Dronetech Challenge

Competition Design:

The challenge comprises of TWO rounds in which first round will test the ability of a pilot to maneuver the multi-rotor in extreme conditions and second round will test the basic knowledge regarding the application of sensors along with ability of a pilot to maneuver. After the first round only, top teams will be selected for the second round (subject to change at time of competition). While for the second (Final) round there will be a "one to one" combat.

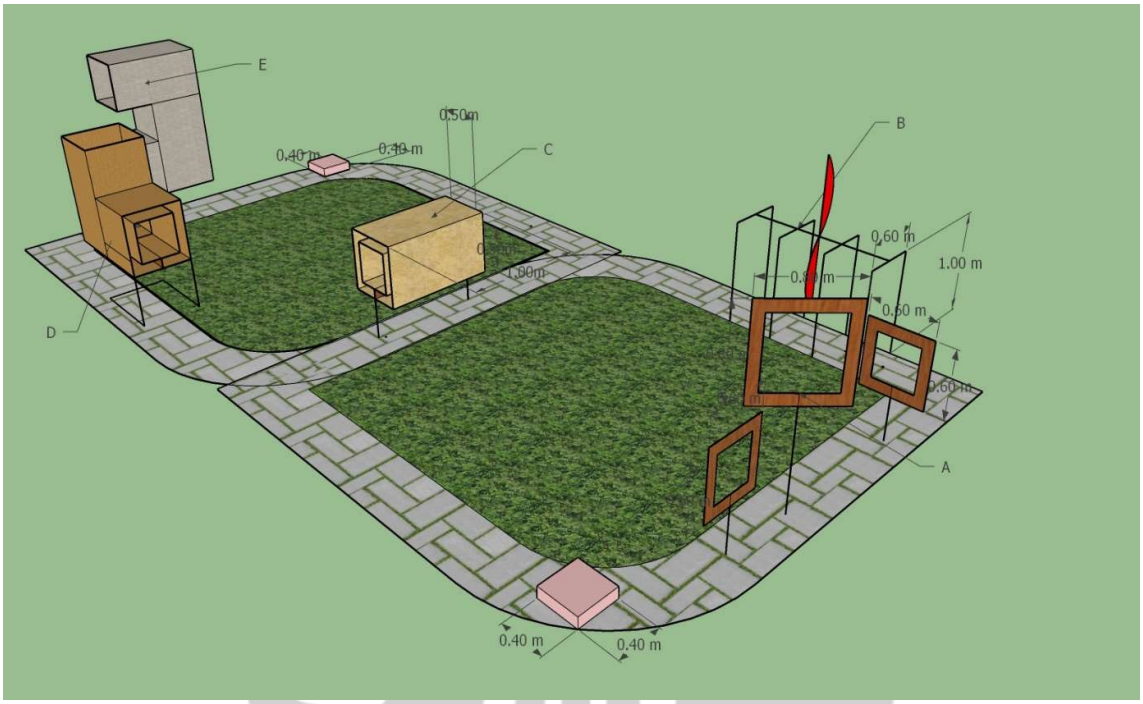
Model Specification:

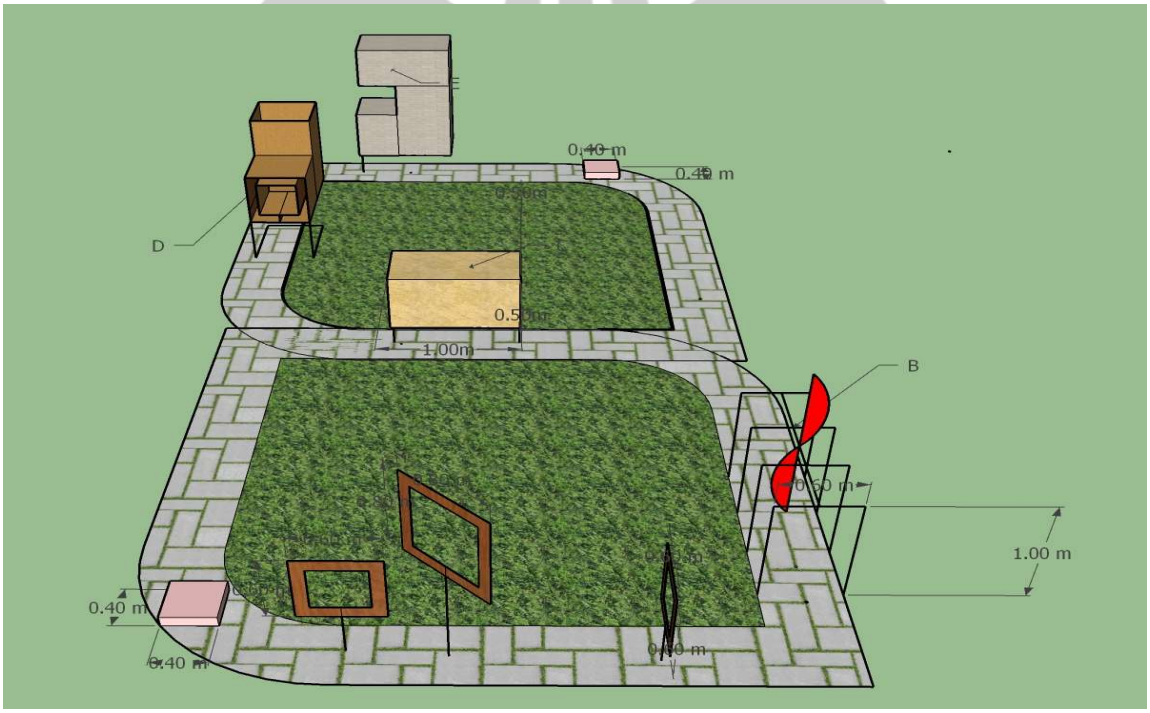
- Only SCRATCH BUILT multirotor is allowed. Pre-made or carbon fibre frames are also allowed.
- Use of metallic propellers is prohibited.
- Use electric motors only.
- The minimum tip-to-tip distance between diagonal motors should be 25cm.
- Use of any Automated Features of flight control Board (such as Position Hold, Altitude Hold etc.) is prohibited.

