



MACHINE
VISION
MAKERS

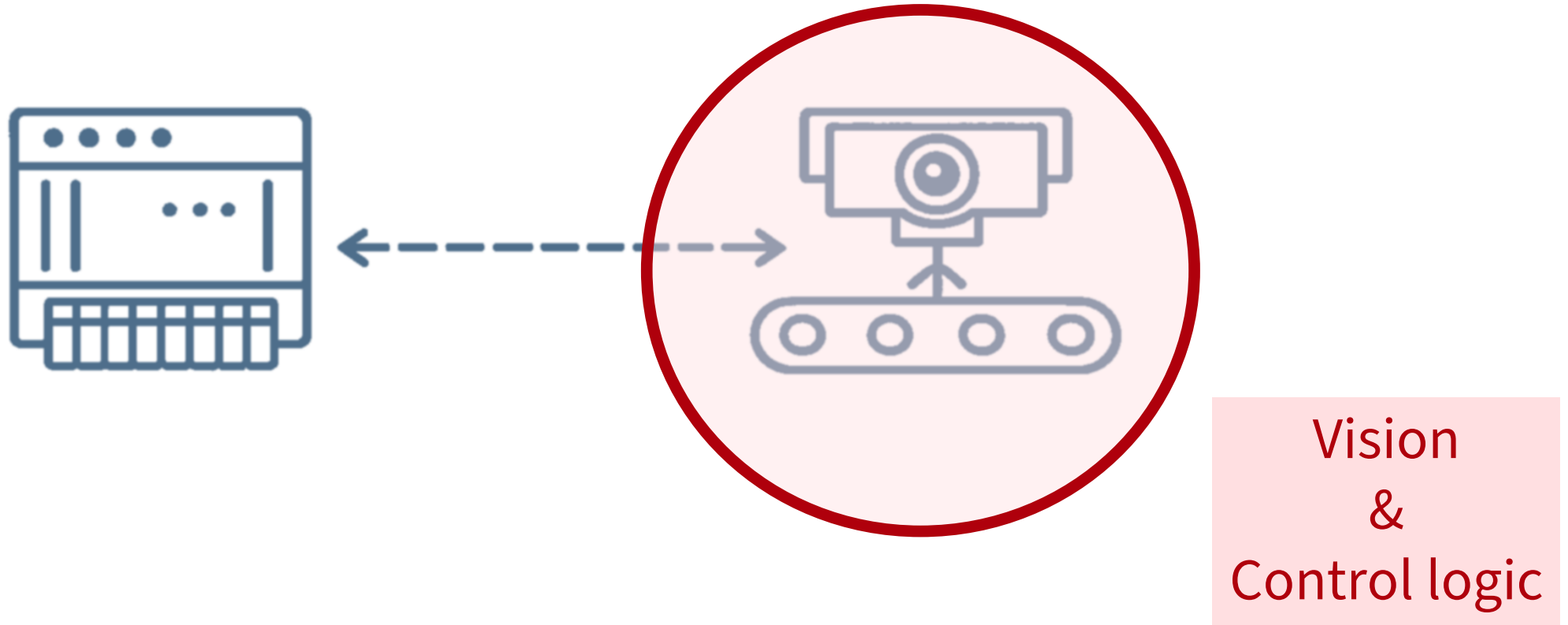
Adding an HTML-based GUI to the HALCON Development Workflow

