# CHAKRAYUHA

## SAMGATHA

## 2018

# RULEBOOK

**IIITDM**

**KANCHEEPURAM**

## Task

- Design a robot for the Indian Navy which can perform operation both manually and switch to autonomous when needed.
- Design another manual robot for Indian Army which can traverse different terrains.

## Bot Specification

- Max Bot dimensions: 300mm X 300mm X300mm.
- The navy tank needs to push cuboids (friendly ships) to a rescue zone containing magnet. Cuboids will have nails embedded on it.
- The army tank needs to have a mechanism to throw the ball to shoot at the shooting area and at the bridge.
- The bot can be wired/ wireless (wireless is preferred).
- **The same Navy boat should have a feature to switch into autonomous after it's manually controlled activities are over. The army bot is fully manually controlled.**
- The bot dimensions specified is excluding the structures for below mentioned mechanisms.
- Electric voltage should not exceed 24V.
- The time limit for the simultaneous completion of both the tasks is 15 minutes strictly.
- Readymade mechanisms or parts and Lego kits are **not** allowed. Readymade gears, shafts however may be used.

**PLEASE GIVE MORE ATTENTION ON THE STURDINESS OF YOUR BOT [EVERY COMPONENT USED MUST BE HIGHLY STABLE AND INTACT], THE TYPE OF WHEEL AND MOTORS AS IT HAS TO TRAVERSE UNEVEN TERRAINS.**

# Game Play

Enemies are planning to attack on India. Indian Army has decided to use unmanned tank against them.

## Navy Bot

Unfortunately, enemies hijacked Indian Cargo Ships. Indian High Command gives order to Navy to execute a rescue operation. The unmanned ship has to be sent to rescue the friendly ships (freely floating cuboids), pushing them to the nearest Naval Bases and fight against the enemy bots (red balloons). During this fight**, the control room loses the control over the ship and an emergency signal is received to activate its autonomous mode to follow the correct path and reach the safe zone.**

## Army Bot

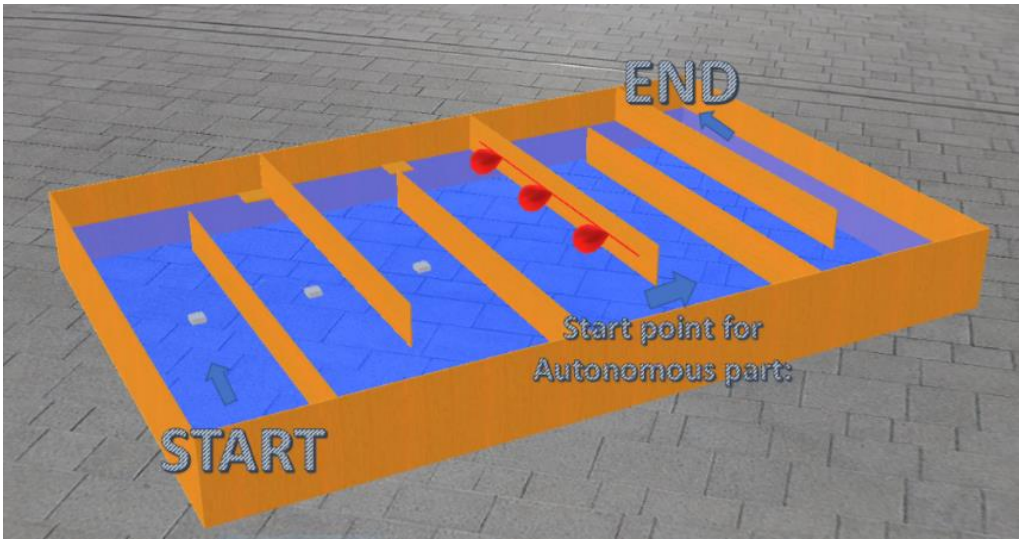
Meanwhile, the Army receives an important order from the Head Office regarding the attack by the enemies near the Line of Control and the Border Action Team releases another unmanned tank for the border. It should reach the end point passing through land conditions including mountains, river, and marshy area and also bombing at enemies and hoisting our National Flag at the end.

