SEA Vision @ UniPV
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SEAVISION

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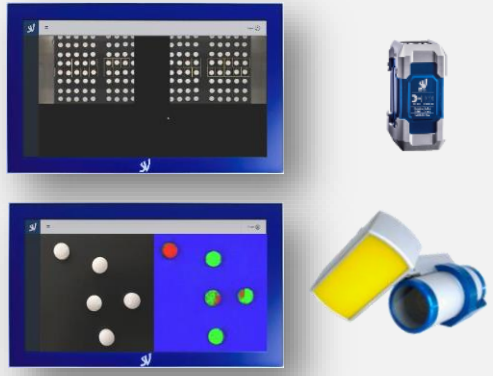
Business areas

Vision inspection systems



harleblister_
harletray_

Serialization and Aggregation solutions

tracker_

4.0 Pharma Software Suite

yudoo_

Software points of strength and

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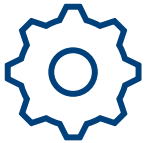
30 years of experience
100% Life Science focused

Full in-house software development - Proprietary Algorithms



In-house electronic and mechanical design

Full stack solution for Track&Trace and Brand Protection

Wide Experience and Consultancy for digitalization processes

+ 2000

Lines Managed in the world

+ 7000

Vision systems installed worldwide
(+18.000 cameras)

Some of our Best Pharma Customers

University and High School Co-operations

POLITECNICO MILANO 1863

UNIVERSITÀ DEGLI STUDI DI MILANO

Politecnico di Torino

UNIVERSITÀ DI PAVIA

UPO UNIVERSITÀ DEL PIEMONTE ORIENTALE

UNIVERSITA' DEGLI STUDI DI MILANO BICOCCA

Serialization and aggregation hierarchy model

(according to ISA 95)

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LEVEL 5
Government repository level

EMVO, MDLP, etc

LEVEL 4
Enterprise level

yudge_ — Serialization data manager

TTmonitoring_ — Track & Trace dashboards and BI

reworkapp_ — Warehouse Management

LEVEL 3
Plant level

ERP connector: yudesk+

MES connector: yulink_

yutrace_ yudesk_ — Serialization data manager; Product / Process data management

yuview_ yubi_ — Business intelligence analysis; Data analytics & KPIs

LEVEL 2
Line level

yurun_ yudesk_ — Line manager; Line data management; Recipe manager; Access control; Batch reports

yuview_ — Real-time dashboards; OEE & KPIs

LEVEL 1
Packaging systems level

Machine setup
Condition monitoring
Predictive maintenance
Remote assistance

Print and check

tracker_ — Serialization system

Machine setup
Condition monitoring
Predictive maintenance
Remote assistance
Advanced robotics

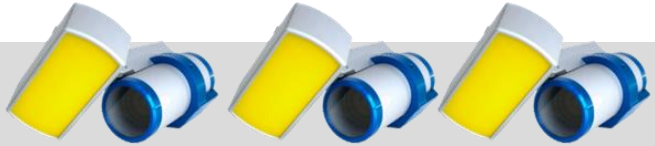
End of line equipment

tracker_ — Aggregation system

LEVEL 0
Devices level

Printer
Camera
Scanner

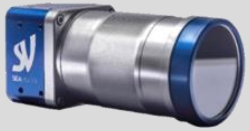
Camera
Camera
Printer
Scanner



Lights

Monitor

Ethernet PoE



Ethernet

I/O Cable

USB

LEVEL 0
Devices level

LEVEL 1
Packaging systems level

Harlequin Applications

Visual inspection on tablets, capsules and blisters

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Size


Shape

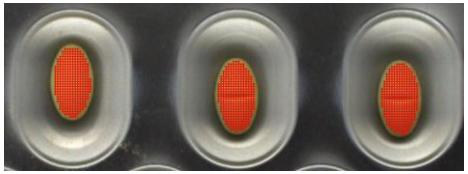
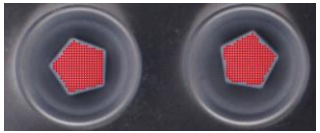
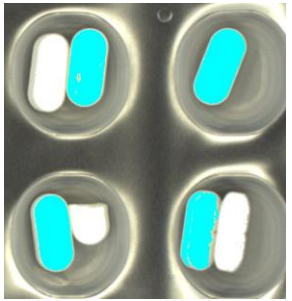
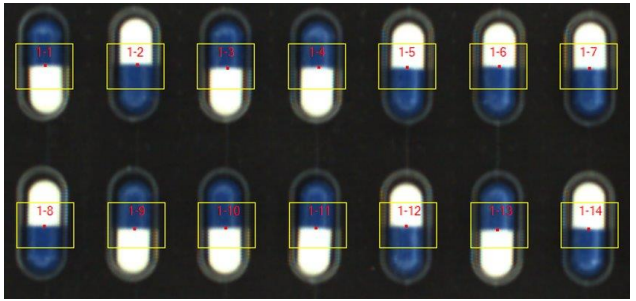

