

**SID 2024**

Sibiu Innovation Days

24-25 October, Sibiu - RO



# Intelligent Approaches for Optimization in Real-world Systems



Grupo de Investigación  
Ciencia y Técnica Cibernética



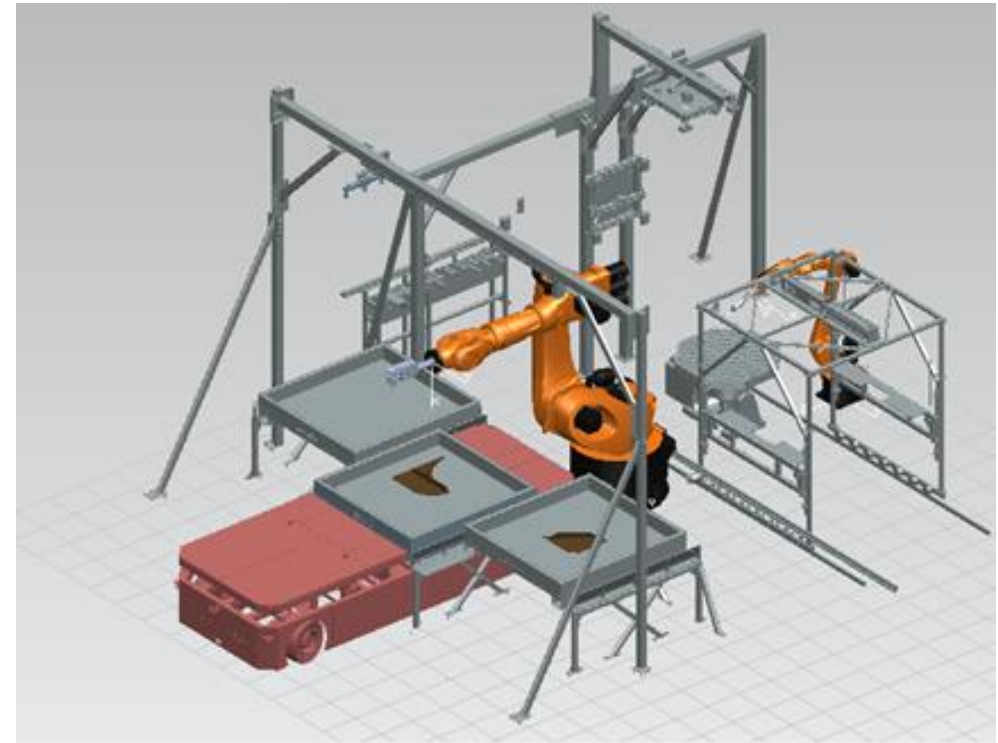
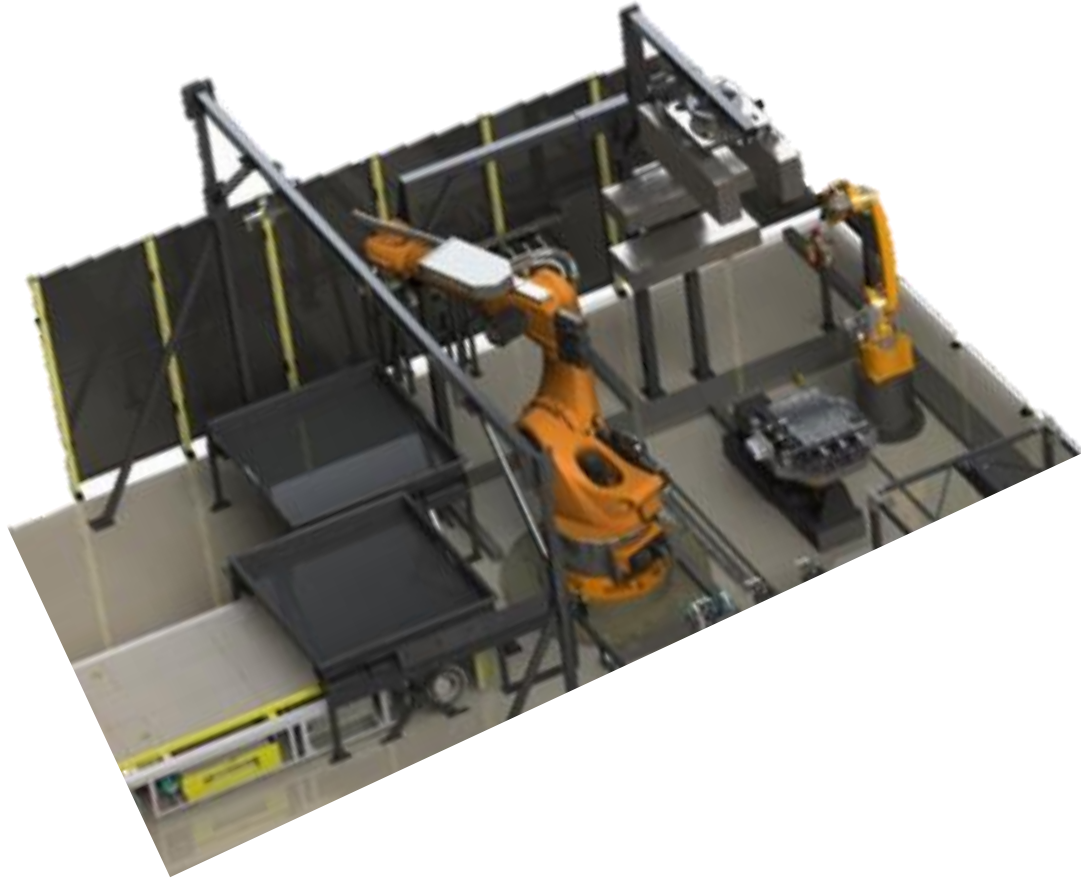
UNIVERSIDADE DA CORUÑA

