

INCOBOTICS 5.0 – Ready for Industry 5.0

Project number: 2019-1-ES01-KA201-064454

CHALLENGE

Robot assembly challenge

[October] [2020]

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Co-funded by the
Erasmus+ Programme
of the European Union

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Revision History [not for public deliverables]

Date	Version	Author	Changes
2020/10	1.0	Bernard CARDENAS	

Current version: 1.0

Project Details:

Title: INCOBOTICS 5.0 – Ready for Industry 5.0

Acronym: INCOBOTICS

Start Date: 01-10-2019

End Date: 30-09-2021

Coordinator: POLITEKNIKA IKASTEGIA TXORIERRI S.COOP



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Contents

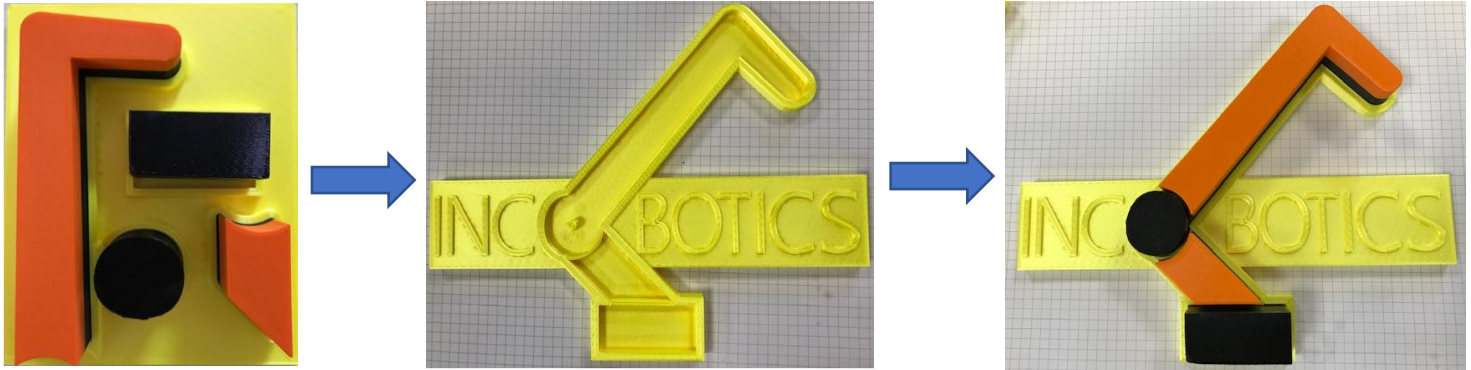
1. THE CHALLENGE	4
2. RÉSULTATS D'APPRENTISSAGE - CRITÈRES D'ÉVALUATION	5
3. REQUIREMENTS (SPECIFICATIONS)	6
Short description.....	6
4. BASIC CONTENT	7
KNOWLEDGE AND SKILLS.....	7
TRANSVERSAL	8
5. GET THE INFORMATION (and seminars)	8
Resources.....	8
Seminars.....	8
6. EVALUATION OF RESULTS	9
7. TIMING	10
CONCLUSION.....	10