Color


Integrity

Chipped

Coating

Blister inspection

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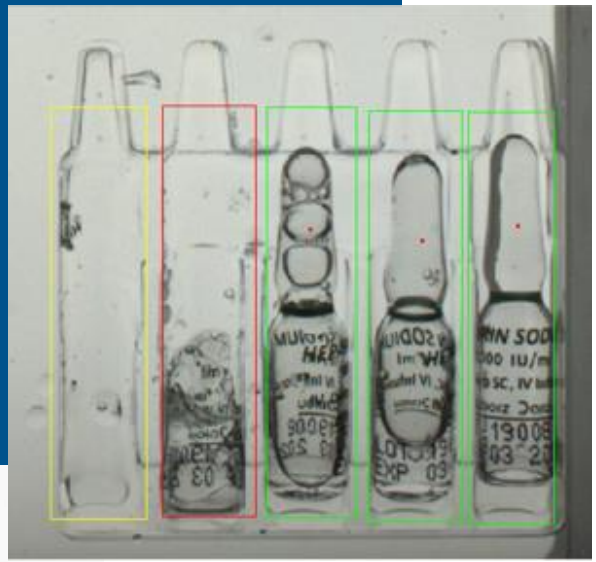
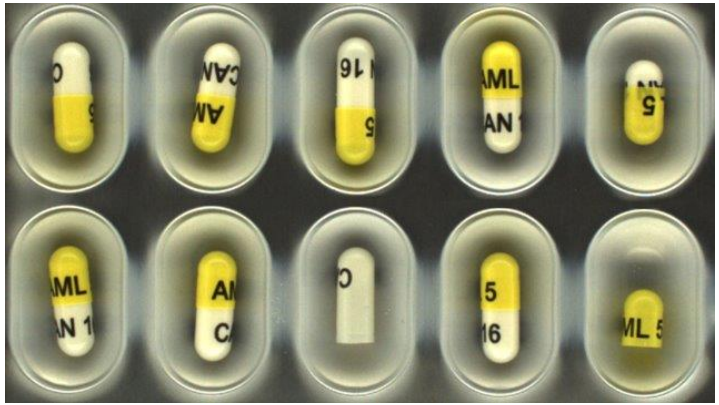
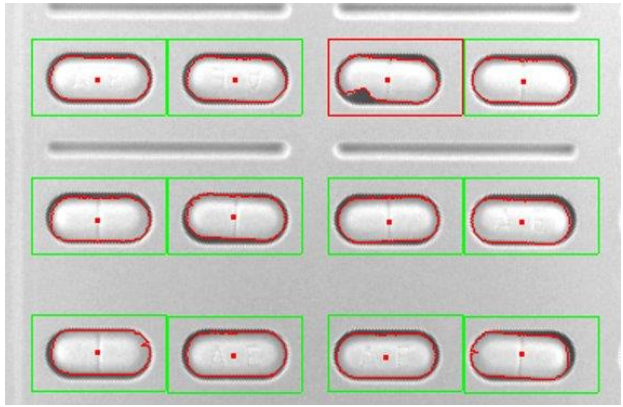
Integrity







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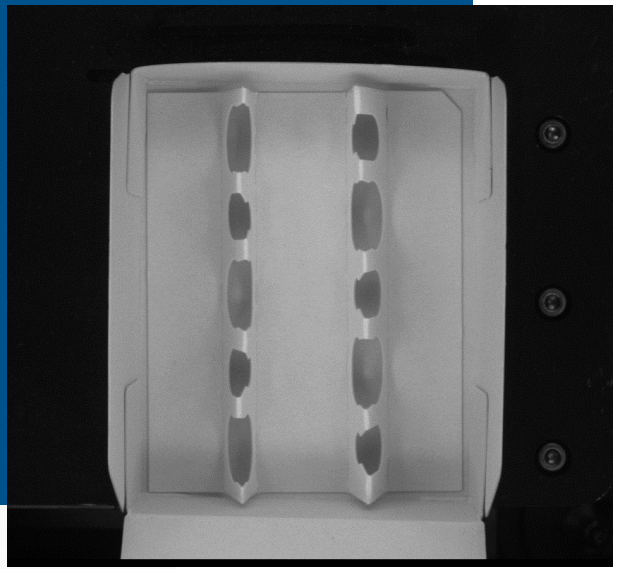
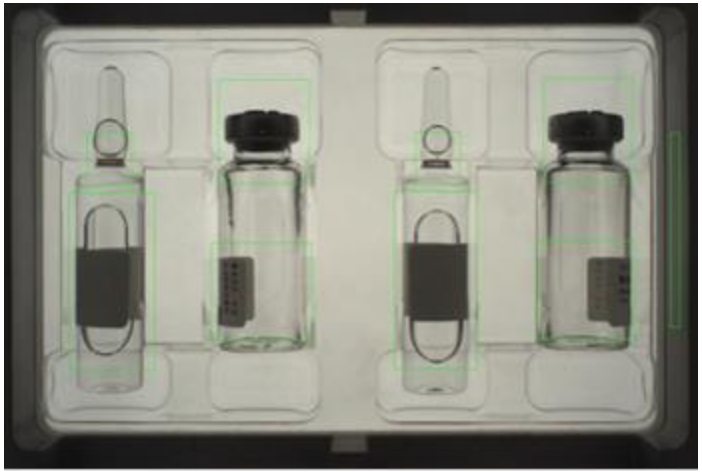
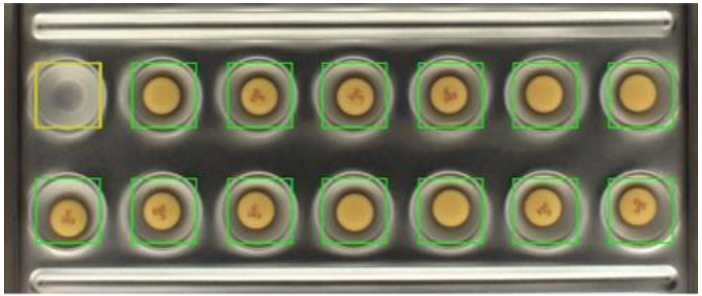
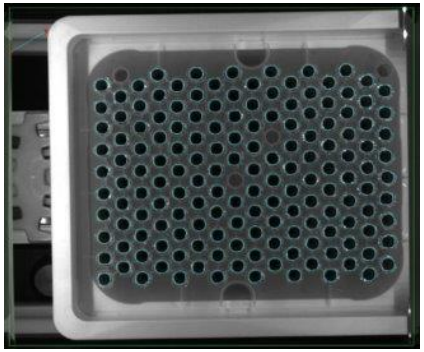
Presence