José Luis Calvo Rolle  
University of A Coruña

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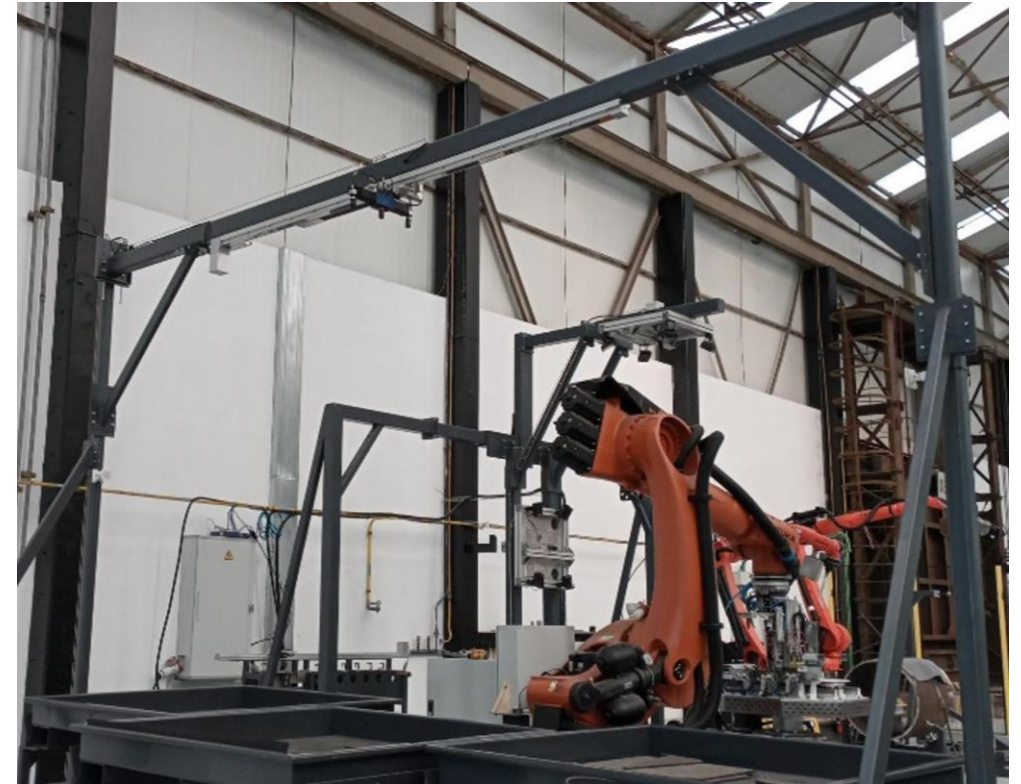
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Transfer of materials into the welding cell

