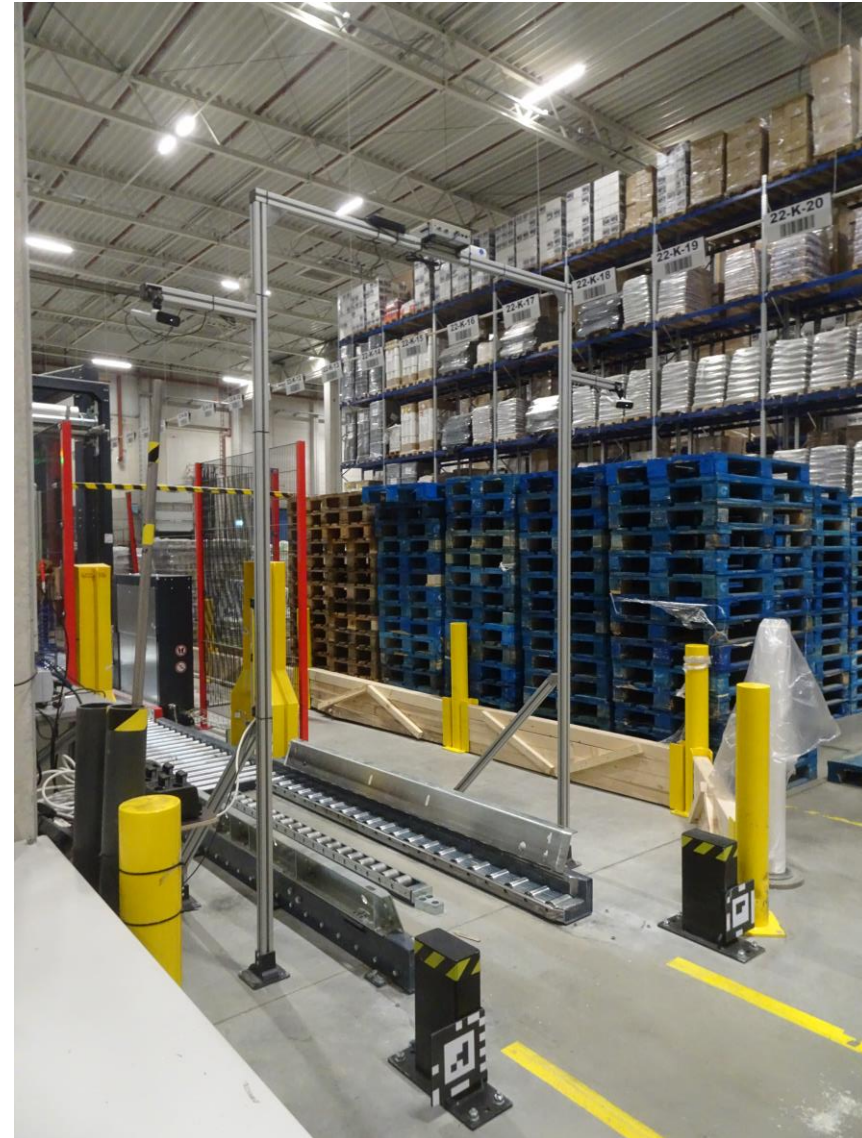
Cross Check



- Recognition of the labels
- Reading the barcodes
- Cross-check whether a barcode was also read for each label

Dimensional measurement of pallets, condition documentation

- Contour inspection
- Volume and dimension determination
- Robust, based on standard components
- Individually customizable
- Directly integrated into the Digital Real-Time Twin
- Creating photos for documenting the condition of a pallet
- Interacting with W2MO Case Pack to determine an optimal loading scheme for the truck/container based on the recognized dimensions



Finding and reading labels of pallets/trolleys on a conveyor system

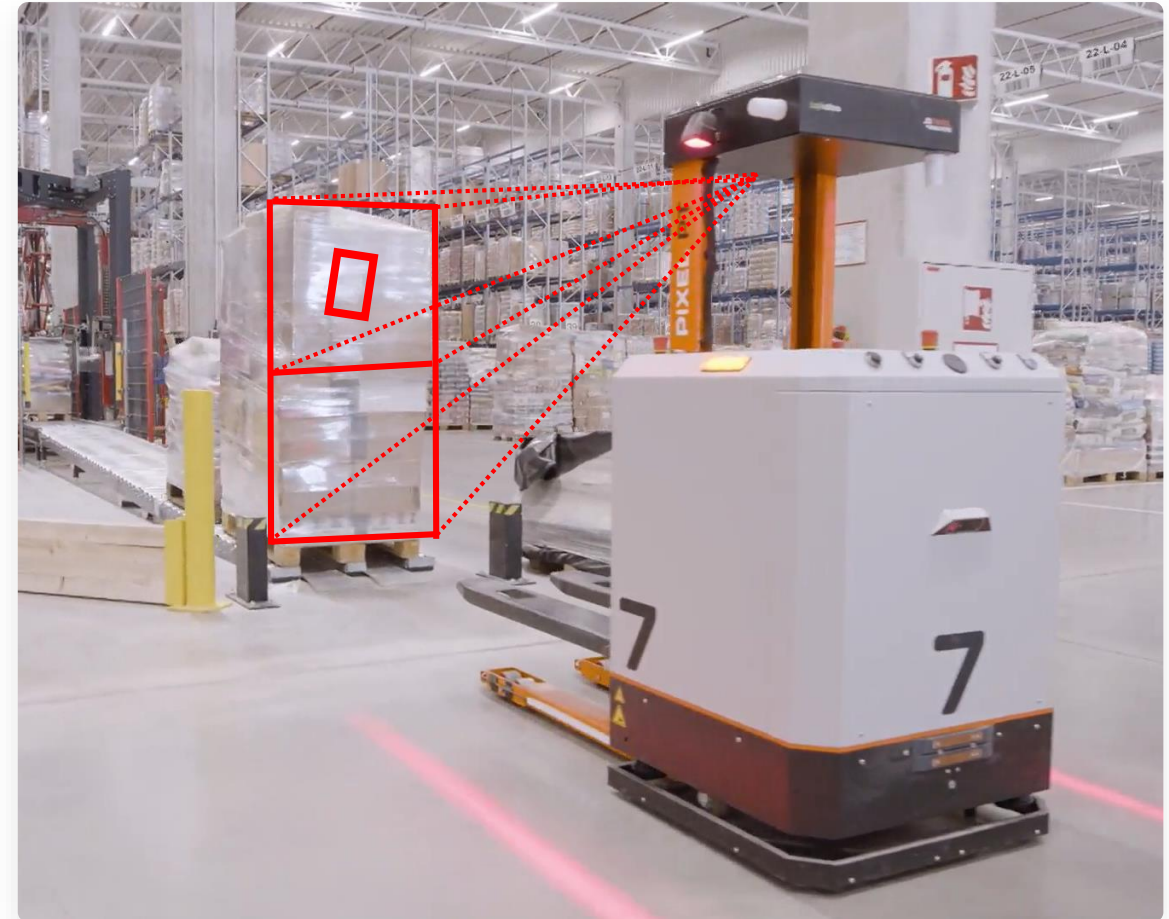
- No fixed position of the label necessary
- Specific labels can be trained and specifically searched for
- Reading text and plain text
- Further checks and classifications possible
- Reading behind foil possible



Goods detection by onboard cameras

Identification by onboard cameras

- Mounts to all types of forklifts, AGVs or AMRs
- Use of two cameras and an onboard machine learning processing unit with GPU
- Covering of pallets up to approx. 2m high and approx. 80 cm width possible
- The area can be expanded with additional cameras
- With multiple labeling, a consistency check is possible to identify the correct label or to check whether all labels have been recognized, which results in considerable advantages compared to a large-area scanner
- Combination with W2MO RTL&RS possible, this enables completely scan-free logistics



Goods detection by onboard cameras

Assembly examples



Long-term task-oriented and sustainable

With the Logivations solution approach, you can always use the latest technology cost-effectively in the long term

Logivations Solution:

- Standard industrial camera with suitable lens – the best system for the planned task
- Light – if required and also optimally configured
- NVIDIA – Machine Learning Computer: the most powerful model currently available. The technology cycles in the AI field will continue to progress very quickly in the coming years: every 2 years, double the performance at half the price. The NVIDIA computer can be regularly replaced with the latest model at low cost: The solution is thus always up to date.
- Logivations software is constantly updated and includes the latest AI tools and systems; updates also include functional developments.