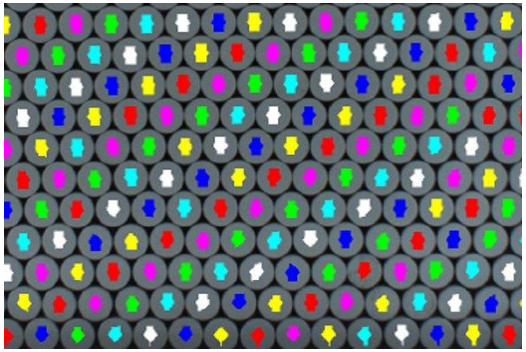






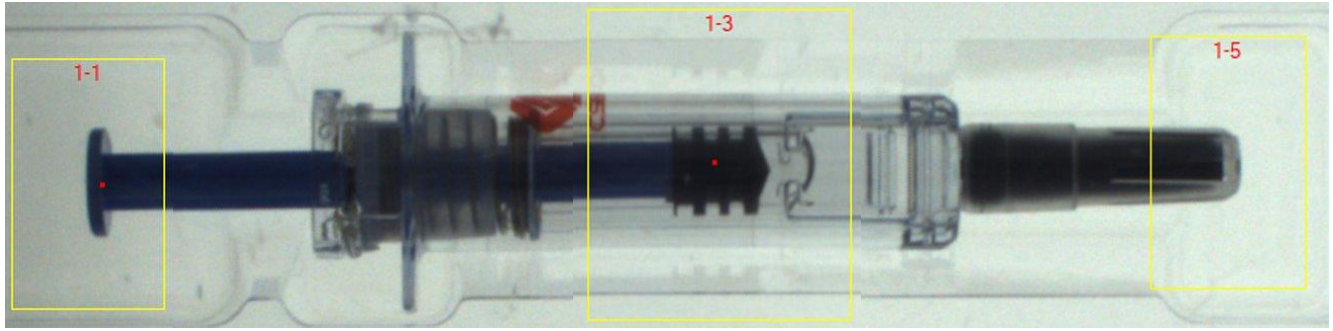
Count



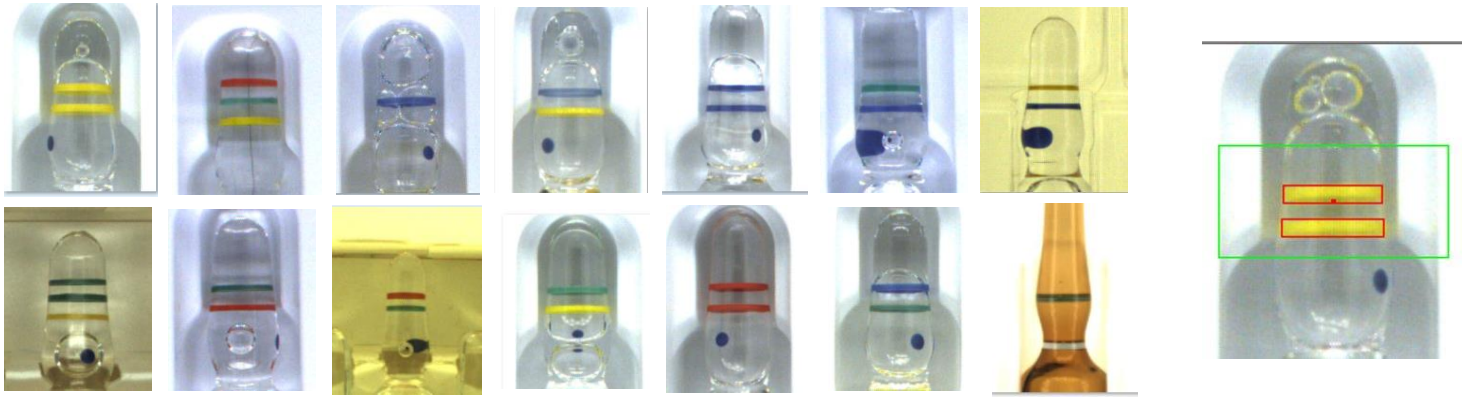



Tyvek® lid
1
Tyvek® insert
Nest
Tub
D2F
Label with ETO indicator

Multi-part inspection



Colored ring inspection



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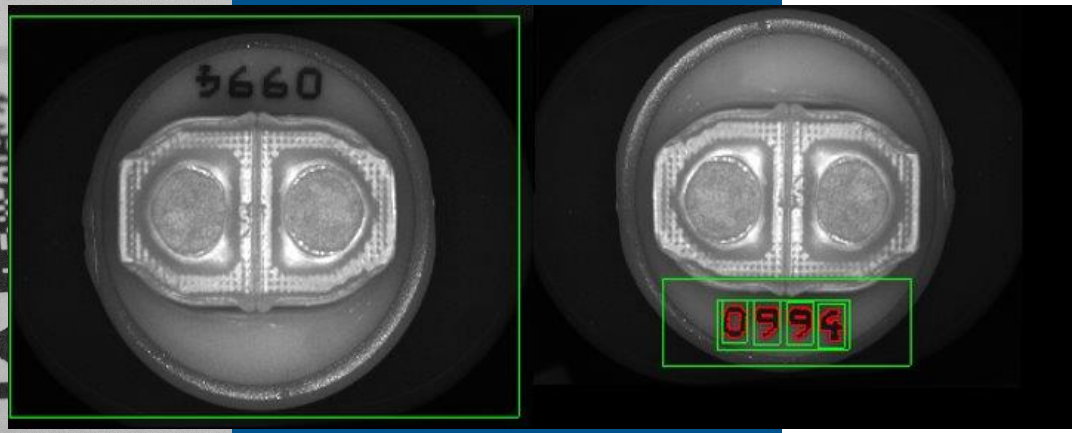
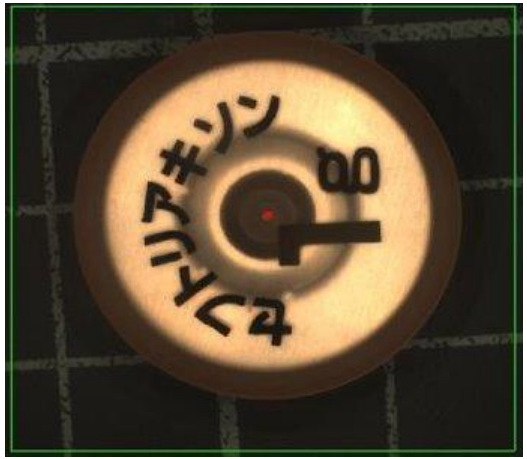
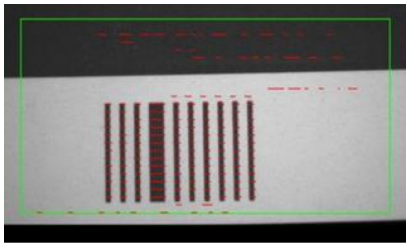
Characters