Artificial Vision Gantry



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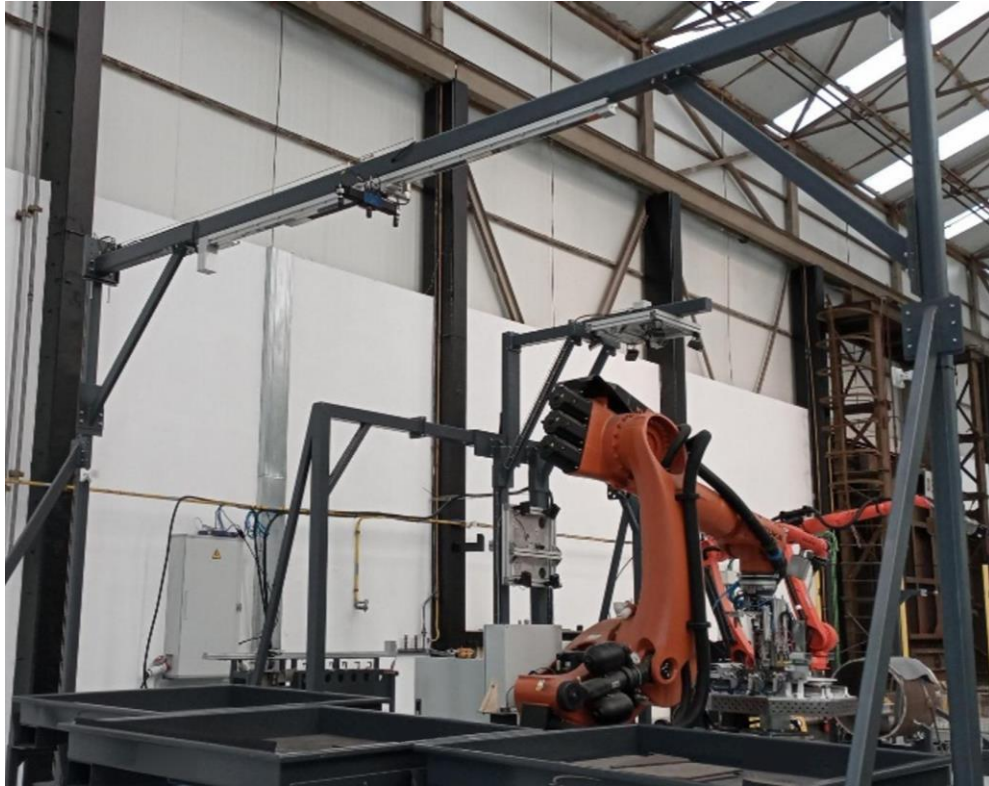
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Identification → Clasification → Orientation → Gripping point → OCR → Defect detection → Welding Process

