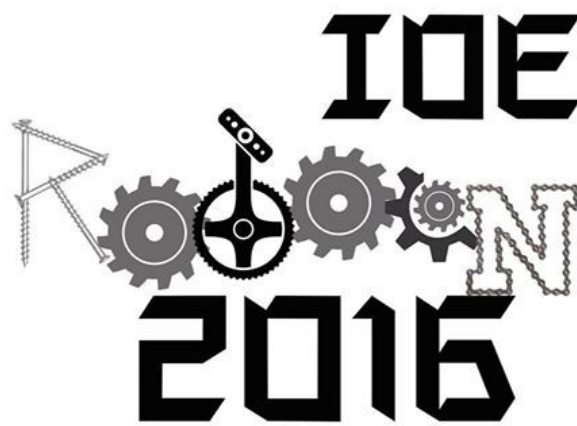


# **IOE ROBOCON 2016 NATIONAL ROBOT CONTEST**



## **THEME & RULES**

### **“Journey to Mustang”**

June 25, 2016  
National Robot Contest 2016  
Host Organizing Committee

Journey to Mustang  
IOE Robocon 2016

<http://robocon.ioe.edu.np>



# **IOE ROBOCON 2016**

## **NATIONAL ROBOT CONTEST**

*JOURNEY TO MUSTANG*

## **Quick Guide**

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# **“Journey to Mustang”**

## **Game Concepts**

Our country Nepal has the most varying geographical terrains in the whole world. The terrains vary from flat belts to mid hills to very steep mountain ranges. Despite the awkward and astonishing terrains, people reside in flat belts as well as near steep mountains. Although the lifestyle of people in southern flat regions has significantly improved there still exists hardship in the hilly and mountain regions. People still transport consumable and non-consumable goods from Terai region to Hills and Mountains for sustaining their lives. People face various obstacles like flood, landslides, etc. during the transport.

Based on the facts above, the game of IOE Robocon 2016 is designed in order to visualize the geographical terrains of our country and transport of various items from flat belts to high mountains. Each team has to build one robot. The robot picks two payloads from flat belt. One is common consumable good (salt) and the other is the telecommunication device. Crossing the different terrains and removing the various obstacles the telecommunication device is dropped off at Pokhara and the consumable good is dropped off at Mustang. So the theme of the contest **“Journey to Mustang”**.

## **Ideas**

Main ideas in designing the rules:

1. The team utilizes limited resources to design robots' mechanisms and strategies to accomplish the assigned tasks.
2. The automatic control technique is emphasized in this game.
3. The game is challenging for the contestants.
4. The game is easy to understand and entertains the spectators.
5. The winner of each game is not predictable until the end of the game.
6. The game matches the geographical terrain and economic flow of our country.

