

# **“Takraw Space Conqueror”**

## **ABU Asia-Pacific Robot Contest Bangkok 2003**

### **CONTEST THEME AND RULES**

### **FINAL EDITION**

The aim of this Robot Contest is to handmade a machine from design to construction which will be most suitable to compete in the below contest theme.

The aim of this contest is to shoot Takraw Balls into 9 baskets comprised of 3 nets in a triangular shape to compete for points. A team is considered the winner when the balls are shot into all baskets including 3 nets of centered basket or when one team scores more point than the opponent. The duration of each game is 3 minutes.

## **1. THE GAME FIELD**

- (1) The floor of the game field shall be made of 2 mm thick vinyl sheeting. The surface of the vinyl sheets shall be joined by vinyl-tape(non-shiny, 50 mm in width).
- (2) Game field consists of one “Automatic Zone” and “Manual Zone”, and an “Automatic Machine Start Zone”, “Manual Machine Start Zone”, “Takraw Ball Stocking Zone” for each team. (Refer to the attached floor plan for details)
- (3) “Automatic Zone”
  - (a) “Automatic Zone” is the running zone for Automatic Machine.
  - (b) This zone is surrounded by a 100 mm height and 20 mm width 16-sided wooden fence.
  - (c) At the “Automatic Zone” 2 circle guide lines 30 mm width, diameter of 3000 mm and 6000 mm are marked on the floor.
  - (d) 8 white guidelines in the diagonals of the shape, 30 mm width, are marked on the “Automatic Zone”.
  - (e) 9 baskets comprised of 3 nets (each net is 450 mm in diameter) in a triangular shape are hung above “Automatic Zone”. 4 outer baskets are hung 1500 mm above the floor, 4 inner baskets are hung 2000 mm above the floor and the center basket is 3000 mm high and fixed at the center of the field.

- (f) There are white circular discs of 100 mm diameter and 10 mm high fixed to the floor immediately under all of the baskets. These discs indicate the position of the basket.
- (g) Refer to the attached floor plan layout for details of the baskets and guidelines.

(4) "Automatic Machine Start Zone"

- (a) Area : 1200 mm x 1200 mm
- (b) Only Automatic Machines are able to start from this zone.

(5) "Manual Zone"

- (a) "Manual Zone" is the running zone for Manual Machine.
- (b) This zone is surrounded by a 100 mm height and 20 mm width 16-sided wooden fence.

(6) "Manual Machine Start Zone"

- (a) Area : 1200 mm x 1200 mm
- (b) Only Manual Machines are able to start from "Manual Machine Start Zone"

(7) "Takraw Ball Stocking Zone"

- (a) 16 Takraw Balls for each team are placed in the Takraw Ball Stocking Zones and are arranged in rows of 4 x 4 .
- (b) Refer to the attached floor plan layout for the shape and form of the "Takraw Ball Stocking Zone"

## 2. COST OF MACHINE PRODUCTION AND FREIGHT SHIPMENT

(1) Cost of production

- (a) The committee shall provide an amount of USD 1000 as a subsidy for the machine construction to each committee member organization.

(2) Cost of Freight Shipment

- (a) The transport company, specified by the committee, will ship the machine. Details will be announced later.
- (b) The machines must be packed so that it/they fit inside one crate measuring 1500 mm x 1500 mm x 1500 mm.

### 3. TEAM MEMBERS

- (1) Each team shall be comprised of 4 members from the same university/polytechnic; 3 students and 1 instructor.
- (2) However only the 3 students are permitted to enter the game field.

### 4. MACHINES

Each team can construct either or both Manual Machine/s and Automatic Machine/s to compete in the contest. There is no restriction in the number of machines. The Automatic Machine/s can mount Takraw balls at the start of the game, and the total number of Takraw balls that can be mounted should not be more than 20 balls. The (Manual Machine/s have to pick up Takraw balls from Takraw stocking area to shoot them to the baskets.)

#### (1) Manual Machine/s

- (a) The Manual Machine/s cannot touch nor extend its parts over to the “Automatic Zone”.
- (b) The operator can operate the Manual Machine/s either via cable using a control box connected to the Manual Machine/s or by remote control using infrared rays, visible rays, or sound waves. The operator must not ride on the Manual Machine/s.
- (c) When operating via cable, the connecting point between the Machines and the control box must be placed at least 1000 mm above the ground. Also, the length of the cable from the Manual Machine/s to the control box must not exceed 3000 mm.

#### (2) Automatic Machine/s

- (a) The Automatic Machine/s must be autonomous .Once the Machines start, the operator must not touch or handle the machine.
- (b) Automatic Machines are allowed to go into any zones.

#### (3) Method of Control

- (a) For each team, only one operator is permitted to control the machine/s.
- (b) Manual/Automatic Machine/s are permitted to handle Takraw balls in their restricted area.
- (c) For Automatic Machines, “retry” is allowed. After a “retry” is called out by a team, they are allowed to reset and restart any Automatic Machine/s from the start zone. Reset and restart can be done by any of the three members of the team. Retry is permitted only once per game for each team.
- (d) The team members are not permitted to handle or touch the machine/s once the game starts.