# Arena Specifications

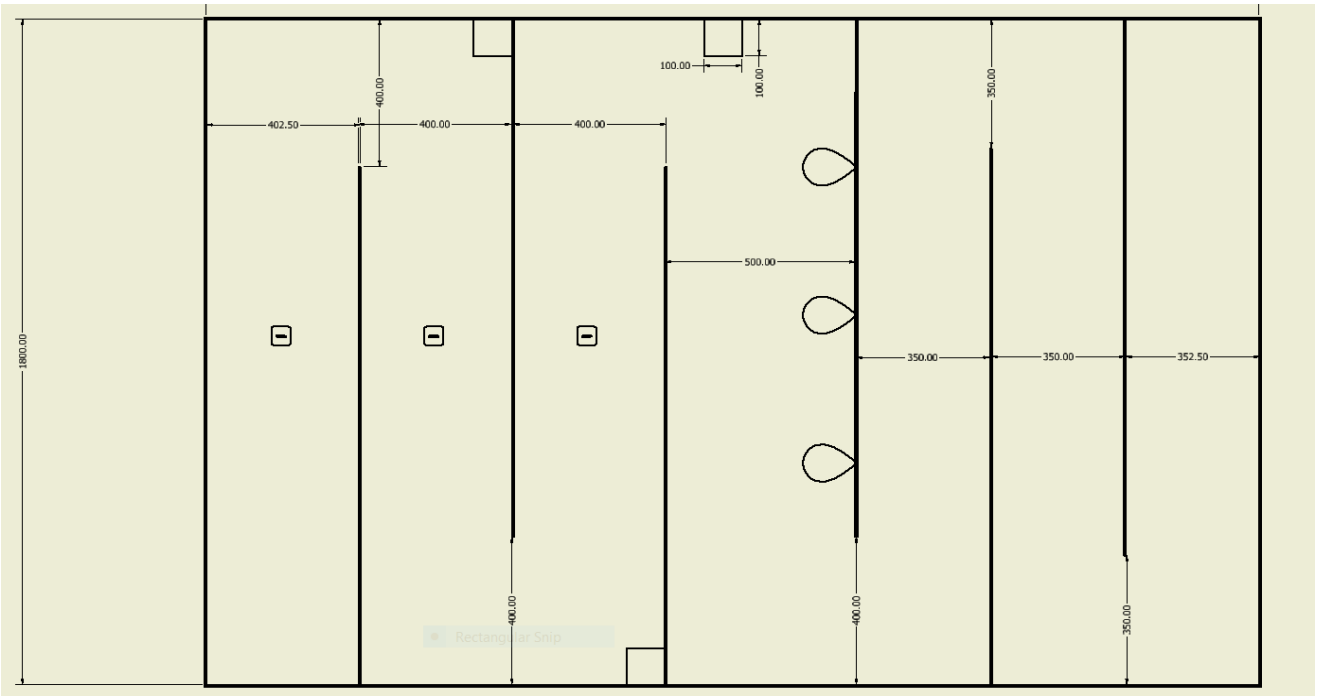
The dimensions mentioned here subjected to minor changes with 5%error.

## Navy Bot

The width of the path is 400mm. **The boat will have two modes i.e. manual and autonomous.** In manual mode, the boat has to push the freely floating cuboids which contain nails such that it sticks to the magnet at the naval bases [square platforms]. Then it should prick the balloons on the way **and switch to fully autonomous mode. In this autonomous mode, the suggested mechanism is to make the boat follow the wall.**

