



2014年度通訊博物館電子裝置製作比賽

Museu das Comunicações – Concurso de Construção de Dispositivos Electrónicos, 2014
Communications Museum - Electronic Device Construction Competition, 2014

Supplementary Rules – Junior and Senior Secondary Groups

Specifications:

The device should be composed of two parts: “Moving part” and “Controlling part”.

The IC555 must be used in the controlling part for time control. Participants cannot use processors or other programmable IC. A complete electric circuit diagram should be submitted together with the device. Each team of participants can get two packs of components for the controlling part, from the Museum, for use or reference.

Operational function of the device:

- Junior Secondary Group: Able to stop the device at specified position with the use of controlling part.
- Senior Secondary Group: Able to move the weight and unload at specified position with the use of controlling part..

Size: The device should not exceed $21cm \times 14.8cm$ (\leq A5 size).

Weight of the device: No limitation

Materials: Materials are not limited except for ready-made devices.

Restriction on source of power: The device should be driven by battery. The quantity used is limited to a maximum of 12 AA batteries at one time.

Restriction on “Device”: DC motor must be used for driving the device.

Format of competition:

Competition will be divided into junior and senior secondary groups to compete in sections of four teams or three teams. After all teams have finished the competition, evaluation will be done based on the scores obtained during the competition. The teams with the highest scores will win. If one or more teams have the same score, a playoff game will be held on the same day after the competition.

Competition ground: (Short form: Pitch)

The Pitch includes a $300cm \times 300cm$ square floor made of four pieces of acrylic, each sized $150cm \times 150cm \times 0.5cm$ and with a $25cm$ wide black border. In addition, fences will be installed around and $5cm$ away from the pitch. Inside the pitch, targets with four different colours which are red, yellow, blue and green are set on the floor representing different score areas. Please refer to the **Diagram** below. The full pitch setup will be shown on the day of competition.

Sequence/Order of competition: The sequence of competition for each team will be determined by sortition.

And the starting position of each team in the section will also be determined by another sortition before the competition of that section starts.



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Flow of competition:

Before the competition, each junior secondary group should follow instruction of the staff to mark a “measuring point” on the edge of the device, while each senior group will get a weight (one PTC 1.00 coin) which will be unloaded in the competition. After that, the team members should proceed to the starting position as determined by sortition. The competition is divided into four rounds. Before the start of each round, the team members have one minute to adjust their device. Then they should place the device at the “starting point”. The staff will signify the start of the first round. Each team has to trigger their device within 5 seconds. And each team has 30 seconds to complete their task in each round. After 30 seconds, the staff will measure and mark the result of each team.

The team members should rotate clockwise, proceed to the new starting position and take back their device. Then the staff will signify the start of the second round, and so on. After all four rounds competition are completed, the team members will have another one minute to choose on the spot the results of any three rounds out of the four rounds as the “effective scores” for the final score calculation. The Effective Scores will then be calculated with the “colour bonus” and “number bonus” to obtain the final result. The team with the highest score will be the final winner.

Scoring System:

Though the competition is carried out in three or four teams at the same time, the winner of the game will be the team with the highest score among all teams.

1. Target marks

Each target in the pitch represents a different area with a different score. Scores can be earned if the device can complete the following tasks:

- Junior secondary group: The device has to stop at the target. The location of the “measuring point” will be used to calculate the score.
- Senior secondary group: The device has to unload the weight onto one of the target areas in order to earn scores. However, the weight must be totally separated from the device, lie completely inside the target area and touch the pitch floor in order to qualified for the score.

When the time of a particular round of competition is up, score will be calculated based on the position where the “measuring point” (Junior) or the weight (Senior) becomes stationary. Therefore, the device or the weight is allowed to be moved or collided before the time of that round is up. (If the position of the “measuring point” or the weight is unclearly located inside or outside of the target, it will be considered as not completely entering the target.)

If two or more “measuring points” or weights are located in the same target, the scores of those “measuring points” or weights will be added together and then divided by the number of “measuring points” or weights in that target to get each of their individual scores (scores will be rounded to the nearest integer). If, finally, the device fails to park or unload the weight at any targets, the score earned in that round will be 10.



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2. “Colour bonus” and “Number bonus”

Each target in the pitch is in a particular colour and has a score number. In a particular round, if the device is scored based on a certain target, it will automatically be associated with the colour and score number of that target too (the score number may NOT be equal to the score earned in that round). Finally, if the colours and score numbers of the three selected rounds for calculating the “effective scores” can fulfill the following criteria, different values of “colour bonus” and “number bonus” will be multiplied to the “effective score”. The values for calculation are as follows:

Colour bonus: Only the four colours on the targets (red, yellow, blue and green) will be counted

Three targets are of the same colour: $\times 3$

Two targets are of the same colour: $\times 2$

All colours are different: $\times 1$

Number bonus: The score number as shown on the target will be used for calculation (not the actual score obtained by the team in that round of competition).

Three numbers are the same: $\times 4$

Two numbers are the same: $\times 3$

All numbers are different: $\times 1$

Example:

Assume a team gets these scores in the four rounds of competition : 1)red 200; 2)red 200; 3)green 200; 4) red 50;

If the team chooses 1) 2) 4) as their effective scores, the “colour bonus” and “number bonus” will be:

Three targets are of the same colour (red, red, red): $\times 3$

Two numbers are the same (200, 200): $\times 3$

For easy understanding, assume that the effective scores are the three selected scores (200, 200, 50), The final result will be: $(200 + 200 + 50) \times 3 \times 3 = 4050$

If the team chooses 1) 2) 3) as their effective scores, the “colour bonus” and “number bonus” will be:

Two targets are of the same colour (red, red): $\times 2$

Three numbers are the same (200, 200, 200): $\times 4$

Assume that the effective scores are (200, 200, 200)

The final result will be: $(200 + 200 + 200) \times 4 \times 2 = 4800$

3. “Jackpot!”

