



CENTRE FOR AUTOMATION AND ROBOTICS



# Challenges for remote handling and human-robot interface

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# Outline

Introduction

Real time image processing

Specialized tools

Conclusions



# Introduction

# Background



Since then:  
Increase  
automation

# DONES



x 1

[1 1 8 0] Unfix the old Scraper

# Main challenges for advancing in telerobotics

- \* 1st. Defining manipulation processes
- \* 2nd. Implementing corresponding robot procedures
  - \* **Tooling**
  - \* Algorithms (force control, impedance control, ....)
- \* 3rd. Defining precise positions and forces
  - \* **Processing images in real time**
  - \* **Improving force control algorithms**
- \* 4th. Operator supervising control

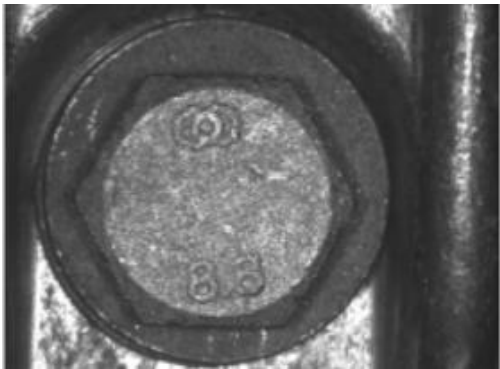


# Real time image processing

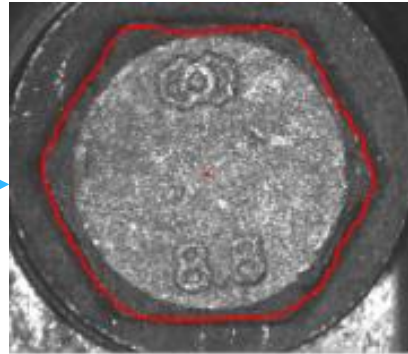


# Real time image processing

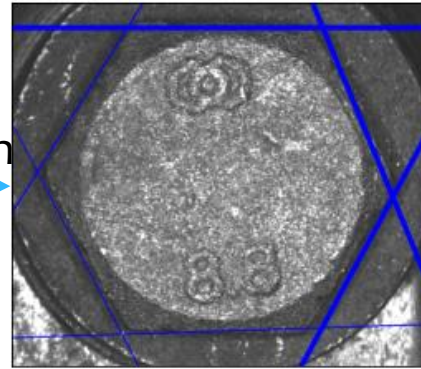
Original image



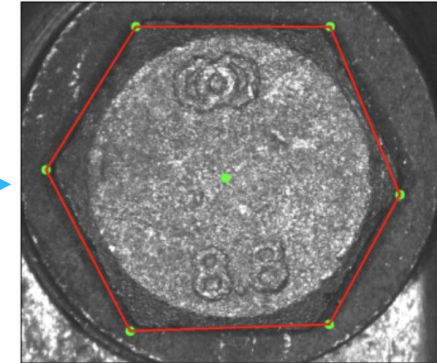
Deep Learning



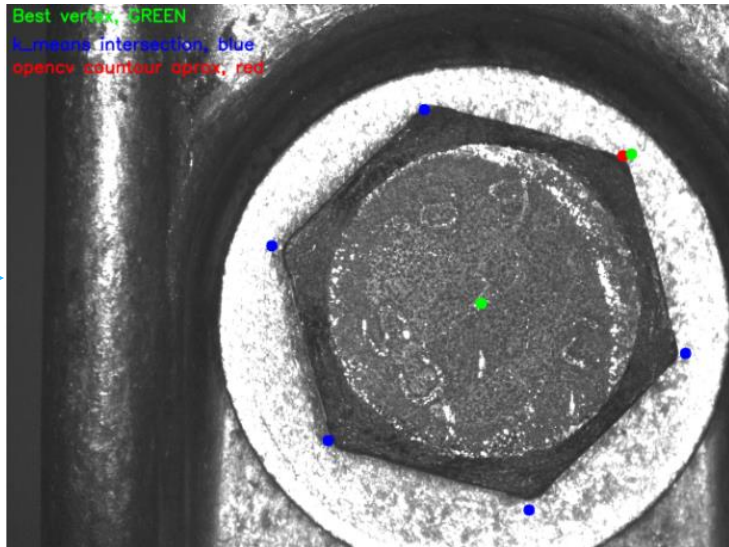
