

IEEE UAE STUDENT DAY 2018-2019

Engineering Design Project (EDP) Competition Marble Sorting System

General Information

This competition is intended to give students an opportunity to explore art, science, Mathematics and Engineering integration and hence infinite possibilities of system design. The objective of this project is to build a system that sorts a collection of marbles based on their type. Students will compete to design a system that sorts a random set of marbles accurately and quickly. Students will be able to show their creativity, innovative designs and have fun!

A panel of judges, to be selected by the IEEE UAE Students Day steering committee, will assess the entries to the competition. The competition rules and the evaluation criteria that will be used for judging are given below.

Competition Rules

1. Undergraduate engineering students within the UAE are eligible to participate.
2. Each institution can submit a maximum of two marble sorting systems for judging.
3. Each competition team should have no more than five students.
4. Three types of marble of approximately **15-16 mm diameter** will be used: metal, glass, and wood. (10x Metal, 10x Glass and 10x Wood)
5. The metal ones are stainless steel and the glass ones are semitransparent.
6. The system should be able to sort a random set of 30 marbles in three separate bins based on their type. (10x Metal, 10x Glass and 10x Wood)
7. Each marble sorting system will be assessed on its accuracy (no of sorted marbles successfully), speed, and efficiency of its design.
8. Each team will be given 10 minutes to demonstrate all aspects of their marble sorting system.
9. All material used in the marble sorting systems must be safe, harmless and accessible to everyone in normal market. For example, items like small balls, marbles, wooden/plastic or metal pieces, paper and glue.
10. Any Kind of Battery operated electronic components are **NOT allowed**.
11. The use of any type of fluid in the sorting process is **strictly forbidden**. Marble sorting systems should be designed such that they need no safety protection.
12. Each marble sorting system weight is limited to such that it can be carried by one person and needs no more space than **1 (one) cubic meter**.
13. All Marbles **MUST be put together** (MIXED) in one place at a starting position (ex: Box). Separation for the marbles at the starting point is **NOT allowed**.
14. Students are required to start the system **ONCE** from an opening position (For example a gate where all the marbles are put together (MIXED)). **ONE to ONE marble feeding by hands is NOT allowed**.

Criteria for Judging

Team: _____ University: _____

Criteria	Weight	Score
Accuracy of Sorting	60%	
Speed of sorting	30%	
Design Innovation	10% (Use Rubric below)	
Bonus Points *	10% additional (refer to Bonus criteria below)	

$$\text{Accuracy of Sorting} = \left[\frac{\text{Sorted metal}}{\text{Max Metal}} + \frac{\text{Sorted glass}}{\text{Max glass}} + \frac{\text{Sorted wood}}{\text{Max wood}} \right] \times \frac{60}{3}$$

$$\text{Speed of Sorting} = \left[\frac{\text{Slowest Sorter time} - \text{current sorter Time}}{\text{Slowest Sorter time} - \text{Fastest Sorter time}} \right] \times 30$$

Note that the scores for Accuracy and Speed will be rounded to 2 decimal places.

Design Innovative Rubric: In this criterion the judges will be looking for innovative efficient designs and for the ability of the team members to explain the operation of their system.

Design Innovative Rubric	Outstanding (2 points)	Satisfactory (1 Point)	Unsatisfactory (zero Point)	Score
Creativity				
Use of Crafting (Ready-made items not preferred)				
Implementation of Physics and Math Concepts				
Design Simplicity				
Efforts And participation				
Total				

Bonus Criteria: Students will have to request for Bonus round to get the bonus points:

1. Bonus points (10 points additional) are **only given if** the system can sort with 100% accuracy **60 marbles** of different size between **15mm to 20mm**. (20x Metal, 20x Glass and 20x Wood)
2. **Speed of sorting the 60 marbles is ignored in the bonus round**
3. All Competition criteria from 1 to 14 apply except number and size of marbles for bonus round
4. Students are **NOT allowed** to use any add-ons or replace parts of the system. Same system from round 1 must be used for bonus round.

Marbles can be purchased online (Also, different sizes available for bonus round)

Open at your browser: www.aliexpress.com and search for the following:

<p>16mm 10 PCS AISI 304 G100 Stainless Steel Bearing Balls</p>	
<p>High Quantity Wood Bead Round 15mm Big Balls Wooden No Holes Different Sizes DIY Crafts For Jewelry Making Findings Accessories</p>	
<p>100% brand new and high quality. 16MM 50pcs Glass Marbles Glass Bead Marbles Children's Toys #35 From</p>	