Andreas Heindl and Stefan Rahmann

Machine Vision Makers

MVTec Innovation Day 2026

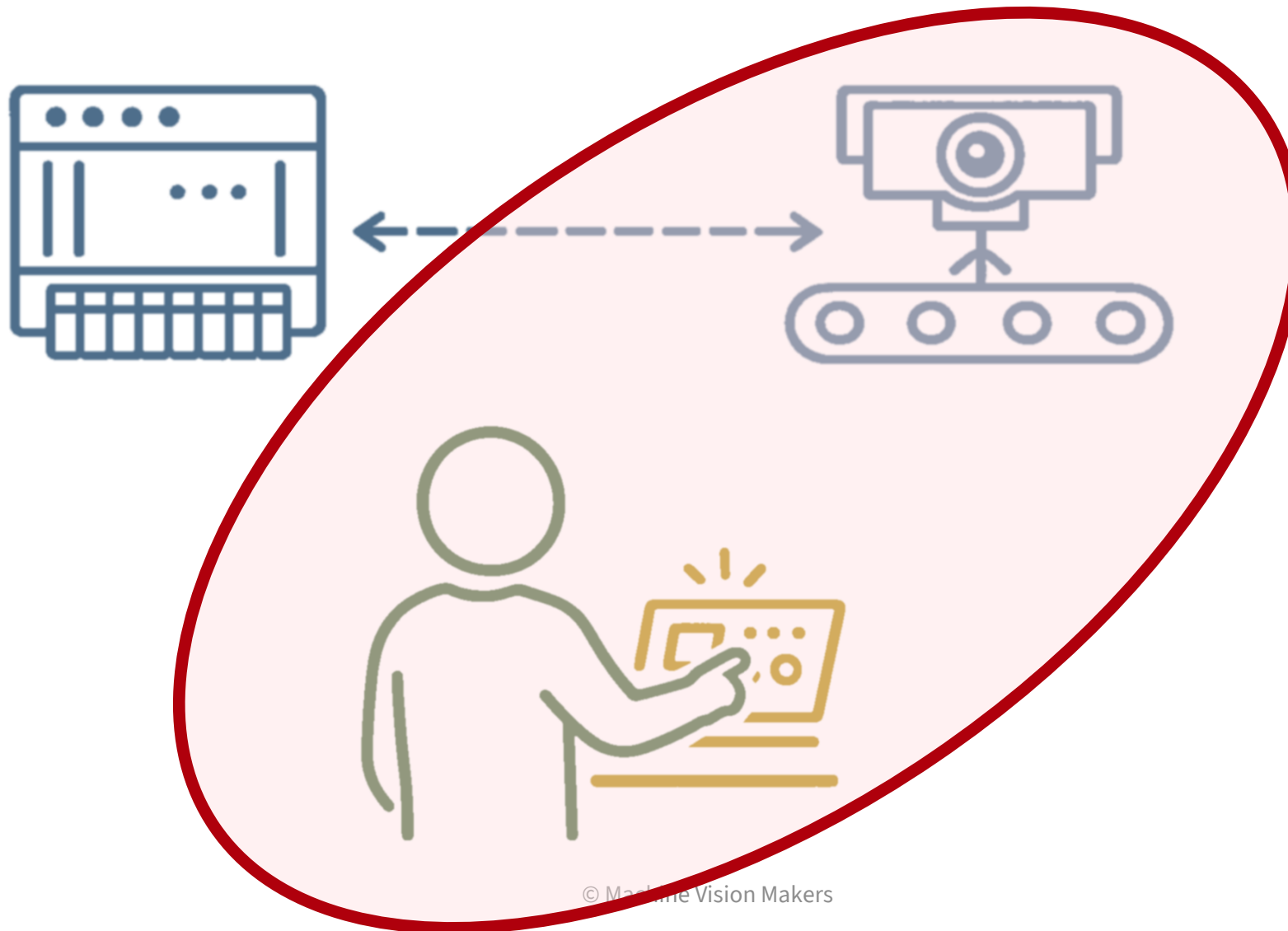
The starting point



The requirement: a graphical user interface

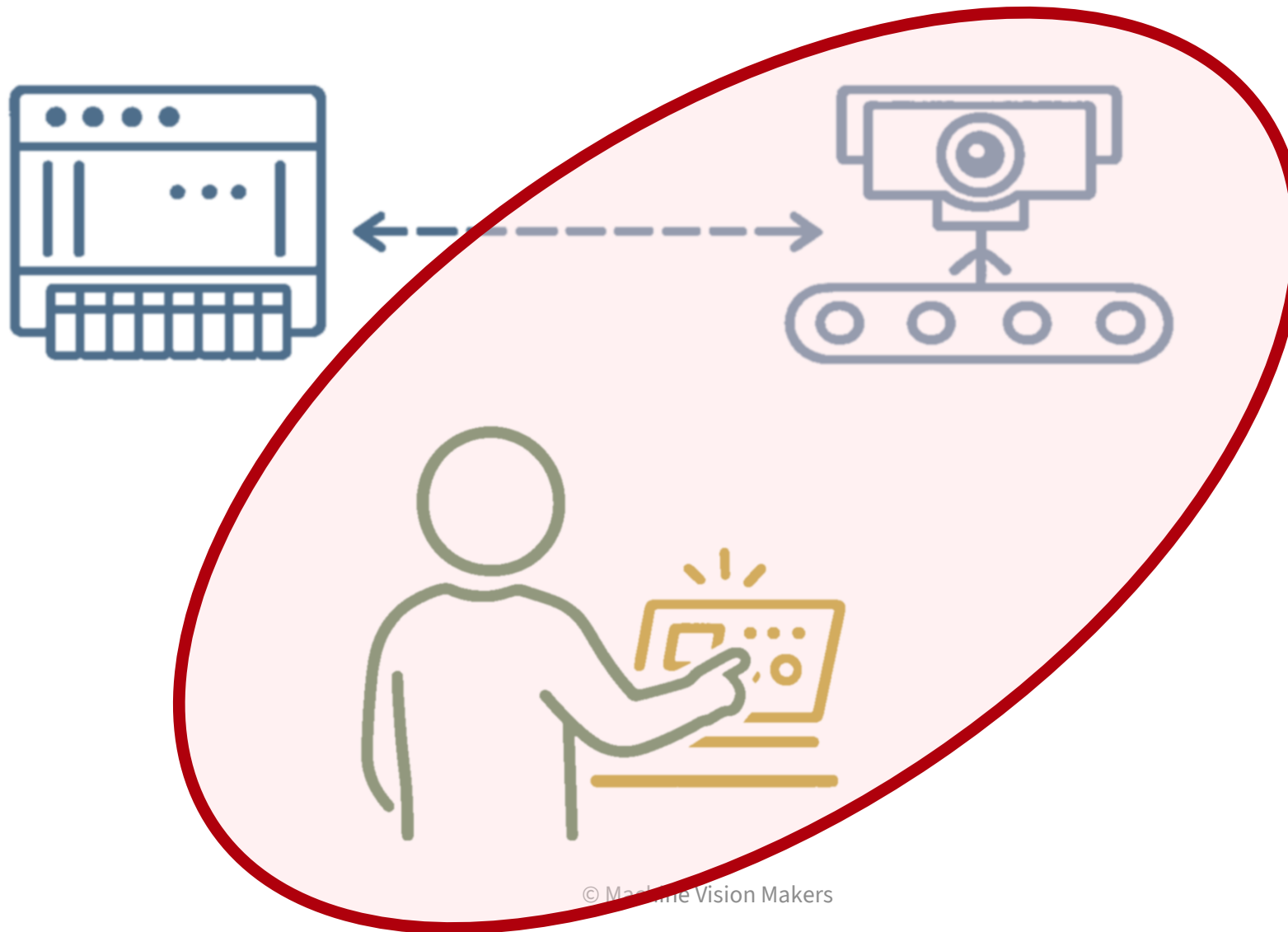


The goal: adding a GUI



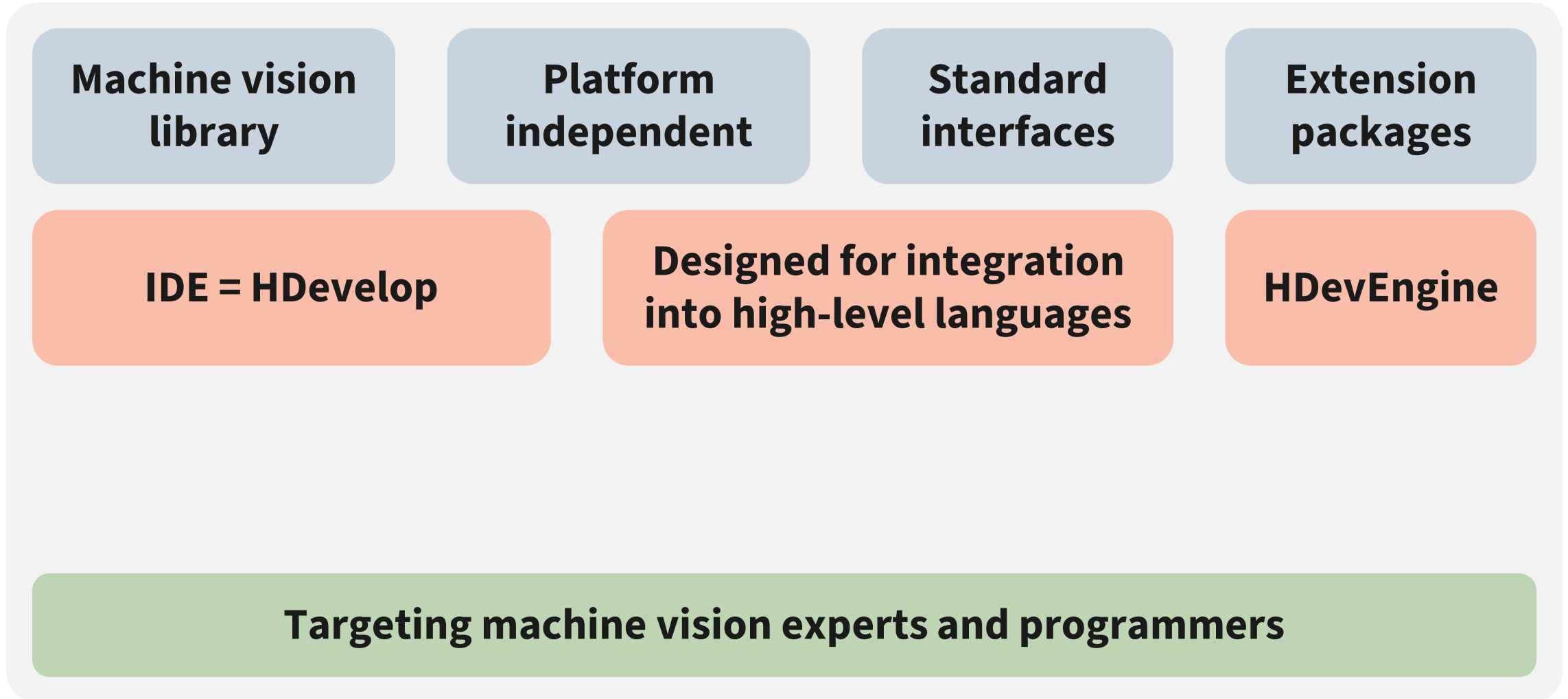
Vision
&
Control logic
&
GUI

The concept: integrating a GUI extension package

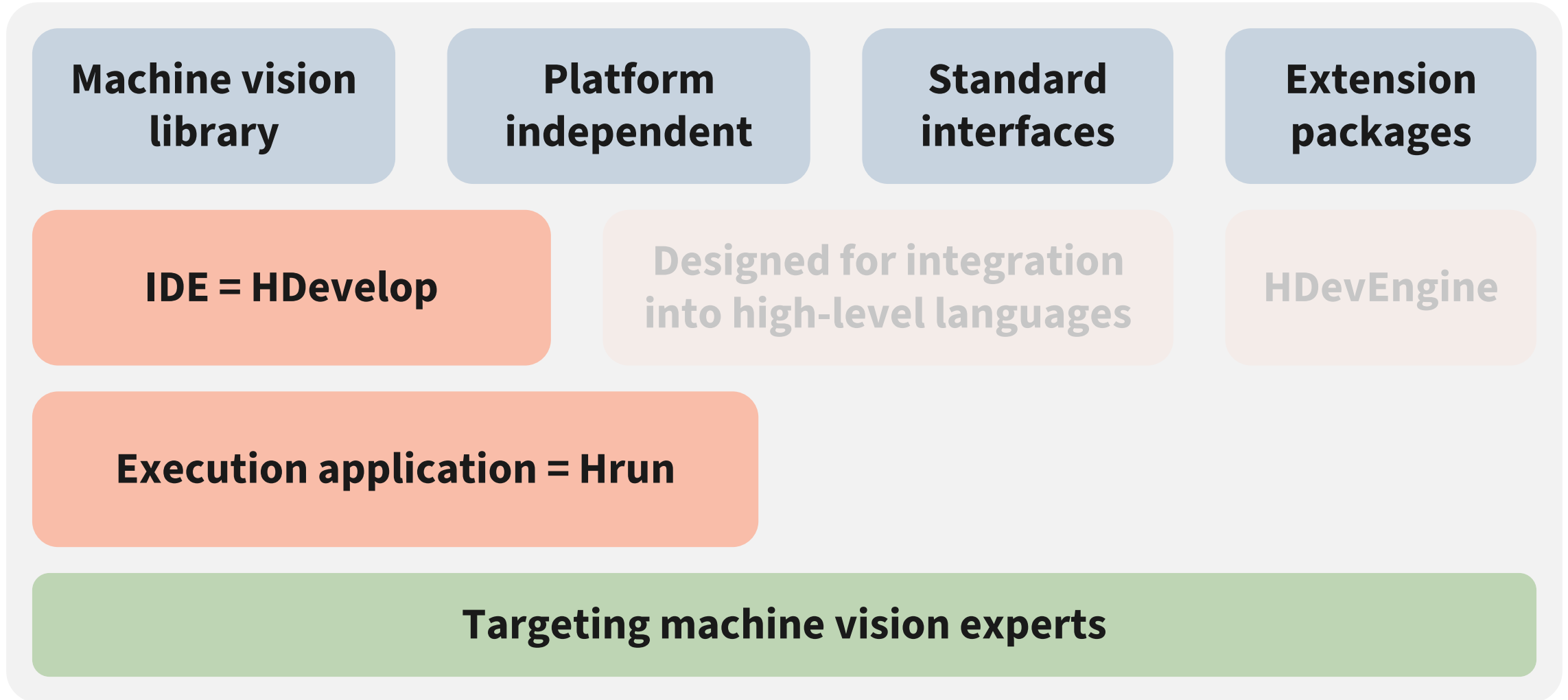


Vision
&
Control logic
&
GUI
=
HDevGUI

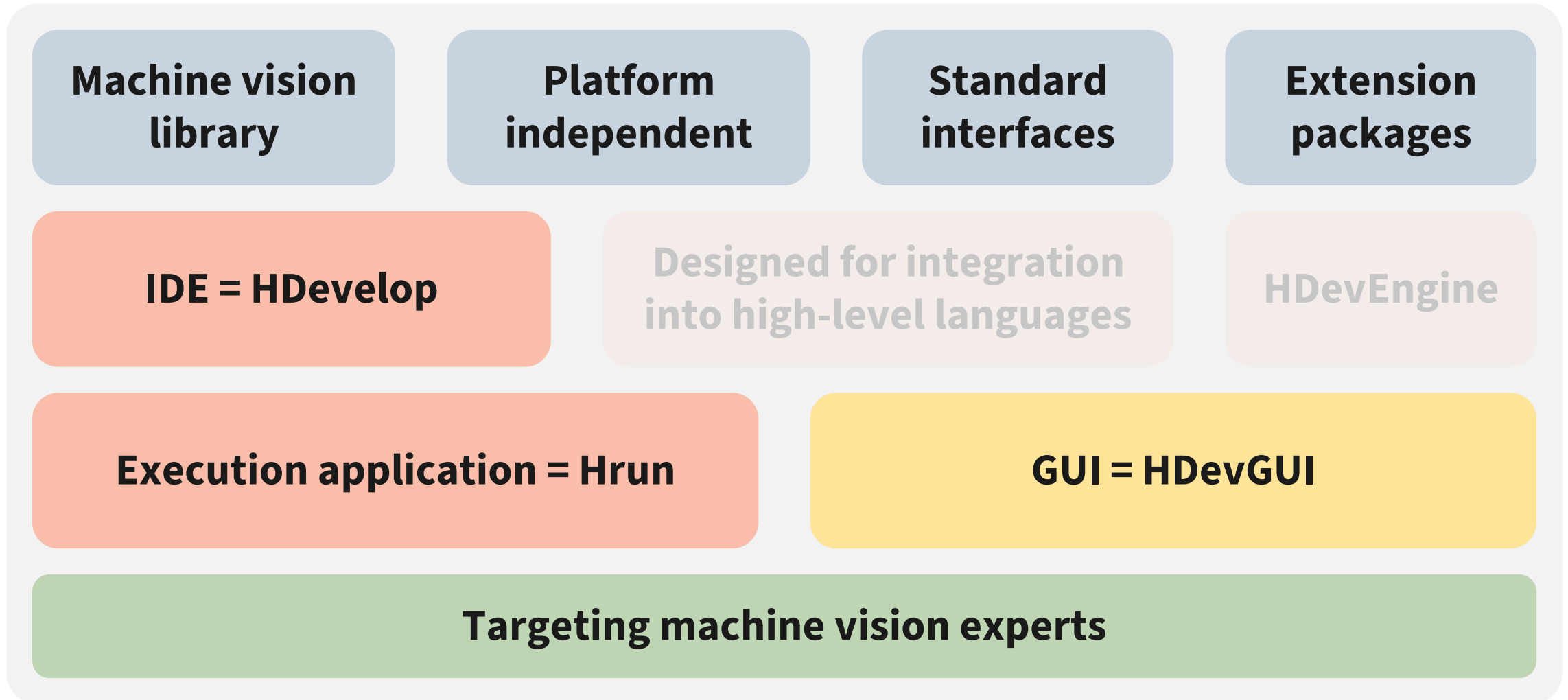
The architecture of HALCON



Execution of scripts



The HDevelop Graphical User Interface



Traditionally, the Halconist is juggling 2 tools



Alternatively, the Halconist keeps it simple



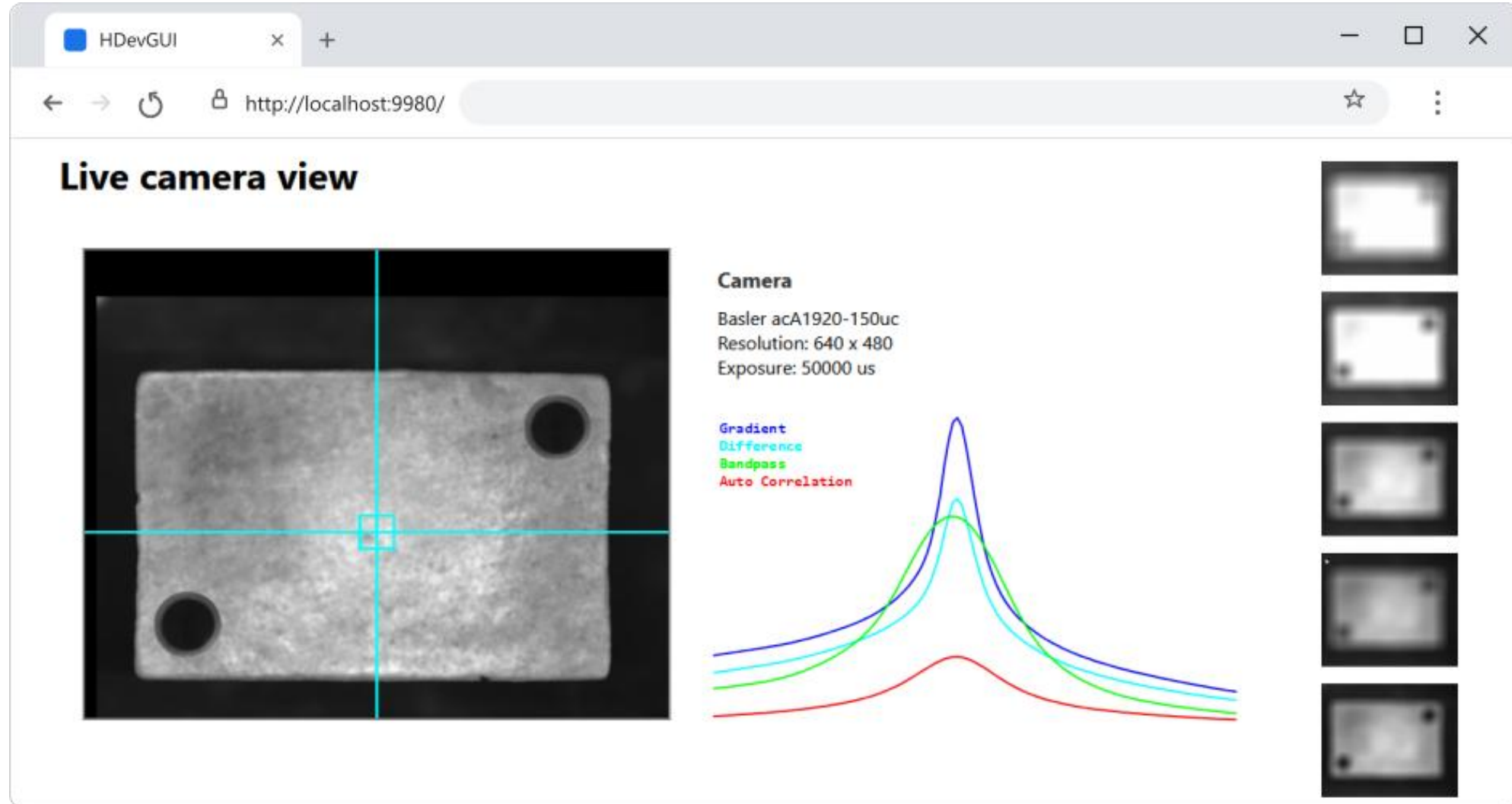
Why a HTML based web GUI?