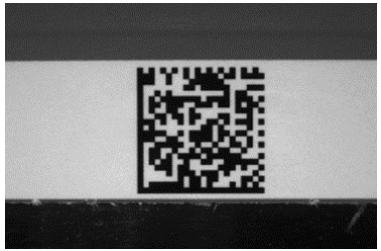
1.1.4.Characters

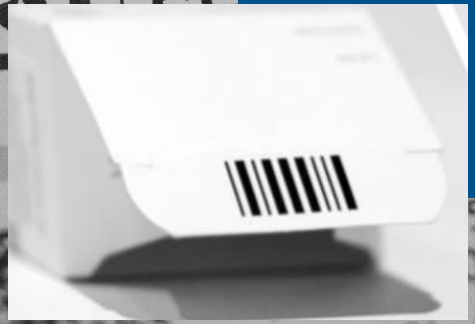


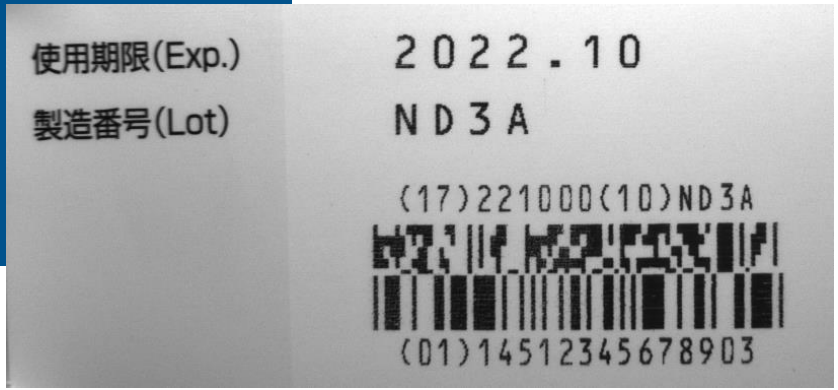


Codes





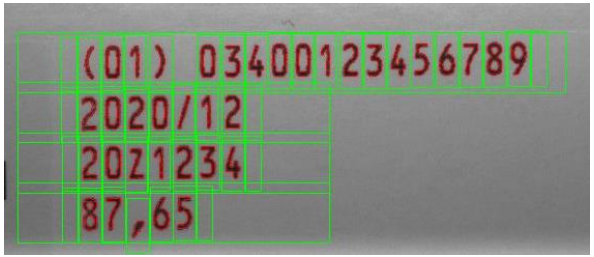


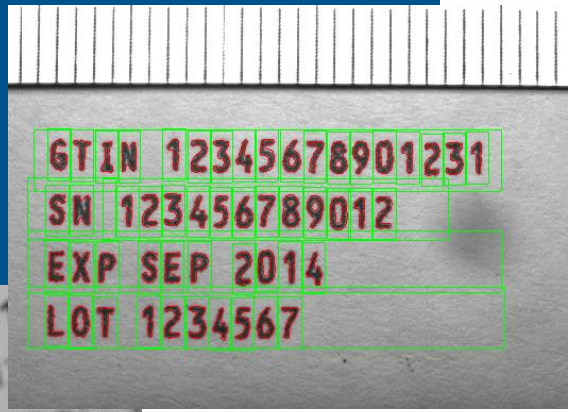


- Pharmacode
- Dual track pharmacode
- 128 code
- Code 39
- 2/5 Code
- 32 Code
- EAN8
- EAN13
- UPCA
- UPCE
- RSS-14
- RSS14 Stacked
- RSS Limited

Characters

ABCDEFGHIJKLMNOPQ
RSTUVWXYZÀÅÉÎÕØÜa



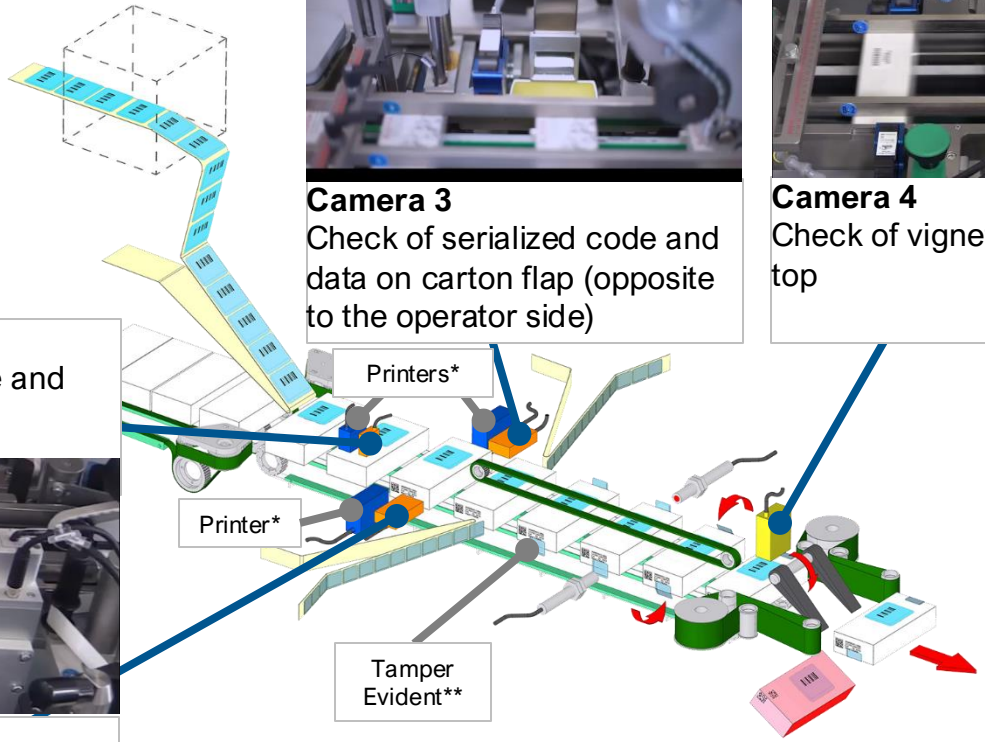


Components

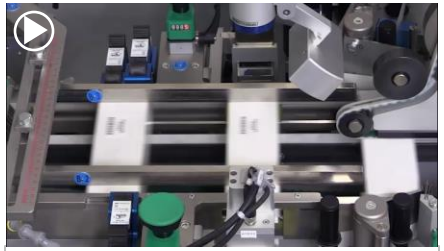

TEST MATERIAL
NOT FOR HUMAN USE
LABEL AREA
TEST MATERIAL
NOT FOR HUMAN USE

Tracker | Serialization possible configuration on print and labelling machine

Maximum installable cameras configuration is related to OEM machine features



Camera 3
Check of serialized code and data on carton flap (opposite to the operator side)



Camera 4
Check of vignette on carton top

*Tracker manages serialized code and data printing

**Tracker manage automatically decommission of cartons with wrong tamper evident application

Camera 2
Check of serialized code and data on carton top

Camera 1
Check of serialized code and data on carton flap (operator side)

Click on the videos to play

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...surprised?

Our Artificial Intelligence vision system has detected many more: lots of pinholes and differences in colour, as well as the scratch you saw, visible with the naked eye.