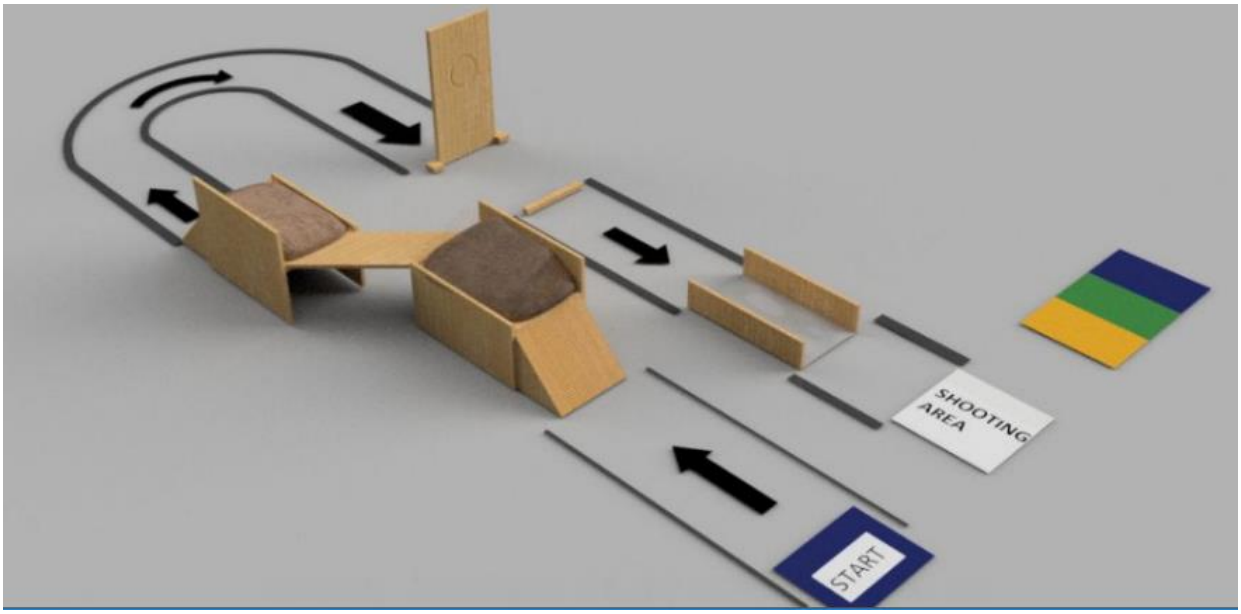


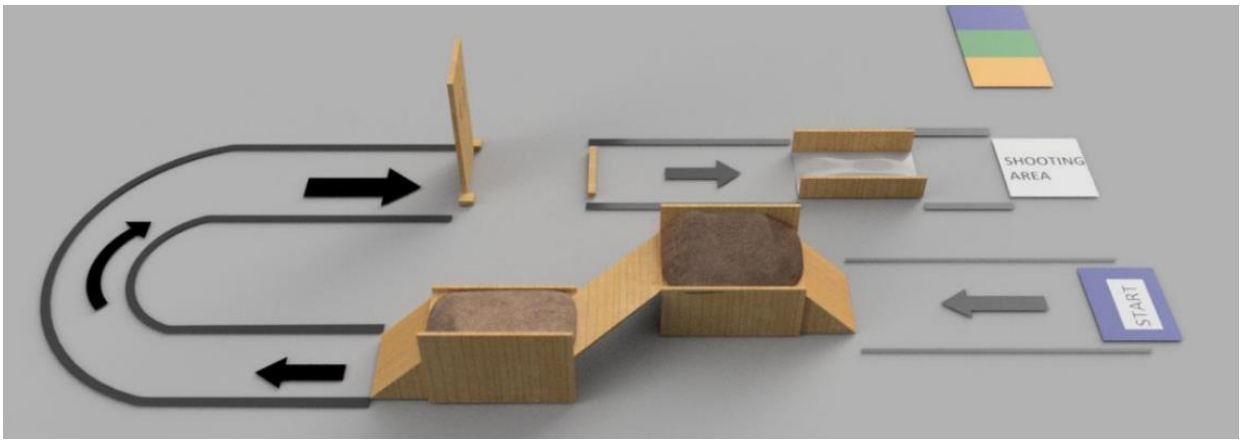

## Top View of the Arena for Navy Bot




# Army Bot

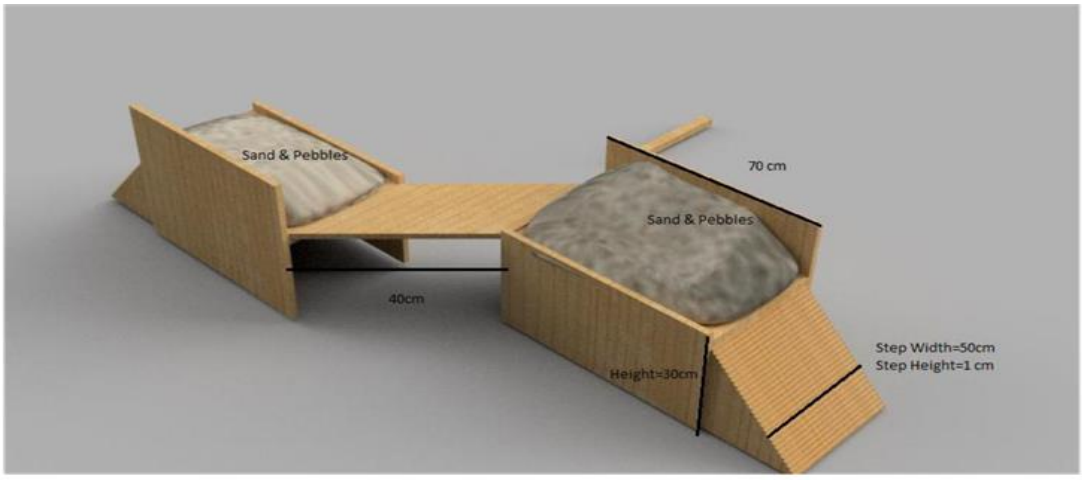
**There will be checkpoints before each land condition.**