- Platform independent
- Simple & standard technological components
- Flexible frontend / deployment
 - 1) Frontend = browser, no additional installation
 - 2) Remote access
 - 3) Desktop application
 - 4) Integration into other systems (like PLC) via <iFrame>
- Huge developer community plus a lot of add-ons

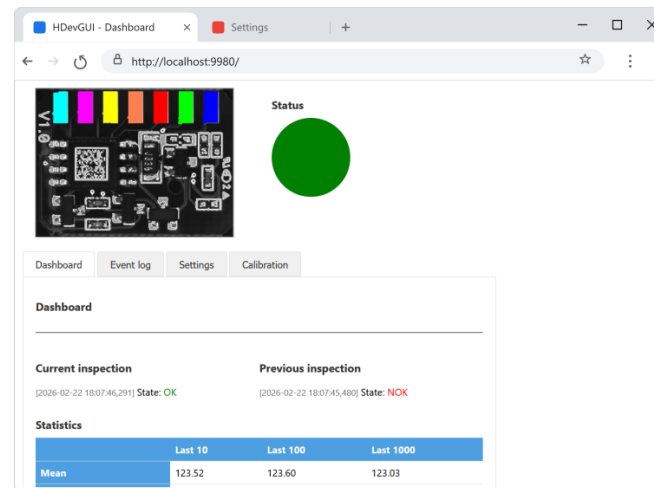


- Hand over to Andreas

Typical applications (I) – Live camera view



Typical applications (II) – Inspection

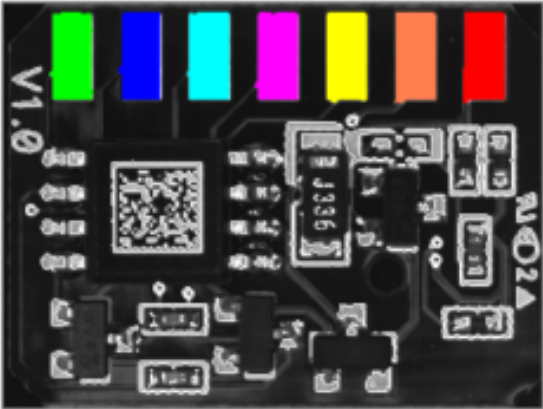


HDevGUI - Dashboard

Settings

+

← → ↺ http://localhost:9980/ ☆ ⋮



Status



Dashboard

Event log

Settings

Calibration

Dashboard

Current inspection

[2026-02-22 18:14:20,380] State: **NOK**

Previous inspection

[2026-02-22 18:14:19,564] State: **NOK**

Statistics

	Last 10	Last 100	Last 1000
Mean	123.62	123.62	123.43

Browser tabs: HDevGUI - Event log, Settings

Address bar: http://localhost:9980/

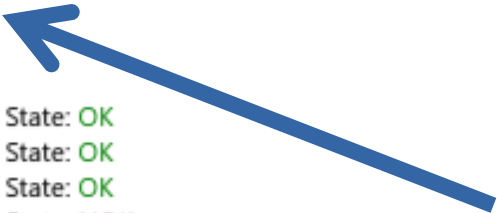
Image of a circuit board (V1.0) with color calibration bars (cyan, magenta, yellow, orange, red, green, blue).

Status: A large green circle.

Navigation tabs: Dashboard, Event log, Settings, Calibration

Event log

- [2026-02-22 18:08:51,317] State: OK
- [2026-02-22 18:08:52,133] State: OK
- [2026-02-22 18:08:52,948] State: OK
- [2026-02-22 18:08:53,760] State: NOK
- [2026-02-22 18:08:54,570] State: NOK
- [2026-02-22 18:08:55,382] State: OK
- [2026-02-22 18:08:56,193] State: NOK
- [2026-02-22 18:08:57,01] State: OK



HDevGUI - Settings

Settings

+

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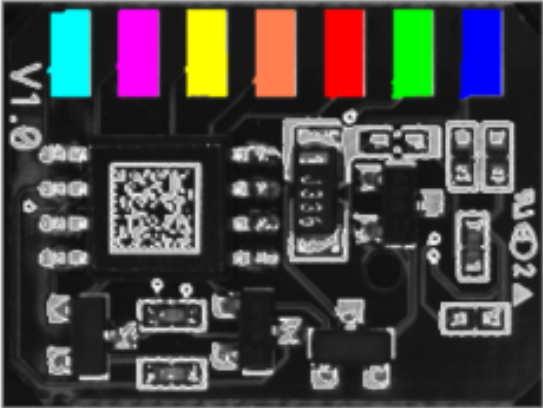
→

↺

http://localhost:9980/

☆

⋮



Status



Dashboard

Event log

Settings

Calibration

Settings

Current Product:

☒ Iron Stick

☐ Pipe

☐ Iron Gear Wheel

Threshold

Slide the threshold value until your subject is solid and distinct, stopping just before background noise or artifacts begin to appear in the image.

HDevGUI - Calibration

Settings

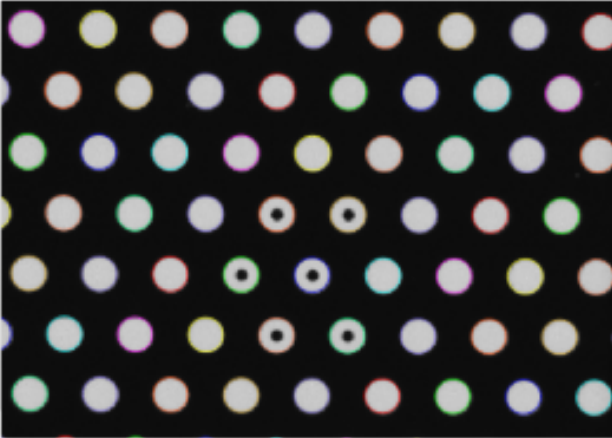
+

← → ↺

http://localhost:9980/

☆

⋮



Dashboard

Event log

Settings

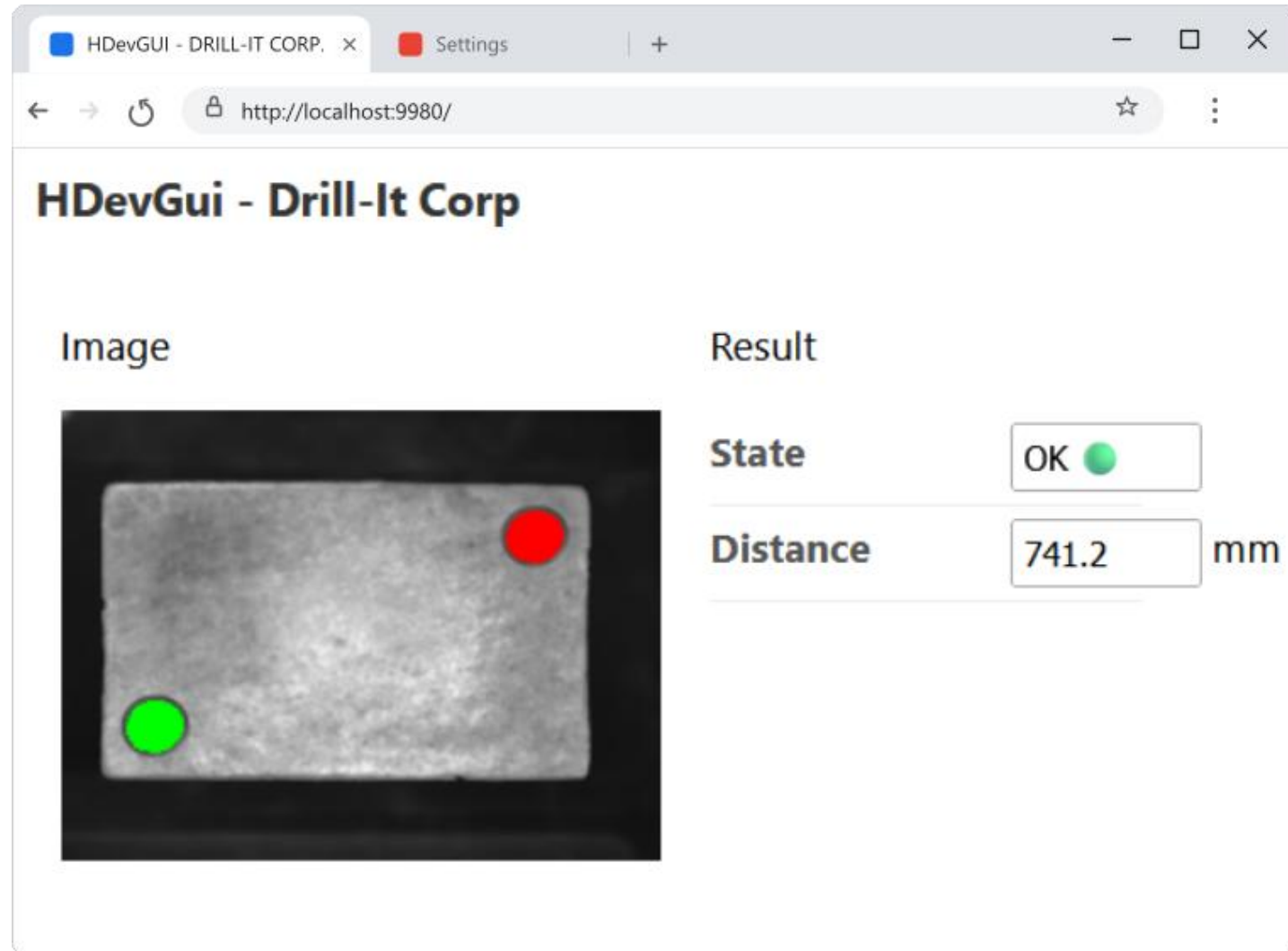
Calibration

Calibration

How to Calibrate Your Camera in HALCON

- 1. Prepare the Calibration Plate**
 - Place a standard calibration plate within your camera's line of sight.
 - Ensure the plate is evenly and well-illuminated so the software can easily detect its features.
- 2. Capture a Series of Images**
 - Acquire a series of **10 to 20 images** of the calibration plate.
 - **Crucial Step:** Between each image, change the position and tilt of the plate. Make sure you move it around so that it covers different areas across the camera's entire field of view (top, bottom, edges, and center).
- 3. Execute the Calibration Operator**
 - Once you have gathered your images, run the `calibrate_cameras` operator on the data.
 - HALCON will process these images to optimize the model and calculate the precise internal

Typical applications (III) – DRILL-IT CORP.