Logivations Competitor:

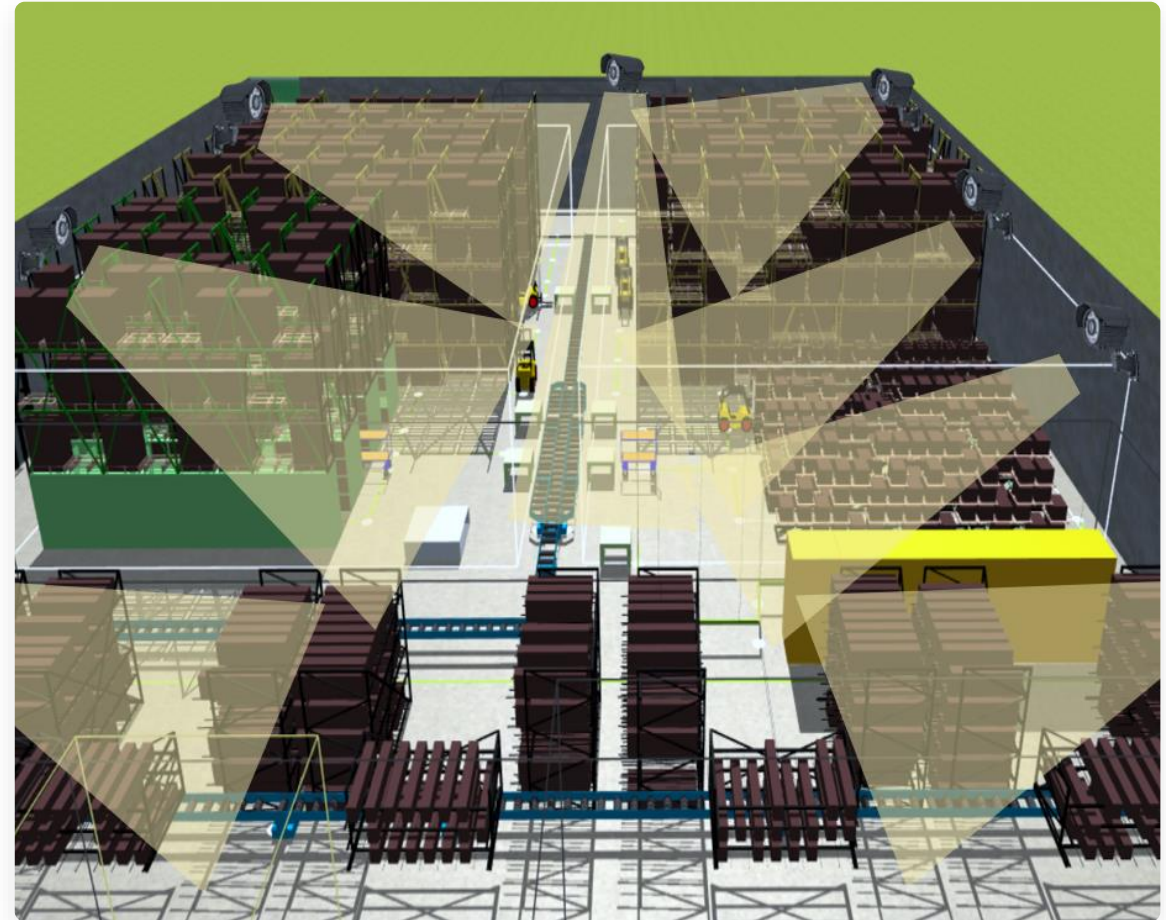
- A device that integrates all functions
- Advantage: if it fits the task - quickly installed and put into operation

Disadvantage:

- An individually configured solution can generally better address specific requirements.
- After at most 2 years, the NVIDIA component is outdated - and therefore the entire device, as replacing the NVIDIA component alone is not possible.
- Software updates are generally not possible and mostly focused on bug fixes.

W2MO Real Time Location & Recognition System RTL&RS

- Automatic detection and recording of goods movements
- AI-based identification AI-based identification represents the interplay between ceiling recognition units (cameras with GPU) and digital twin for covering all areas and real-time transparency of all processes
- High accuracy of the decentralized object detection and localization in combination with 100% data protection (GDPR-compliant): all persons are already made unrecognizable when they are recorded



W2MO Real Time Location & Recognition System RTL&RS

The base solution concept was patented by us.

(19)



(11)

EP 3 543 901 B1

(12)

EUROPÄISCHE PATENTSCHRIFT

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(21) Anmeldenummer: **19020079.0**

(52) Gemeinsame Patentklassifikation (CPC):
G06V 20/52; G06V 10/245; G06T 2207/30204

(22) Anmeldetag: **19.02.2019**

(54) **VORRICHTUNG UND VERFAHREN ZUR ROBUSTEN ERMITTLUNG DER POSITION, AUSRICHTUNG, IDENTITÄT UND AUSGEWÄHLTER ZUSTANDSINFORMATIONEN VON OBJEKTEN**

DEVICE AND METHOD FOR ROBUST DETERMINATION OF THE POSITION, ORIENTATION, IDENTITY AND SELECTED STATUS INFORMATION OF OBJECTS

DISPOSITIF ET PROCÉDÉ DE DÉTERMINATION FIABLE DE LA POSITION, DE L'ORIENTATION, DE L'IDENTITÉ ET DES INFORMATIONS D'ÉTAT SÉLECTIONNÉES D'OBJETS

W2MO Real-Time Digital Twin

Agenda

Real-Time Digital Twin Basics

From a Digital "Twin" to a Real-Time Digital Twin

All recognition units connect the real and digital world in real-time

Digital "Twin"

- Mapping of the layout and processes of planned or existing logistics
- Simulation of the resulting workload and load distribution (Operational) use of optimization algorithms to calculate e.g. transport orders, order sequence, and container (position)
- Forward-looking capacity and workforce planning

Real-Time Digital Twin

- Recognition and tracking of anything, e.g. all objects including industrial trucks and people and material movements
- Fleet management: optimized transport orders and intelligent navigation with traffic jam and obstacle detection
- Automatic detection and booking of goods movements
- Easy integration into the existing system environment

Basics

RTL 855 Use Case

Use case 1: Full transparency

Evaluations based on real-time data provide detailed insight into real process flows and visualize potential savings

Challenge

- Real processes in the processing are not transparent
- Potential savings are defined by gut feeling

Logivations Solution

- 1) Recording of position data from industrial trucks, people, etc. via AI camera tracking
- 2) Evaluation of the recorded data as heat maps or in the form of reports
- 3) Evaluation of positions, speeds, idle times, and productive times
- 4) Definition of potential for cost savings by reducing the number of vehicles, route optimization, or improved storage

Added value

- Clarity and visualization of previously unknown data

Use cases

RTL 855 Technical background

Recognition units: Commercial off-the-shelf

Standard components enable a cost-effective solution that is available worldwide

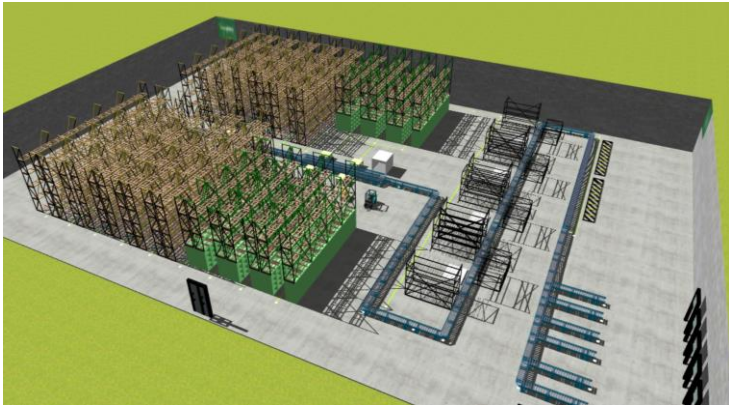
- Cameras
 - Resolution: 6MP, 120 degree viewing angle (other viewing angles optional)
- Industrial cameras directly connected to processing unit
 - NVIDIA AGX Orin Xavier
 - Processes 4, 8 or 12 camera inputs in parallel
 - Detection is decentralized, directly on the GPUs
 - No streaming of video - only transmission of position data
 - Can be upgraded independently of the cameras
 - Covered Area dependent on accuracy of localization (1mm - 10 cm): 100m² - 1.500m²
- Very fast: latency < 50ms
- Approx. 380 € per industry-camera

1. Generation (2018): 0.003 TOPS – Raspberry Pi with ML-Stick
2. Generation (2020): 0.5 TOPS – NVIDIA Jetson
3. Generation (2023/24): 22 TOPS – NVIDIA Orin (in use)
4. Generation (2025/2026): NVIDIA Thor planned > 100 TOPS

Technical background

From a Digital “Twin” to a Real-Time Digital Twin

AI recognition units connect the real and digital world in real-time

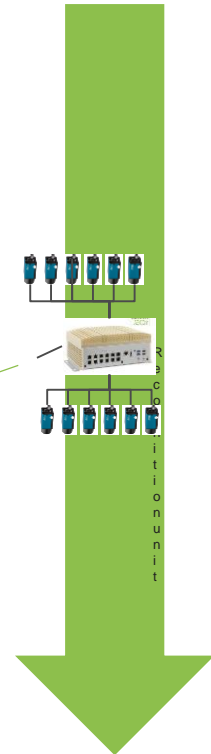


Digital “Twin”

- Mapping of the layout and processes of planned or existing logistics
- Simulation of the resulting workload and load distribution
(Operational) use of optimization algorithms to calculate e.g. transport orders, order sequence, and container (portfolio)
- Forward-looking capacity and workforce planning