Line calculation



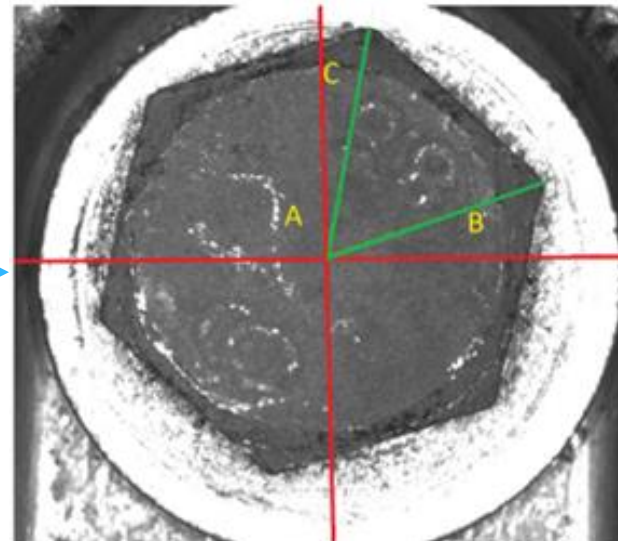
Vertices calculation



Best vertex calculation

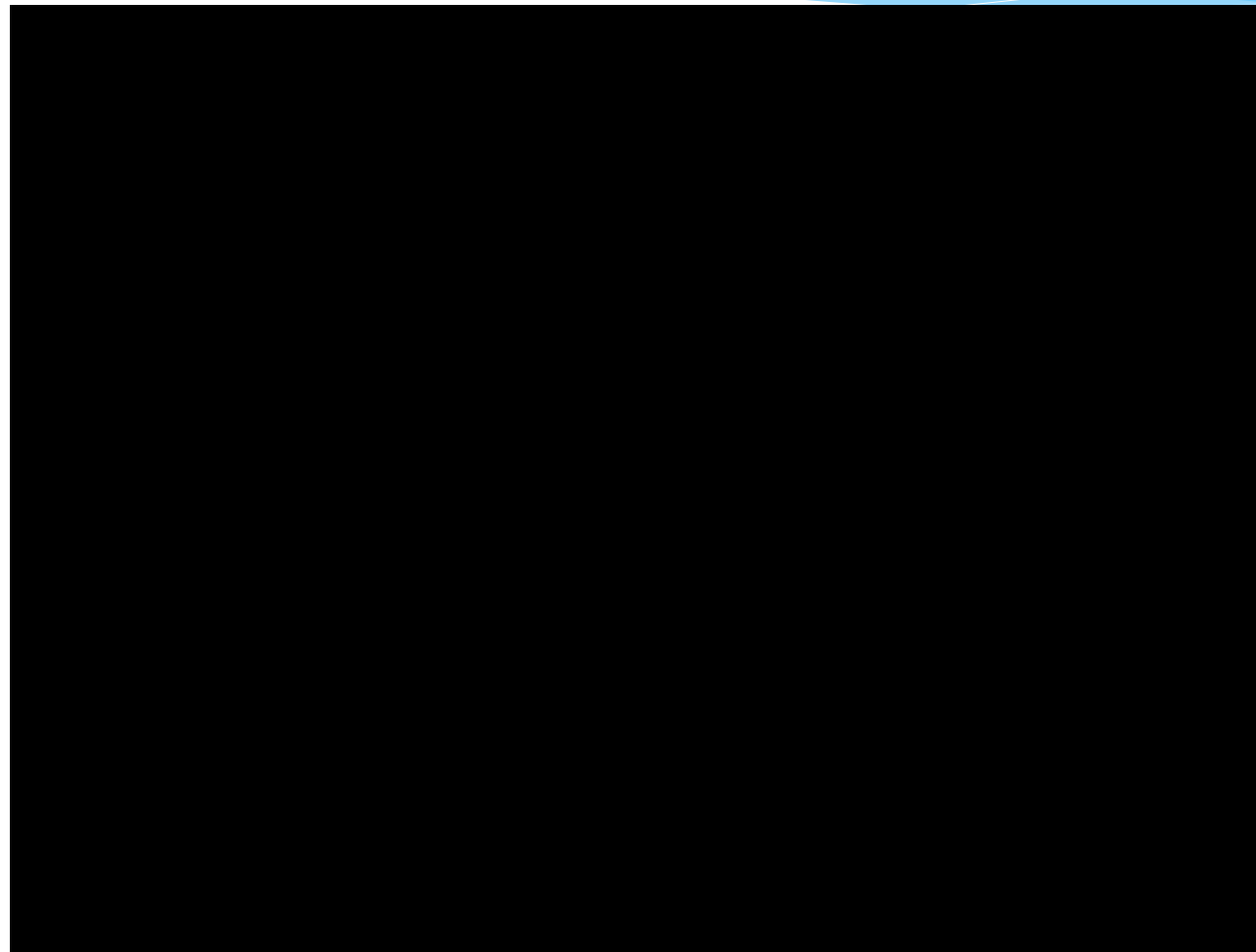


Rotation calculation





# Real time image processing



# Real time image processing

To get to these results it is needed:

- \* Semantic segmentation for 

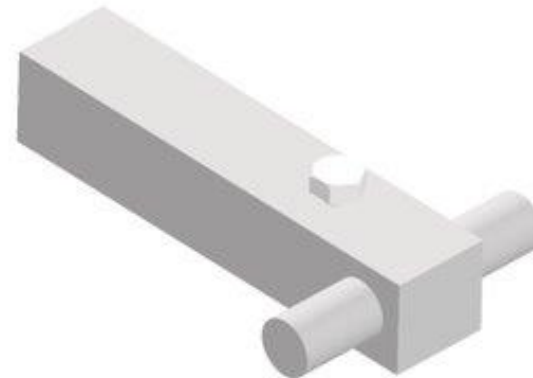
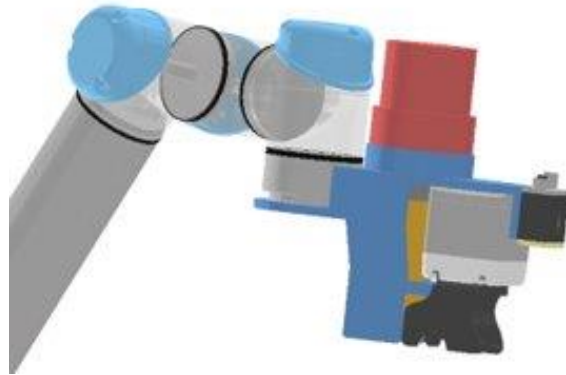
}	Object recognition
	Orientation calculation
- \* Use a suitable hardware to minimize the processing time



