

**ABU**  
**ASIA - PACIFIC ROBOT CONTEST 2018**  
**NINH BINH - VIET NAM**



**THEME & RULES**  
**“NÉM CÒN”**  
**The Festival Wishing Happiness and Prosperity**

## CONTENTS

|  |    |
|--|----|
| I. THEME.....                                  | 3  |
| II. THE IMPORTANCE OF SAFETY .....             | 3  |
| III. DOMESTIC CONTESTS AND CONTEST DATES ..... | 5  |
| IV. CONTEST RULES .....                        | 6  |
| 1. Terms and Definitions .....                 | 6  |
| 2. Contest Outlines .....                      | 8  |
| 3. Game Procedure .....                        | 8  |
| 4. Violation.....                              | 12 |
| 5. Disqualifications.....                      | 12 |
| 6. Teams .....                                 | 12 |
| 7. Robot .....                                 | 12 |
| 8. Safety.....                                 | 13 |
| 9. Others .....                                | 13 |
| 10. Shuttlecock Award .....                    | 14 |
| V. APPENDIX                                    |    |

*Figures and information on contest-related articles (Appendix ) will be a separate file.*

## I. THEME

# “NÉM CÒN”

## The Festival Wishing Happiness and Prosperity

Vietnam is on the fast development track. However, the traditional culture is always treasured.

The concept of the ABU Robocon 2018's Theme & Rules is based on an interesting folk game called “Shuttlecock Throwing”.

So what is required for Shuttlecock Throwing?



The game consists of an open field with a 15m bamboo trunk planted in the middle.

A bamboo ring is hung on top of the bamboo stick. The ring is covered in yellow and pink papers. Yellow color represents the moon, while pink represents the sun.

The heart and soul of this game is the Shuttlecock. The shuttlecock is an object made of cotton balls or filled with rice husks, symbolizing prosperity and happiness.



The shuttlecock is hung by a string sewn to the center of the Shuttlecock. It is decorated with colorful cotton representing the colors of the rainbow.

When playing, the player holds the end of the string to swing it clockwise various times before throwing and aims for the center of the ring.

If the shuttlecock makes it through the ring, the player wins. The flying shuttlecock depicts a flying dragon, iconic of human power and the universe.



That's why the Shuttlecock Throwing Festival opening is commenced with a ceremony to pray for deities of the Land and Sky. After the first shuttlecock hits the target, it will be opened. The husks inside it are shared among the people as a wish for a prosperous year.



Nobody knows when the game started. Today, it is not only a folk game for both men and women, where they can meet and find their other halves but also a sport for players to show their skills.



In this spirit, teams of ABU Robocon 2018 are expected to design formidable robots and charismatic shuttlecocks showing their colors.

Now, let's celebrate the spirit of Shuttlecock Throwing in the ABU Robocon 2018!

## **II. THE IMPORTANCE OF SAFETY**

In ABU Robocon, safety is a top priority. Participants shall give safety precedence over everything at all times, from the robot designing and building stages to taking part in the actual contest. They are also asked to cooperate fully with the organizer in order to ensure a safe running of the contest for everyone involved, including team members, spectators, officials and staff, as well as for the surrounding environment.

Members of all teams are required to wear shoes with rubber soles and helmets when participating the game.

## **III. DOMESTIC CONTESTS AND CONTEST DATES**

### **1. Domestic Contests**

All domestic contests held in order to select the representing teams that will participate in ABU Robocon 2018 Ninh Binh – Vietnam should adhere to the rules laid out in this Rule Book. However, it is understood that if (a) material(s) is/are not available, organisers are to employ the best possible replacement(s) available in their country/region.

### **2. Contest Dates**

24/8/2018 (Fri.): Arrival

25/8/2018 (Sat.): Test- run, Rehearsal

26/8/2018 (Sun.): Contest Day

27/8/2018 (Mon.): ABU General Meeting, Producers Workshop, Friendship Exchange Programme.

28/8/2018 (Tue.): Departure.

