

ABU

**Asia·Pacific Robot Contest
2004 Seoul**

THEME & RULES

FINAL VERSION

April 23, 2004

2004 Seoul Contest

Theme and Rules

The aim of this robot contest is to make machines by hand from design to construction which will be most suitable to compete in the below contest theme and rules.

Reunion of Separated Lovers, 'Gyeonwoo and Jiknyeo'

The theme of this contest is based on a love story in Asian legend. A couple called 'Gyeonwoo & Jiknyeo' are forced to be apart from each other with the Milky Way between them due to their laziness. Magpies and crows which feel sorry for the couple fly up to the sky and build a bridge with their bodies to get the couple together. It is called 'Ojak Bridge' (Bridge of Crow and Magpie). The couple get together by crossing 'Ojak Bridge' once a year, on July 7th by lunar calendar. It always rains on this day and we say that it is the tears of joy from Gyeonwoo and Jiknyeo for their reunion.

The aim of this contest is to compete for accomplishing "Reunion" by completing the unfinished bridge and carrying Golden Gift by Automatic Machine from "Gyeonwoo Zone (Zone A)" to "Jiknyeo Zone (Zone B)". The duration of each match is three minutes.

1. THE GAME FIELD

- (1) The floor of the game field shall be made of 2 mm thick vinyl sheeting (Taraflex).
- (2) The game field is surrounded by a wooden fence 150 mm in height and 50 mm in thickness.

(3) The game field consists of “Gyeonwoo Zone (Zone A)”, “Jiknyeo Zone (Zone B)”, “Milky Way Zone” and “Manual Machine Common Zone”. Refer to the attached floor plan layout for details of each zone.

(4) **“Gyeonwoo Zone (Zone A)”**

- a. Area: 5000 mm x 10000 mm of a rectangular form.
- b. 100 mm high and 50 mm thick wooden fences are at the left and right side.
- c. This zone is divided into two square zones with the same sized fence as above. One side is for team Blue and the other side is for team Red.
- d. **“Automatic Machine Start Zone”** sized 1200 mm x 1200 mm is located in the lower-middle section of each team’s zone.
- e. 20 cubical Gifts and 1 Golden Gift are placed in 13 different spots for each team in “Gyeonwoo Zone (Zone A)”. The arrangement of the Gifts is as follows.
 - 1 spot of one Golden Gift.
 - 7 spots of one cubical Gift.
 - 2 spots of two stacked cubical Gifts.
 - 3 spots of three stacked cubical Gifts.
- f. “1 Point Scoring Bins” for “Gifts” are placed on the right side of team Blue and the left side of team Red. The bin sized 1000 mm x 1000 mm of a square form is made of 100 mm high and 3 mm thick polycarbonate.
- g. Only Automatic Machine(s) can be operated in Gyeonwoo Zone (Zone A). 30 mm wide white guidelines can be used for Automatic Machines to find out the direction where the “Gifts” and “Ojak Bridges” are located.
- h. Refer to the attached floor plan layout for details of the arrangement in Gyeonwoo Zone (Zone A).

(5) “Jiknyeo Zone (Zone B)”

- a. Area: 2000 mm in diameter of a circular form.
- b. There is a “2 Point Scoring Bin” for Gifts at the center of “Jiknyeo Zone (Zone B)”. The Bin sized 1400 mm in diameter is made of 100 mm high and 3 mm thick polycarbonate.
- c. There is a symbolic disk of “Jiknyeo’s Hands” for Golden Gift in the middle of the bin. The disk sized 400 mm in diameter and 10 mm in thickness is fixed on top of the cylinder with 490 mm in height and 200 mm in diameter.
- d. Only Automatic Machine(s) are permitted to go into “Jiknyeo Zone (Zone B)”.