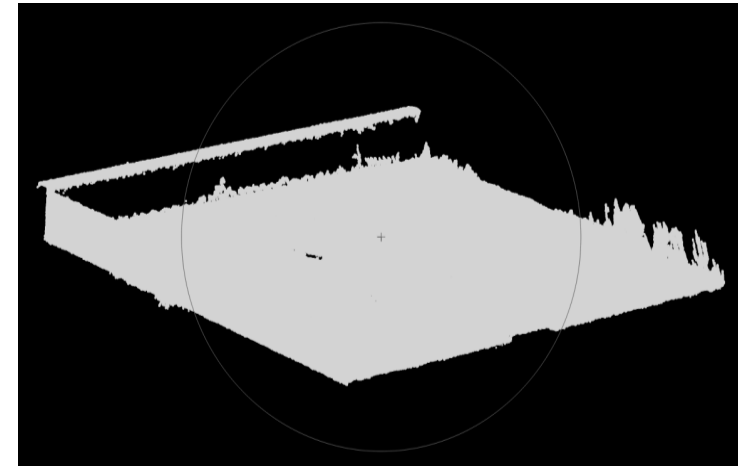
## Artificial Vision Gantry



## 3D camera



## 2D Image of the Tray



## Point Cloud of the Tray

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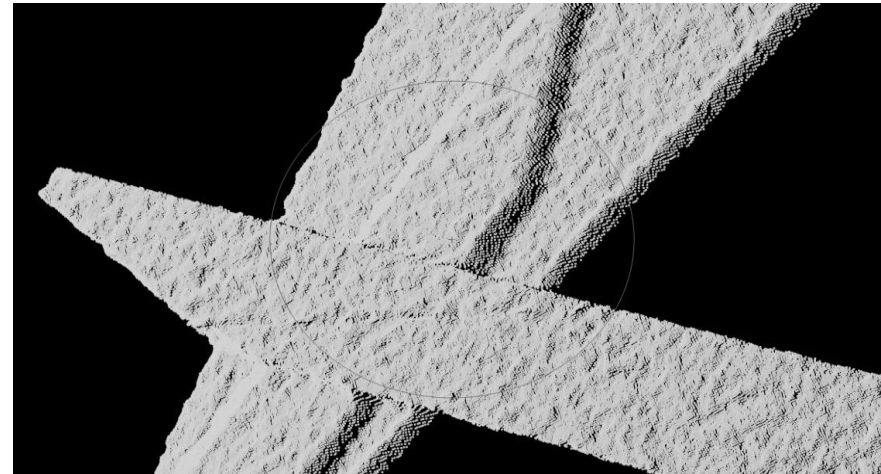
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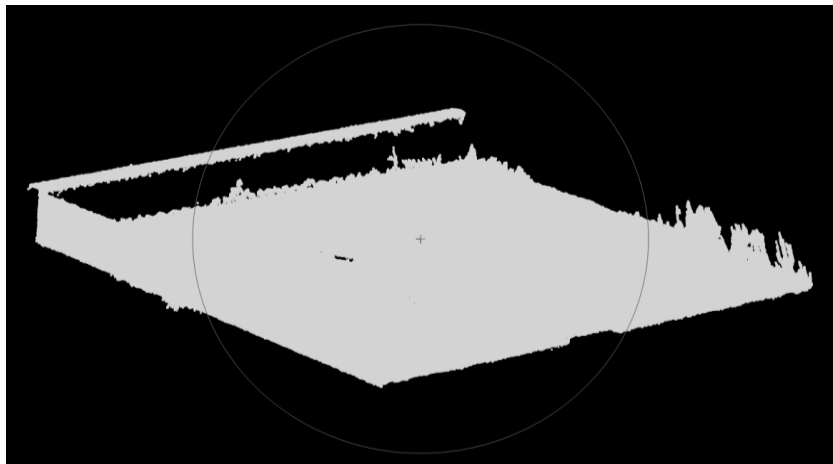
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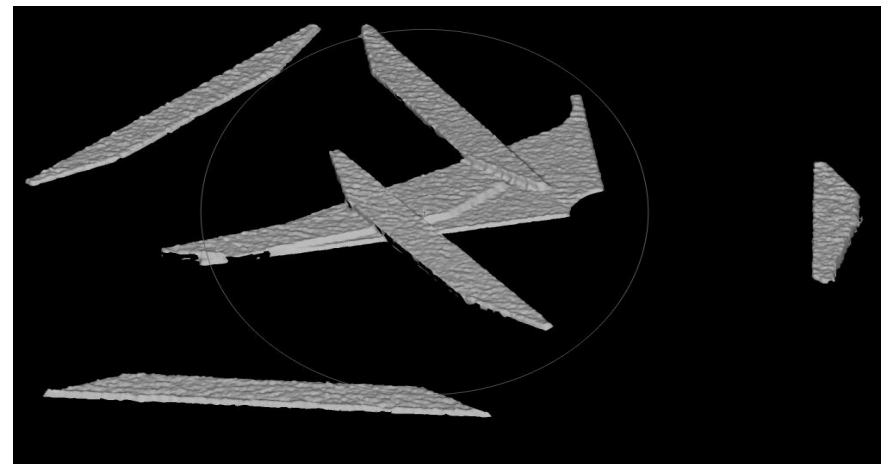
2D Monochromatic Image of the Tray



Zoom of the Processed Point cloud



Point Cloud of the Tray



Processed Point cloud of the elements in the tray

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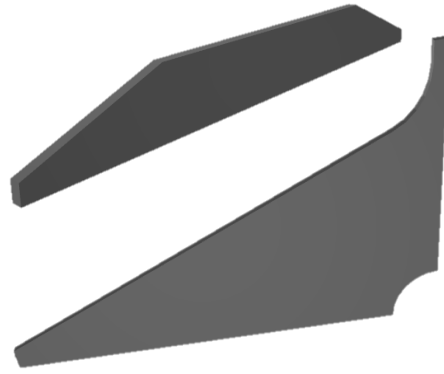
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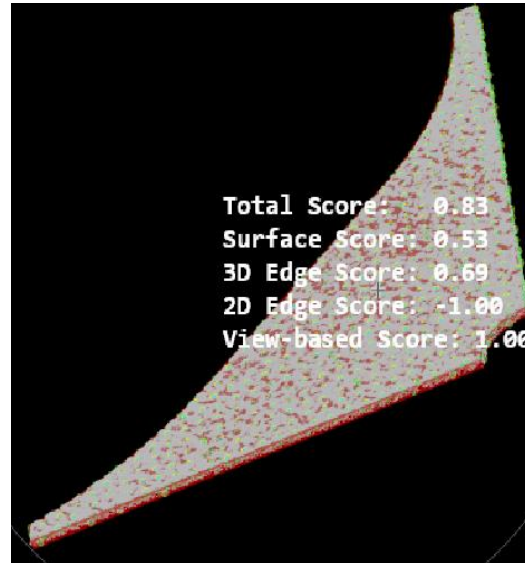
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## 3D Tecniques