HALCON Extension Package

- Extension Package
 - Web server
 - WebSocket communication
 - Javascript framework library hdevguilib

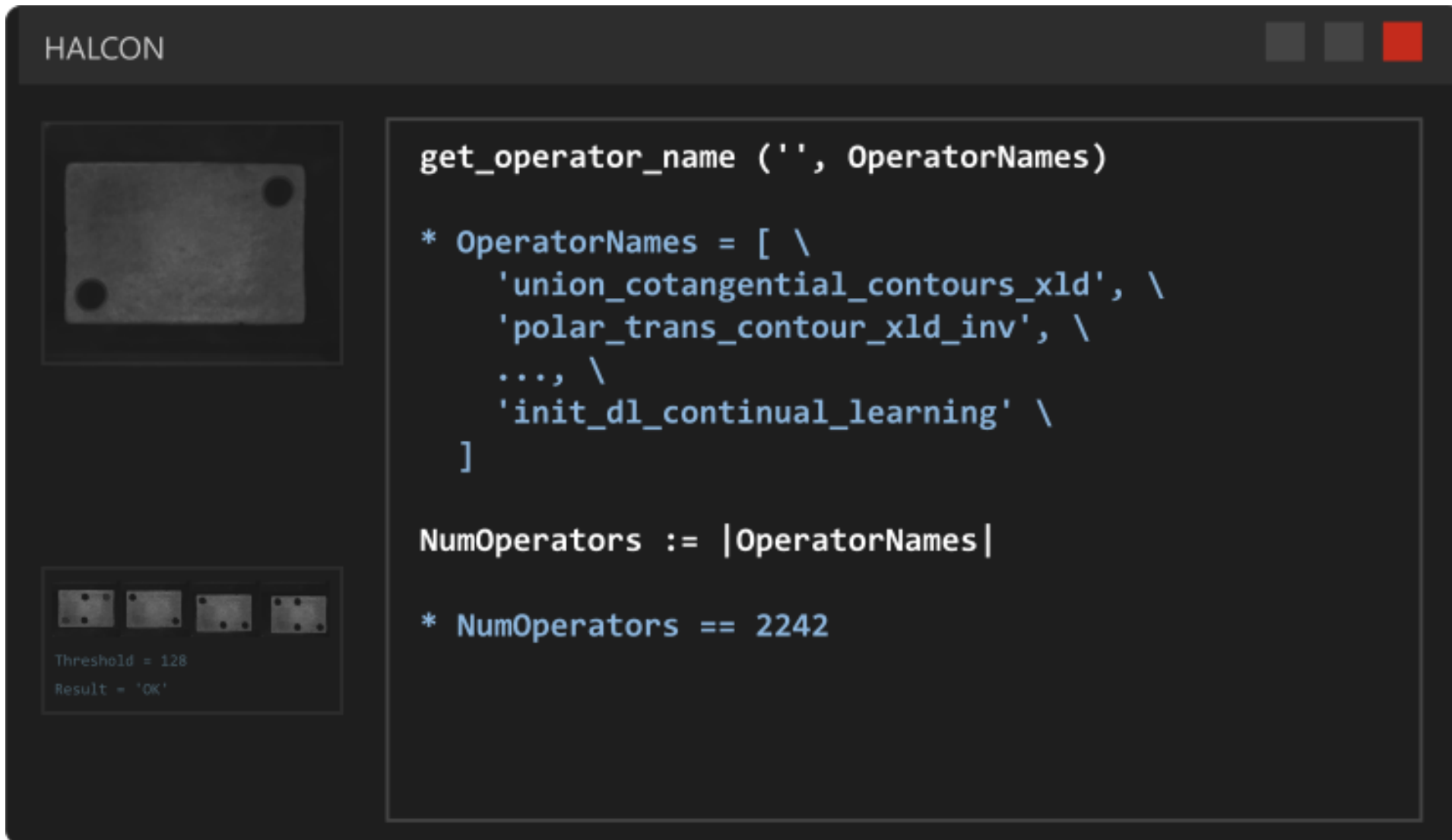
What's an Extension Package?

- Activated by setting environment variable HALCONEXTENSIONS

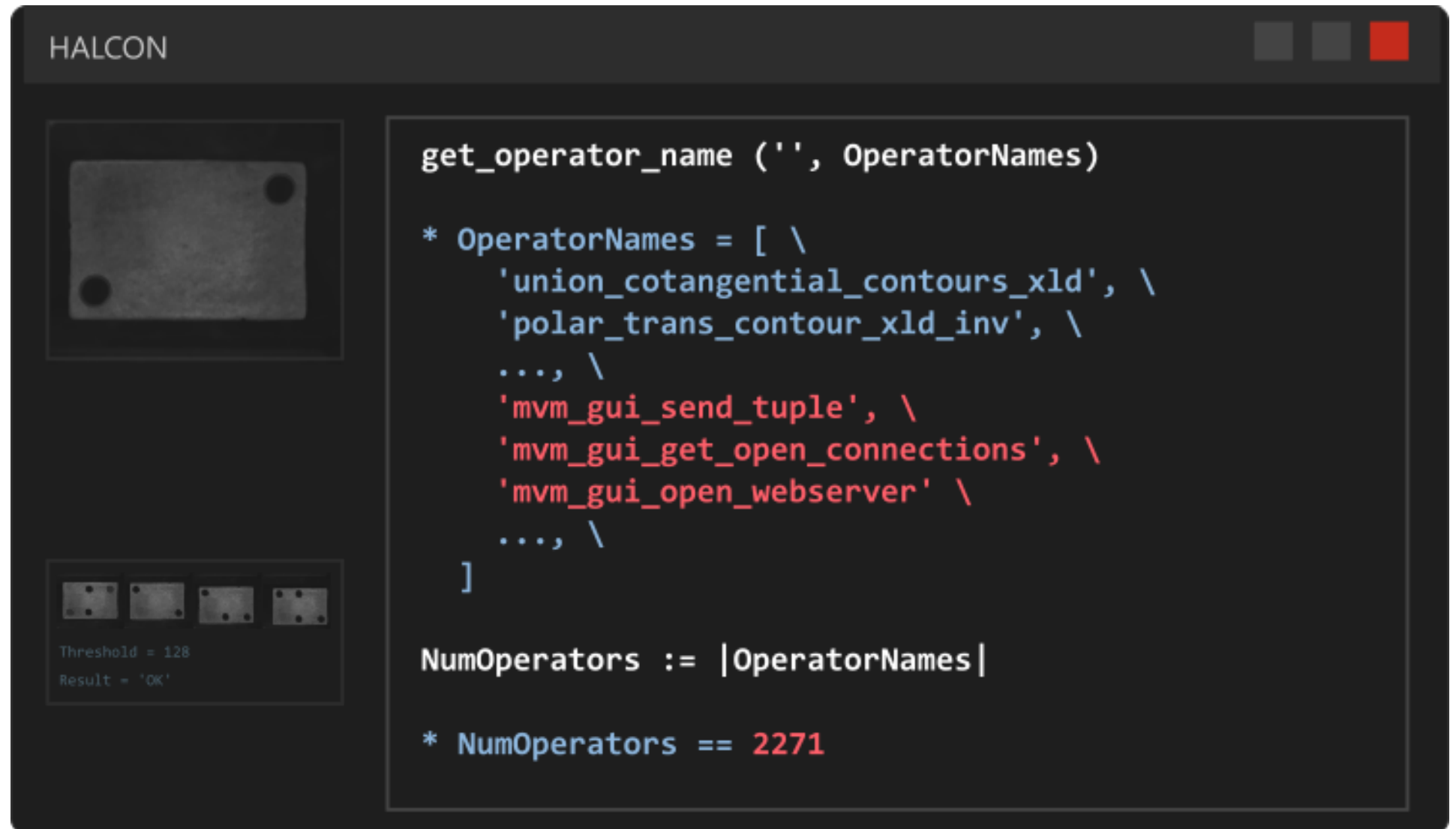
```
$ set HALCONEXTENSIONS=C:\Program Files\Machine Vision Makers\  
HDevGUI\halcon-25.11-Progress\hdevgui_server_extpack  
  
$ hdevelop modern_ui.hdev
```