(6) “Milky Way Zone”

- a. “Milky Way Zone” is where “Ojak Bridges” and “Manual Machine Start Zone” are located for each team.
- b. “Milky Way Zone” is divided into two zones by a 30 mm wide white line at the center of this zone. One side is for team Red and the other side is for team Blue.
- c. “Ojak Bridges” connecting “Gyeonwoo Zone (Zone A)” and “Jiknyeo Zone (Zone B)” is located in this zone for each team in uncompleted condition.
- d. **“Manual Machine Start Zone”** sized 1200 mm x 1200 mm of a square form is located in the lower corner of “Milky Way Zone” for each team.

(7) “Manual Machine Common Zone”

- a. “Manual Machine Common Zone” is located in the upper section of “Milky Way Zone”. The two zones are divided by a 30 mm wide non-shiny red and blue vinyl line.
- b. Nine “Bridge Parts” to be used for uncompleted “Ojak Bridges” are located in this zone.
- c. The “Bridge Parts” are comprised of 5 Big Bridge Parts, 2 Small Bridge Parts and 2 Smaller Bridge Parts. The Big Bridge Parts at the right and left ends are double stacked.

- d. A Big Bridge Part itself can be used to fill one space of the uncompleted “Ojak Bridges”.
- e. A Small Bridge Part needs the Smaller Bridge Part to fill one space of the bridge.
- f. Both of the Manual Machines from each team are allowed to operate in this zone, but must not go into the opponent’s “Milky Way Zone”.

2. TEAM MEMBERS

- (1) Each team shall be comprised of 4 members (3 students and 1 instructor) from the same university, polytechnic or college. However, only the 3 students are permitted to enter the game field.
- (2) Team members must enroll in University/Polytechnic at the time of the international contest. An exception is allowed to those who enroll in University/Polytechnic at the time of domestic contest.
- (3) Postgraduates are not qualified.

3. MACHINES

Each team must design and construct either or both handmade Manual Machine and Automatic Machine(s) to compete in the contest. There is no restriction in the number of Automatic Machine(s) but ONLY ONE Manual Machine is allowed to each team.

(1) Manual Machine

- a. Manual Machine has to be operated via remote control using cable connected to the Manual Machine or remote control using infrared rays, visible rays or sound waves. Radio waves are not allowed. Operators are not allowed to ride on the machines.
- b. When operating via cable, the connecting point between the Machine and the control box must be placed at least 1000 mm above the ground. Also the length of the cable from the Manual Machine to the control box must not exceed 3000 mm.

- c. The team members are not allowed to operate the machines or touch the materials placed on the game field by using cable.
- d. Manual Machine or its operator cannot touch “Gyeonwoo Zone (Zone A)’s floor and extend over into “Jiknyeo Zone (Zone B)”.
- e. Manual Machine cannot touch the boundary lines or extend over the opponent’s “Milky Way Zone”.
- f. Manual Machine cannot touch its own team’s Automatic Machines.
- g. Manual Machine is allowed to send a signal to an Automatic Machine only once for communication.

(2) Automatic Machine(s)

- a. Automatic Machines have to be autonomous.
- b. Everything separated from an automatic machine is considered to be another automatic machine, so it must work as an automatic machine.
- c. Automatic Machines are allowed to go into any zones except for the opponent’s “Gyeonwoo Zone (Zone A)”.
- d. There is no time restriction for the start of Automatic Machines. In other words, each Automatic Machine can be started at a different time after a game begins.
- e. Once a machine starts, the team members are not allowed to touch the machine. But, after a team calls for a “retry” and the referee grants it, all the team are allowed to reset and restart any Automatic Machines from the start zone.
- f. “Retry” is permitted only once per game for each team.

(3) Method of Control

- a. Only one operator for each team is allowed to control Manual Machine in the game field.
- b. The Automatic Machine operators are allowed to enter the game field only when they start the machines including a “retry”.
- c. Each Automatic Machine must be started by one operation.