## The Contest Theme

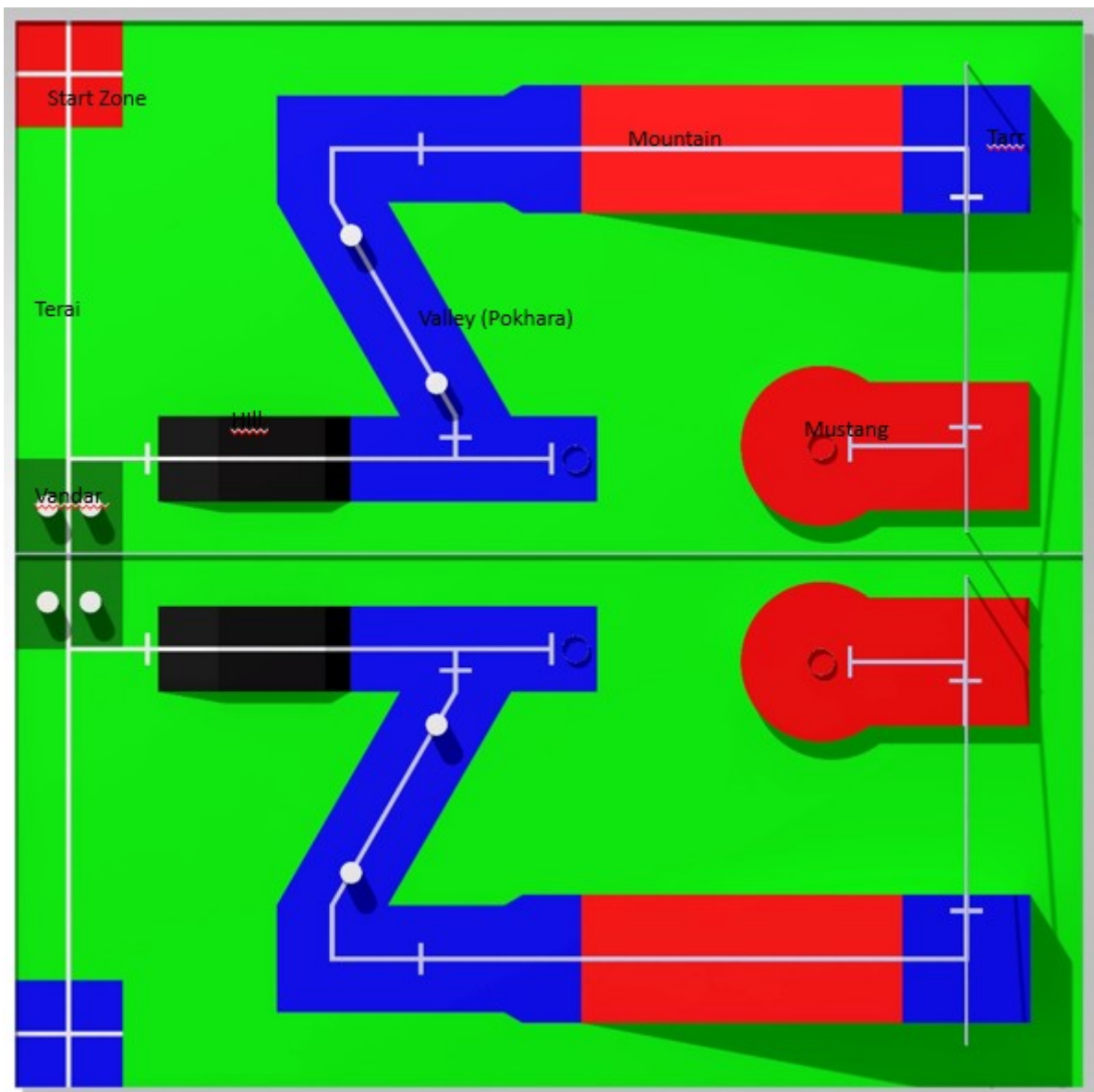
“Journey to Mustang”

### Outline of the contest:

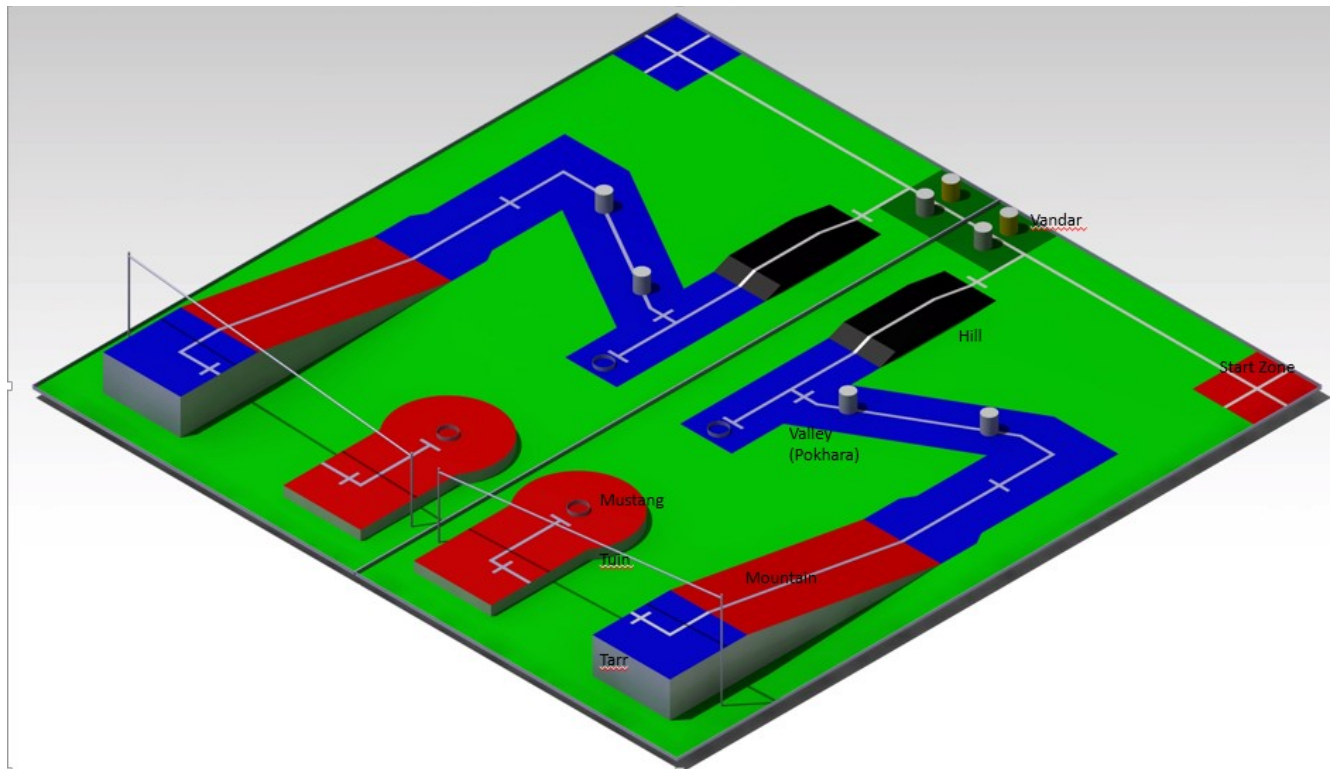
A match is contested by **Red** and **Blue** teams. It lasts 3 minutes at most.