- Adds custom operators to HALCON

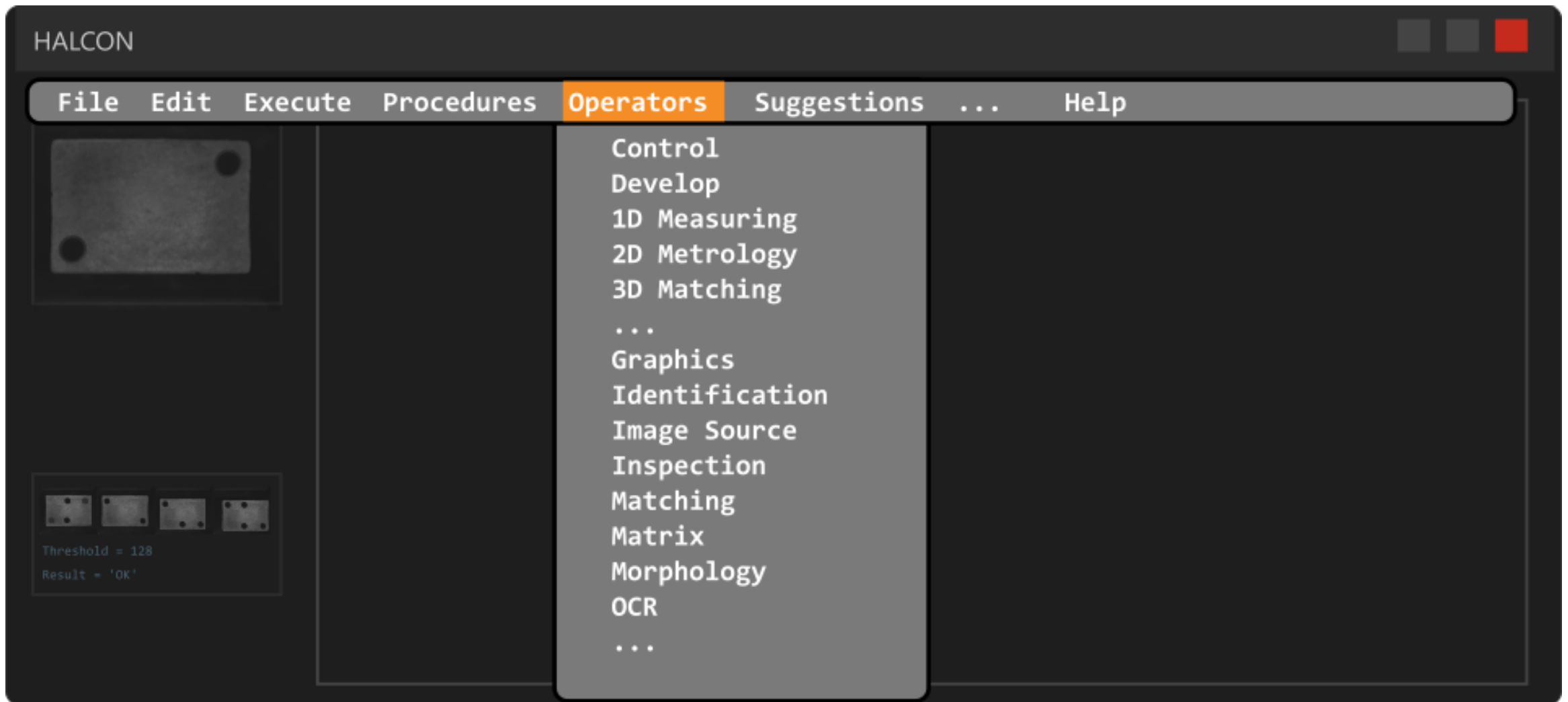
HALCON 25.11



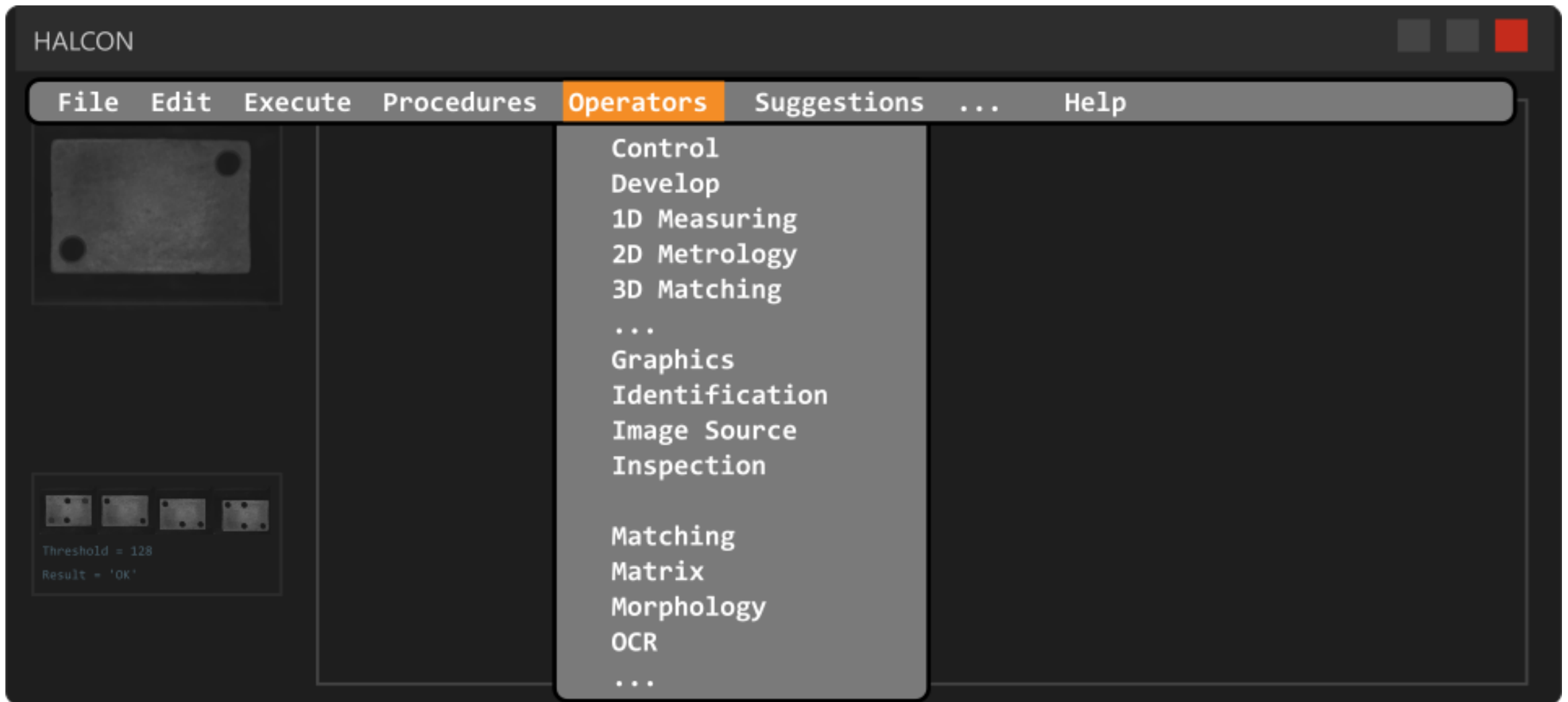
HALCON 25.11 with HDevGUI extension package



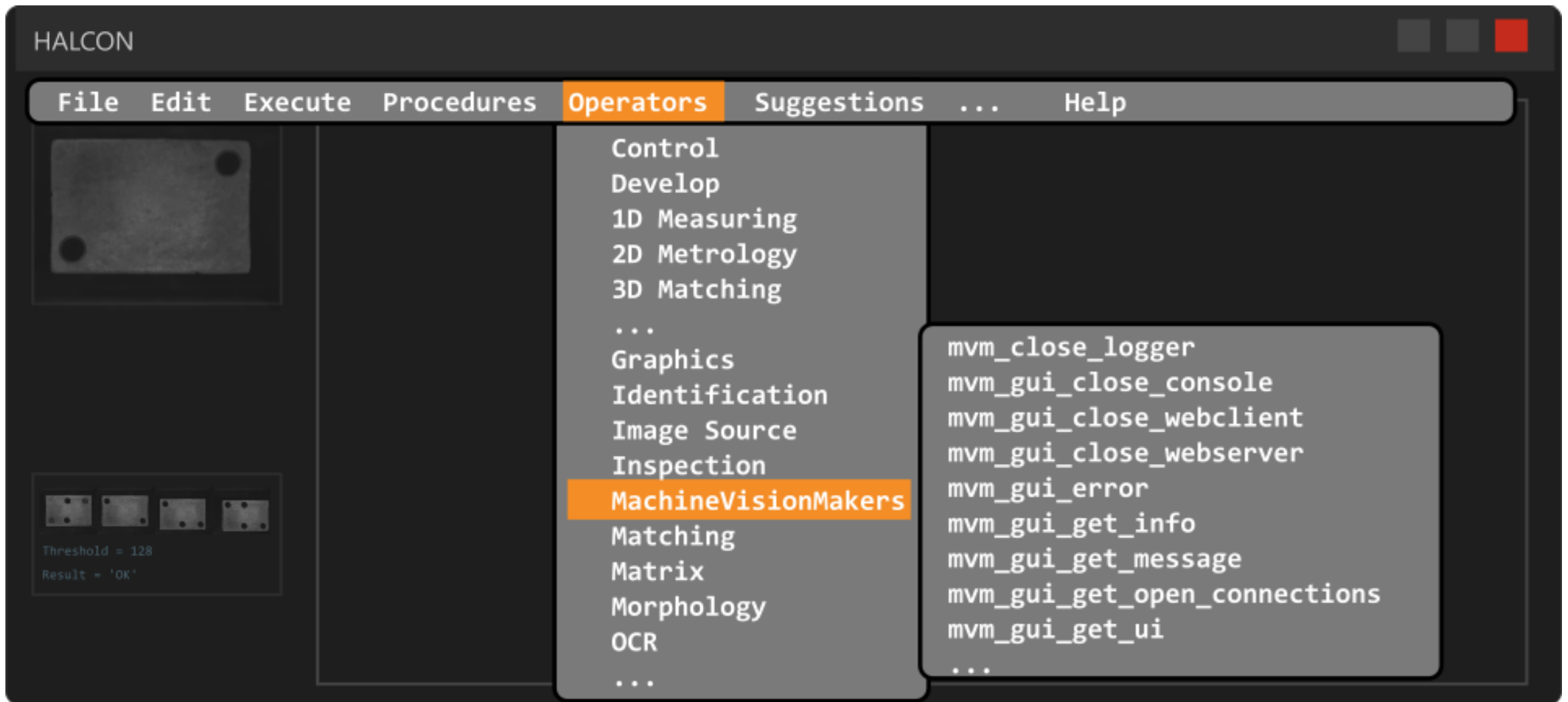
HALCON 25.11 with HDevGUI extension package



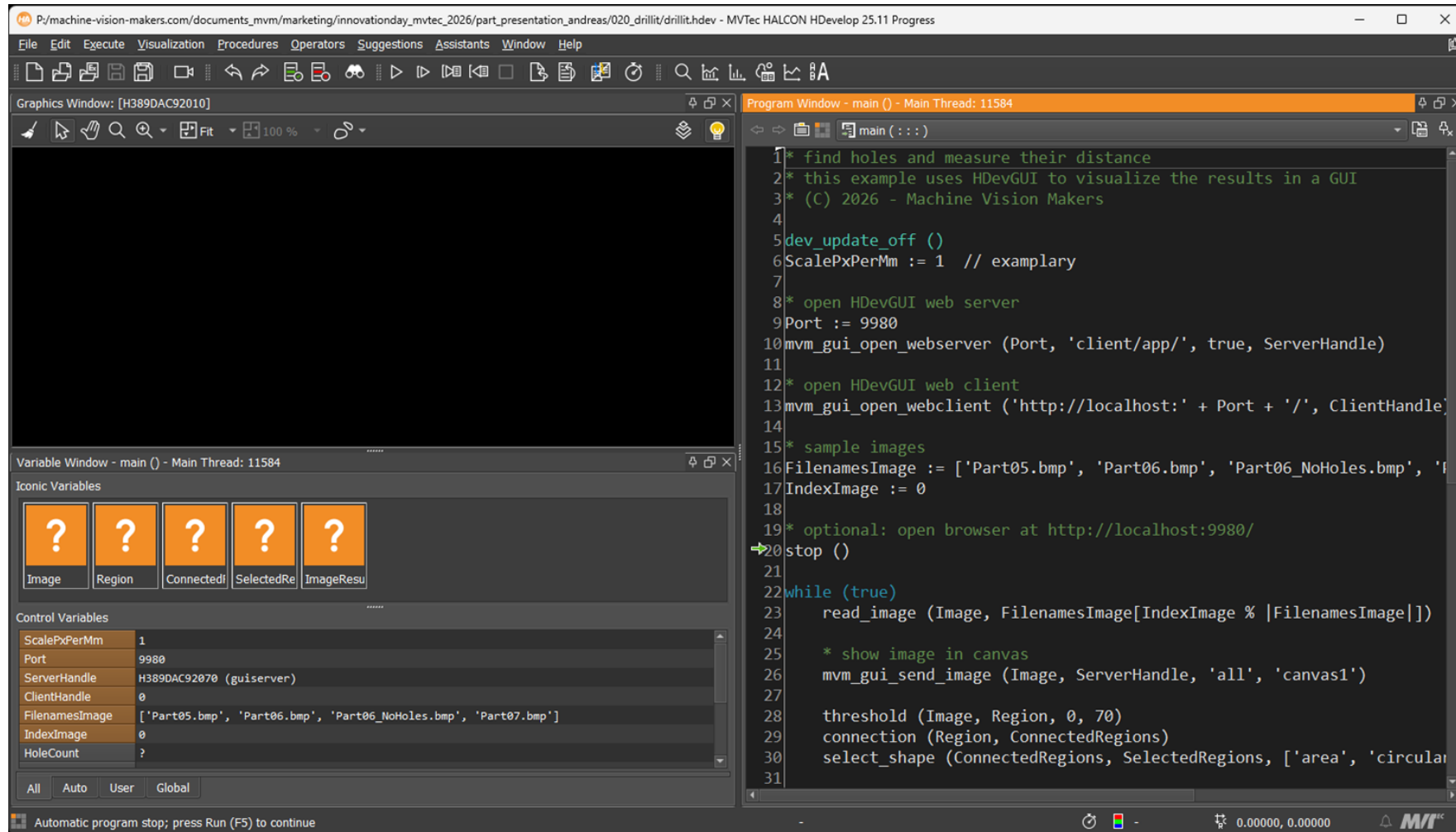
HALCON 25.11 with HDevGUI extension package



HALCON 25.11 with HDevGUI extension package



HDevGUI in HDevelop



HDevGUI in Hrun

```
$ HDevGUI\examples\modern_ui>dir
Volume in drive C has no label.
Volume Serial Number is EE13-F68A
```

