

Grasping System (GS) – Problem Description

1. CONTEST DESCRIPTION

This Grasping System contest is part of the Robotic Arm Challenges. For this challenge, you are asked to design the grasping system attached to a separately designed robot, which can pick items available in an Airbus Warehouse.

How it works:

Upon the request for items from the warehouse (e.g. two units of item A, one unit of item B, and two units of item C), the robot will pick precisely the items requested; picking can be done one by one.

The grasping system will be mounted to a robot that can move in three dimensions which relies on an intelligent vision system (part of a separate challenge) to identify the location of the desired item and collect them. Once collected, the robot will then move the grasping system over the destination bin, where the item will be released.

You are free to choose any design of grasping system, as long as the requirements are met.

Please refer to the document providing the figure of items that need to be picked up and the submission template.

A prize of \$1500 will be awarded for the most technically feasible solution, submitted before 23.59 CEST on August 18th 2019

2. CONCEPT OF OPERATIONS – HOW THE GRASPING SYSTEM NEEDS TO WORK

The grasping system (GS) should consist of three main modes, which are standby, picking, and placing. **Standby** is defined as mode at which GS is at a low powered waiting mode before it receives any command. At **Picking** mode, the system should collect the item and maintain it firmly. Lastly, the **Placing** mode, corresponds to the release of the picked item when GS is commanded.



Figure 1. Possible position of item



Figure 2. Presented items in plastic bin

3. REQUIREMENTS

In this section, all the requirements are presented in Table 1. Your design must meet all these requirements.

Name	Requirement	
	Code	Description
Standby Mode	R1	GS should not move but it is able to receive commands
Picking Mode	R2	GS should be able to pick the item in all possible positions (see Figure 1 and Figure 2)
	R3	GS starts picking when it receives "pick" command
	R4	GS sends "itemPicked" message when an item is picked
Placing Mode	R5	GS should be able to release the item over the destination bin
	R6	GS starts releasing when it receives "release" command
	R7	GS sends "itemReleased" message when the item is released
	R8	GS sends "itemFell" message when the item fell before "release" command is received
Safety Consideration	R9	GS should have no sharp edges
	R10	GS should not damage any picked item
GS-Robot Interface	R11	GS should have an interface plate as shown in Figure 3
Wiring	R12	All wiring should be connected using a connector with lock mechanism, number of pins depends on your design
Data Transmission	R13	All data are transmitted or received through serial communication. Specify the pin number in your design

Table 1. Design requirements

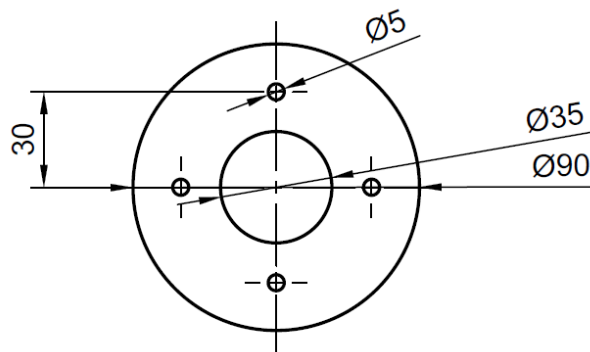


Figure 3. Interface, all dimensions are in mm

4. WAREHOUSE ITEMS

The item criteria are shown in Table 2. The heaviest item mass is 250 grams, while the lightest item mass is 1.5 grams. See Figure 4 and Figure 5 for sample of items.

Item Criteria	Length (cm)	Width (cm)	Height (cm)
Smallest	1	0.5	1.5
Longest	20	3	3
Widest	5	5	4

Table 2. Item criteria



Figure 4. Samples of Packaged items



Figure 5. Samples of Individual items

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By entering the Challenge you:

- 1) Accept the official [Freelancer.com](https://www.freelancer.com/terms-conditions) Terms & Conditions.
- 2) Agree to be bound by the decisions of the judges (Jury).
- 3) Warrant that you are eligible to participate.
- 4) Warrant that the submission is your original work. Warrant, to the best of your knowledge, your work is not, and has not been in production or otherwise previously published or exhibited.
- 5) Warrant neither the work nor its use infringes the intellectual property rights (whether a patent, utility model, functional design right, aesthetic design right, trademark, copyright or any other intellectual property right) of any other person.
- 6) Warrant participation shall not constitute employment, assignment or offer of employment or assignment.
- 7) Are not entitled to any compensation or reimbursement for any costs.
- 8) Agree the Sponsor and Freelancer.com have the right to promote all entries.

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