**3. Contest Venue:** Ninh Binh Sport Center (Ninh Binh city, Ninh Binh province)

## IV. CONTEST RULES

### 1. Terms and Definitions

| Terms                      | Definitions   | Remark            |
|----------------------------|---|-------------------|
| Manual Robot               | The robot which is operated by operator via wireless or cable connection.<br>Abbreviation: MR.  |                   |
| Automatic Robot            | The robot which is able to work independently without any help from an operator.<br>Abbreviation: AR.   |                   |
| Manual Robot Start Zone    | An area, from where the manual robot starts the game.<br>Abbreviation: MRSZ.  | See<br>Figure 1.1 |
| Manual Robot Area          | An area which manual robot and operator are allowed to operate.<br>Abbreviation: MRA.   |                   |
| Automatic Robot Start Zone | An area, from where the Automatic Robot starts the game.<br>Abbreviation: ARSZ.   |                   |
| No Contact Area            | An area which robots cannot come in contact with.<br>Robots are able to enter the space above.<br>Abbreviation: NC.   |                   |
| Throwing Area              | An area from which Automatic Robot throws Shuttlecock.<br>Throwing Area consists of three zones: <ul style="list-style-type: none"><li>- The first throwing zone: Abbreviation: TZ1.</li><li>- The second throwing zone: Abbreviation: TZ2.</li><li>- The third throwing zone: Abbreviation: TZ3.</li></ul> |                   |
| Loading Zone               | Areas where teams allocate Shuttlecock or Shuttlecock Rack before the game begins.<br>Abbreviation: LZ.   |                   |
| Ring                       | The circle attached vertically on top of Ring Tree. The Automatic Robot will throw the Shuttlecock through the Ring.<br>Ring includes 2 types: Normal Ring and Golden Ring.   | See<br>Figure 1.4 |
| Ring Tree                  | The pole attached vertically against the game field, with the Ring on top.  | See<br>Figure 1.4 |

|               |  |                   |
|---------------|--|-------------------|
|               |  |                   |
| Golden Cup    | <p>The Cup that receives the Golden Shuttlecock threw by Automatic Robot.</p> <p>Abbreviation: GC.</p>   | See<br>Figure 1.5 |
| Shuttlecock   | <p>The object is used during the game, with a sphere shape or other shapes. Shuttlecock is designed and made by teams with a team name or symbol or logo so that which shuttlecock belongs to which team.</p> <p>Shuttlecock is made of soft material (natural fiber or synthetic fiber) and is attached by Tail and Fringe.</p> <p>Shuttlecock has 2 types:</p> <ul style="list-style-type: none"> <li>- Normal Shuttlecock: ten (10) in whatever colors, can be single color (except for gold), or multi colors.</li> <li>- Golden Shuttlecock: five (5) in gold color.</li> </ul> | See<br>Figure 3.1 |
| Tail          | <p>The component attached to the Shuttlecock which is used to keep and throw the Shuttlecock .</p> <p>Tail is made of soft material (natural fiber or synthetic fiber), not elastic and have different colors.</p>   |                   |
| Fringe        | <p>The decoration component, freely attached to different po Shuttlecock.</p> <p>Fringe is made of soft material (natural fiber or synthetic fiber) in different colours with minimum 3 colors.</p>  |                   |
| Keeping point | <p>The point on the Tail, created from one or more kinks or tie the tail forming circle (without additional materials).</p>  |                   |
| Rack          | <p>Rack is used to place or hang the Shuttlecock, designed and made by teams.</p> <p>Team can make as many racks as they wish and there is no regulation in dimension.</p> <p>All the Shuttlecock Racks have to be fit inside the Loading Zone.</p> <p>Rack can be used or not used by teams.</p>  | See<br>Figure 3.3 |

## 2. Contest Outlines

2.1 A game between two teams takes place within 3 minutes. Each team has two robot of:

- + One (1) manual robot and one (1) automatic robot or
- + Two (2) automatic robots.

Only one (1) automatic robot is allowed to throw Shuttlecock.

2.2 Game field is divided into 3 areas, including fields for the 2 teams and NC area (See figure 1.1).

2.3 A team field consists of: Start Zone, Loading Zone, Throwing Zone, Manual Robot Area, and Automatic Robot Area.

2.4 NC Area is placed with Ring Trees, Normal Rings, Golden Ring and Golden Cup.

2.5 Before a game starts, ten (10) Normal Shuttlecocks and five (5) Golden Shuttlecocks are placed inside Loading Zone.

2.6 When a game starts, Manual Robot will pick Normal Shuttlecocks and handle it to Automatic Robot.

2.7 After receiving the Normal Shuttlecock, Automatic Robot will move into TZ1, TZ2 and throw the shuttlecock at the Normal Ring. If the shuttlecock goes through the ring successfully, points will be given.