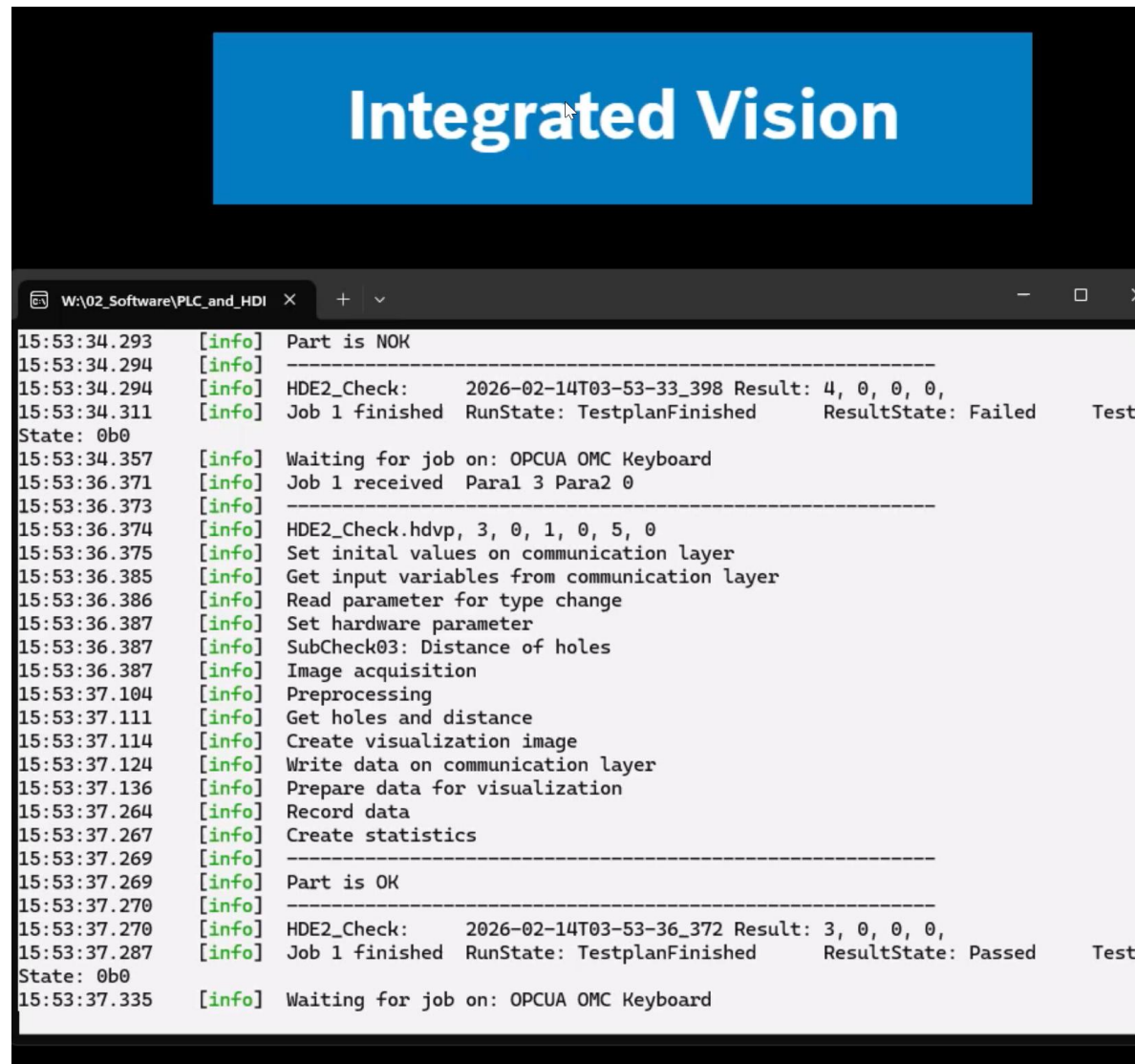
```
Directory of C:\Program Files\Machine Vision Makers\HDevGUI\examples\modern_ui
```

```
2024-05-06  10:08    <DIR>          .
2024-05-06  10:08    <DIR>          ..
2024-05-06  10:08    <DIR>          client
2025-04-16  08:26                7,334 modern_ui.hdev
               1 File(s)                7,334 bytes
               3 Dir(s)  22,154,588,160 bytes free
```

```
$ HDevGUI\examples\modern_ui>set HALCONEXTENSIONS=C:\Program Files\Machine Vision
Makers\HDevGUI\halcon-25.11-Progress\hdevgui_server_extpack
```

```
$ HDevGUI\examples\modern_ui>hrun modern_ui.hdev
```

HDevGUI in Integrated Vision Runtime



The screenshot displays the HDevGUI Integrated Vision Runtime interface. At the top, a blue banner reads "Integrated Vision". Below it, a window titled "W:\02_Software\PLC_and_HDI" shows a log of system messages. The log includes timestamps, log levels (all [info]), and detailed test results for two jobs. Job 1 (ID 2026-02-14T03-53-33_398) failed, while Job 2 (ID 2026-02-14T03-53-36_372) passed. The log also shows various system events like waiting for jobs, receiving jobs, and data acquisition.

```
15:53:34.293 [info] Part is NOK
15:53:34.294 [info] -----
15:53:34.294 [info] HDE2_Check: 2026-02-14T03-53-33_398 Result: 4, 0, 0, 0,
15:53:34.311 [info] Job 1 finished RunState: TestplanFinished ResultState: Failed Test
State: 0b0
15:53:34.357 [info] Waiting for job on: OPCUA OMC Keyboard
15:53:36.371 [info] Job 1 received Paral 3 Para2 0
15:53:36.373 [info] -----
15:53:36.374 [info] HDE2_Check.hdvp, 3, 0, 1, 0, 5, 0
15:53:36.375 [info] Set initial values on communication layer
15:53:36.385 [info] Get input variables from communication layer
15:53:36.386 [info] Read parameter for type change
15:53:36.387 [info] Set hardware parameter
15:53:36.387 [info] SubCheck03: Distance of holes
15:53:36.387 [info] Image acquisition
15:53:37.104 [info] Preprocessing
15:53:37.111 [info] Get holes and distance
15:53:37.114 [info] Create visualization image
15:53:37.124 [info] Write data on communication layer
15:53:37.136 [info] Prepare data for visualization
15:53:37.264 [info] Record data
15:53:37.267 [info] Create statistics
15:53:37.269 [info] -----
15:53:37.269 [info] Part is OK
15:53:37.270 [info] -----
15:53:37.270 [info] HDE2_Check: 2026-02-14T03-53-36_372 Result: 3, 0, 0, 0,
15:53:37.287 [info] Job 1 finished RunState: TestplanFinished ResultState: Passed Test
State: 0b0
15:53:37.335 [info] Waiting for job on: OPCUA OMC Keyboard
```

What's more: Local web client

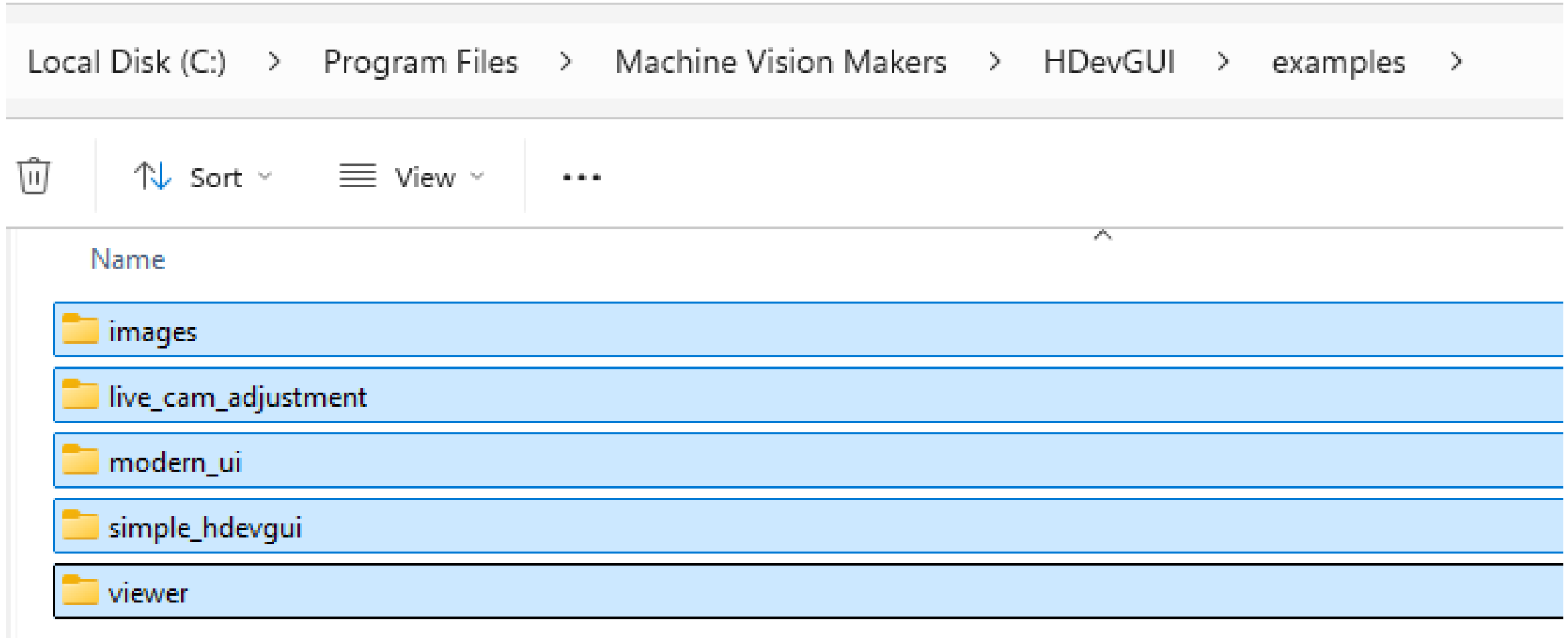
The image shows two side-by-side views of the HDevGUI interface. The left view is a browser window with the address bar showing `http://localhost:9980/`. A large red 'X' is drawn over the browser window's title bar and address bar. The right view is a dedicated application window titled 'HDevGUI - Dashboard'.

Both windows display the same dashboard content:

- Status:** A large red circle.
- Navigation:** Dashboard, Event log, Settings, Calibration.
- Current inspection:** [2026-02-22 18:14:20,380] State: **NOK**
- Previous inspection:** [2026-02-22 18:14:19,564] State: **NOK**
- Statistics:**

	Last 10	Last 100	Last 1000
Mean	123.62	123.62	123.43

What's more: Examples



What's more: Demo widgets

Dropdown dropdown1 sender receiver

provides a menu of options

Choose a pet:

Checkbox checkbox1 sender receiver

provides a binary true/false option

☐ Batteries included

Radiobuttons radio1 sender receiver

only one button can be selected at a time

Select type of light:

- ☒ Incandescent
- ☐ Halogen
- ☐ LED

Slider slider1 sender receiver

a value between 0 and 255

127

Listview listview1 receiver

a list of textual entries

Item 1

Item 2

Item 3

Status indicator status1 receiver

indicates a state by changing the color

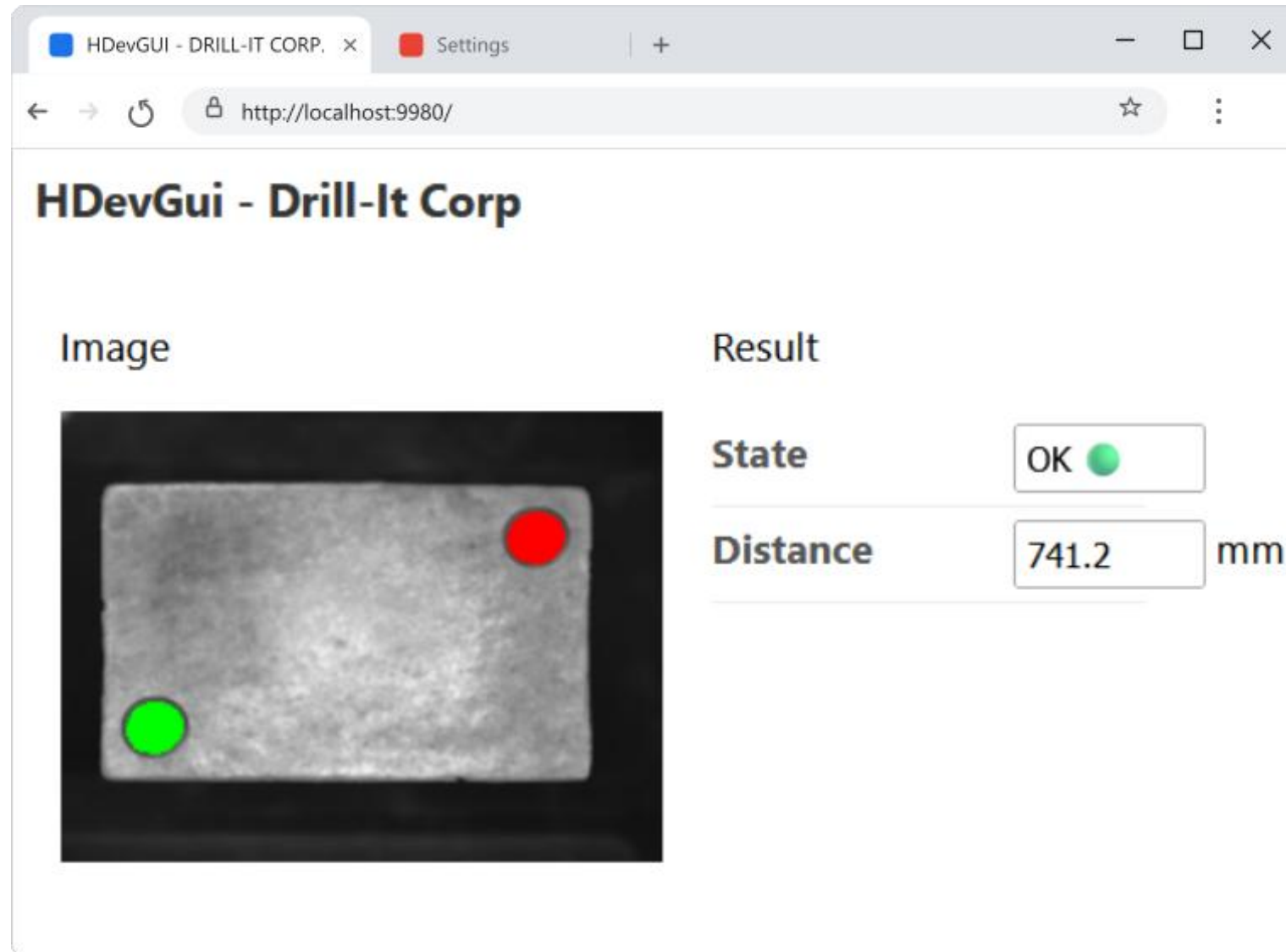


Dynamic table dyntable1 set_html

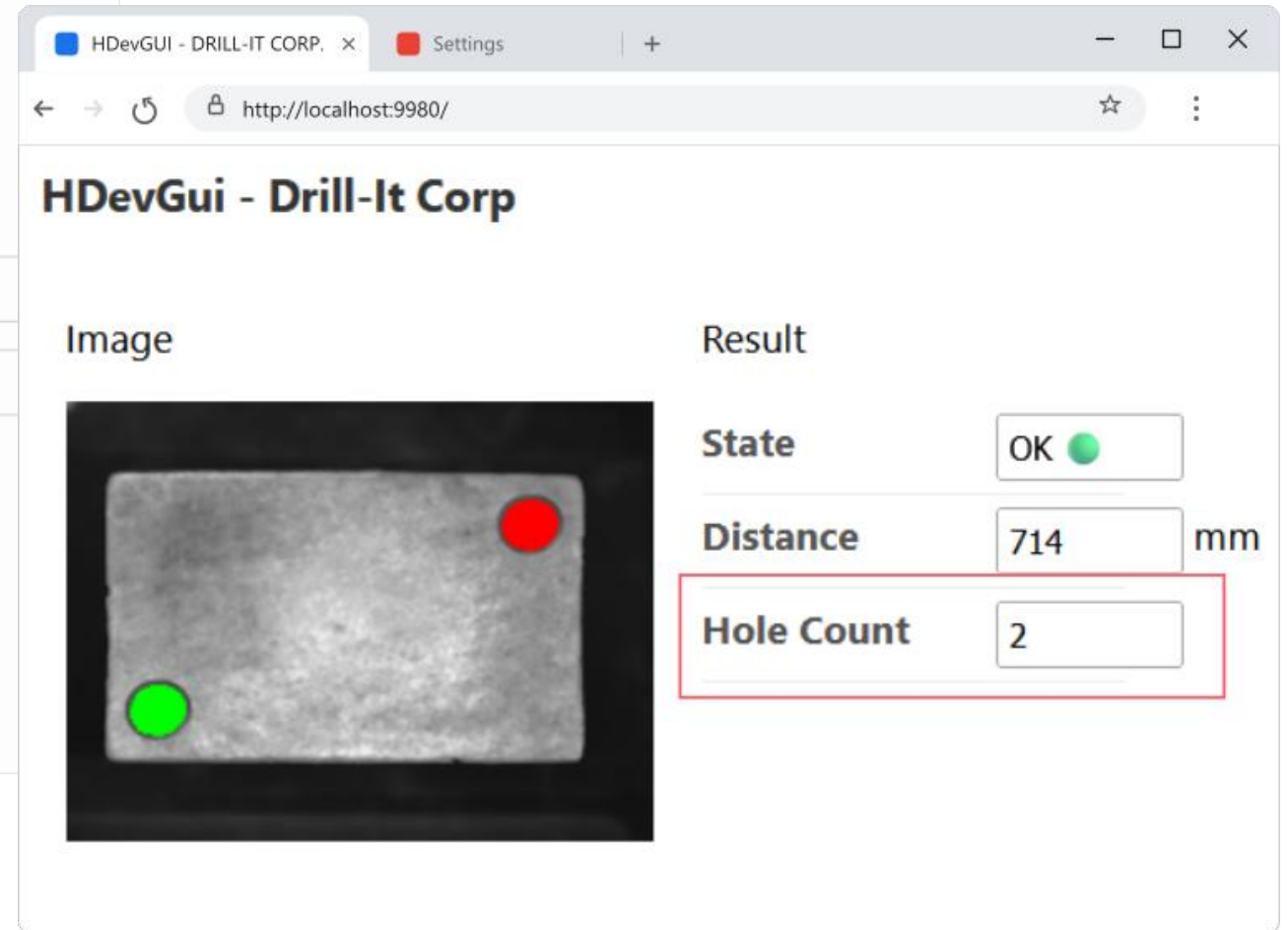
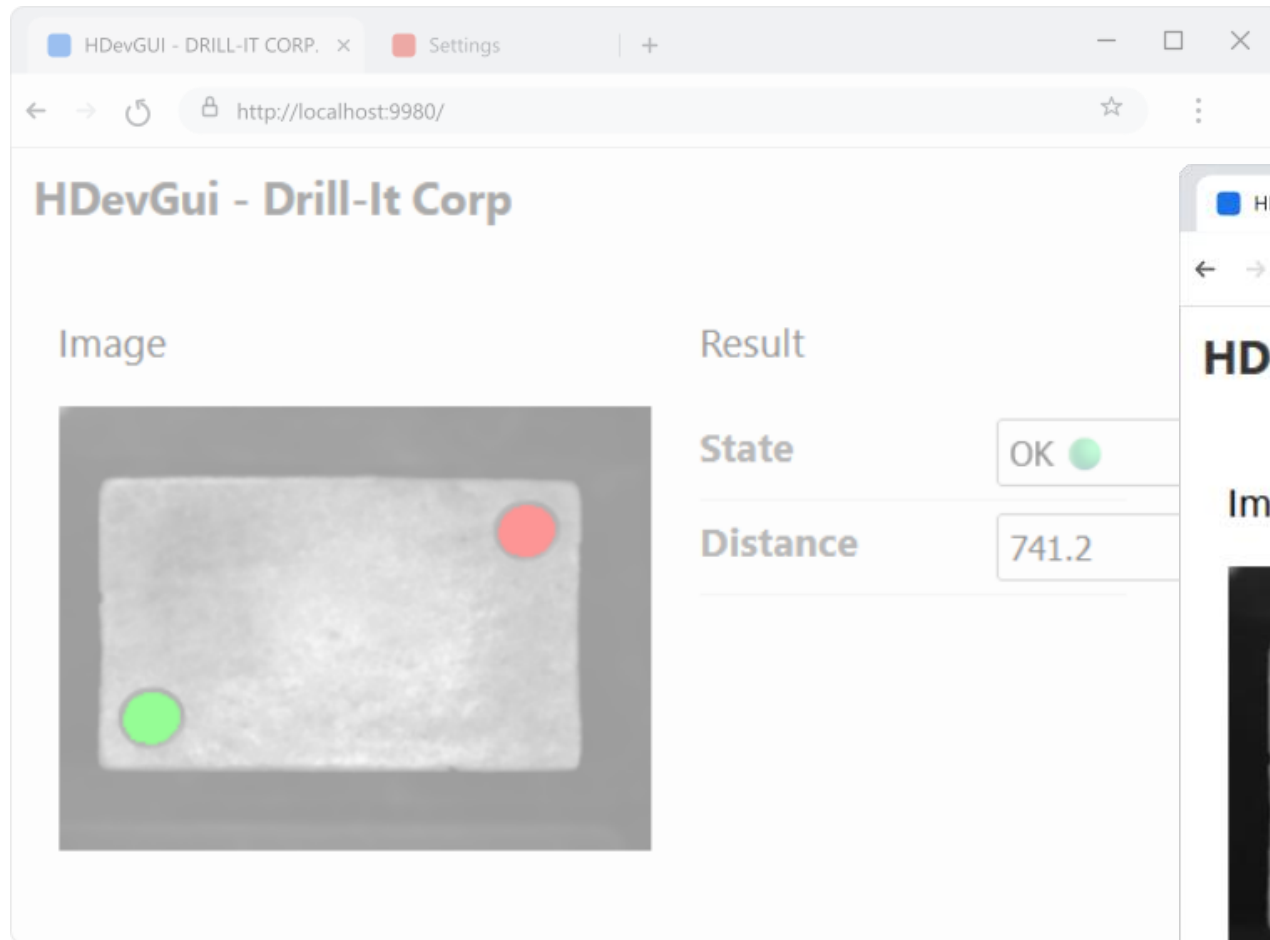
dynamically updated inner HTML

	Column 1	Column 2	Column 3
Row 1	96.51%	77.50%	60.45%
Row 2	40.40%	92.81%	53.20%
Row 3	87.19%	71.01%	54.29%

HDevGUI at DRILL-IT CORP



HDevGUI at DRILL-IT CORP



HDevGUI at DRILL-IT CORP



LIVE DEMO

Fingers crossed!

```
$ drillit>  
  
$ drillit>set HALCONEXTENSIONS=C:\Program Files\Machine Vision  
Makers\HDevGUI\halcon-25.11-Progress\hdevgui_server_extpack  
  
$ HDevGUI\examples\modern_ui>hdevelop drillit.hdev
```

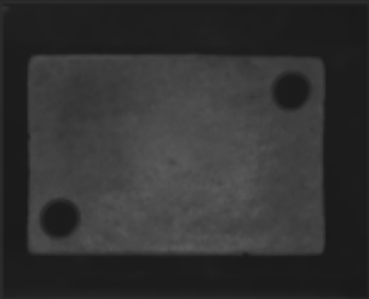
HDevGUI at DRILL-IT CORP



LIVE DEMO

Fingers crossed!

HALCON



Threshold = 128
Result = 'OK'

```
dev_update_off ()
ScalePxPerMm := 1 // exemplary

* open HDevGUI web server
Port := 9980
mvm_gui_open_webserver (Port, 'client/app/', true, ServerHandle)

* open HDevGUI web client
mvm_gui_open_webclient ('http://localhost:' + Port + '/', ClientHandle)

* sample images
FileNamesImage := ['Part05.bmp', 'Part06.bmp', 'Part06_NoHoles.bmp', 'Part07.
IndexImage := 0

* optional: open browser at http://localhost:9980/
stop ()
```

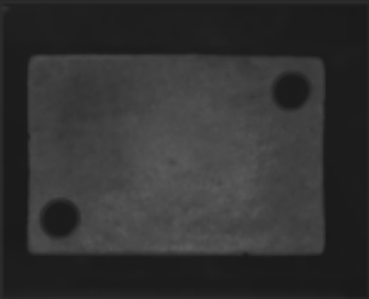
HDevGUI at DRILL-IT CORP



LIVE DEMO

Fingers crossed!

HALCON



Threshold = 128
Result = 'OK'

```
while (true)
    read_image (Image, FilenamesImage[IndexImage % |FilenamesImage|])

    * show image in canvas
    mvm_gui_send_image (Image, ServerHandle, 'all', 'canvas1')

    threshold (Image, Region, 0, 70)
    connection (Region, ConnectedRegions)
    select_shape (ConnectedRegions, SelectedRegions, ['area', 'circularity'],

    * show result image in canvas
    DumpResultImage (Image, SelectedRegions, ImageResult)

    * send result image
    dev_display (ImageResult)
    mvm_gui_send_image (ImageResult, ServerHandle, 'all', 'canvas1')
```

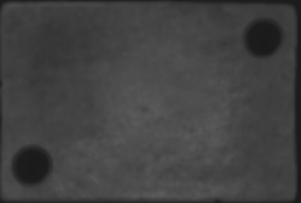
HDevGUI at DRILL-IT CORP



LIVE DEMO

Fingers crossed!