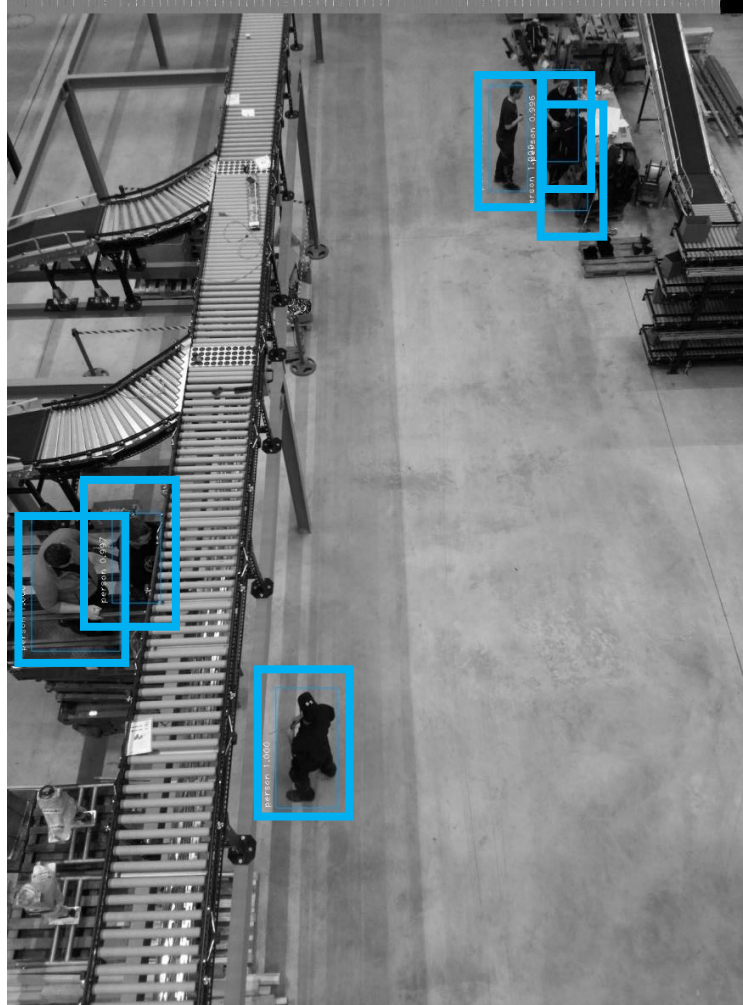
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RTL&RS: Object localization with AI

Object localization with cameras and AI



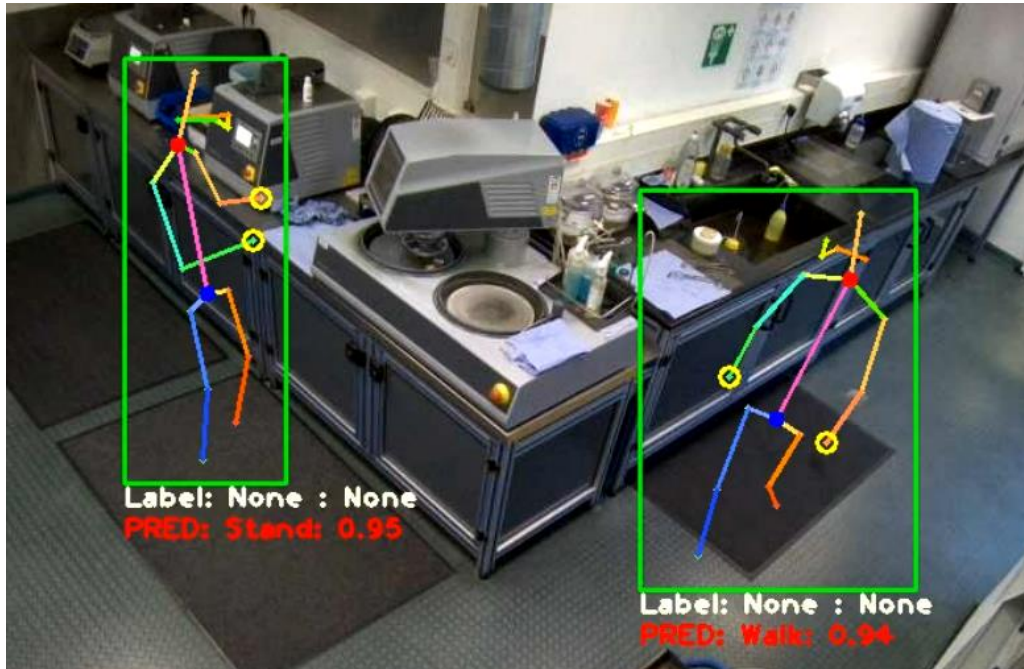
- Forklift trucks, objects, and people are identified and located by a recognition unit using artificial intelligence.
- ID markers ("number plates") allow you to differentiate identical-looking objects.



GDPR-compliant data protection through person pixelation

Data processing on the camera and pixelation of people ensure privacy protection

- Images are processed directly on the camera and not stored, only positions are forwarded to the server.
- For the support mode, the camera can *optionally* be configured to allow viewing of the video stream. People are made unrecognizable directly on the recognition unit. → No processing of personal data.



> Camera: 318

Camera status : ●

Monit status link

x: 49.2486 y: 182.854 z: 11.629





Create

- Station
- Transport process
- Custom object
- Virtual camera

Elements

Layout

Stages

Hide all

- 1
- 2
- 3

Stations

Hide all

- station 1

Transport processes

Hide all

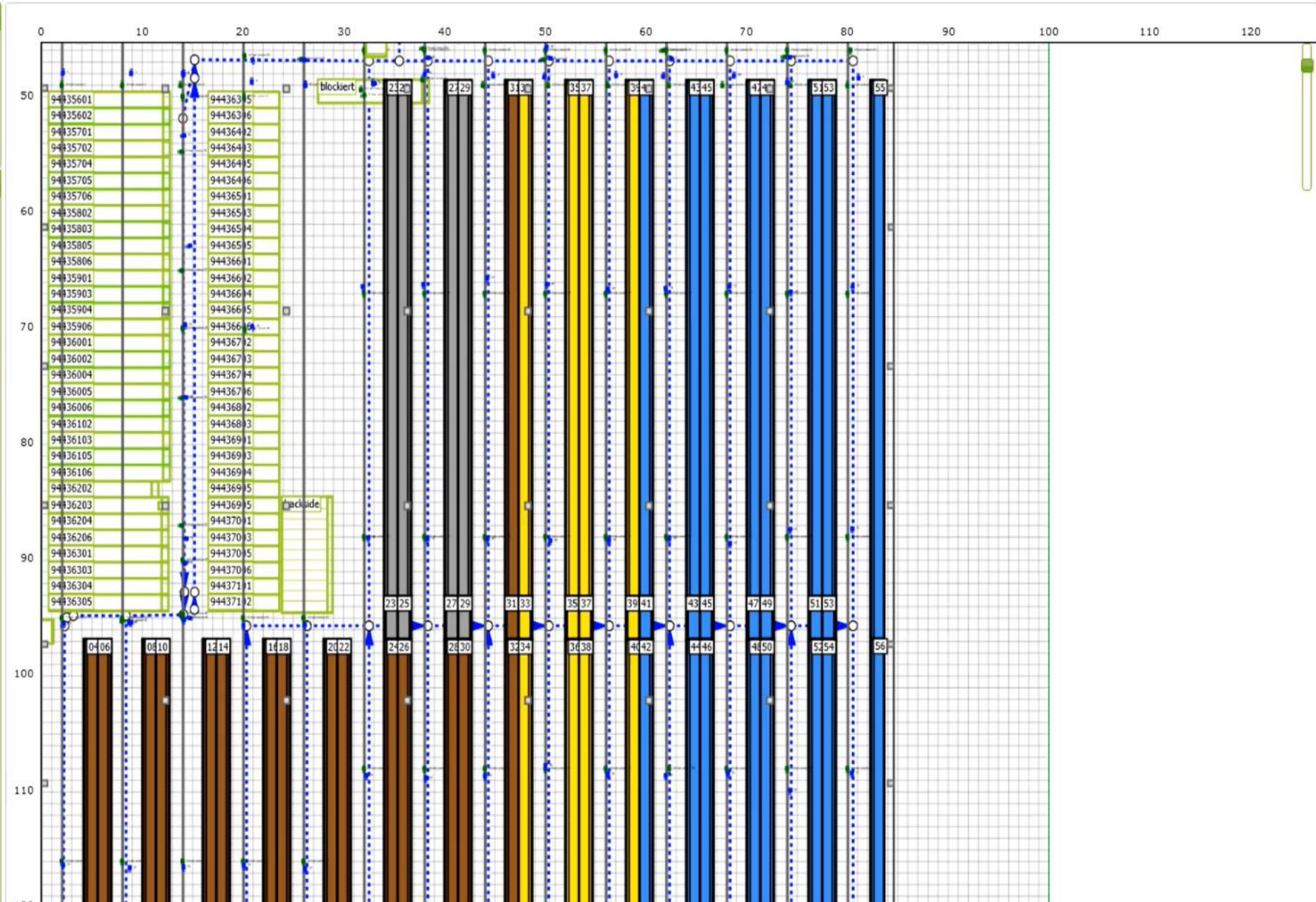
- 1
- 3_Nachschub

Paths

Process points

Virtual cameras

Real cameras



Layout : AGV Navigation

Name: AGV Navigation

Description:

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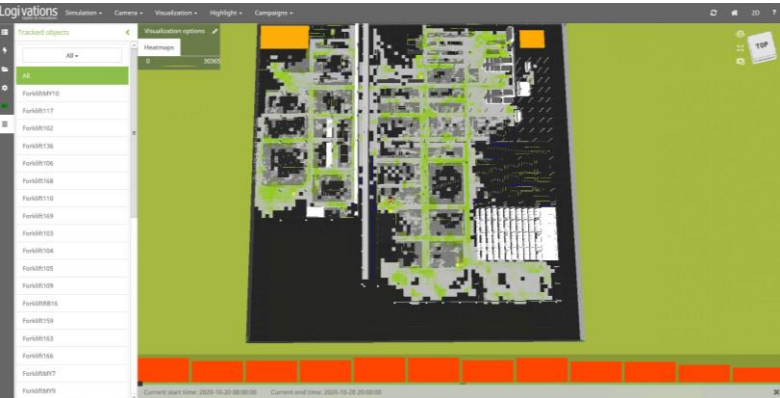
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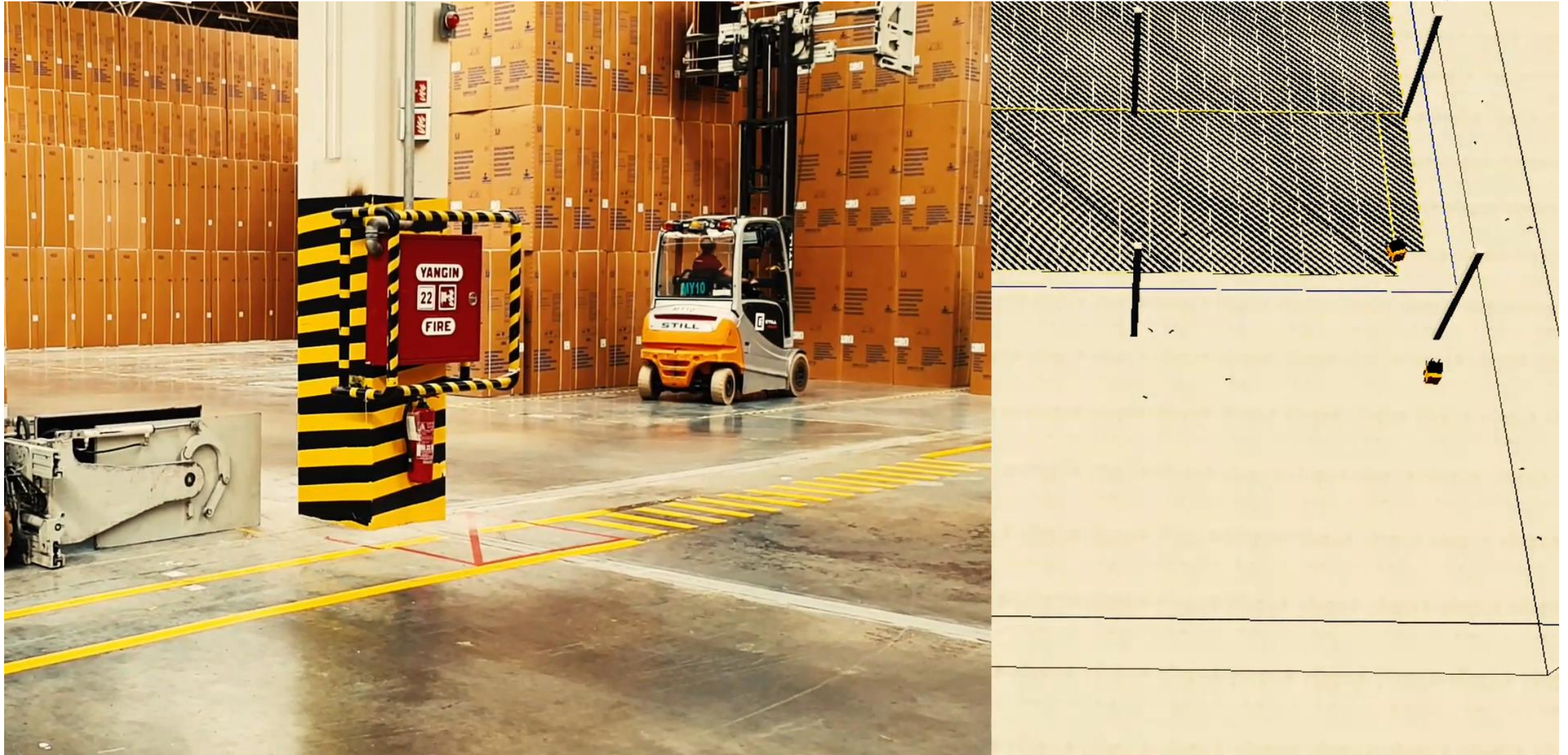
Added value

- Clarity and visualization of previously unknown data

Example: visualization of processes



Project example: Camera-based tracking of forklifts



Use case 2: Safety at work

Use of real-time position data and status detection enables comprehensive support for work safety

Challenge

- Dangerous situations are not recognized or it's done too late
- Measures to improve security must not disrupt the process

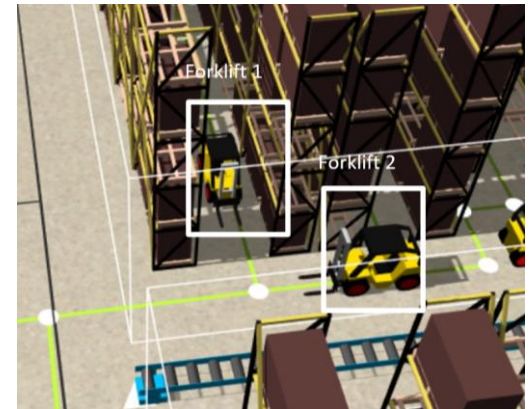
Logivations Solution

- 1) Real-time tracking of position data from industrial trucks, people, etc. via AI cameras indoors and outdoors
- 2) Use of the position data of the vehicles, people, and AI object recognition of other objects involved and their status (e.g. loaded - unloaded, standing - moving, ...)
- 3) Triggering of alarms in the event of an error or dangerous situation, e.g. are all routes free? Are people moving off the footpaths? Is a person lying on the ground? Do dangerous situations arise from the current positions of people and industrial trucks?

Added value

- Significant expansion of workplace safety without disrupting processes
- Enabling additional functionality such as bookings into the WMS