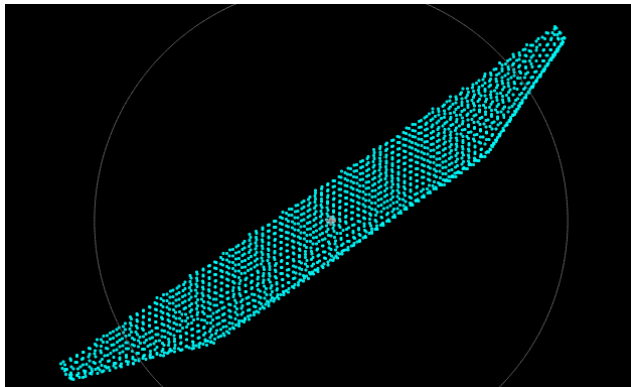
- Surface Matching
- 3D Edge Matching



CAD Models



## Matching Results



Surface model



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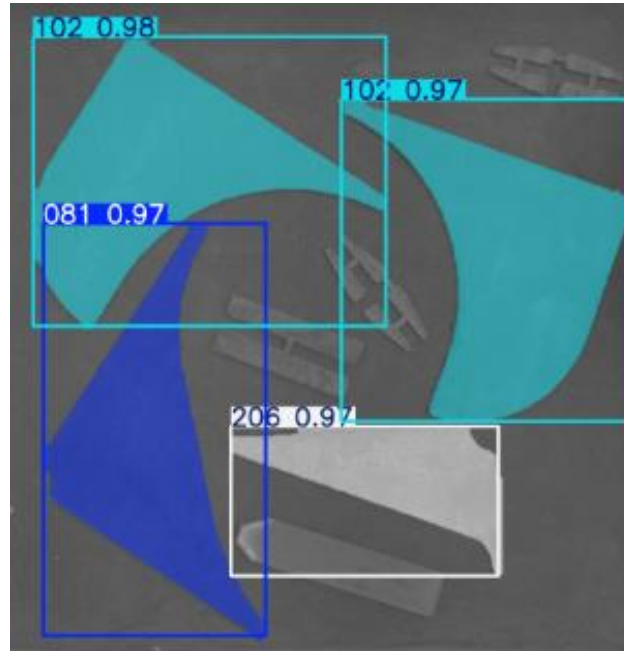
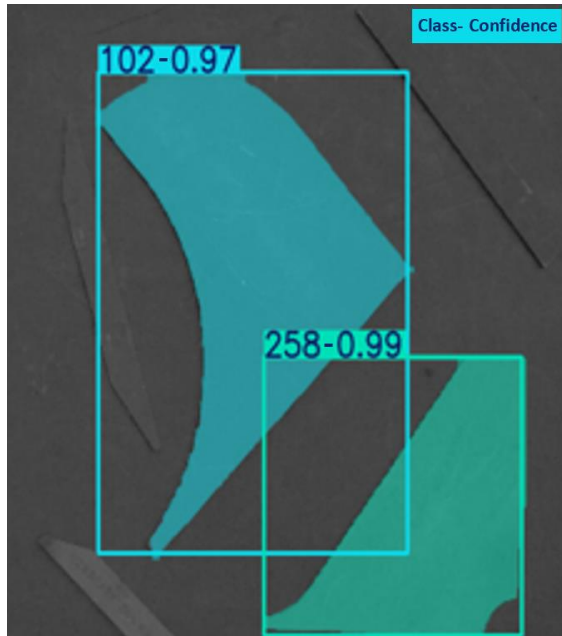


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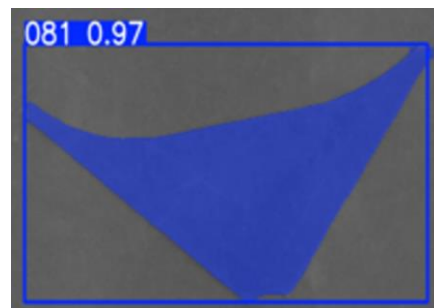
## 2D Tecniques