(4) Power Supply

- a. Each team shall prepare its own power source for all its machines during the games.
- b. Voltage of the machines' electrical power source must be below DC24 V.
- c. Power source that is considered dangerous or unsuitable by the committee shall not be permitted.

(5) Weight

- a. The total sum of weight of all machines must not exceed 50 kg.
- b. The total weight includes the weight of power sources, cables, remote controller and other parts of the machines.

(6) Size

- a. The total size of Automatic Machines has to fit in the size of 1200 mm x 1200 mm x 1500 mm at the Start Zone.
- b. After the game begins, Automatic Machines can be separated and the sizes can be changed freely.
- c. The Manual Machine has to fit in the size of 1200 mm x 1200 mm x 1500 mm at the Start Zone.
- d. After the game begins, the size of Manual Machine can be changed freely, but it cannot be separated.

4. OBJECTS (GIFT/GOLDEN GIFT/BRIDGE)

(1) Gifts are made of EPS (Expandable Polystyrene) sized 200 mm x 200 mm x 200 mm and 0.4 ± 0.05 kg in weight. The surface is covered with EVA (Ethylene Vinyl Acetate) plate.

(2) Golden Gifts are made of EPS (Expandable Polystyrene) sized 400 mm x 400 mm x 400 mm and **2.3 ± 0.1 kg in weight**. The surface is covered with EVA (Ethylene Vinyl Acetate) plate.

(3) Big Bridge Parts are made of EPS (Expandable Polystyrene) sized (400mm + 600mm) x 800 mm of a trapezoid form with 100 mm height.

It is 3.2 ± 0.1 kg in weight.

(4) Putting together a Small Bridge Part and a Smaller Bridge Part, it is equal to a Big Bridge Part in size.

(5) The top surface of Ojak Bridges and all surfaces except for the bottom side of Bridge Parts are covered with the same material as that of the game floor, and a white guideline is marked on them.

5. MATCHES

(1) The Tournament

Not settled yet.

(2) The Duration of Matches

- a. Matches shall last for 3 minutes. However, matches may be ended earlier if a team accomplishes “Reunion”.
- b. Setting of the machines shall be completed within 1 minute after receiving the signal for setting.
- c. Each game starts and ends with the equivalent signal.

(3) Points Awarded

Points are calculated for each “Gift” and “Ojak Bridge”. Points are calculated when the match ends.

- a. Being centroid of a “Gift” inside “Scoring Bins”(the Gift must not be touched by the machine), it is regarded to gain point(s). Point for each bin is as follows.
 - A Gift in “1 Point Scoring Bin” is 1 point.
 - A Gift in “2 Point Scoring Bin” is 2 points.

- b. If a team fills any spaces of “Ojak Bridge” with Bridge Parts, that team gains 3 points for each space. Each Bridge Part must be inside the indicating line of the space and the largest surface of each Bridge Part must touch the floor to be regarded as filling the space for scoring.
- c. When Automatic Machine carries a Golden Gift onto the symbolic disk of “Jiknyeo’s Hands” in “Jiknyeo Zone (Zone B)” and leaves it there for over 3 seconds without help of the Automatic Machine, it is regarded as “Reunion”. The Golden Gift has to be carried by Automatic Machine crossing over the completed “Ojak Bridge”.
- d. A team accomplishing “Reunion” wins the match.

(4) Deciding the Winner

The winner of the match will be decided based on the following conditions.

- a. A team accomplishing “Reunion” wins the match.
- b. In the case that none of the teams accomplishes “Reunion”, a team that scores more points by adding up all the points after subtracting points for violations wins the match.
- c. In the case of a draw, the winner of the match will be decided by the following order.
 - ① The team that completes “Ojak Bridge” wins the match.
 - ② The team that scores more points from “2 Point Scoring Bin” wins the match.
 - ③ The team that scores more points from “1 Point Scoring Bin” wins the match.
 - ④ The team that fills in more spaces of “Ojak Bridge” wins the match.
- d. In the case of no winner being selected by the above order, the judges will decide a winner.