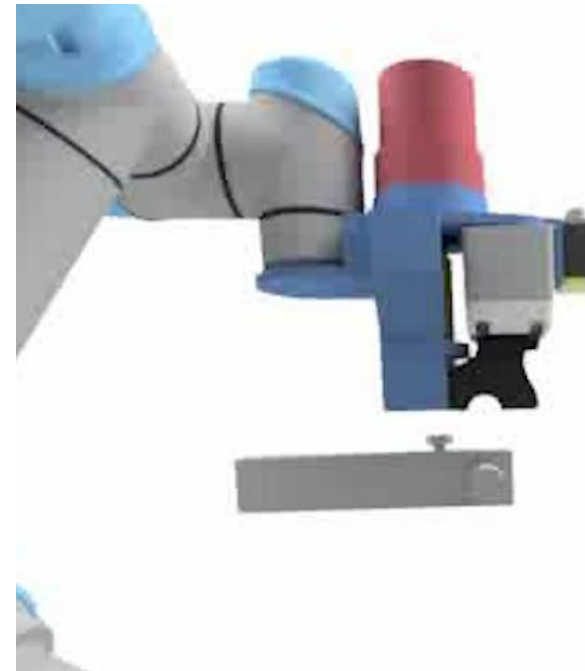
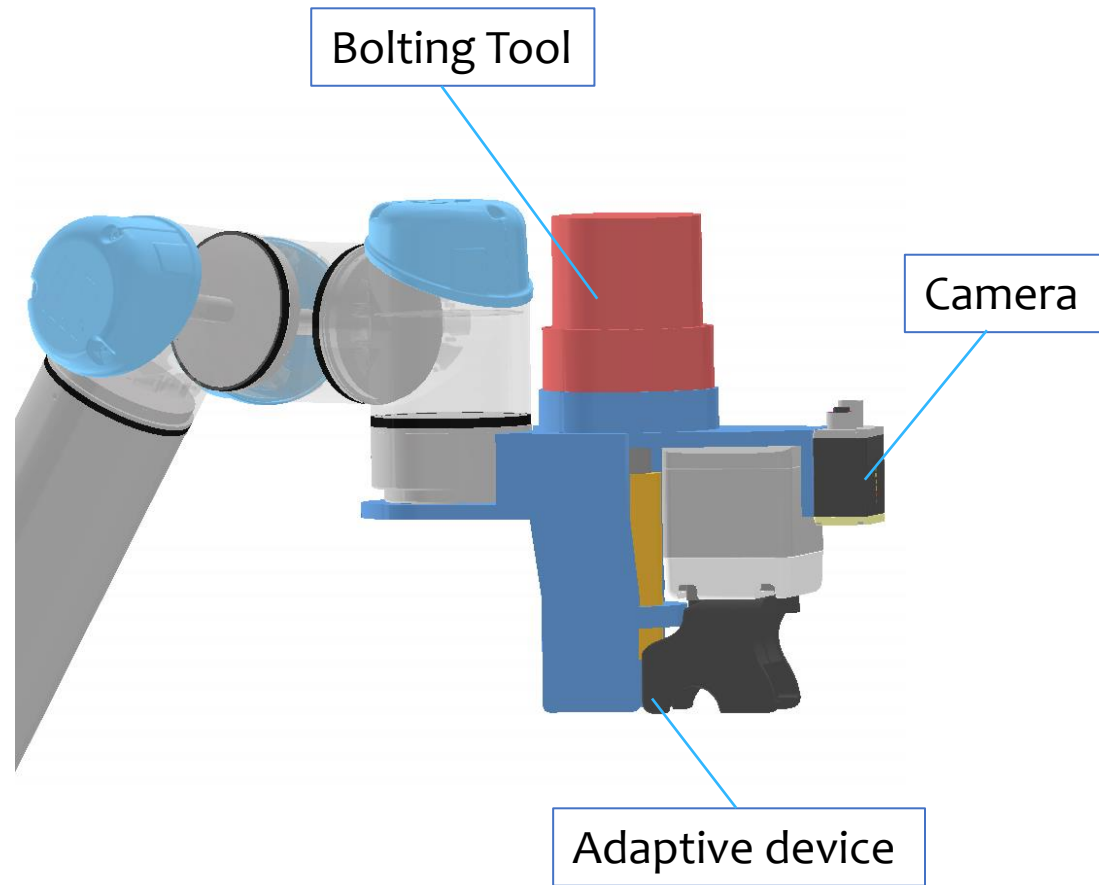
# Specialized tools