Line Clearance

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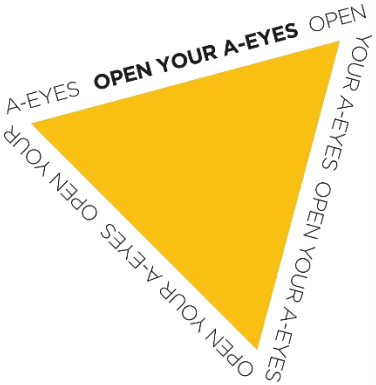
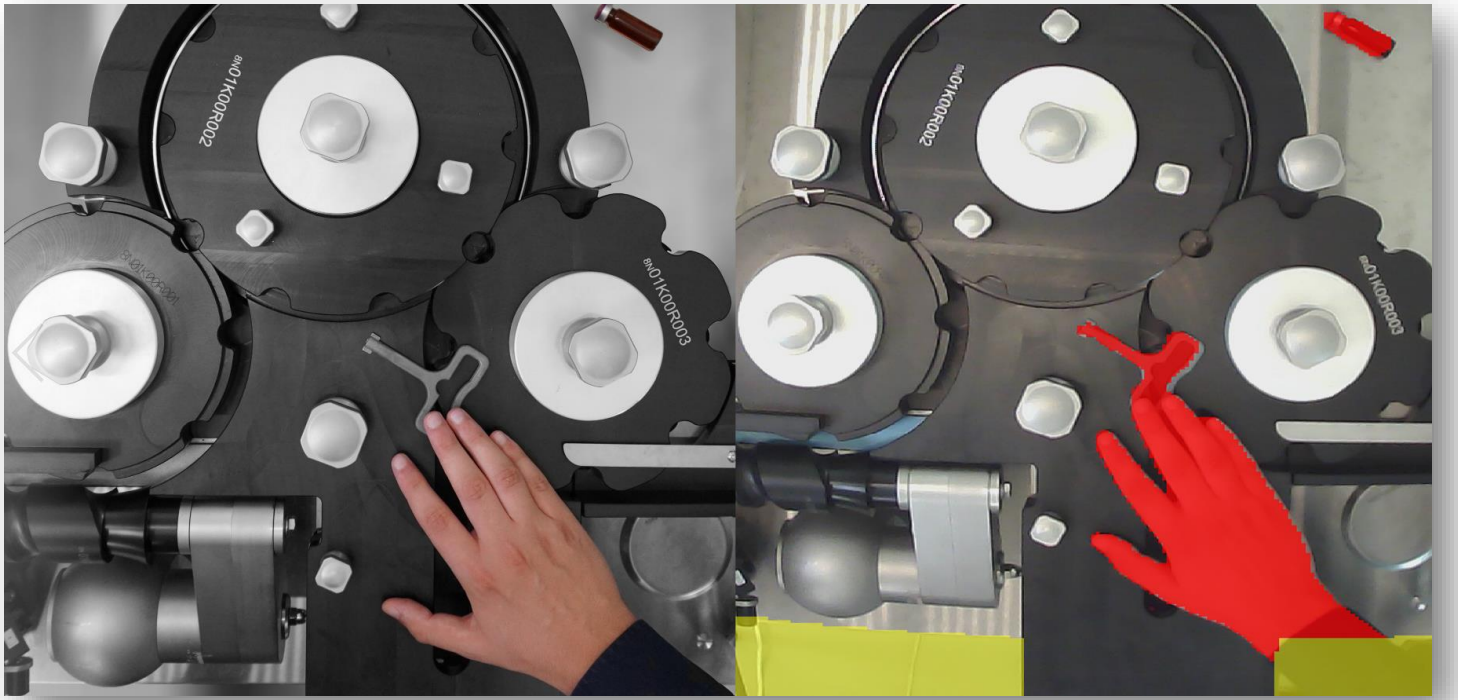
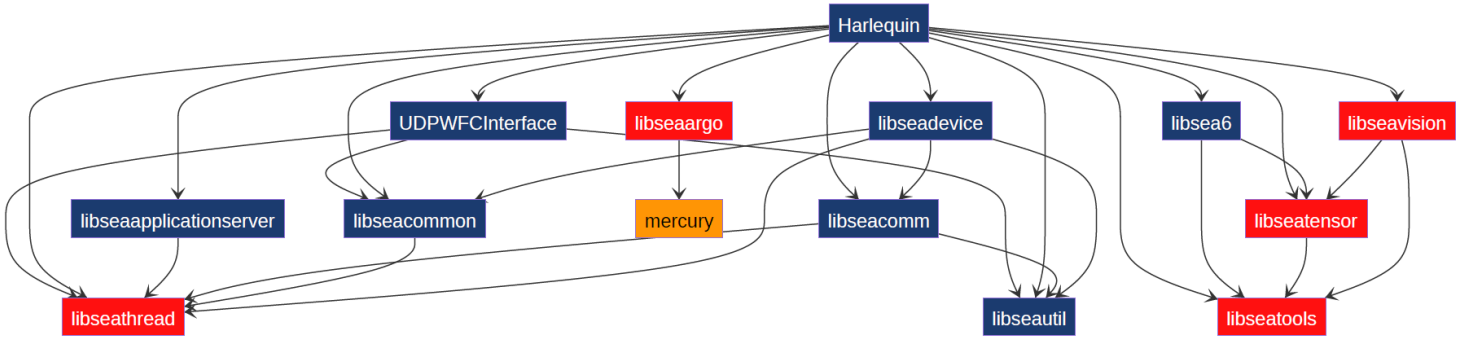




Harlequin Architecture

Harlequin architecture



Library	Responsibility
libseaargo	Mercury library integration.
libseacomm	Communication with peripherals.
libseacommon	Business-logic shared with layers 3 and 4.
libseatensor	Data structures and operators on tensors.
libseathread	Multi-threading management.
libseatools	General-purpose utility.
libseautil	MFC-based general-purpose utilities.
libseavision	Vision algorithms.
mercury	Integrated vision system to offer neural network evaluation tools.