6. VIOLATION AND DEDUCTION OF POINTS

The following actions will be regarded as violations and 1 point will be deducted for each instance. If 3 points are deducted, the team will be disqualified.

- (1) Manual Machine touches the floor of “Gyeonwoo Zone (Zone A)”.
- (2) Manual Machine extends over into “Jiknyeo Zone (Zone B)”.
- (3) Manual Machine extends over into the opponent’s “Milky Way Zone”.
- (4) Manual Machine touches its own team’s Automatic Machines.
- (5) Manual Machine touches the placed objects by cable.
- (6) If above (2), (3), (4) or (5) violation continues, 1 point will be deducted for every 3 seconds.
- (7) An Automatic Machine extends over into the opponent’s “Gyeonwoo Zone (Zone A)”.
- (8) If above (7) violation continues for 3 seconds, the machine will be removed from the game field by a referee.
- (9) A team member touches the machine after a machine starts.
- (10) If a team throws a Gift into the opponent’s “Gyeonwoo Zone (Zone A), 1 point will be deducted for each gift.

7. DISQUALIFICATION

The following behavior shall be considered for disqualification by the referee. The team could be possibly disqualified.

- (1) Attempting to cause damage to the game field, its equipment (such as Gifts) or the opponent’s machines.
- (2) A Manual Machine touching the opponent’s Automatic Machine in “Ojak Bridge”, “Gyeonwoo Zone (Zone A)”, “Jiknyeo Zone (Zone B)”.
- (3) A Manual Machine touching the opponent’s Golden Gift.
- (4) Performing any act against the spirit of fair play.

8. SAFETY

- (1) All machines must be built so that they will not harm the operators, the referees and the audience.
- (2) To ensure safety, when using a laser beam, it must be less than class 2 laser, and used in a way that will not harm any operators, the referees and the audience.

9. COST OF PRODUCTION AND CARRIAGE

(1) Cost of production

- a. The committee shall provide US\$1000.00 as a subsidy for the machine construction to each committee member organization.

(2) Cost of carriage

- a. The transport company, specified by the committee, will ship the machine. Details will be announced later.
- b. The machines must be packed in ONE CRATE measuring 1500mm x 1500mm x 1500mm.

10. OTHERS

- (1) For any other behaviors that are not specified in the rules, referees are given full authority to make the decision and the decision is final in the event of a dispute.
- (2) Any amendments to the rules will be announced by the Contest Committee.
- (3) All teams are encouraged to decorate their machines with their country's national symbols.
- (4) Only handmade machines are allowed in the contest.

11. AWARDS

Prizes shall include awards for the winners, runner-ups, best technology, best idea and best artistic design.

12. NOTICE ON MACHINE DESIGN AND CONSTRUCTION

Followings are the points to be kept in mind when constructing machines. In every case, sufficient attention must be paid to avoid possible danger.

- (1) Each team shall avoid machines damaging the game field or its equipment considering the materials of Gift, Golden Gift and Bridge.
- (2) For official supplementary information on the contest rules, the Contest Committee will release the FAQ (Frequently Asked Question).
- (3) Each participating country will be asked to prepare a 5-minute videotape, which explains the structure and the movement of the participating teams' machines. The Contest Committee will verify whether each participating machine complies with the rules through viewing the videotapes, prior to the shipment of the machines.

13. QUESTIONS REGARDING THEME AND RULES

Questions regarding theme and rules should be addressed by e-mail to the Committee in English.

E-mail: robocon2004@kbs.co.kr

14. FAQ (Frequently Asked Question)

Supplementary information (FAQ) on rules will be provided on Robocon Official Homepage.

‘ABU Robocon 2004 Seoul’

<http://www.abu.org.my/programme/robocon/robocon.htm>

<http://www.kbs.co.kr/aburobocon2004>

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