

HUMANOID ROBOTS COMPETITION REGULATIONS

1. Competition Content

In this category, tasks are more complex, requiring the robot to perform practical actions close to human activity. Robots must work carefully with objects placed on a table, avoid damaging them, and complete tasks within the specified time.

The competition can be performed in **manual** (operator control) or **autonomous** (sensor/camera/algorithm) mode.

2. Participant and Robot Requirements

Mandatory Requirements:

- The robot must be in a humanoid form: head, torso, two arms, and two legs.
- The robot must operate safely on the table surface during the task execution.
- The robot must have an emergency stop (**E-Stop**) button or a quick power-off capability.
- Sharp, cutting, flammable, spark-producing, or otherwise damaging parts are prohibited.

Recommended Limits:

- **Height:** $30\text{--}100\text{ cm}$
- **Weight:** Up to 20 kg
- **Work Area Force:** Safe levels that do not break objects.

Field and Equipment (Provided by Organizer):

- **Work Table:** Level, with a non-slip coating.
- **Markers:** "START" and "FINISH" signs for each task.
- **For Coffee Task:** Cup, spoon, coffee powder container, sugar container, water container (standard volume), and a designated spot for the cup.
- **Calculator:** Simple button calculator (same model recommended).
- **Book:** Medium-thickness book with a specific "page-turning requirement" indicated by page number (e.g., turn 1 page or 3 pages).

General Time Requirement:

- Each team is given **2–4 minutes** to complete the tasks (organizers will set the exact limit during the finals).
- Time is calculated from the moment the "START" command is given.
- Actions performed after the time expires will not be counted.

3. Task Order and Execution Conditions

1) Coffee Brewing Task

The robot prepares 1 cup of coffee using the items on the table and places the cup in the designated spot.

- **Initial State:**

The cup is in the "START" zone or at a designated point.

Coffee powder, sugar, and water containers are on the table ($30\text{--}50\text{ cm}$ from the cup).

The spoon is in a separate location.

- **Execution Steps:**

The robot picks up the spoon with its "hand."

Adds the specified amount of coffee powder into the cup.

Adds the specified amount of sugar into the cup.

Carefully pours water into the cup (must not spill).

Stirs the coffee at least 3 times (must be 3 clear rotating motions).

Places the finished cup on the "FINISH" mark.

- **Penalties:**

Spilling coffee or water (small spill — minor penalty; large spill — major penalty).

Dropping, breaking, or damaging objects.

Stirring fewer than 3 times — the stage is considered incomplete.

2) Calculator Task

The robot correctly enters a given expression into the calculator and displays the result on the screen.

- **Execution Conditions:**

Expression: $12 \times 8 + 34 \div 2$

The robot prepares the calculator (e.g., presses "C/AC" if necessary).

Enters the expression by pressing buttons sequentially.

Presses "=" to produce the final answer.

The final answer must be clearly visible on the screen.

- **Penalties:**

Pressing the wrong button (for each error).

Incorrect calculation — task is considered incomplete (though partial points may be awarded).

Sliding the calculator off the table or damaging it.

- **Note:** Additional points are awarded if the robot identifies buttons autonomously (camera/sensor) without operator intervention.

3) Book Page-Turning Task

The robot turns the pages of the book and returns the book to its place.

- **Execution Conditions:**

Turns at least 1 page (or the number specified by the judge).

Pages must not be torn, and "two pages at once" must be avoided.

Returns the book to the designated spot.

- **Evaluation Criteria:**

Turning speed.
Stability of the page (no shaking or excessive wrinkling).
No damage to the book.

- **Penalties:**

Tearing or severely bending a page — major penalty.
Turning the wrong number of pages — partial points.

4. Scoring System

Judges award points based on the following criteria:

- **Quality of Task Execution – 40 points**

Coffee: 20 points
Calculator: 10 points
Book: 10 points

- **Accuracy and Stability of Movements – 25 points**

Delicacy of hand movements, gripping, not dropping objects.

- **Humanoid Structural Compliance – 15 points**

Similarity to human movement, realistic use of arms and legs.

- **Technical Solution and Innovation – 10 points**

Gripper design, sensors, algorithm, balance.

- **Time and Discipline – 10 points**

Finishing within time, following order.

- **Bonus Points:** (max. +10)

- **Total Score: 100**

5. Safety Rules

- The operator stays near the robot only at a safe distance.
- If the judge says "STOP," the robot must be stopped immediately.
- If liquid is spilled, activity is prohibited until the area is dried.
- Wires, batteries, and power sources must be safely insulated.

6. Disqualification

- Deliberately breaking objects or dangerous actions.

- Failure to follow the judge's instructions.
- Gross violation of safety rules.
- Replacing the robot during the task.

**These regulations may be changed at least 30 days before the start of the competition. Updated regulations will be provided to all registered participants.*

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