2.8 Manual Robot can go and pick up the Golden Shuttlecock only after at least one Normal Shuttlecock thrown from each TZ1 and TZ2 went through the Normal Ring successfully.

2.9 After receiving Golden Shuttlecock from Manual Robot, Automatic Robot can move to TZ3 and throw the Golden Shuttlecock at the Golden Ring. If the Golden Shuttlecock goes through the Golden Ring successfully, points will be given.

2.10 When Golden Shuttlecock is thrown through the Golden Ring and then is landed on the Golden Cup, that team will gain the victory and the match will be finished. This victory is called **“Rongbay”** (“Flying Dragon”).

2.11 If neither team reaches **“Rong bay”**, and the game time of three (3) minutes passes, the game shall end. The winner will be decided by who has the higher score at the said end of the game. In case two (2) teams get the same scores, the winner will be determined under Article 3.7.

## 3. Game Procedure

3.1. Set up

3.1.1 Before a game, there is one (1) minute for each team to set up, moving the robot and shuttlecocks or the rack (if any) to the regulated position.

3.1.2 Three (3) team members and up to three (3) pit crew members shall be allowed to participate in the set-up.

3.1.3 The set-up time will start right after the signal from referees and will end right after one (1) minute.



- 3.1.4 If a team fails to complete its set-up within the given one (1) minute, it may resume set-up after the start of the game by obtaining permission from the referee.

### 3.2 Start of the Game

- 3.2.1 When the set-up time is over, referees will signal to start the game.
- 3.2.2 Teams that complete their set-up after the start of the game shall obtain permission from the referee at that moment to commence moving their robots.
- 3.2.3 When the game starts, robots have to be abided by the Article 7.5.

### 3.3 Team members during the game

- 3.3.1 Only members who controlling Manual Robot are allowed to move inside MRA. If moving to another zones, they must be permitted by referees.
- 3.3.2 Other members have to stand inside the pre-assigned area out of the game filed.
- 3.3.3 Team members are not allowed to touch robots without referees' permission.

### 3.4 Shuttlecock Loading, Handling/ Receiving and Throwing

#### 3.4.1 Loading the Shuttlecock

Manual Robot picks the Shuttlecock in the LZ area.

In each time, Manual Robot is allowed to load one (1) or more shuttlecocks or the racks (if any).

Manual Robot can go and pick up the Golden Shuttlecock only after at least one shuttlecock thrown from each TZ1 and TZ2 went through the Normal Ring successfully.

#### 3.4.2 Handling/Receiving the Shuttlecock

The Manual Robot must pass Automatic Robot one Normal Shuttlecock at a time. Only after the Automatic Robot has finished throwing the Normal Shuttlecock, Manual Robot can pass on the next Normal Shuttlecock.

Robots are allowed to handle and receive one (1) or more Golden Shuttlecock or the rack (if any) each time.

Handling and Receiving the Shuttlecock is considered successful only when having enough 4 factors as follows:

- + Automatic Robot successfully keeps or hold Shuttlecock or Tail or Fringe.
- + Shuttlecock is not allowed to touch the game field.
- + None of the Manual Robot part makes any contact with shuttlecock.
- + None of the Manual Robot part makes any contact with Automatic Robot.

During the process of handling and receiving shuttlecock, the Manual Robot is allowed to make contact with Automatic Robot. But, the Manual Robot is not allowed to send any signal to or control the Automatic Robot.

However, the Automatic Robot is allowed to control itself using sensors and so on.

#### 3.4.3. Throwing the Shuttlecock

Automatic Robot is allowed to choose the order of throwing Normal Shuttlecock in TZ1, TZ2.

Only when throwing successfully at least one (1) Normal Shuttlecock in TZ1 and one (1) Normal Shuttlecock in TZ2, the Automatic Robot is allowed to take the Golden Shuttlecock.

The Automatic Robot is allowed to carry multiple shuttlecocks if they are Golden Shuttlecocks. The Automatic Robot can throw the maximum of five (5) Golden Shuttlecocks in TZ3.