Example: dangerous situations



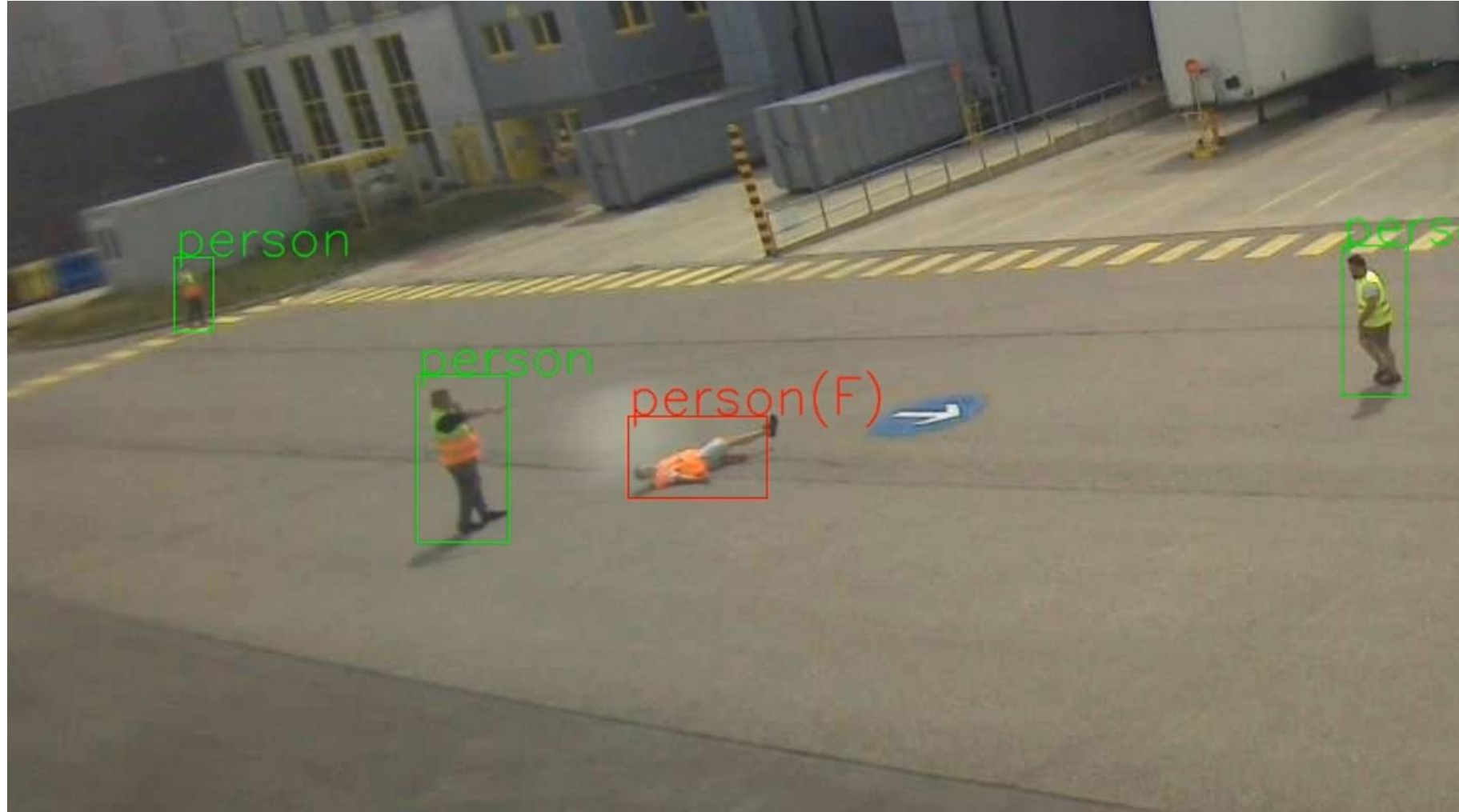
Use case 2: Safety at work

Further examples



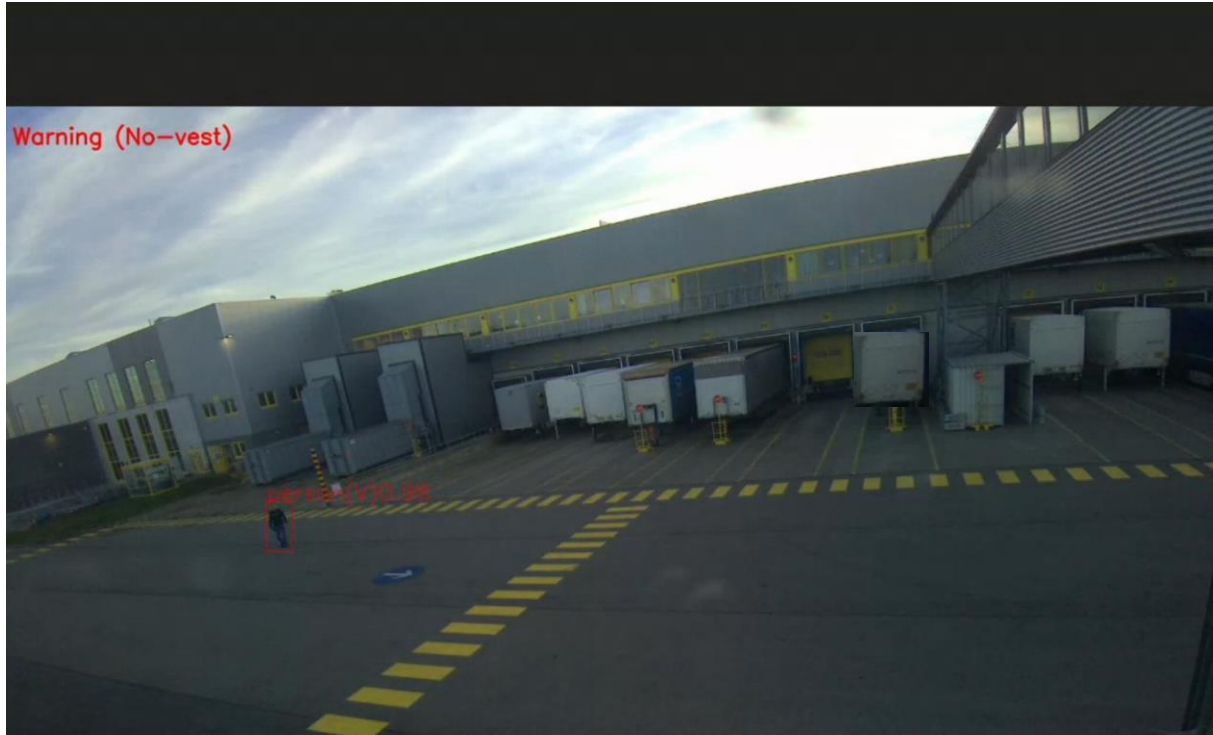
Use case 2: Safety at work

Additional examples: Person on the ground



Use case 2: Safety at work

Additional examples: A person without a vest



Get Messages | Write | Tag | Quick Filter | Search <Ctrl+K>

Subject	Co...	Date
Notification - Safety Vest Violation	am...	16:04

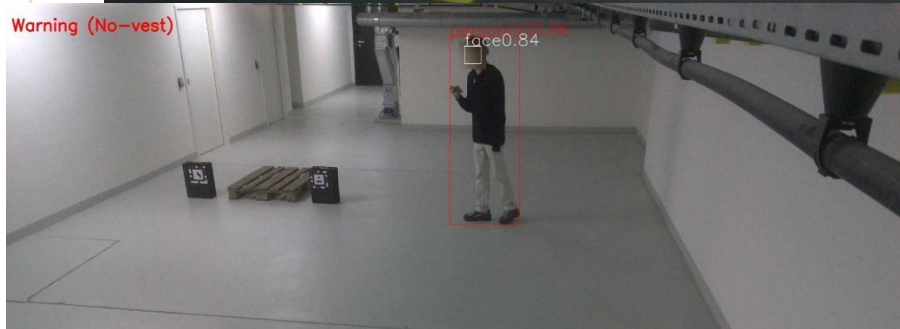
Reply | Reply All | Forward | Archive | Junk | Delete | More

Subject **Notification - Safety Vest Violation**

A person without a safety vest was detected in the yard

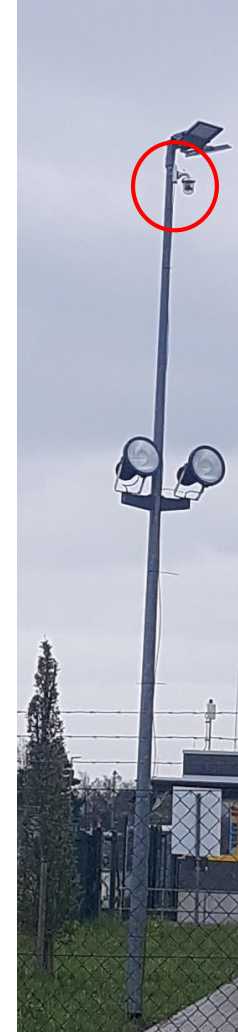
Location: camera 1
Date and time: 11-11-22 16:04:12

—cam-1_11-11-22_16-04-12.jpg—



Use case 2: Safety at work

Additional examples: person in close proximity to a moving vehicle



Workplace safety: List of observed events

All events to be monitored are placed on an event list. Then it is defined which reaction should take place

Raised at	Bin	Tracked object	Event action	Generated by	Processed
2021-09-16 16:45:07	GateArea-8	low_forklift_75725	Forklift entered area	Ceiling camera	<input checked="" type="checkbox"/>
2021-09-16 16:45:07	600	low_forklift_75722	Forklift has picked item(s) from	Ceiling camera	<input checked="" type="checkbox"/>
2021-09-16 16:45:07	620	low_forklift_75715	Forklift has picked item(s) from	Ceiling camera	<input checked="" type="checkbox"/>
2021-09-16 16:45:07	540	low_forklift_75725	Forklift has picked item(s) from	Ceiling camera	<input checked="" type="checkbox"/>
2021-09-16 16:45:06	GateArea-5	low_forklift_75726	Forklift entered area	Ceiling camera	<input type="checkbox"/>
2021-09-16 16:45:05	GateArea-6	low_forklift_75714	Forklift entered area	Ceiling camera	<input type="checkbox"/>
2021-09-16 16:44:59	GateArea-5	low_forklift_75727	Forklift entered area	Ceiling camera	<input type="checkbox"/>
2021-09-16 16:44:59	GateArea-4	low_forklift_75727	Forklift entered area	Ceiling camera	<input type="checkbox"/>
2021-09-16 16:44:59	GateArea-4	low_forklift_75592	Forklift entered area	Ceiling camera	<input type="checkbox"/>
2021-09-16 16:44:58	GateArea-5	low_forklift_75572	Forklift entered area	Ceiling camera	<input type="checkbox"/>
2021-09-16 16:44:51	GateArea-8	low_forklift_75725	Forklift entered area	Ceiling camera	<input type="checkbox"/>
2021-09-16 16:44:44	GateArea-8	low_forklift_75725	Forklift entered area	Ceiling camera	<input checked="" type="checkbox"/>
2021-09-16 16:44:44	GateArea-6	low_forklift_75715	Forklift entered area	Ceiling camera	<input type="checkbox"/>
2021-09-16 16:44:37	GateArea-5	low forklift 75715	Forklift entered area	Ceiling camera	<input type="checkbox"/>

- Certain reactions can be defined for each observed event or the objects involved.
- Reactions can include:
 - Sending e-mails
 - Lights
 - Sirens
 - Controlling alarms, etc.