→ Convolutional Neural Networks

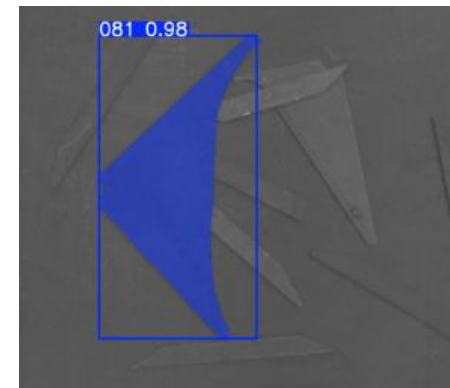
→ Transformers



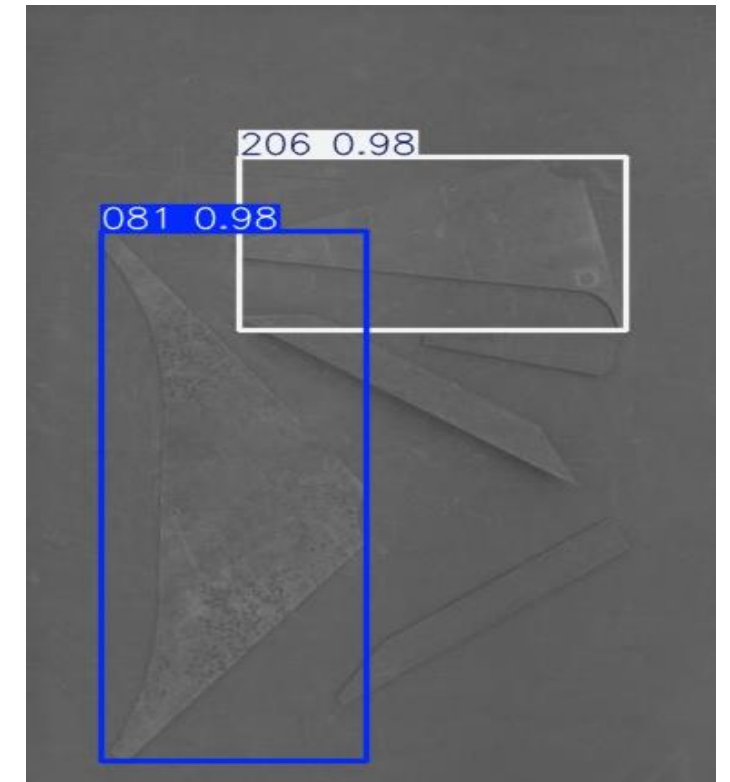
## Instance Segmentation



YOLOv8



## Object Detection



RT-DETR

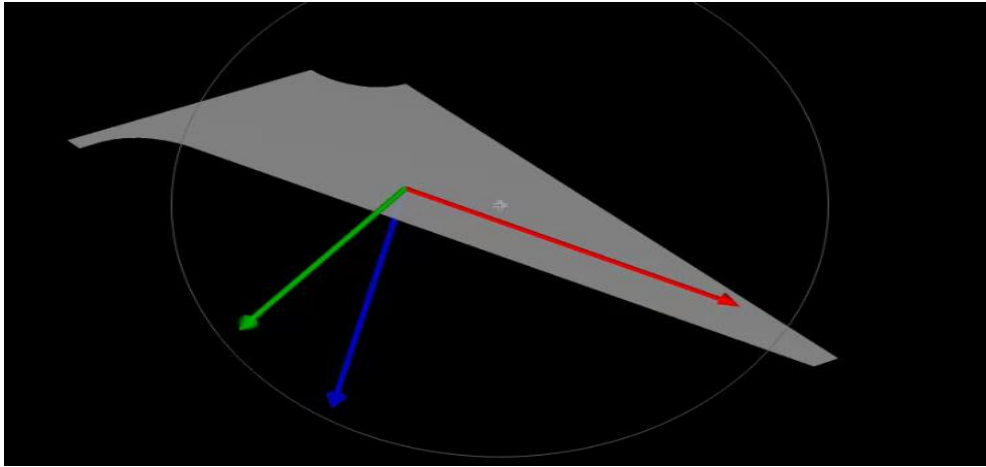
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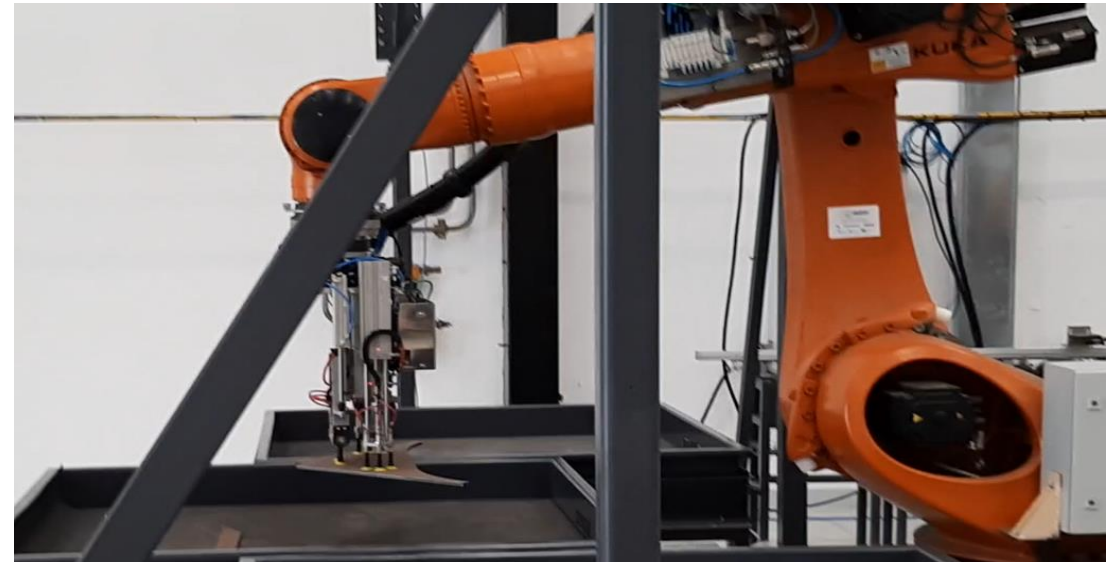