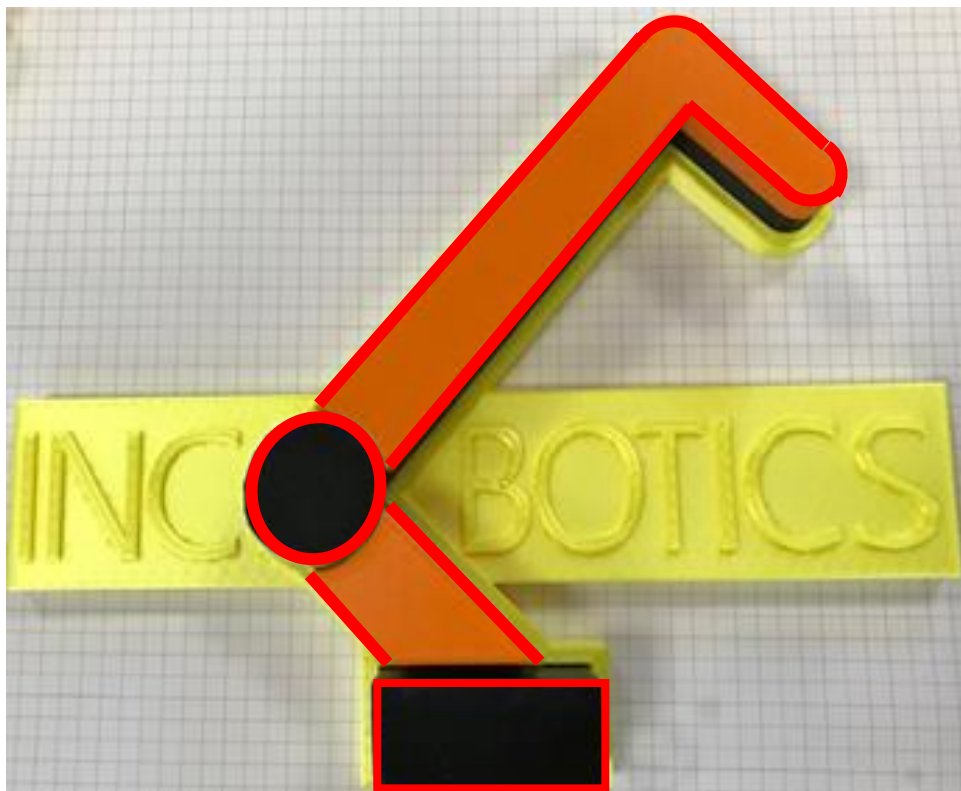
1. THE CHALLENGE

A toy packing company asks you to design a robotic cell to assemble the different parts of a robot.

The different parts of the robot arrive on a pallet. The robot takes the pieces one by one and places them on the matrix.



The robot takes a glue gun and drops it while respecting the contour of the shape.

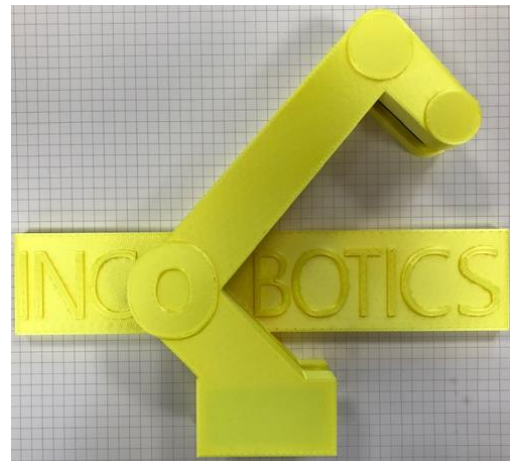




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Finally, the robot places the lid on the assembly.



2. LEARNING RESULTS - EVALUATION CRITERIA

LO	Explanation	Value
LO-1	Comprehend the CO-BOTS major bands available on the market	
LO-2	Choose the characteristics of the robot. Defined the Cobotique system, select and connect the components. Make the design of the gripping hand.	10
LO-3	Program the robot, using programming and data processing techniques.	15
LO-4	Check the operations of the robot, adjust the control devices and apply the safety rules.	10
LO-5	Configure the artificial vision system, selecting and connecting the elements and components.	5
LO-6	Program the artificial vision system to be used with the robot.	5



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3. REQUIREMENTS (SPECIFICATIONS)

Short description

1. GENERAL TECHNICAL CONDITIONS OF THE CHALLENGE	
1	Choose the collaborative robot that will be used to carry out the process according to the specifications
2	Use a start button to start the machine cycle. A green light will light up during the operating time.
3	You will use an artificial vision system to ensure assembly compliance before applying a glue joint.
2. CONDITIONS OF THE DOSSIER FORMAT	
1	It will be delivered in digital format (PDF)
2	The documents should include the requirements for each module and will have the following structure: Cover, Index, Dissertation and Bibliography.
3	The cover page includes: the challenge and its photo, the group members, the group number, the session and the modules.
4	Contents and numbered pages
5	Writing font size 12.
6	Well-numbered and organized titles
7	Well-defined bibliography.
3. CONDITIONS OF THE PRESENTATION	
1	The presentation aims to expose, explain and justify the challenge as best as possible.
2	Each team will have a maximum of 10 minutes for the presentation.
3	The teaching staff will not say the order of intervention of the teams in advance.
4	The order of intervention of each member will be carried out by the teaching staff "in situ and live"
5	Team members must be able to explain the challenge in its entirety.
6	The use of correct and appropriate technical expressions will be valued.
7	The defence must be fluid and not monotonous.
8	Do not read the content, be well organized and personal remarks will be appreciated.
9	If questions are asked, all members should be able to answer.
10	The presentation format is not imposed. It is the initiative of the working group.
11	It is suggested that the text should be reduced as much as possible
12	It is suggested to use visual resources; images, graphics, animations, etc.