The middle of the pitch has a small area labeled as “Jackpot!” (see the **diagram** below). If the “measuring point” or the weight can be placed inside the “Jackpot!” area completely, the team can earn the “Jackpot!” score. While “Jackpot!” has a score of 2000, it will not be counted in the calculation of “colour bonus” and “number bonus”.



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Border (Only for senior secondary group)

The pitch includes a 25cm wide border in black. In senior secondary group's competition, if the team can park the device completely inside the black border after unloading the weight, the result of that round will be multiplied by 1.2 (the result will rounded to the nearest integer).

Maintenance:

Participants can perform maintenance work on the device. If any repair work is required during the competition, participants should notify the staff concerned before they can enter the competition ground to get back their device and perform the maintenance. While the repair work is in progress, the competition time, the number of rounds finished as well as the result in previous rounds will continue to count.

Violation of rules:

The penalty for violation of rules in the following situations will depend on their seriousness. The team may be disqualified for the competition in serious situations.

1. The device causes damage to the pitch in any way during the competition;
2. The participants touch the device during the competition without notifying the staff;
3. The dimensions of the device do not follow the specifications listed in the rules and regulations;
4. The participants use devices that have not been inspected by the Organizer of the competition;
5. Without permission from the staff, participants enter the restricted area of the pitch during competition.
6. The participants do not follow the instruction of the staff during the competition;
7. The participants do not use IC555 in the "Controlling part".
8. After the commencement of the competition, team member(s) do(es) any actions that may facilitate the operation of the device (e.g. using remote controls to stop the device).
9. Final judgment and decision will be made by organizer if emergency situation happened during the competition.

Others:

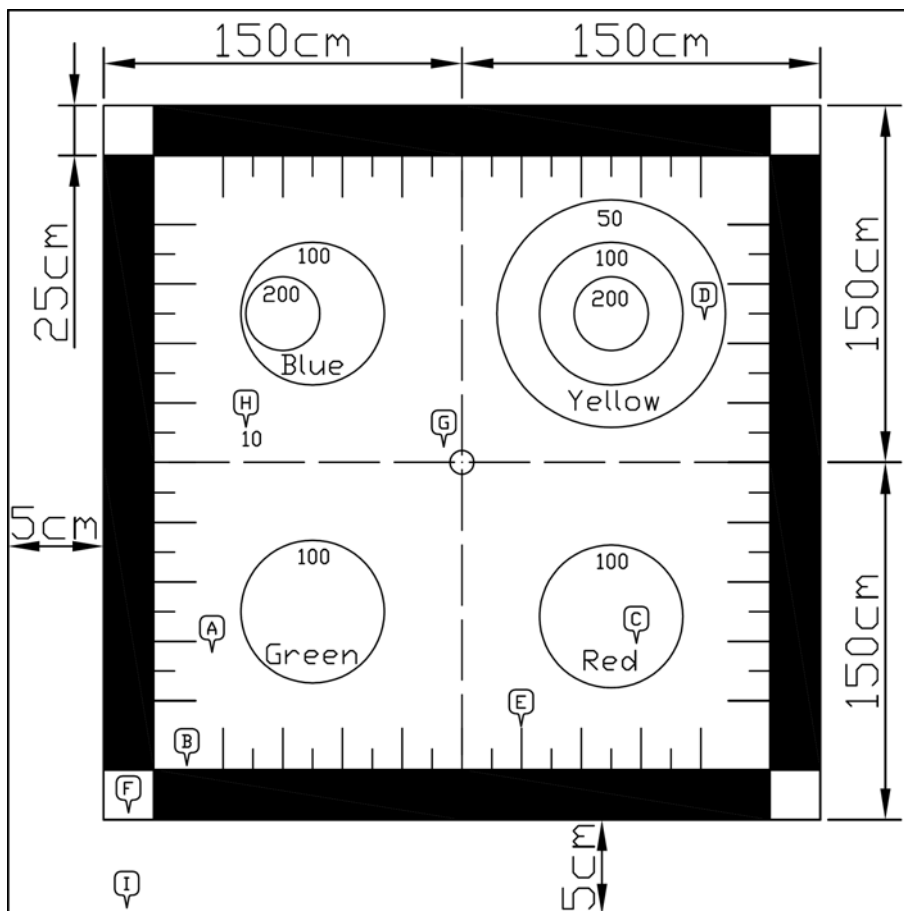
1. All participants should pay attention to electrical safety.
2. No tools will be provided by the Organizer.
3. All participants are welcome to use the testing pitch in the museum during opening hours before the competition.
4. All rules in Chinese shall prevail.



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Schematic diagram of the Pitch:



Description:

A : The $300\text{cm} \times 300\text{cm}$ square pitch is made of four pieces of acrylic, each sized $150\text{cm} \times 150\text{cm} \times 0.5\text{cm}$.

B : 25cm wide border in black.

C : Targets in four different colours: red, yellow, blue and green

D : The number scores on the targets represent different scoring areas. The relationship between the targets and the scores are:

50: target with diameter 40cm

100: target with diameter 22cm

200: target with diameter 8cm

E : The distance set up on the edge of the pitch is for reference only.

F : The four starting points located at the four corners of the pitch.

G : The "Jackpot!" area is located at the centre of the pitch and it has a diameter of 3.5cm for the senior secondary group and 2cm for the junior secondary group.

H : 10 scores for the white areas in the pitch.

I : A fence of 5cm high is set up around 5cm away from the pitch.