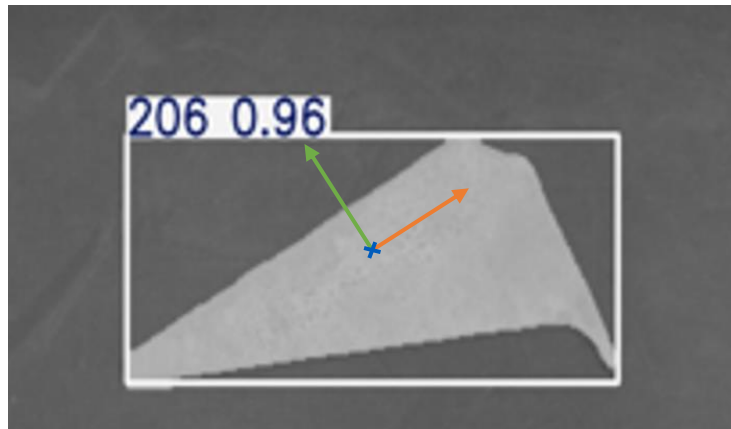
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Orientation of the pieces



Pick up



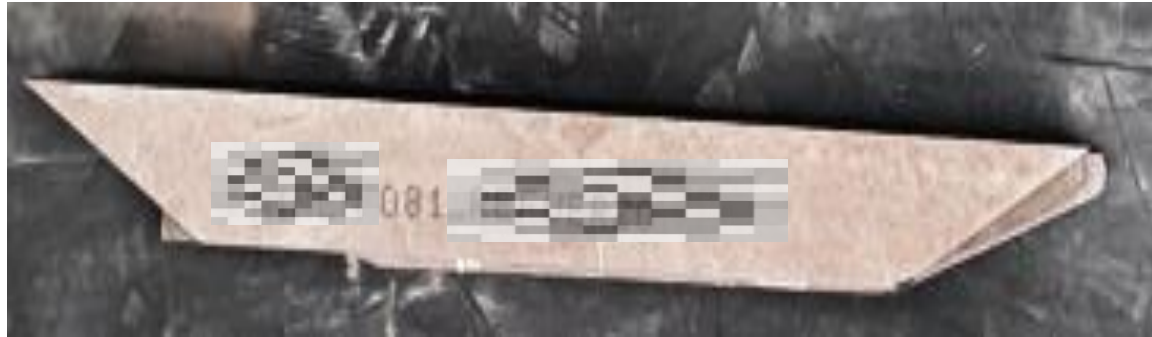
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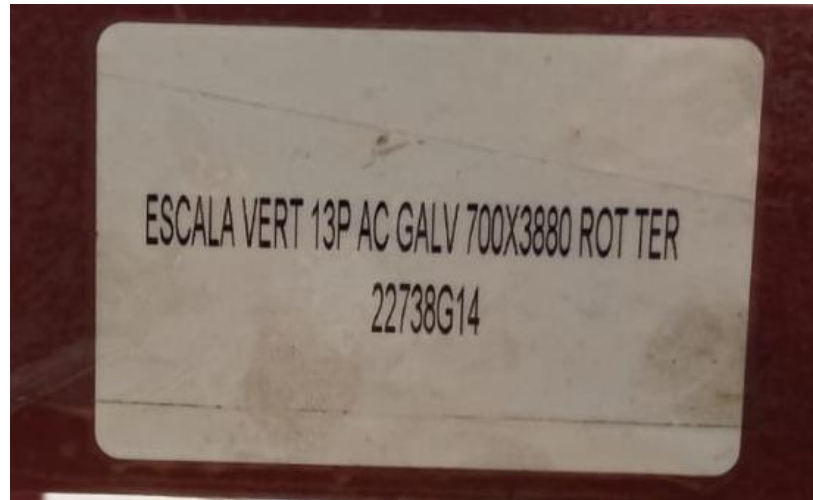