When the Automatic Robot fails to throw the Golden Shuttlecock, it is allowed to come back and throw Normal Shuttlecock in TZ1 and TZ2 for scoring.

For each throwing:

- + The Automatic Robot is allowed to throw one (1) Normal Shuttlecock at a time.
- + The Automatic Robot is allowed to throw one (1) or more Golden Shuttlecocks at a time.
- + The Automatic Robot has to hold the Tail to throw from the Keeping point or a further position from the shuttlecock. The Automatic Robot is not allowed to hold the Shuttlecock. Distance between the Keeping point and Shuttlecock is 250 millimeters, at minimum (See Figure 3.1a).

When throwing Normal Shuttlecock, the Automatic Robot has to entirely stay inside TZ1, TZ2. The vertical shape of robot is not allowed to fall on the border line between MRA and TZ1, TZ2.

When throwing Golden Shuttlecock, the Automatic Robot has to entirely stay inside TZ3. The vertical shape of robot is not allowed to fall on the border line between TZ2 and TZ3.

#### 3.4.4 Picking up the Shuttlecock

The Manual Robot is allowed to pick falling Normal Shuttlecocks in the MRA and handle them to the Automatic Robot.

Falling Normal Shuttlecocks and Golden Shuttlecocks in the NC are not allowed to be picked.

The Normal Shuttlecocks fell outside of the game field can be picked up and placed in the LZ by the team members without asking for a retry. In case of Golden Shuttlecock, team members could pick it up without re-using.

If the team asked for retry and granted by referee:

- + Team members can pick up Normal Shuttlecocks that fell in TZ1, TZ2 and TZ3 and place them in LZ.
- + Team members can pick up Golden Shuttlecocks that fell in TZ1, TZ2 and TZ3. However, they will not be re-used.
- + The Automatic Robot must restart from ARSZ.

### 3.5 Score

Score is calculated as follows:

- + A success of one (1) shuttlecock from the Handle and Receive between Manual Robot and Automatic Robot: **One point**
- + A success of throwing one (1) Normal Shuttlecock by the Automatic Robot through the Normal Ring in TZ1: **10 points**
- + A success of throwing one (1) Normal Shuttlecock by the Automatic Robot through the Normal Ring in TZ2: **15 points**
- + A success of throwing one (1) Golden Shuttlecock by the Automatic Robot through the Golden Ring in TZ3 and not landing on the Golden Cup: **30 points**
- + A success of throwing one (1) Golden Shuttlecock by the Automatic Robot through the Golden Ring and landing on the Golden Cup: Winning the **“Rong bay”**.

### 3.6 End of the Game

The game ends when:

- + A team wins the **“Rong Bay”**, or
- + The game time of three (3) minutes is over.

### 3.7 Deciding the Winner

A Winning Team is determined as follows::

- 1) The **“Rong Bay”** Winner.
- 2) A team whose best score.
- 3) In case 2 teams have the same points:
  - a. Team of higher scores in TZ3.
  - b. Team of higher scores in TZ2.
  - c. Team of higher scores in TZ1.
  - d. Team with less total weight of the robots.
  - e. Determination by Judge Committee.

### 3.8 Retries

- 3.8.1 There is no limitation for retry. A retry is considered by the rule with approval from referee.

- 3.8.2 Before a retry takes place, Teams have to bring their robots back to start zone.
- 3.8.3 The Shuttlecocks or Racks on Robot will stay in the same position even during the retry. If the team wishes to rearrange the shuttlecocks or racks (if any), they have to place them in LZ first and then pick them up again. Robots have to be abided by the Article 3.4.

#### **4. Violations**

The team who commits the following shall be deemed to be in violation of the rules and subject to a mandatory retry:

- 4.1 Manual Robot enters the opponent's game field (including space area);
- 4.2 A team member touches the robot without referee permission;
- 4.3 Manual Robot enters throwing zones or no contact area.
- 4.4 Any other acts deemed to be an infringement on the rules

#### **5. Disqualifications**

If a team is deemed to have committed the following intentionally, the team shall be disqualified for that game.

- 5.1 Any acts that pose danger to the game field, its surroundings, the robots, and/or people.
- 5.2 Any other act that goes against the spirit of fair play.
- 5.3 Any act of disobedience against a referee's warning.