4. BASIC CONTENT

KNOWLEDGE AND SKILLS

LO-2	Choose the characteristics of the robot. Define the Cobotic system, select and connect the components. Make the design of the gripping hand.
Knowledge	The TCP configuration
Knowledge	The characteristics of entry and exit systems
Knowledge	Good knowledges of SolidWorks
Skills	Mounting and connecting the clamp and/or suction cup
Skills	Using SRS software
LO-3	Program the robot, using programming and data processing techniques.
Knowledge	The programming of the different movements (movej, movel, movec) and approach
Knowledge	The SRS software
Knowledge	Setting up and assigning IOs
Skills	Structured programming
Skills	The instructions
Skills	Variables
Skills	The use of the system's IOs
LO-4	Checks the operation of Cobot systems, adjusting the control devices and applying safety regulations.
Skills	Learning points and trajectories
Skills	Optimize the running time of a cycle
Skills	Follow safety rules
Skills	Locate and recognize potential installation and programming errors
LO-5	Configure the artificial vision system, selecting and connecting the component elements.
Knowledge	The camera's features
Skills	Connect the camera to the robot
LO-6	Program the artificial vision system to be used with the robot, using programming and data processing techniques.
Knowledge	Set up the camera via SensoConfig software
Skills	Detect the presence of all parts on the pre-assembly pallet

TRANSVERSAL

In addition, the challenge will work on crosscutting aspects that teachers evaluate according to the corresponding rubric:

1. Personal (Planning, Involvement.)
1. Teamwork.
2. Communication (written and oral).

In addition, the challenge will work on Soft Skills aspects that the students evaluate:

1. Co-evaluation of teamwork (which includes valuing teammates at work).
2. Self-evaluation of teamwork (which includes self-improvement in the team).

5. GET THE INFORMATION (and seminars)

Resources

We have the following resources:

- Computers with Drive for shared work and completion of files and presentations.
- The TX2-60, TX2-60L and TX2-60L Touch robots
- Robot manuals
- Informations [de www.incobotics.eu](http://www.incobotics.eu)
- Bibliography

Seminars

SEMINAR	Manual movements
HOURS / SESSIONS	4 h
TEACHERS / SPECIALISTS	Bernard Cardenas - Frédéric Bissonnier
CONTENT	Manual movement in "Joint," "Frame" and "Tool" modes.

SEMINAR	Learning points and trajectories
HOURS / SESSIONS	2 h
TEACHERS / SPECIALISTS	Bernard Cardenas - Frédéric Bissonnier
CONTENT	Point learning and program transfer



SEMINAR	Movement programming
HOURS / SESSIONS	8 h
TEACHERS / SPECIALISTS	Bernard Cardenas - Frédéric Bissonnier
CONTENT	<ul style="list-style-type: none"> • Using SRS • Movej, movei et movec • Gripper • Instruction "Approach" • The "Reach" and "Leave" functions

SEMINAR	Artificial Vision
HOURS / SESSIONS	6 h
TEACHERS / SPECIALISTS	Bernard Cardenas - Frédéric Bissonnier
CONTENT	<ul style="list-style-type: none"> • V10 camera setup • Connect the camera to the robot • Use configuration software

6. EVALUATION OF RESULTS

HOMOGENIZATION				TRANSVERSAL								TECNICAS						
				SOFT SKILLS								SKILLS			KNOWLEDGE		MINIMUM	
SOFT SKILLS	SKILLS	KNOWLEDGE	TOTAL	AUTONOMY	PLANNING	TEAMWORK	COMMUNICATION	WRITTEN COMMUNICATION	ORAL COMMUNICATION	SELF-EVALUATION	CO-EVALUATION	DOSSIER	ACTIVITIES	FINAL PRODUCT	DEFENDING	EXAM	MINIMUM DOSSIER	MINIMUM EXAM
25	40	35	100	5	2	4	5	5	2	2	15	15	10	10	25	5	5	

7. TIMING

Durée : 42 sessions			
1	Sessions	1	Present the challenge to the students
20	Sessions	21	Obtaining the information included visits to the facilities, giving seminars and training activities.
10	Sessions	31	Offline programming, testing and assembly
7	Sessions	38	Preparing documentation until planned tasks are completed. Completion of the "Dossier." During the execution, feedback with the teams.
1	Sessions	39	Presentation, defence, co-assessments and self-assessment will be carried out.
1	Sessions	40	Final feedback

CONCLUSION

Conclude once the whole challenge is finished.