Use case 3: Area monitoring

Use of real-time filling levels of areas to simplify replenishment processes

Challenge

- Monitoring of area fill levels is usually only possible on sight
- Replenishment control purely based on average values

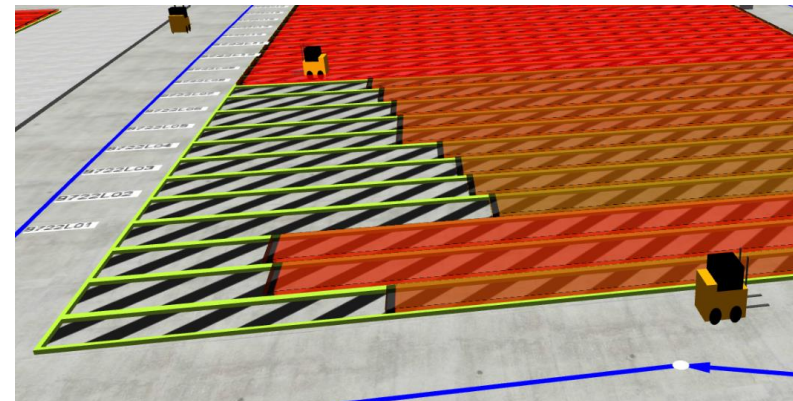
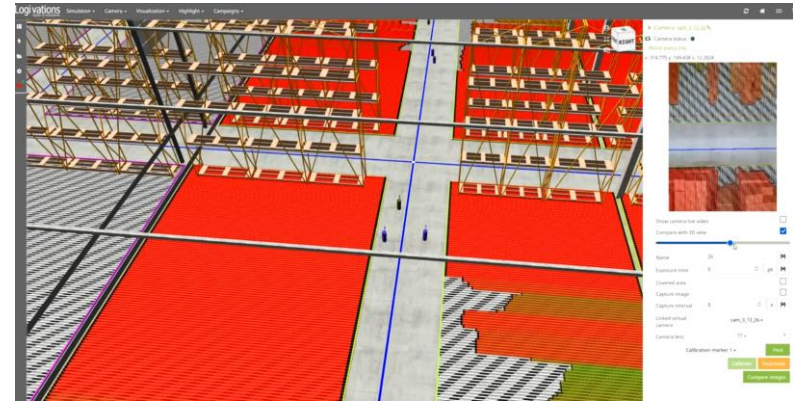
Logivations Solution

- 1) Monitoring of area fill levels even with flexible lane widths by using AI cameras
- 2) Real-time information about current space requirements or current space use
- 3) Generation of events depending on the filling level, e.g. for controlling replenishment processes

Added value

- Automated monitoring of areas prevents delayed replenishment

Example: Monitoring of areas



Use case 4: Automatic goods booking

Automatic goods booking through the use of real-time positions enables scan-free logistics

Challenge

- Goods booking on areas is only possible through many manual scans
- Current position of goods often unclear

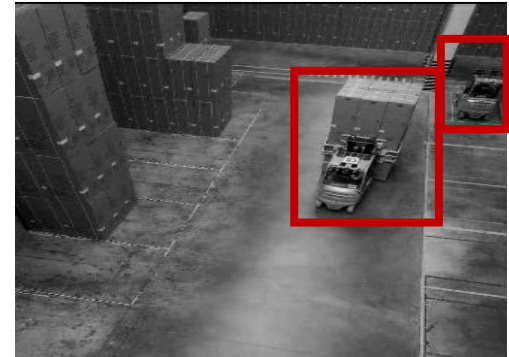
Logivations Solution

- 1) Tracking of pallets after a one-time recognition of the pallet (e.g. by an identification gate)
- 2) Position tracking by tracking the forklift position as well as the pallet position
- 3) Detection of loading and unloading of industrial trucks
- 4) Automatic booking of pick and puts avoids scanning processes
- 5) The position of each pallet in the warehouse is known at all times

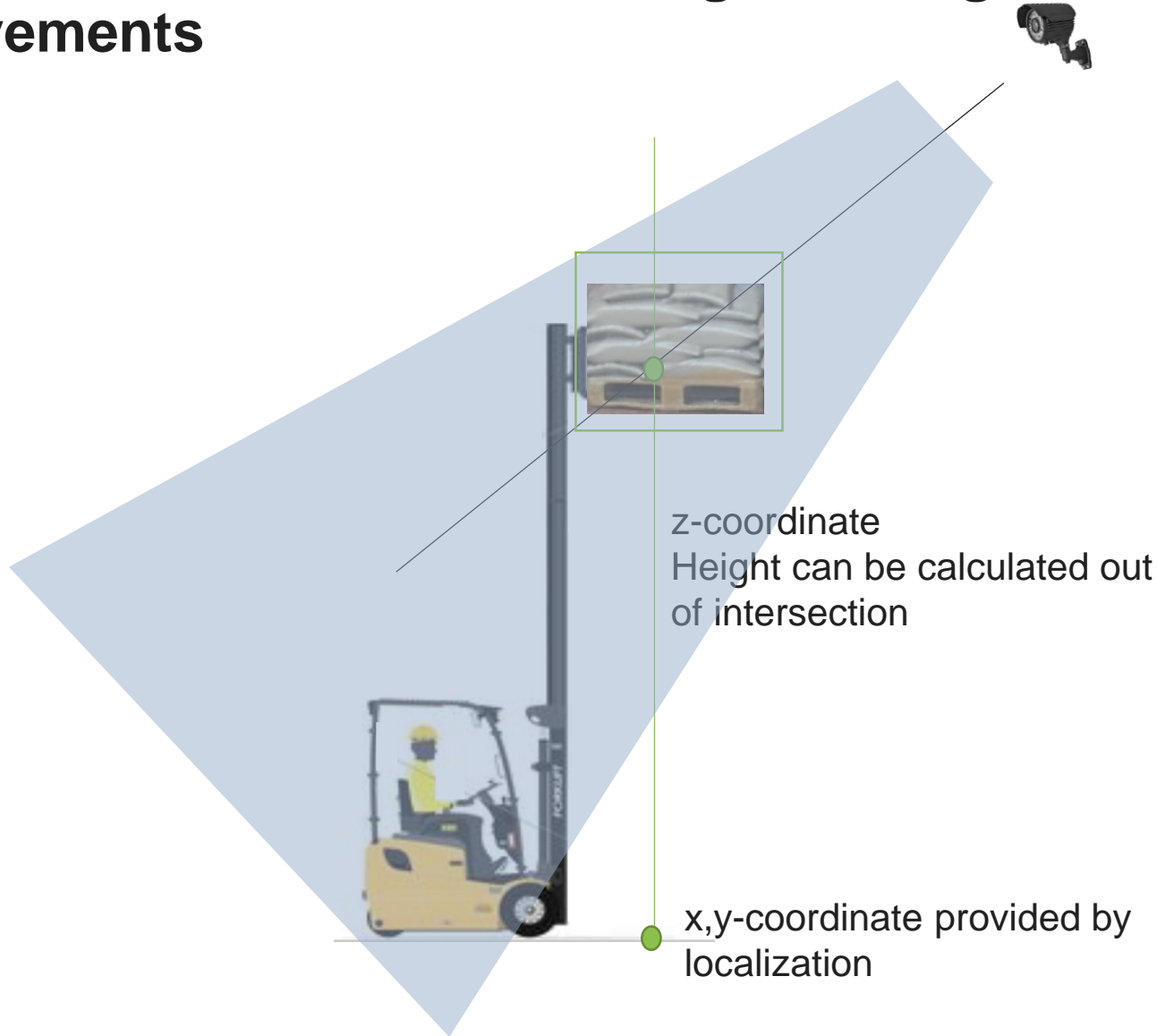
Added value

- Saving up to 10 seconds per transported pallet by avoiding manual scans
- Creating transparency about current pallet positions

Example: Automatic goods booking



Use case 4: Automatic booking of storage-in and storage-out movements



- Using the Digital Twin provides the coordinates of the bins
- Localization recognizes the x,y,z-coordinates of the pallet and the bin and if the pallet is moved in or taken out
- Recognition of empty / loaded fork
- Automatic booking into WMS
- Works for pallet racks or floor locations

Use case 5: Tracking on conveyor technology

Camera-based tracking reduces errors and increases throughput by up to 15%

Challenge



- No tracking of goods on the conveyor system
- Blockages, duplicates, damage, theft, errors