## Optical Character Recognition

## Defect detection



Defective Piece



Parts marked with alphanumeric identifiers

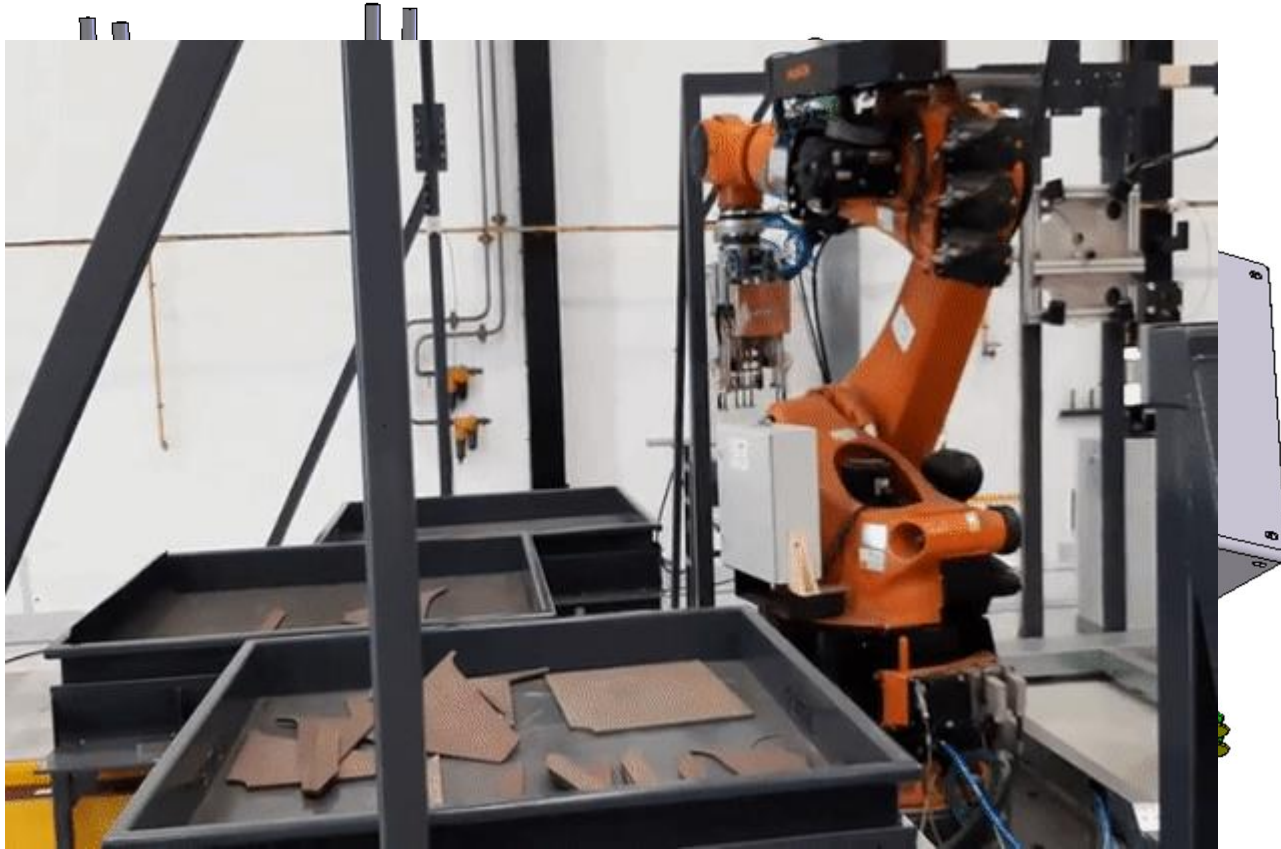
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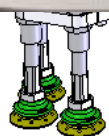


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s pick up

Gripper



Gripper

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Application of traditional/intelligent  
techniques for the detection of failures  
or anomalies in welding