Project proposals

1. Code reading

Analysis of **performances** and comparison between our linear, QR and datamatrix code reader and state of the art in literature (**timing, grading, robustness**)

- Creation of a hybrid test dataset: **real** (we can provide support) and **synthetic** (with controlled degradation)
- Can be limited to QR codes but best if extendable to DataMatrix and Barcodes

1. Code reading

ISO/IEC 15415 Quality Parameters

Symbol Contrast refers to the difference between the darkest and the lightest modules.	
Modulation measures local variations in contrast.	
Fixed Pattern Damage includes errors with the L sides or clock pattern or quiet zone.	
Axial Non-uniformity refers to the uneven scaling of the code.	
Grid Non-uniformity measures the biggest deviation from the grid.	

2. Image Processing algorithms

Analysis and comparison between legacy, new and SoA for selected image processing algorithms in our library (i.e. morphology, connected-component labeling, edge detection).

The goals are:

- Compare legacy vs new algorithms in place vs state of the art
- Create a "datasheet" for our image processing algorithms
- Algorithm instrumentation and automate measurements

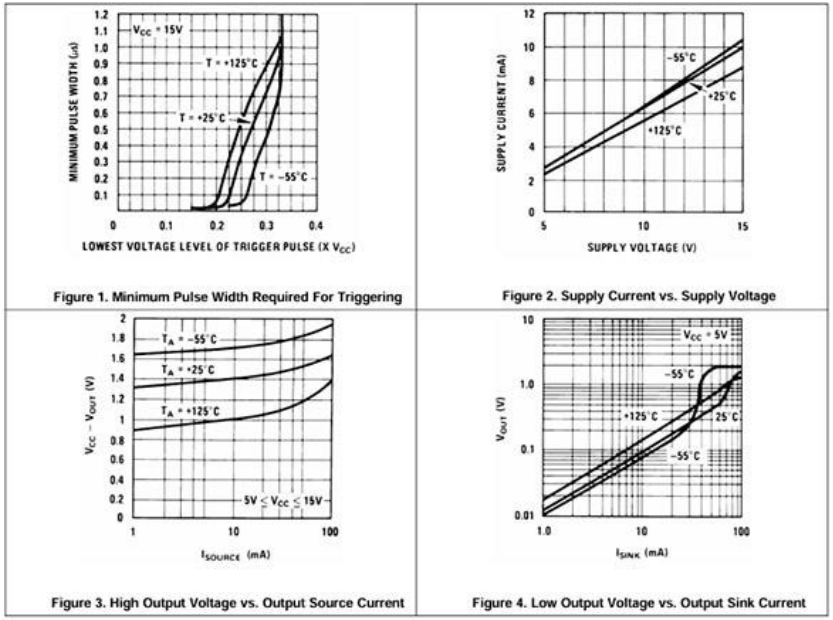


Figure 1. Minimum Pulse Width Required For Triggering

Figure 2. Supply Current vs. Supply Voltage

Figure 3. High Output Voltage vs. Output Source Current

Figure 4. Low Output Voltage vs. Output Sink Current

3. Domain Specific Language (DSL)

Literature review and proposal for a Domain Specific Language to describe image processing sequence for anomaly detection

⟨*statement*⟩ ::= [Under ⟨*subprocess*⟩ ‘,’] ⟨*role*⟩ ⟨*binding_expr*⟩ [⟨*endorse_constraint*⟩] ‘;’
| ⟨*role*⟩ is ‘case-creator’ ‘;’

⟨*binding_expr*⟩ ::= (‘nominates’ | ‘releases’) ⟨*role*⟩ [⟨*binding_constraint*⟩]

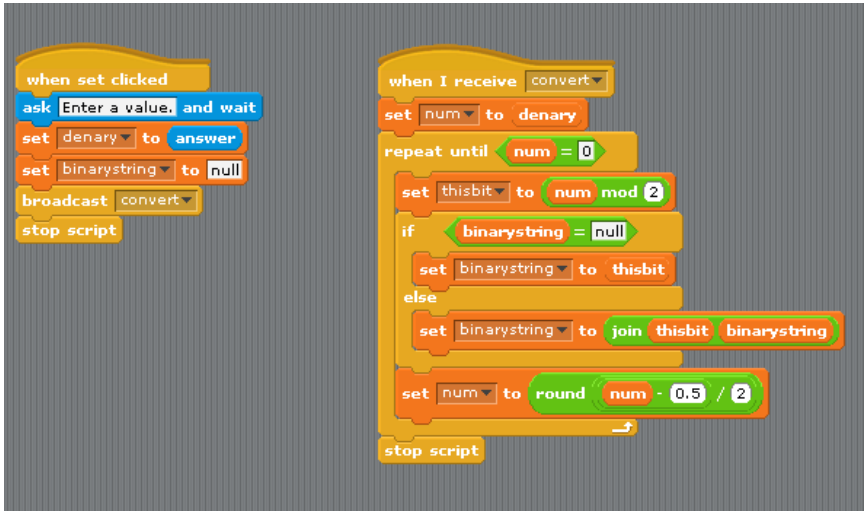
⟨*binding_constraint*⟩ ::= (‘in’ | ‘not in’) ⟨*set_expr*⟩

⟨*endorse_constraint*⟩ ::= ‘endorsed-by’ ⟨*set_expr*⟩
| ‘with’ ⟨*vote_ratio*⟩ ‘votes’ [‘by’ ⟨*role_list*⟩]