Logivations Solution



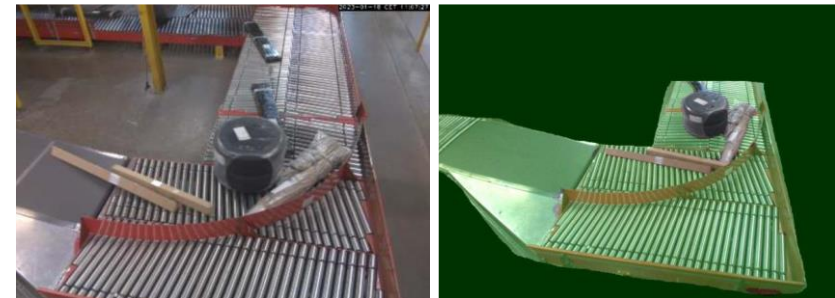
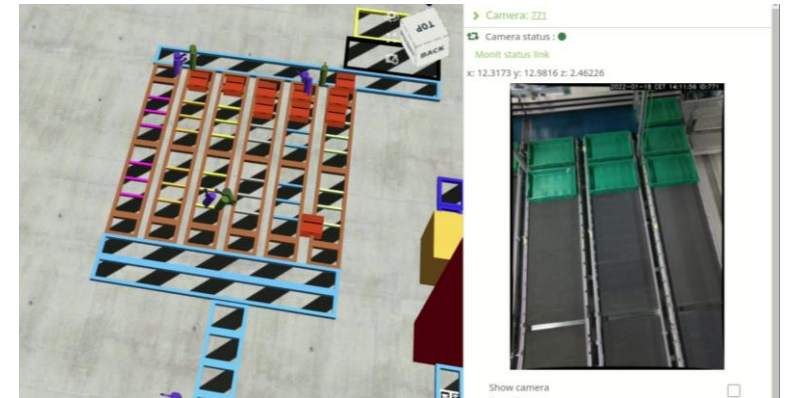
- 1) Tracking of boxes after a one-time recognition of the pallet (e.g. by barcode scanner)
- 2) AI-based tracking without tags or labels
- 3) Position of each transported item known at all times
- 4) Extensive visualization and optimization algorithms in the W2MO digital twin

Added value



- Traceability & documentation of the route of all goods
- Avoidance of downtime & errors

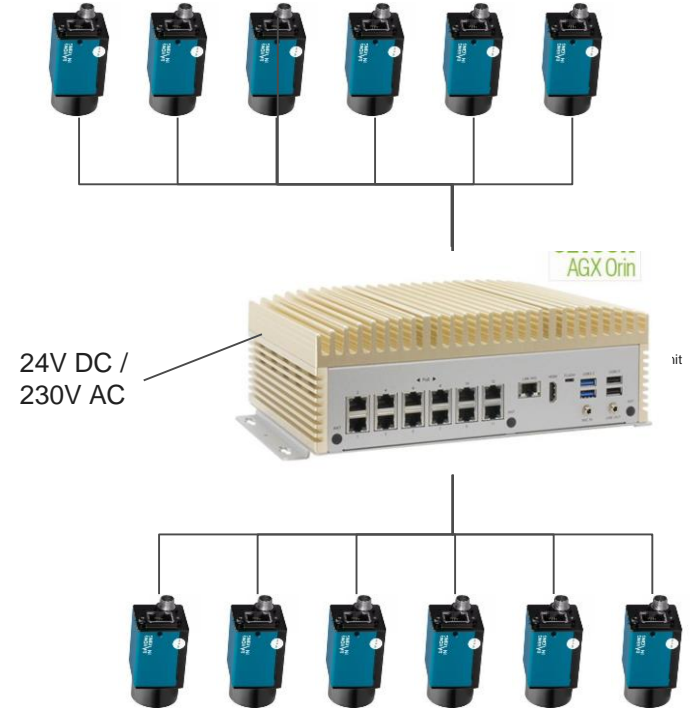
Example: Conveyor technology tracking



Recognition units: Commercial off-the-shelf

Standard components enable a cost-effective solution that is available worldwide

- Cameras
 - Resolution: 5MP, 120 degree viewing angle (other viewing angles optional)
- Industrial cameras directly connected to processing unit
 - NVIDIA AGX Orin Xavier
 - Processes 4, 8 or 12 camera inputs in parallel
 - Detection is decentralized, directly on the GPUs
 - No streaming of video - only transmission of position data
 - Can be upgraded independently of the cameras
 - Covered Area dependent on accuracy of localization (1mm - 10 cm): 100m² - 1.500m²
- Very fast: latency < 50ms
- Approx. 380 € per industry-camera

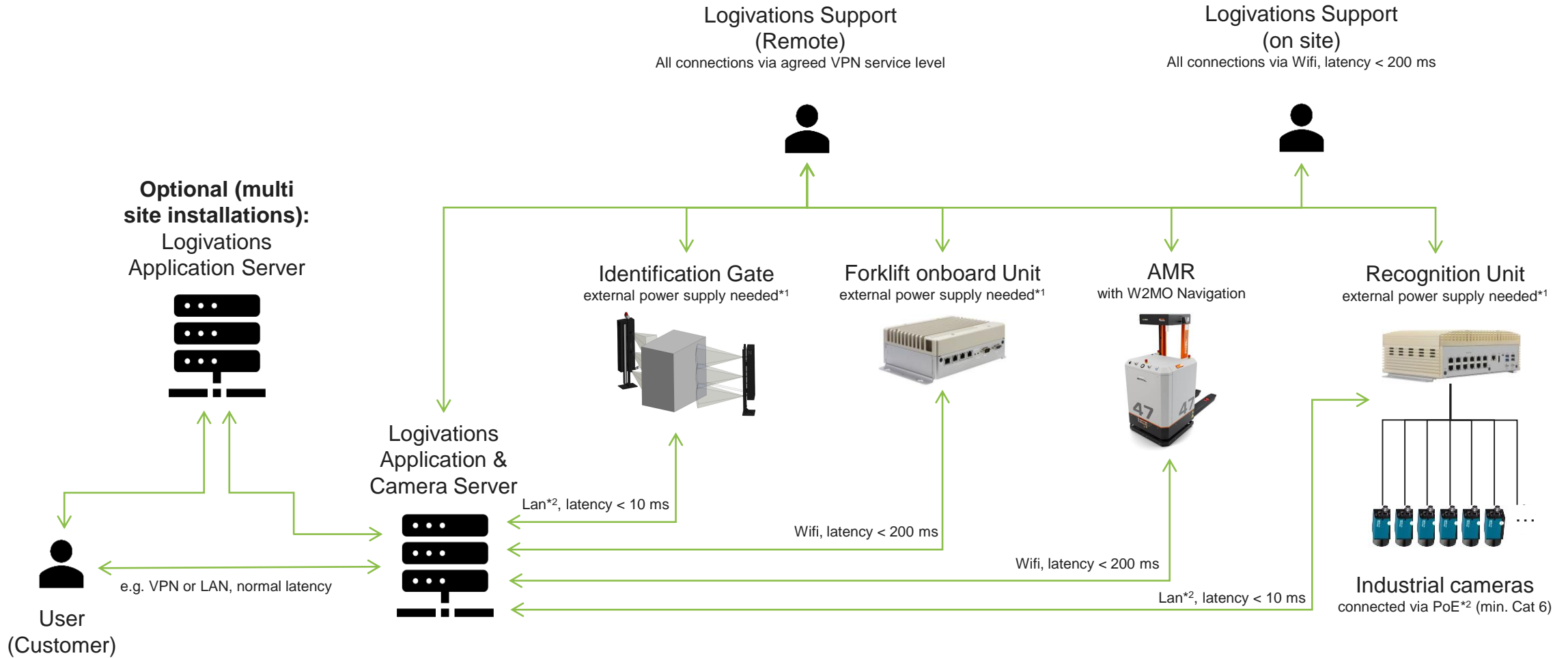


1. Generation (2018): 0.003 TOPS – **Raspberry PI with ML-Stick**
2. Generation (2020): 0.5 TOPS – **NVIDIA Jetson**
3. Generation (2023/24): 22 TOPS – **NVIDIA Orin** (in use)
4. Generation (2025/2026): **NVIDIA Thor** planned > 100 TOPS



Real-Time Digital Twin Network Topology

Object localization directly on the camera enables a distributed, decentralized, and parallelized software architecture



*1: External power supply: direct 24V DC or Standard 230V AC via power adapter

*2: Max. Lan/PoE cable length for each connection: 100m

Real-Time Digital Twin

Track and recognize anything what is happening



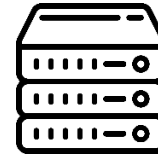
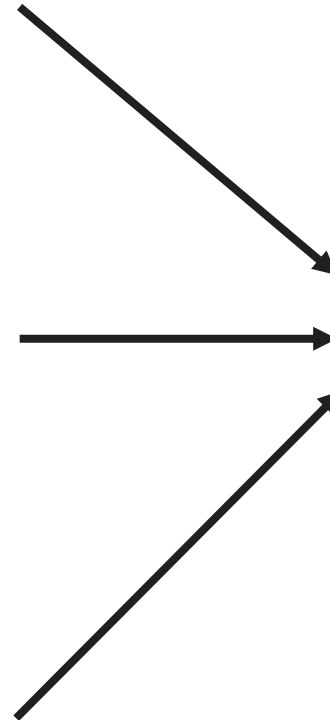
Recognition units mounted on the ceiling detecting any trained objects and their movements



Forklift or AMR with barcode scan camera for initial pallet identification



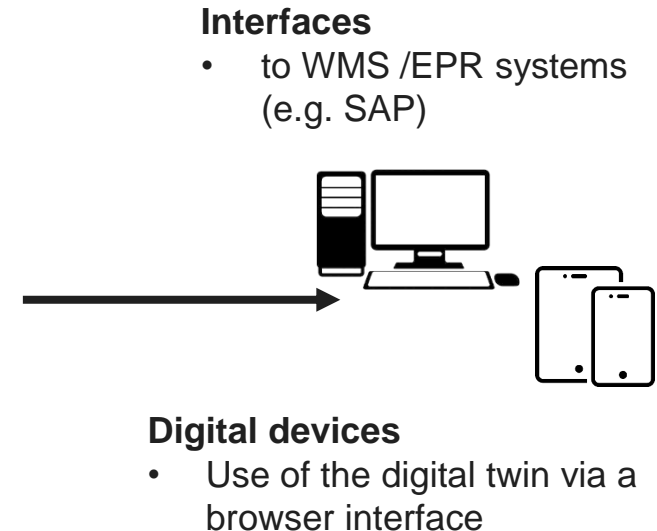
AI recognition & measurement gate and workplace for identification and measurement of products