HALCON





Threshold = 128
Result = 'OK'

```
* set result
count_obj (SelectedRegions, HoleCount)

State := 'NOK'
if (HoleCount != 2)
    State := 'NOK ●'
else
    State := 'OK ●'
    area_center (SelectedRegions, __, Row, Column)
    distance_pp (Row[0], Column[0], Row[1], Column[1], DistancePx)
    Distance := DistancePx / ScalePxPerMm
endif

mvm_gui_send_tuple (ServerHandle, 'all', 'State', State)
```

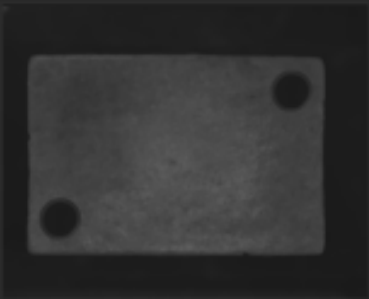
HDevGUI at DRILL-IT CORP



LIVE DEMO

Fingers crossed!

HALCON





Threshold = 128
Result = 'OK'

```
mvm_gui_send_tuple (ServerHandle, 'all', 'State', State)
mvm_gui_send_tuple (ServerHandle, 'all', 'Distance', Distance$.1f')

wait_seconds (1)
IndexImage := IndexImage + 1
endwhile
```

HDevGUI at DRILL-IT CORP



LIVE DEMO

Fingers crossed!

```
<!doctype html>
<html>

<head>
  <title>HDevGui - Drill-It Corp</title>
  <link rel="stylesheet" href="styles/main.css">
</head>

<body>
  <h2>HDevGui - Drill-It Corp</h2>
  <div class="container">
    <div class="box"><p class="intro">Image</p>
      <div class="canvas-container">
        <canvas id="canvas1" data-bind="canvas1"></canvas>
      </div>
    </div>

    <div class="box"><p class="intro">Result</p>
    ...
  </div>

</div>
```

HDevGUI at DRILL-IT CORP



LIVE DEMO

Fingers crossed!

```
...  
    <div class="box"><p class="intro">Result</p>  
      <div class="stats-container">  
        <div class="stats-row">  
          <span class="label">State</span>  
          <input class="value" type="text" value="---" data-bind="State">  
        </div>  
  
        <div class="stats-row">  
          <span class="label">Distance</span>  
          <input class="value" type="text" data-bind="Distance">&nbsp;mm  
        </div>  
  
      </div>  
    </div>  
  ...
```

HDevGUI at DRILL-IT CORP

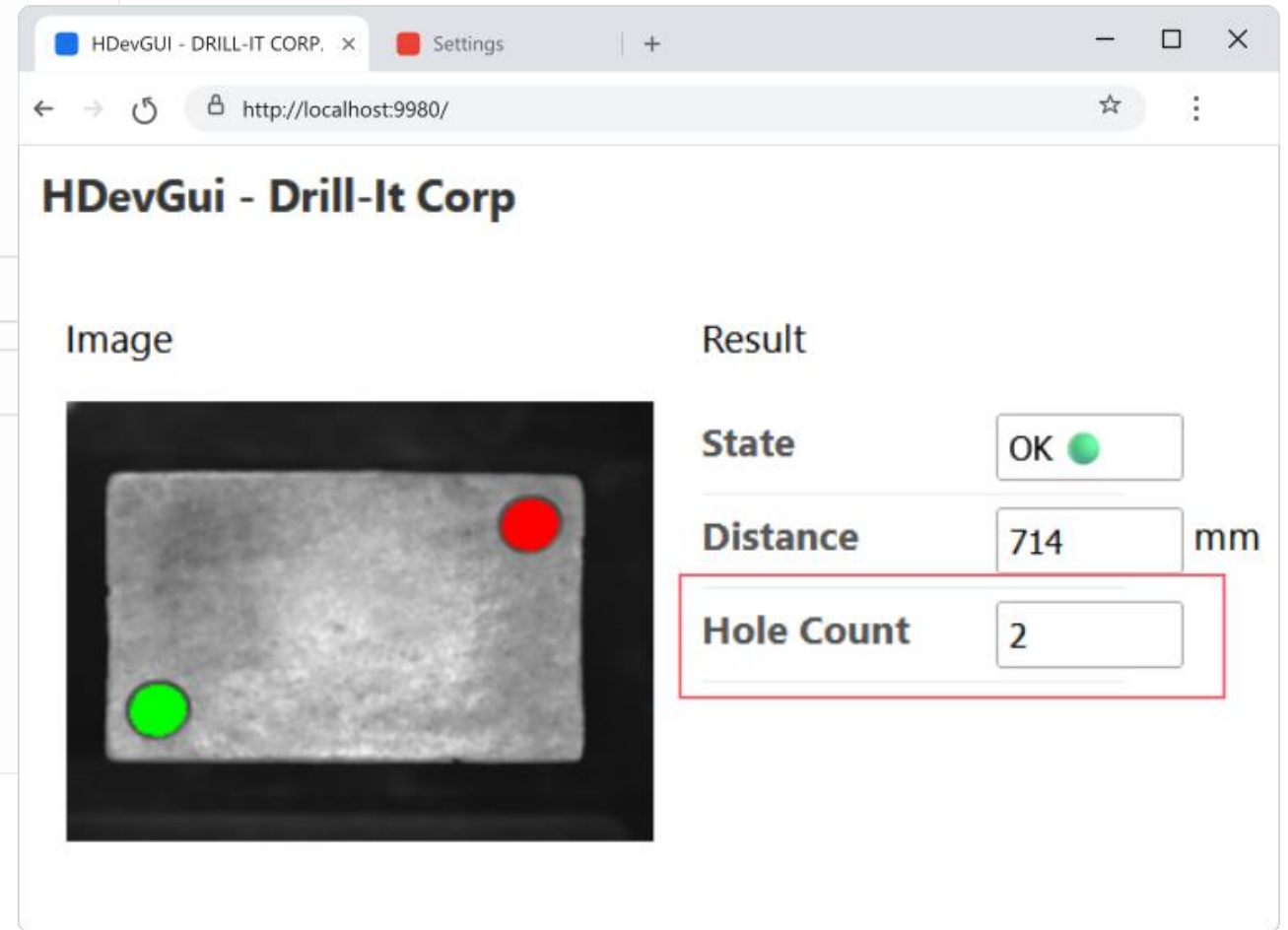
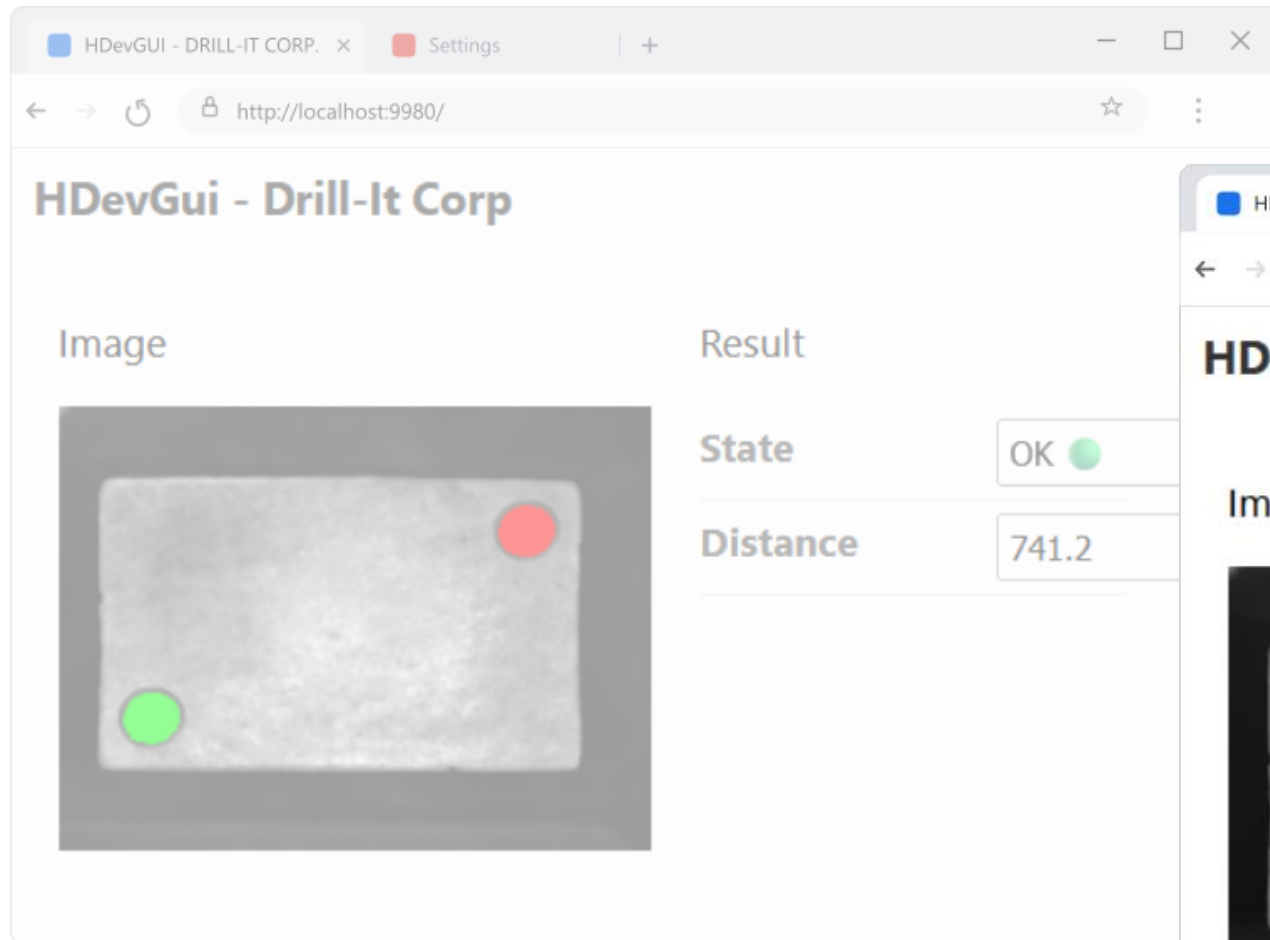


LIVE DEMO

Fingers crossed!

```
...  
</div>  
  
<script src="/hdevgui_web/dist/jquery/dist/jquery.min.js"></script>  
<script src="/hdevgui_web/dist/hdevguilib/js/hdevguilib.js"></script>  
  
<script>  
  (function () {  
    hdevguilib.init();  
    hdevguilib.connection.connect();  
  })();  
</script>  
</body></html>
```

HDevGUI at DRILL-IT CORP



HDevGUI at DRILL-IT CORP



LIVE DEMO

Fingers crossed!

```
...
    <div class="box"><p class="intro">Result</p>
      <div class="stats-container">
        <div class="stats-row">
          <span class="label">State</span>
          <input class="value" type="text" value="---" data-bind="State">
        </div>

        <div class="stats-row">
          <span class="label">Distance</span>
          <input class="value" type="text" data-bind="Distance">&nbsp;mm
        </div>

        <div class="stats-row">
          <span class="label">Hole Count</span>
          <input class="value" type="text" data-bind="HoleCount">
        </div>
      </div>
    </div>
  </div>
...
```

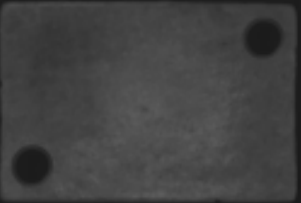
HDevGUI at DRILL-IT CORP



LIVE DEMO

Fingers crossed!

HALCON



Threshold = 128
Result = 'OK'

```
mvm_gui_send_tuple (ServerHandle, 'all', 'State', State)
mvm_gui_send_tuple (ServerHandle, 'all', 'Distance', Distance$.1f')
mvm_gui_send_tuple (ServerHandle, 'all', 'HoleCount', HoleCount)

wait_seconds (1)
IndexImage := IndexImage + 1
endwhile
```

HDevGUI at DRILL-IT CORP



LIVE DEMO

 Fingers crossed!

```
$ set HALCONEXTENSIONS=C:\Program Files\Machine Vision Makers\  
HDevGUI\halcon-25.11-Progress\hdevgui_server_extpack  
  
$ hrun drillit.hdev
```

About Machine Vision Makers



MACHINE
VISION
MAKERS

- We are vision software integrators
- Focus on development of customer specific machine vision software
- Including development of hardware and system concepts
- MVTec Certified Integration Partner
- With around 20 years of HALCON experience, our roots lie in the MVTec software development department.