Each team consists of one robot. Robots start from **Robot Start Zone** and pick up the payloads from the **Vandar**. Then the robots run along three zones; **Terai, Hills, Mountains**, and aim for **Mustang**.

Robot starts from the **Robot Start Zone** and picks up two payloads, a telecommunication device and salt from the **Vandar**. Then it climbs the **Hill** and reaches the **Valley** where it drops the first payload i.e. the telecommunication device at **Pokhara**. Clearing the obstacles from its path the robot aims towards **Mountain**. With the help of tuft, robot moves from **Tarr** to **Mustang**. The robot drops the second payload i.e. salt at the **Mustang**. The team that successfully delivers payloads earlier is the winner of the game. This type of winning is called “**Sahi-Ho**”.



*Figure 1 Top View of Game Field*



*Figure 2 Isometric View of Game Field*



# The importance of Safety

Safety is one of the most important elements in the sustainable development of the IOE Robocon.

The safety of the designed robots is the first and foremost issue for the safety principle of the contest. The participating teams, as the robot designers, are responsible for the safety of their robots.

The teams must work and cooperate closely with the organizers to ensure the utmost safety of the contest.

Safety must always be the top priority and it must be considered by all people involved in the contest including officials, participants and spectators in all circumstances.

Teams are required to pay sufficient attention to the safety of their robots before applying to take part in the contest.

<b>Team members must wear running shoes with rubber sole, helmets, and safety goggles during the matches and test runs.</b>
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# Rules

## Terms and Definitions

Terms and definitions which are used in the rules of IOE Robocon 2016 are given here.

<b>Term</b>	<b>Definition</b>
Robot	Either a semi-autonomous or fully autonomous robot.
Actuator	A device that creates motion; for examples, motor, pneumatic piston, hydraulic piston, solenoid
Steering	An action that turns heading direction of a robot
Payload	The cylindrical object to be dropped off at their respective drop zones
Driving	An action that creates front motion of a robot
Semi-autonomous	Ability to work independently for some actions and also work according to commands from an operator
Fully autonomous	Ability to work independently without any helps from an operator

# **1. Game Procedure and Competition Tasks**

Once the game has begun, each team has to complete the tasks in the following sequences:

## **1.1 Setting of robots:**

- 1.1.1 One minute is given for setting of the robots before the game starts.
- 1.1.2 At most, three team members of each team can engage in setting of the robots. Pit crew cannot join setting.
- 1.1.3 Any teams that fail to complete setting of the robots within one minute can resume the setting again once the game starts.

## **1.2 Deployment of the robots and team members at the start of the game:**

- 1.2.1 Robot must be started in Robot Start Zone.