⟨*set_exp*⟩ ::= ⟨*role*⟩
| ⟨*role*⟩ (‘and’ | ‘or’) ⟨*set_expr*⟩
| ‘(’ ⟨*set_exp*⟩ ‘)’

⟨*vote_ratio*⟩ ::= ⟨*floating_number*⟩

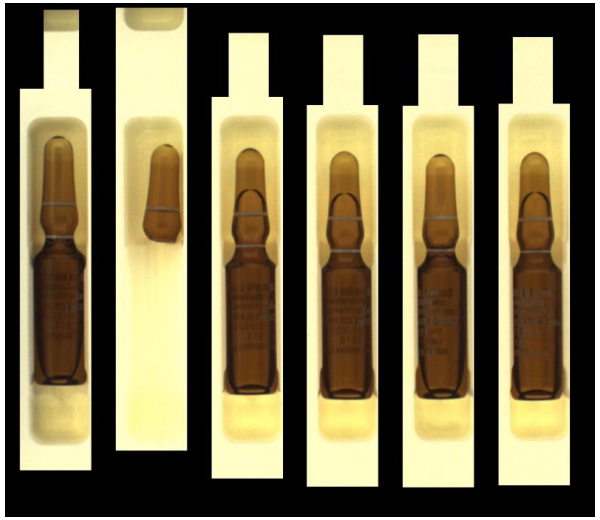
⟨*role_list*⟩ ::= ⟨*role*⟩
| ⟨*role*⟩ ‘,’ ⟨*role_list*⟩

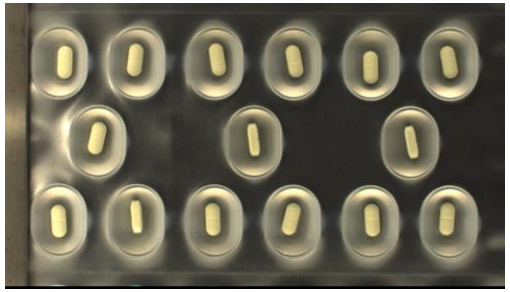


4. Synthetic input data

System to create synthetic input, using photorealistic rendering techniques (and related tools) to be used as performance testing.

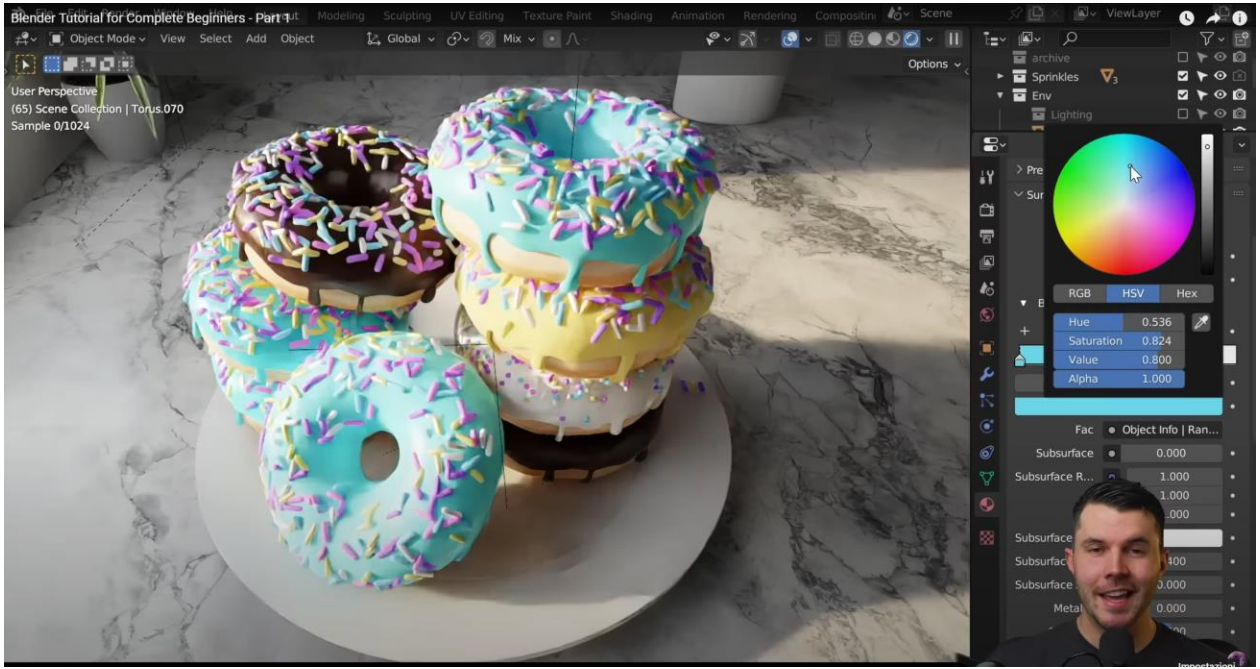
- Geometry (mesh)
  - Bonus: procedural mesh shattering / degradation
- Materials (shaders)
  - Bonus: procedural surface anomalies
- Lighting (raytrace and post-process)
- Camera lenses: Field of View (FoV), Depth of Field (DoF), distortions,





4. Synthetic input data

Start with the Blender Donut first!
https://www.youtube.com/watch?v=B0J27sf9N1Y



Contacts

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