

ROBOCON 2018

Along with the Gods (신과 함께)

GAME RULE

Design and build a ghost robot (controlled by electric/pneumatic wire) and an angel robot (controlled by pneumatic wire). The robots are expected to collect and store the sloth, lie, injustice, and rebirth blocks to the pray or forgiveness or future zones. There are 4 injustice blocks (aluminum cylinder, 265 g, 50 mm diameter, and 50 mm height), 6 lie blocks (red wood cylinders, 125 g, 50 mm diameter, and 100 mm height) and 8 sloth blocks (black wood blocks, 80 g, 50 mm cube) in each ghost robot zone. One rebirth blocks (aluminum cylinder, 530 g, 50 mm diameter, and 100 mm height) are also in each ghost robot zone and are disturbed by evil spirits (black wood blocks, 2880 g, $300 \times 100 \times 150 \text{ mm}^3$).

Before a match starts, the score of yours sins is 100 points. When the blocks are transported to your pray zone, each sloth is worth -1 point; each lie -2 points; each injustice -3 points; and each rebirth -10 points. The forgiveness and future are located in the hell with the angel robot. When you transport sloth or lie or injustice to the forgiveness, the points of them are doubled (each sloth is worth -2 points, each lie is worth -4 points, and each injustice is worth -6 points). When you transport rebirth to the future, the points are quadrupled (each rebirth is worth -40 points). In case you bring the blocks to the wrong zone, you'll get the original point. For example, if you bring rebirth to the forgiveness, each rebirth is worth -10 point. As soon as you eliminate all of your sins (scores becomes zero), you win and the match ends.

There are two teams of contestants in each match. Before the match starts, the ghost and angel robots should be placed in the starting and hell zones, respectively. The game field is divided by the center line and your ghost and angel robots should be placed at your own side. Each match starts with the starting signal and ends with the stop signal. Each match lasts for 2 minutes and 30 seconds. The ghost robot is not allowed to cross over the center line until 1 minute has passed after the match starts. The ghost robot is not allowed to touch the rebirth or evil spirits until 1 minute has passed after the match starts.

The team whose sins become less points wins the match. In the case of a tie, the winner is decided in the following order.

- More rebirth blocks are in the future.
- More injustice blocks are in the forgiveness.
- More lie blocks are in the forgiveness.
- More sloth blocks are in the forgiveness.

When the winner is not decided yet, the team who possesses less possible points wins the match. Only the objects lifted by the robot will be considered as being possessed. In the case when the score is still tied, the game will be repeated.

You are expected to make one ghost robot and one angel robot. But you can make many ghost and angel robots if you want. For each team, we will provide two types of power lines. One is coming from the ceiling and can drive 3 motors and 2 air cylinders for the ghost robot. The other is coming from the bottom of the hell and can drive 3 air cylinders for the angel robot.

CONSTRAINTS

Materials

With the following exceptions, each robot must be constructed solely from materials provided in the "Kit":

- fasteners and adhesives (not tape) used only for fastening and joining;
- washers used as simple bearing and/or parts of fastening systems;
- bolts no longer than 30 mm used as posts of pivot joints, but not as structural elements;
- tape used only for electrical insulation;
- electrical wires for electric connection;
- nonfunctional decorations.

Each team may use any material worth 10,000 won at the market. However, this material should not be used as an energy storage device or energy source. You can use the material for energy transmitting device such as a power transmission axle.

Energy Sources

The energy used by the devices in the competition must come solely from:

- a change in the altitude of the center of gravity of the device;
- storage achieved by deformation of the springs;
- electrical and pneumatic energy derived through the umbilical.

Size

At the start of each competition, every part of robots (angel and ghost) must fit, **unconstrained**, within a 300 mm cube.

Mass

Each team's ghost robot must not exceed 4.0 kg and the angel robot must not exceed 3.0 Kg.