## 2. Retries of Robots

- 2.1 2.1A retry can be made only after the referee's permission.
- 2.2 Team members are allowed to touch the robots while preparing for a retry.
- 2.3 Retries of Robot can be made as many times as necessary.
- 2.4 A retry is compulsory if Robot falls out of the traveling path or Payloads falls out of Robot.
- 2.5 A retry is compulsory if Robot conducts any violations.
- 2.6 Restart position after a retry of Robot is assigned as follows:
  - 2.6.1 A retry of Robot before picking up the payload is made at Robot Start Zone only.
  - 2.6.2 A retry of Robot after picking up the payload before reaching Check point 2 is made at Check point 1.
  - 2.6.3 A retry of Robot after Checkpoint 2 before dropping off the payload at Pokhara is made at Check point 2.
  - 2.6.4 A retry of Robot after dropping off the payload before reaching Check point 4 is made at Check point 3.
  - 2.6.5 A retry of Robot after Check point 4 before reaching Check point 5 is made at Check point 4.
  - 2.6.6 A retry of Robot after Check point 5 before reaching Check point 6 is made at Check point 5.
  - 2.6.7 A retry of Robot after checkpoint 6 before dropping off the second payload is made at checkpoint 6.
- 2.7 **Strategies premised on the use of retries are allowed.**

### 3. Deciding the Winner

**The team that successfully delivers both the payload earlier will be the winner of the game irrespective of the points obtained. Points for success in completion of the task and the total game point are 1000 points.**

#### 3.1 Tasks

1. Start zone to Vandar	100 pts
2. Picking of payload	200 pts( 100 pts each )
3. Dropping off payload at drop zone 1	100 pts
4. Removing the obstacles	200 pts( 100 pts each )
5. Tarr	100 pts
6. Mustang	200 pts
7. Drop of Salt	100 pts
<b>Total Points</b>	<b>1000 pts</b>

#### 3.2 Description

1. Start zone to Vandar: Robot starts and reaches to checkpoint 1.
2. Picking of payloads : Robot picks up the payloads.
3. Dropping off payload at drop zone 1: Robot drops telecommunication device at drop zone 1 ( Pokhara ).
4. Removing the obstacles: Robot removes the obstacles on the path in the valley and reaches the autonomous zone. (\* removing the obstacle is optional)
5. Tarr: Robot starts at autonomous zone and reaches the pole1.
6. Mustang: Robot moves down the tuin from pole 1(Tarr).
7. Drop of Salt: Robot reaches the final drop zone and drops off the salt.

\* Points are given only once per each task.

### 3.3 The game result

- 3.3.1 The game result is announced after the end of the 3 minutes match and the referee already checks and confirms the completed tasks and the faulty actions of the robots.
- 3.3.2 The match will end when
  - 3.3.2.1 End of 3 minutes.
  - 3.3.2.1 One of the teams is disqualified.
  - 3.3.2.2 One of the teams achieves “Sahi-Ho”.
- 3.3.3 In case of a draw, the winner is decided based on the following order.
  - 3.3.3.1 The team that gets the last earning score earlier.
  - 3.3.3.2 The team whose total weight of the robots is lighter.
  - 3.3.3.3 The team that is selected by the referee as the winner of that match.

### 3.4 Awards

#### 3.4.2.1 Grand Pix

**Two tickets to the team that wins the first position in IOE Robocon 2016 to observe the ABU Robocon 2016, Thailand.**

#### 3.4.2.2 First Runnerup

**One ticket to the team that wins the second position IOE Robocon 2016 to observe the ABU Robocon 2016, Thailand.**

#### 3.4.2.3 Second Runnerup

**One ticket to the team that wins the third position IOE Robocon 2016 to observe the ABU Robocon 2016, Thailand.**

#### Note:

- **The participating teams are allowed to send one observer to the ABU Robocon 2016 on their own cost.**
- If a student is to participate as an observer, it is compulsory that S/He is accompanied by a teacher of the same institute.

- **Other Awards shall be announced in the event itself.**

## **4. Robots Design and Development**

### **4.1 Regulations for Robot**

- 4.1.1 Each team has to build 1 robot.
- 4.1.2 Robot cannot be split into sub-units and connected by flexible cords.
- 4.1.3 The robot in the contest must be built by the team members from the same university/college/polytechnic.
- 4.1.4 **Weight of the Robot**  
The total weight of Robot, controller, cable, primary set of batteries and any equipment or devices used in the entire contest must not exceed 20 kg. However, the back-up set of batteries of the same type, weight and voltage as the primary set of batteries, is exempted.
- 4.1.5 **Power sources of the robots**
  - 4.1.5.1 Each team must prepare its own power sources.
  - 4.1.5.2 The voltage of the power sources used by robot must not exceed DC 24V.
  - 4.1.5.3 The pressure of the compressed air power must be not more than 6 bars.
  - 4.1.5.4 The organizer has the right to declare and prohibit any dangerous and inappropriate power sources.