# High torque tasks

- \* Robotic arm cannot absorb the high torque -> Solution: Adding devices so the component absorbs it
- \* For RH both the RHE and the components to be operated on have to be adapted

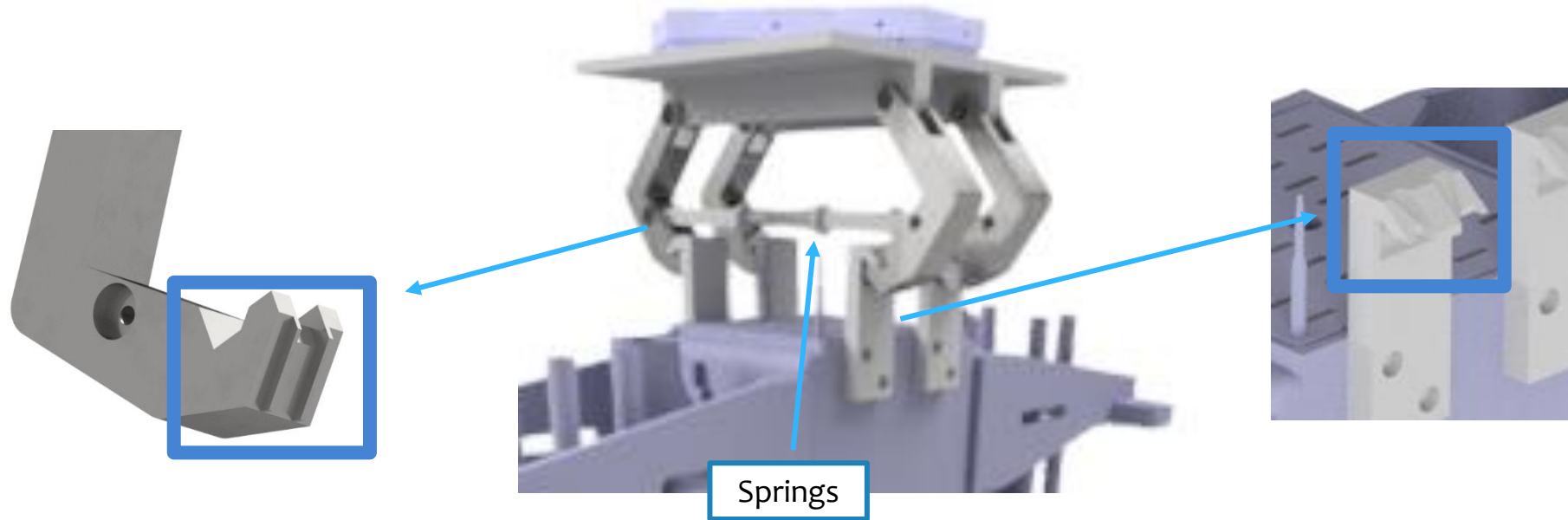


# High torque tasks



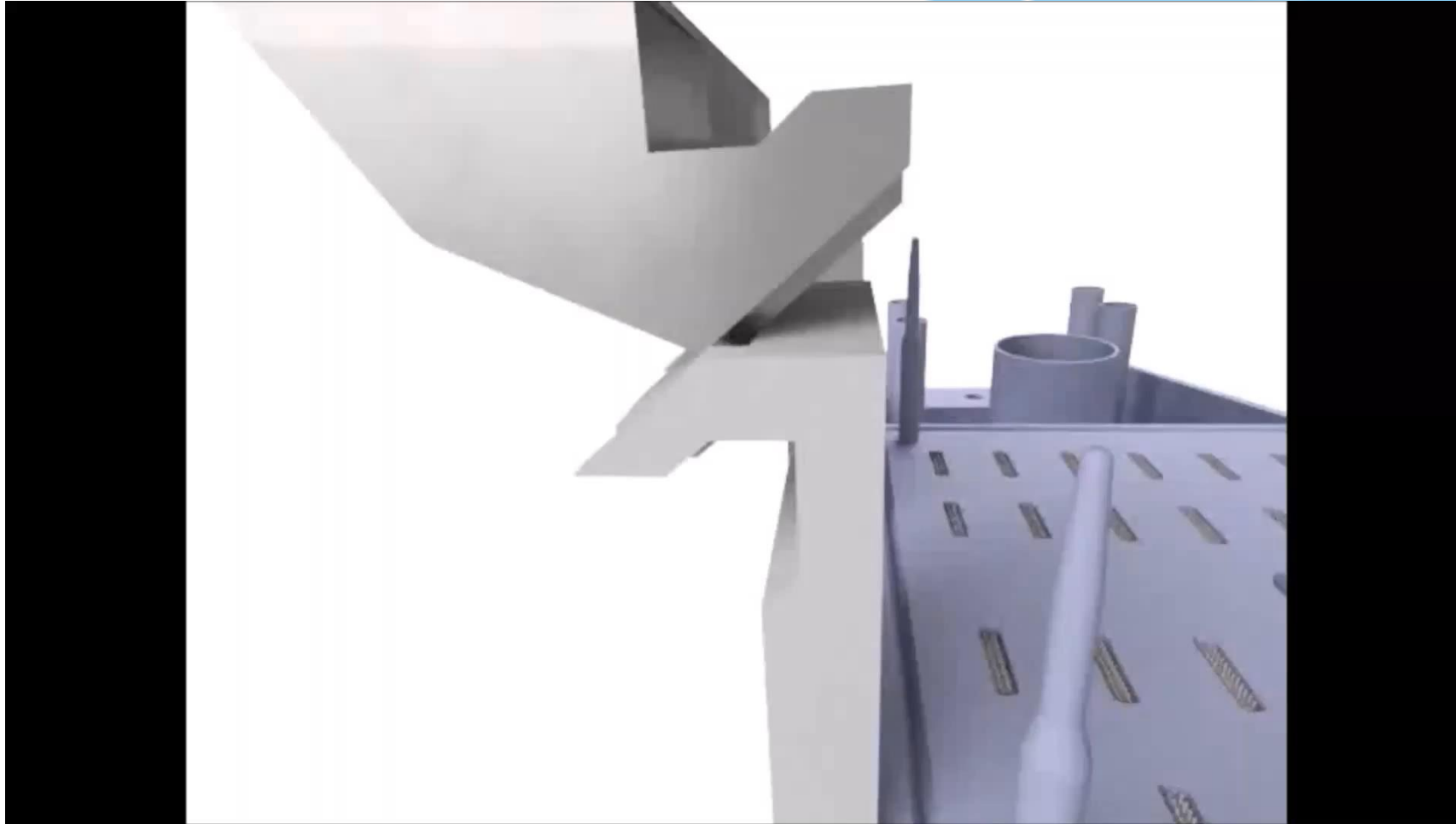
# Hostile environments for electronic components

- \* When electronic components cannot be used -> Mechanical solutions
- \* Passive tools:

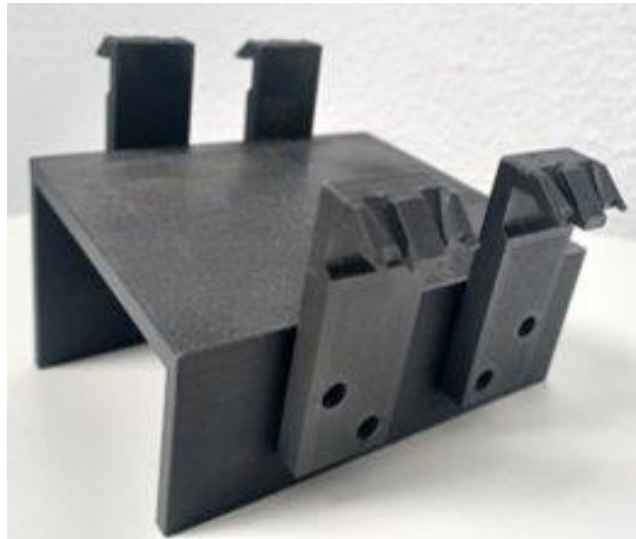
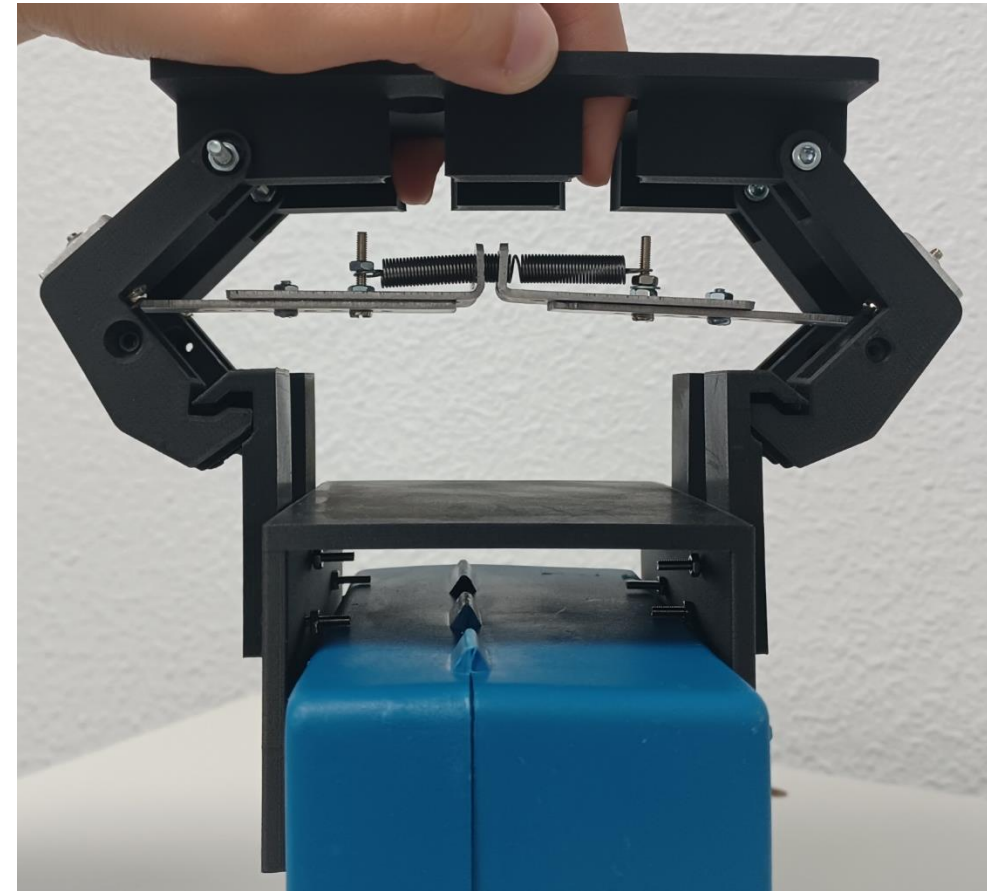




# Hostile environments for electronic components



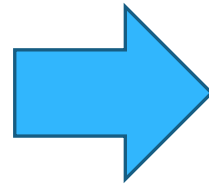
# Prototype



# Conclusions

# Conclusions

\* Significant advance in the automation degree of tasks



Allows to reach precision of

{ 1mm in position  
1° in orientation

\* The operator becomes a supervisor of the task performing less telamanipulated tasks -> More productivity



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Thanks for your attention!