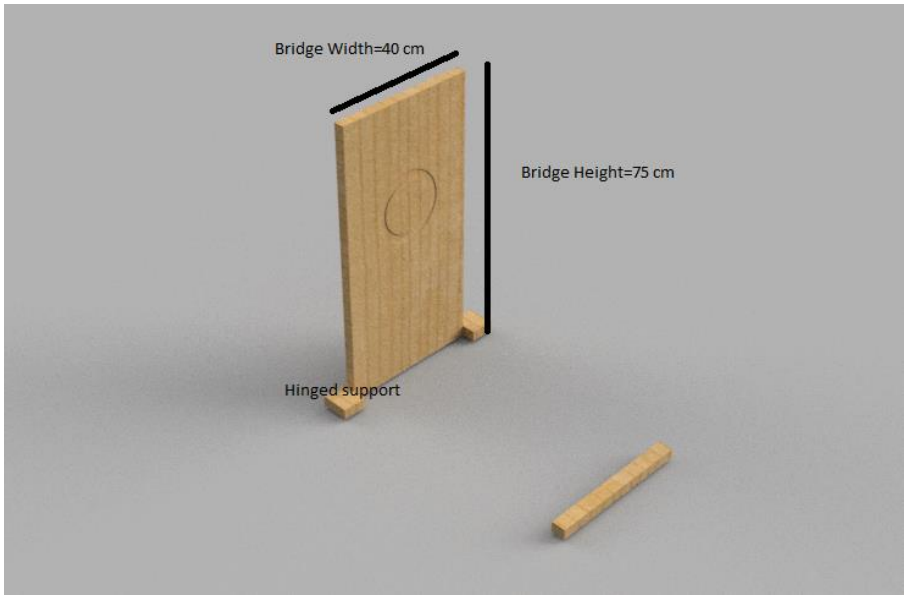

## 1. Mountains

The height of the ramp is 30cm and length of the slanted part is 50cm. And slope of the mountain will be 25 degrees.



## 2. River Bridge

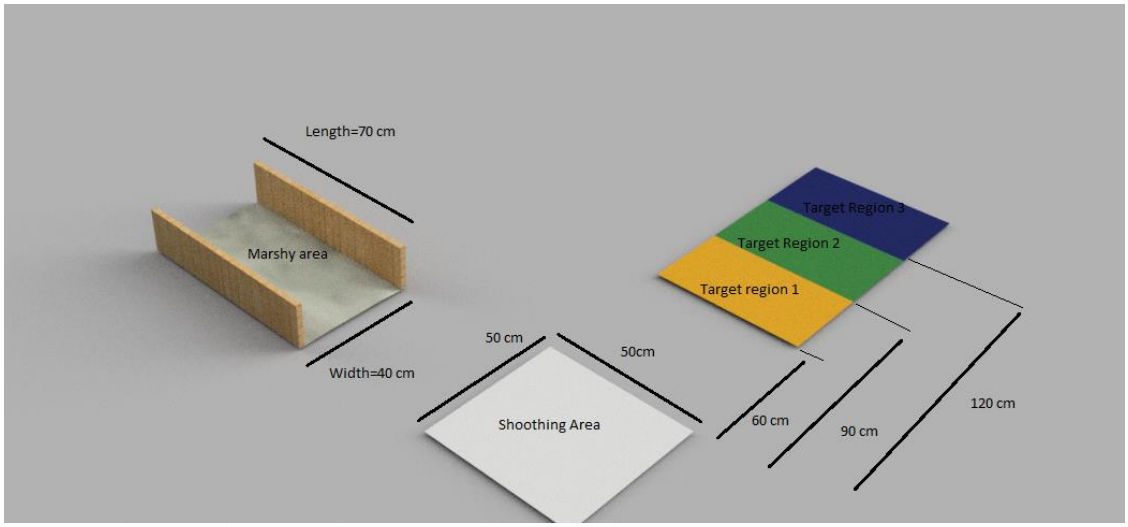
To pass through this bridge the bot should throw a ball to make the plank fall on and touch the other side of the river. The ball will be kept on the bot by the club coordinators and the time will be paused during this arrangement. The bot needs to have a mechanism to throw the ball to hit the bridge.