DETAILS

1. A robot violating the constraint will be disqualified.
2. Contestants will be given at least 2 minutes warning of their upcoming contest and table assignment.
3. A maximum set-up time of 30 seconds will be allowed at the contest table. After 30 seconds, 2 points are added.
4. 30 seconds will be allowed to remove all robots after each match.
5. Each contestant must use the same robot in each contest.
6. Robots must be connected to the power lines only by normal use of the connectors provided.
7. After unplugging the connectors, the power lines should be lifted up free.
8. The orientation of the electrical connector will be clearly marked according to the specifications, and the pneumatic hoses will be clearly color coded so that the judges can connect them without consulting the contestant.
9. You may interact with your robots during a contest only through normal operation of the control station. It is not allowed to use the power lines for any purpose other than translating electrical and pneumatic power.
10. Judges will disqualify any device that appears to be a safety hazard.

11. Damaging or contaminating the playing surfaces, items, or the control station may result in disqualification. It is not allowed to use any adhesive to interact with the objects.
12. The robots should be robust because they are expected to experience collision and interference.
13. Strategies aimed at only destruction of or damage to the opponent robots are not in the spirit of this course; thus, it is not allowed. A net can damage the other robot and it is not allowed.
14. Each match starts after the power lines are engaged and ends when the power is switched off. The judges will wait until all items have stopped moving, and then count the scores.
15. The objects will be counted when its center of gravity is within the vertical boundary of the score zone.
16. The motors should be connected to the designated power sources.
17. Kit materials should not be changed chemically.
18. The motor and cylinders should not be machined.
19. Contestants cannot enter the stadium nor touch the robots or objects during the game. 2 points will be added for each violation. In case of violation, the robot will be moved to the starting zone and the object will be moved to the original position by the judge.
20. The ghost robot starts from the ghost robot starting zone. The angel robot starts from anywhere on its own hell. At the start of each competition, every part of the ghost robot or angel robot must fit, **unconstrained**, within a 300 mm cube.
21. The game lasts for 2 minutes and 30 seconds. When the robot moves before the starting signal, 2 points are added.
22. The ghost robot is not allowed to cross over the centerline until 1 minute has passed after the start of the match. When the robot crosses over for more than 5 seconds, the robot is moved to the starting zone by the judge. Two points will be added for each violation.
23. The ghost robot is not allowed to touch the rebirth or evil spirits until 1 minute has passed after the start of the game. In case of violation, 2 points are added and the rebirth or evil spirit is moved to the original position by the judge. When the violation lasts for 5 seconds, the robot is moved to the starting zone by the judge.
24. The ghost robot is not allowed to cross over to the opponent's hell. 2 points will be added for each violation. When the ghost robot crosses over for 5 seconds, the robot is moved to the starting zone by the referee.
25. The ghost robot is not allowed to touch the hell. Two points will be added for each violation. When the ghost robot touches the hell for 5 seconds, it is moved to the starting zone by the judge.
26. When the ghost robot moves objects to the opponent's angel robot or opponent's hell, 2 points are added for each violation. Those objects are removed immediately by the judge.
27. When total penalty points are 6 points or over, the team is disqualified. Also, any team who wins as a result of serious violation is disqualified.

PART LIST

No.	Part name	Specification	Quantity
1	Aluminum plate	150 x 150 x 3t	2
2	Aluminum plate	150 x 150 x 1t	5
3	PVC Plate	300 x 300 x 5t	3
4	MDF Wood Plate	800 x 400 x 4.5t	2
5	MDF Wood Plate	800 x 400 x 9t	1
6	PVC Round Pipe	∅115 x 3t x 25	4
7	Epoxy Plate	300 x 300 x 1t	4
8	MDF Wood Bar	9t x 40 x 800	2
9	Aluminum Square Pipe	25 x 25 x 2t x 300	2
10	Aluminum Angle	20 x 2t x 300	3
11	Aluminum Angle	15 x 0.8t x 300	6
12	Aluminum Angle	40 x 2t x 100	3
13	Hard Steel Round Bar	∅4 x 500	2
14	Steel Drawing Square Bar	Square4=L150, Order Made (Center : 4x4 square, L40 both ends : ∅4, L55)	3
15	AHP Bosh Worm Geared Motor	0 390 206 692 (12V-4W)	3
16	Air Cylinder	MC10-45D	5
17	Adjustable Bushing	∅4	20
18	Wheel Plate-8	∅4	4
19	Round Type Electric Connector	Order Made (Female)	1
20	Chain Gear (S)	∅4	4
21	Chain Gear (L)	∅4	4