### **4.2 Robot**

- 4.2.1 Robot can be either semi-autonomous or fully autonomous robot.
- 4.2.2 Robot must have its dimension no larger than 700 mm in width, length and height at the beginning of the game. However the robot can extend up to 1200 mm x 1000 mm x 1000 mm while game run.
- 4.2.3 The robot is allowed to expand, stretch or extend as long as the dimension is still within the dimension limit.



### **4.3 Manual Robot operation**

- 4.3.1 An operator is allowed to operate the robot for all tasks up to checkpoint 4.
- 4.3.2 The operator can be inside the game field for manual operation of the Robot. However the operator should immediately leave the game field after switching the Robot to autonomous mode.
- 4.3.3 Robot is operated by the operator through a connected cable. The length of cable from Robot to the controller must be in between 1,000 mm and 3,000 mm.
- 4.3.4 An infrared, visible ray, sonar, sound, or wireless radio frequency remote control is prohibited. The operator is not allowed to ride on the robot.
- 4.3.5 It is not allowed to remove any parts out of Robot during the transformation to autonomous mode.

### **4.4 Fully autonomous Robot operation**

- 4.4.1 If Robot is designed as a fully autonomous robot, all team members must be outside the game field except during start operation or a retry.

### **4.5 Examination of the robots**

- 4.5.1 Participating robots will be examined on the game day prior to contest. The team that fails the examination is not allowed to participate in the contest.
- 4.5.2 Details of what to be examined and how will be provided at a later date.

## 5. Violations

If a violation occurs, 50 points will be immediately deducted. A retry is compulsory after each violation. The violations are categorized as follows:

- 5.1 Any parts of the Robot or payloads move out of the game field.
- 5.2 Any parts of the Robot or payloads enter the opposing team area or the space above it.
- 5.3 Any team members touch any parts of the Robot except controller of the Robot. However, the team members are allowed to touch the robot during retries.
- 5.4 The team makes a false start. The game (both teams) will be restarted.
- 5.5 Other actions that infringe on the rules without mentioning in the disqualification are considered as violations.

## 6. Disqualifications

A team will be disqualified if it commits any of the following actions during the match:

- 6.1 The team damages or tries to damage the field, facilities, equipment or opponent's Robot.
- 6.2 The team performs any acts that are not in the spirit of fair play.
- 6.3 The team fails to obey instructions or warnings issued by the referees.
- 6.4 The team has made false start for three times in the same match.

## **7. Safety Issues of the Robots**

- 7.1 All robots must be designed and manufactured as to pose no danger of any kinds to any persons in the venue.
- 7.2 All robots must be designed and manufactured as to cause no damage to any robots of the opposing team or the field.

### **7.3 Safety rules**

- 7.3.1 The use of explosives, fire or dangerous chemicals is prohibited.
- 7.3.2 If a laser is used, it must be of class 1. In designing and preparing the laser, full care must be taken to protect all persons at the venue from harm during all procedures. In particular, the beams must be so oriented that they cannot shine into the eyes of the spectators.

## 8. Teams

- 8.1 Two teams (Red and Blue teams) compete in each match.
- 8.2 A team consists of three students, called team members, and one instructor who all belong to the same college, university or polytechnic. The three students of the team are entitled to participate in the match.
- 8.3 In addition, two members of pit crews are allowed to assist in the pit area and to carry the robots to the field, but cannot participate in the match including setting. The members of the pit crews must be students of the same college, university or polytechnic as the team.
- 8.4 Participation of graduate students is not permitted.

## 9. Others

- 9.1 The legitimacy of any actions not provided in this rule book will be subject to discretion of the referees.
- 9.2 The dimensions, weights, etc., of the field, facilities and equipment described in this rule book have a **margin of error of plus or minus 5%** unless otherwise stated. However the dimensions and weights of the robots as shown in the rule book are the maximum and cannot be tolerated.
- 9.3 All questions should be addressed to the official website of the IOE Robocon, <http://robocon.ioe.edu.np> FAQ section will be provided on the site.
- 9.4 Notification of any additions and/or corrections to this rule book will be made on the official web site.
- 9.5 The referees may demand additional explanations on safety issues when the safety of robot is deemed to be in question.