#### (4) Power Supply

- (a) Each team shall prepare its own power source for all its machine/s during the games.

(b) Voltage of the machine's electrical power source must be below DC24 V.

(c) Power sources that are considered dangerous or unsuitable by the Committee shall not be permitted. (e.g. use of fire)

(5) Weight

(a) Total weight of all machines shall be less than 50 kgs.

(b) The total weight includes the weight of power sources, control box, cables and other machine parts and accessories. However, weights of takraw balls are not included.

(c) Machines shall be weighed twice as follows :

1. Prior to the test run on the day before the tournament
2. Prior to the contest on the actual day of the tournament

(6) Size

(a) At the start, the Manual Machine/s must not exceed 1200 mm length, 1200 mm width, and 2000 mm height.

Also, the Automatic Machine/s must not exceed 1200mm length, 1200mm width, including the pre-mounted Takraw Balls. Height restriction for Automatic Machine/s is 2000mm, and this does not include the mounted Takraw Balls.

(b) If a number of machines are starting from the same Start Zone, they must fit in the size of 1200 mm length, 1200 mm width, and 2000 mm height.

(c) The machines can be separated and sizes can be changed freely after the game starts, but the height is limited to 3000 mm. All separated machine/s must have the ability to move. Machine/s separated from Automatic Machine/s must work as Automatic Machine/s. Also, all machine/s separated from Manual Machine/s are considered as Manual Machine/s.

## 5. “TAKRAW BALLS”

(1) Takraw balls to be used are synthetic Takraw balls, 135 mm in diameter and 155 grams in weight. ( Product equivalent to Marathon “MT101” Series )

(2) There are two colors of Takraw balls, Red balls for team A and Blue balls for team B.

## 6. MATCHES

(1) The Tournament

(a) The contest is played on the knockout system .

## (2) The Duration of Matches

(a) Matches shall last for 3 minutes. However, matches may be ended earlier if the referees decide that the game cannot continue due to mechanical problems or for safety reason .

☐ (b) Setting of the machine/s shall be completed within 1 ☐

☐ minute of receiving the signal for setting.

☐ (c) Match Start.

☐ ☐ ☐ Manual Machine/s and Automatic Machine/s can start at the instant when the game signal starts. Each

Automatic Machine shall be constructed so that it can be started in one operation.

## (3) Points Awarded

(a) Points are calculated when the match ends.

(b) A point is scored when Takraw ball are caught in the net . Only one takraw per net is required to earn the points .

(c) If both teams' Takraw balls are placed in the same net, both teams gain the points.

(d) Points for each net are as follows :

“Center Basket” 5 points/ ball/ net

“Inner baskets” 2 points/ball/ net

“Outer baskets” 1 point/ball/ net

(e) At the moment when a team shoots Takraw balls into all of the baskets and the three nets of the central basket, it is considered to have “conquered the space” and the team wins.

## (4) Deciding the Winner

(a) The game shall be decided by adding up the points scored by each team after subtracting points as a result of any violation.

(b) In the case of a draw, the winner of the match will be decided based on the conditions in the following order.

1. The team that scores more Takraw balls into the Center Basket wins the match.

2. The team that scores more baskets wins the match.

3. Judges' Decision.

(c) If a team fills all baskets and 3 nets at the Center Basket, it is considered to have “conquered the space” and wins the match.

# 7. 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 from the game.

- (1) Manual Machine/s touch or extend its parts over the "Automatic Zone".
- (2) Manual Machine/s shoot the ball directly at the opponent's operator and machine/s intentionally.

## **8. 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 opponent's machines.
- (2) Attempting to damage the game field, baskets, or takraw ball.
- (3) Performing any act failing to comply with the spirit of Fair Play.

## **9. SAFETY**

- (1) All machines must be built so that they will not harm the operators, audience, and the referees.
- (2) Operators must wear helmets during the game and must operate the machine with safety.
- (3) The shooting speed of Takraw balls should be limited so that it will not harm any operators, audiences, and the referees.

## **10. OTHERS**

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

## **11. AWARDS**

Prizes shall include awards for the winners, runner-ups, and there will be prizes for Best Technology, Best Idea and Best Artistic design.

## **12. NOTICE ON MACHINE DESIGN AND CONSTRUCTION**

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

- (1) Automatic Machine/s may come in contact with one another and the takraw ball being shot by another machine may fall on to the automatic machine unintentionally. Therefore, sufficient design must be carried out to avoid damage to the machine when constructing Automatic Machine/s
- (2) To ensure safety, when using a laser beam, it must be a class 2 laser, and used in a way that it will not harm any operators, audience, and the referees.
- (3) For an official supplementary information on the Contest Rule, the Contest Committee will release the FAQ(Frequently Asked Question).
- (4) Each participating country will be asked to prepare a 5-minute videotape, which explains the structure and the movement of the participating team's machine. The Contest Committee will verify whether each participating machine is fitted for the rules through the viewing of the videotapes, prior to the shipment of the machine.