W2MO Camera Server

- Consolidation of data
- Matching dynamic data with infrastructure

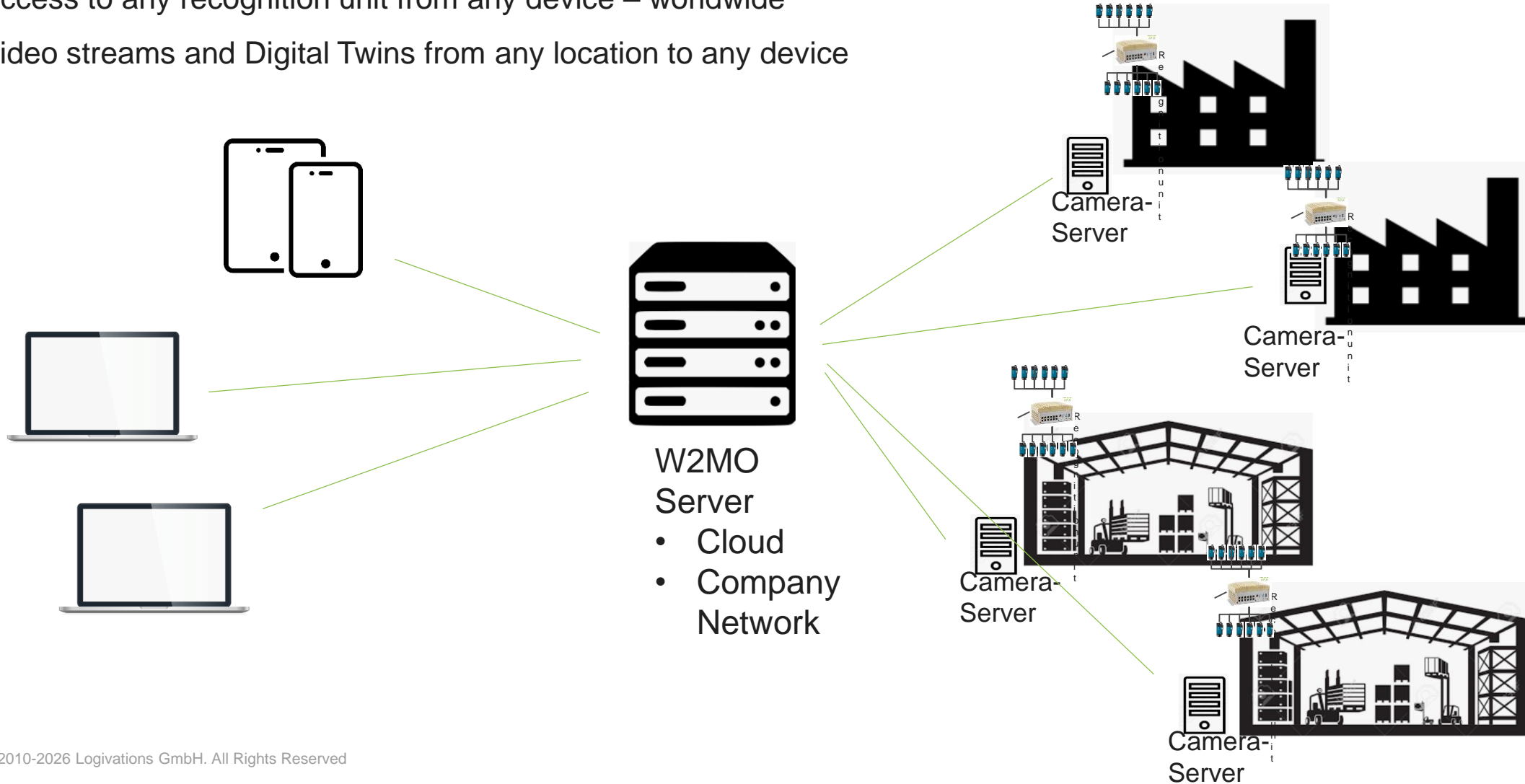
→ **Tracking of any trained objects movements**



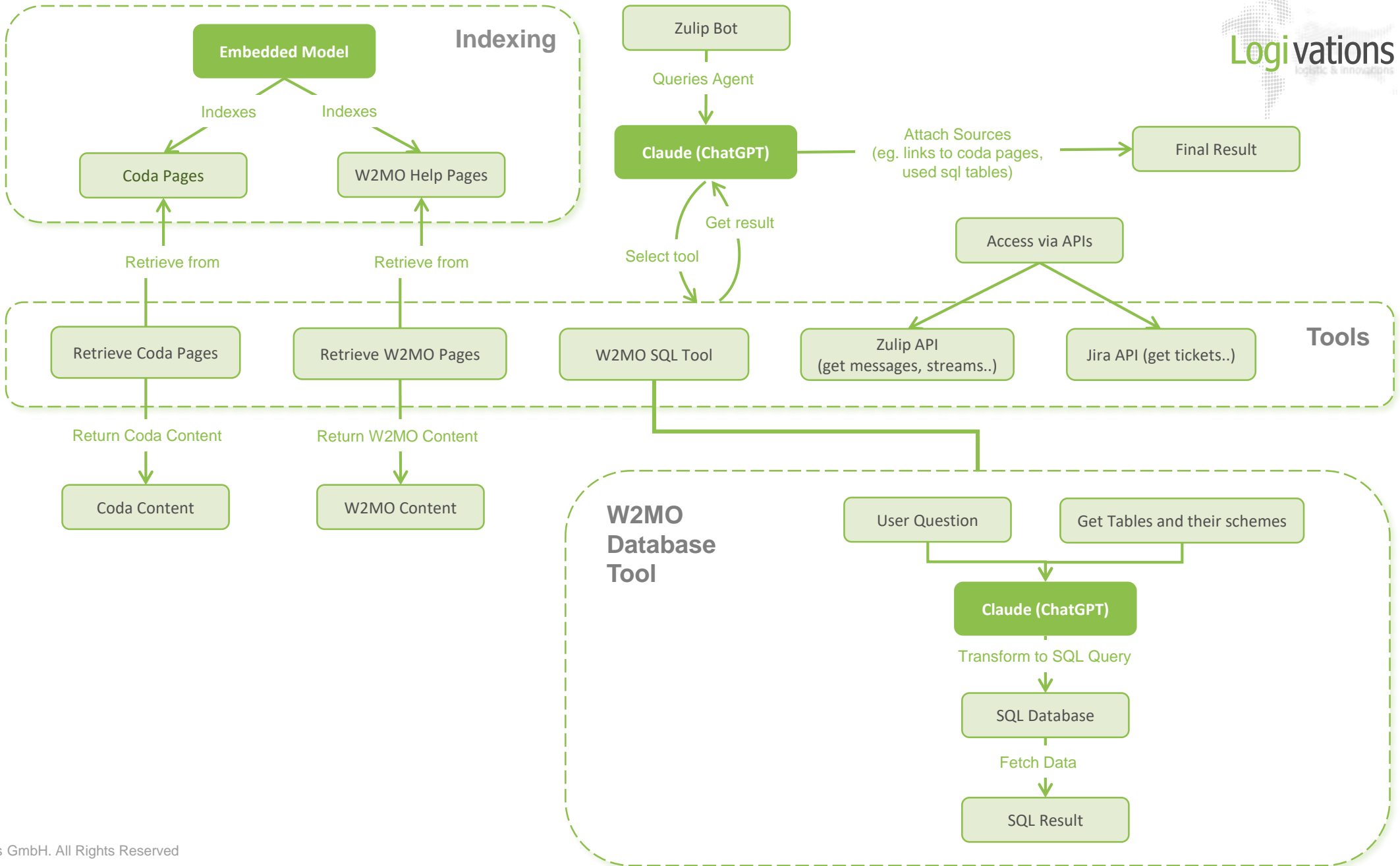
Real-Time Digital Twin – companywide access

Access to any recognition unit from any device – worldwide

Video streams and Digital Twins from any location to any device



Integration generative AI in W2MO



Profitability: potential benefits

- Avoidance of scanning times, generally over 98%
- Absolute inventory accuracy at any time, stock issues/arrivals can be visually documented if necessary
- Avoidance of incorrect loading, proof of the condition of the goods
- Tracking of the position of goods: much more accurate than the WMS, as the position of a goods item is also known, e.g. in a bulk area - often a WMS is no longer required
- Integration with scan and measurement gates
- Fleet management: holistic, across all means of transport (AGV, forklift, hand pallet truck, conveyor, tugger train, ...)
- Fleet efficiency, productivity of material handling vehicles
- Working time recording, process analyses
- Safety at work: warning of potential hazards
- Safety at work: not only current dangerous situations but also general risks can be assessed



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