#### **6. Teams**

- 6.1 One (1) representing team from each country or region shall participate in ABU Robocon 2018. As the host country, Vietnam shall be represented by two (2) teams.
- 6.2 A team consists of three (3) team members who are students and one instructor, who all belong to the same university/college/polytechnic.
- 6.3 Besides three (3) team members, three members are allowed to be registered as the pit crew. The members of the pit crew shall also be students from the same university/college/polytechnic as those in 6.2. The pit crew may assist in the work in the pit area, in carrying the robot from the pit area to the game field.
- 6.4 Graduate students cannot participate in ABU Robocon 2018.

#### **7. Robot**

- 7.1 Each team is allowed to bring one (01) Manual Robot and one (01) Automatic Robot to participate in the contest. In case of using two (02) Automatic Robot, the robot starting from MRSZ shall be considered as Manual Robot.
- 7.2 The robot must not split into parts during the game.

- 7.3 The robot must be hand-built by students from the same university/college/polytechnic.
- 7.4 Wireless/infrared/laser/super sonic communications between Manual Robot and Automatic Robot is not allowed.

#### 7.5 Robot size

The robot (including the controller and cable) must fit into the Start Zone (1000mm x 1000mm x 1000mm). Throughout the game, the robot together with any rack that will be attached to the robot after shuttlecocks loading shall not exceed regulated 1500mm length x 1500mm width x 1800mm height.

#### 7.6 Robot weight

- 7.6.1 The total weight of each robot, including Racks, battery, controller, cables and any other equipment that the team brings for use in the game must not exceed 25kg.
- 7.6.2 Back-up batteries (of the same type as that originally installed in the robot) are exempt.

#### 7.7 Power source of the robot

- 7.7.1 Each team shall prepare its own power source.
- 7.7.2 All batteries used in the robot, controller, and any other device used during the game shall not exceed 24V.
- 7.7.3 The maximum voltage within the circuits shall not exceed 42V.
- 7.7.4 Teams using compressed air must use either a container made for the purpose, or a plastic soda bottle in pristine condition that is prepared appropriately. Air pressure must not exceed 600kPa.
- 7.7.5 Any power source deemed dangerous may be banned from use.

### **8. Safety**

- 8.1 Emergency stop buttons must be built on all robots.
- 8.2 Robots must be designed and built so as to pose danger to no one, including the team, the opposing team, the people in the surroundings, and the venue.
- 8.3 The use of the following are prohibited:
- 8.3.1 Accumulator, lead-acid batteries (including colloidal), power sources that involve flames and/or high temperatures, anything that may contaminate the game field, as well as anything that may cause the robots to break down and/or create a situation that hinders the procession of the contest.
- 8.3.2 If laser is used, it shall be class 2 or less. Care must be taken not to damage the eyes of anyone in the venue.

### **9. Others**

- 9.1 For anything not mentioned in this Rule Book, the teams are required to obey the decisions of the organisers and referees.

- 9.2 Dimensions, weights, etc. of the game field described in this Rule Book have a margin of error of plus or minus 5% unless otherwise stated.
- 9.3 Questions must be sent in through the contact page on the ABU Robocon 2018 Ninh Binh – Vietnam <http://www.aburobocon2018.vtv.vn>.
- 9.4 Any additions/changes to the rules will also be posted on the ABU Robocon 2018 official website <http://www.aburobocon2018.vtv.vn>. Rule changes will be updated on the official website <http://www.aburobocon2018.vtv.vn>
- 9.5 For anything that has to do with the safety of the robots and/or the people in the vicinity, the teams are to obey the directions from the organisers and referees.
- 9.6 Transporting of the robots
- 9.6.1 The organiser shall arrange for the transport of the robots participating in the ABU Asia-Pacific Robot Contest 2018 Ninh Binh - Vietnam. Details will be given separately to each representing team.
- 9.6.2 For ABU Robocon 2018 Ninh Binh - Vietnam, the robot must fit inside a single box of length 1000mm x width 1600mm x height 1400mm.

**Note: Participants should take note in designing and building their robots to accommodate for this box size; its dimensions are smaller than that allowed for the robots during the contest.**

## **10. Shuttlecock Award**

ABU Robocon Contest 2018 Ninh Binh Vietnam shall award the prize of the best Shuttlecock to the team designing the most beautiful and impressive shuttlecock.