## 3. Marshy Land (vulnerable border) and shooting area

The robot should pass this vulnerable area under surveillance within a time of 12 sec failing which there will be negative points.

The shooting area is the whitespace where the robot should throw table tennis balls and hit the maximum distance. The distance is counted as 60cm if the ball in target A, 90cm if it hits target B and 120cm if it hits target C. Each team will be given three chances and the average of the distance will be calculated. If the shooting goes beyond target C, the distance of target C will be calculated.



## 4. Flag hoisting

The coordinators will tie one end of a rope, which contains Flag on the other end. The pole will be kept near the shooting area and the rope will be running over it and the robot should hoist the flag to finish the run.

# Points

- If the bot topples or loses control in the middle of any land conditions, a reset at the previous checkpoint is done with a loss of points.
  1st reset [-20]
  2nd reset [-40]
  3rd reset [-80]
  And so on….
  Skipping any of the land condition will lead to loss of 200 points and negative points for damaging arena.

Navy Bot Awards

| Sl no. | TASKS | POINTS |
|---|---|---|
| 1. | Pushing and placing ball at correct place | 40+40+40 |
| 2. | Pricking balloons | 30+30+30 |
| 3. | Switching to autonomous | 90 |
| 4. | Complete autonomous traversing | 300 |
| | Total | 600 |

Negative points:

- ❖ Skipping a ball [-50]
- ❖ Leaving any balloon [-40]
- ❖ Failing to switch to autonomous [-90] (This case the participant has an option to upload the second code by taking out the robot without any negative points with the time still running.) In case the boat in autonomous mode stops in the middle of the path, points will only be awarded up to task 3.
- ❖ Use of heating elements to prick balloon is strictly not allowed.

Army Bot Award

| Sl. No. | TASKS | POINTS |
|---|---|---|
| 1. | Mountain | 250 |
| 2. | Making way over the river | 240 |
| 3. | Crossing marshy area within 12 sec | 200 |
| 4. | Shooting Distance | Average dist. * 2.5 |

| | | |
|---|---|---|
| 5. | Flag hoisting | 10 |
| | Total | 1000 |

Negative Points

- ❖ Skipping any of the tasks [-200]
- ❖ Damaging Arena [-10] for each count
- ❖ Failing to cross marshy area within 12 secs [-100]

## Governing Rules

- A team can consist of a maximum of five members.
- Students from different educational institutions can form a team.
- Participants must have a valid identity card of their respective educational institution.

- Both the bots should be operated simultaneously by 2 individuals only.
- Dimensions should be restricted to the measurements mentioned above; there will be a dimension check before the start of the event.
- The participants are allowed to either skip an obstacle or reset their bot to the previous checkpoint. The participants should take note that time will not be paused while resetting the bot to the previous checkpoint.
- Participants need to be careful enough to prevent any outside intervention to their communication with the bot.

- The time limit for the simultaneous tasks is 10 minutes strictly exceeding which your game stops. The time measured by the organizers will be final and will be used for awarding points. Time measured by any contestant by any other means is not acceptable for scoring
- The following criteria will be used for final point calculation:
  If $t_1$ is the time taken for completing the boat tasks and $t_2$ is. Then the **final points will be equal to** $= [\{Total\ points\ earned\ from\ manual\ tasks\} + \{(1-t_1/10) * 1000\}] + [\{Total\ points\ earned\ from\ boat\ tasks\} + \{(1-t_2/10)*600\}]$

- No disputes would be entertained on any issue. The decision of the Technical Club Cores is final and binding in all circumstances.
- The organizers reserve the rights to modify the above rules. Any change in rules will be highlighted event page on Samgatha'18 website.

- Heating elements should not be used to prick the balloons (enemy bots).

## Disqualification

A team will be disqualified if it commits any of the following actions during the match: (Decision rests solely with the organizers and Technical Cores)

* The team fails to obey the instructions given by the coordinators.
* If the team has made false start for 2 times in the same match.
* The team performs any acts that are not in the spirit of play.
* The team damages the arena or opponent's bot intentionally or unintentionally.
* Any team with completely purchased machine.

## Contact us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