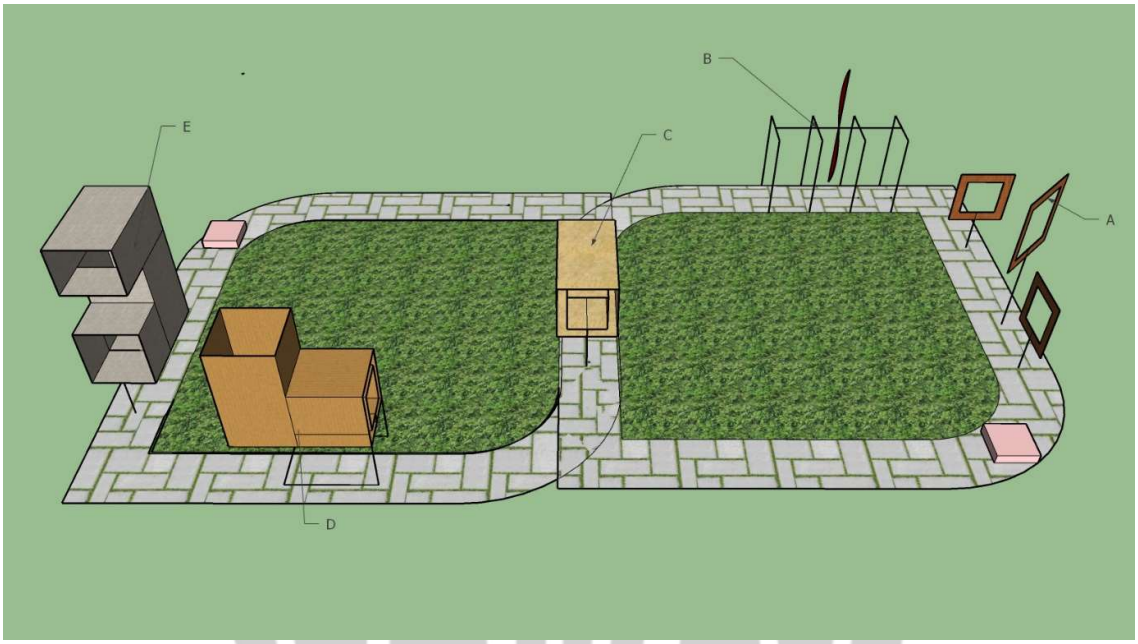
Arena Design:

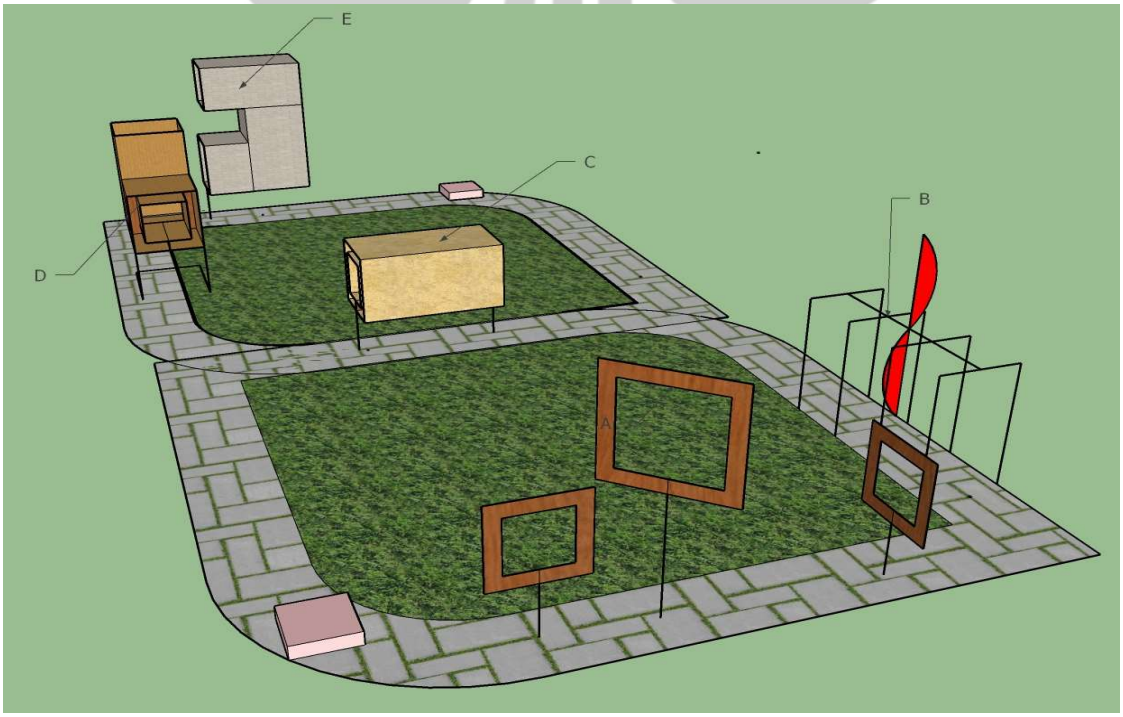
ROUND FIRST:

1. Arena design and its dimensions are shown in the figure.

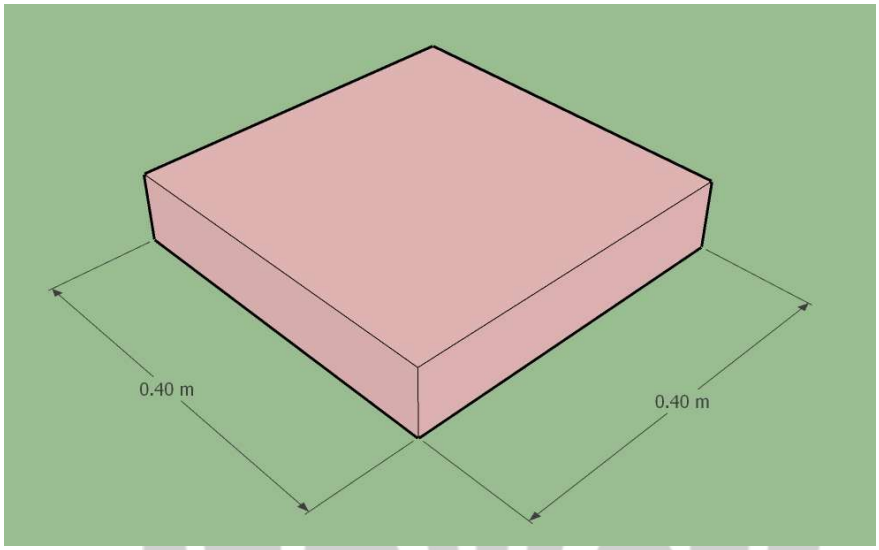

E
0.50m
0.40 m
0.40 m
C
B
0.60 m
1.00 m
0.50 m
0.60 m
D
A
0.40 m
0.40 m


0.40 m
D
0.50m
1.00m
B
1.00 m
0.40 m
0.40 m

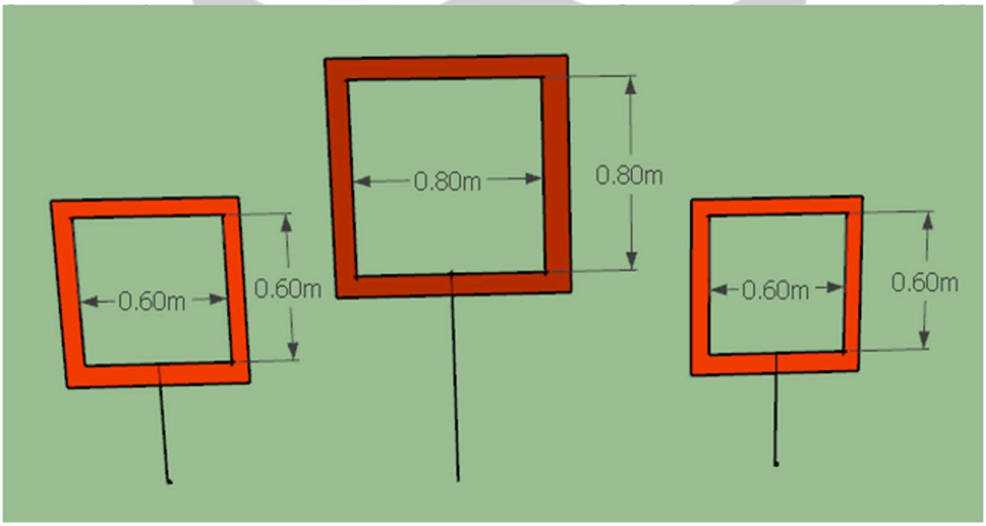

B
E
C
A
D


E
C
B
D
A

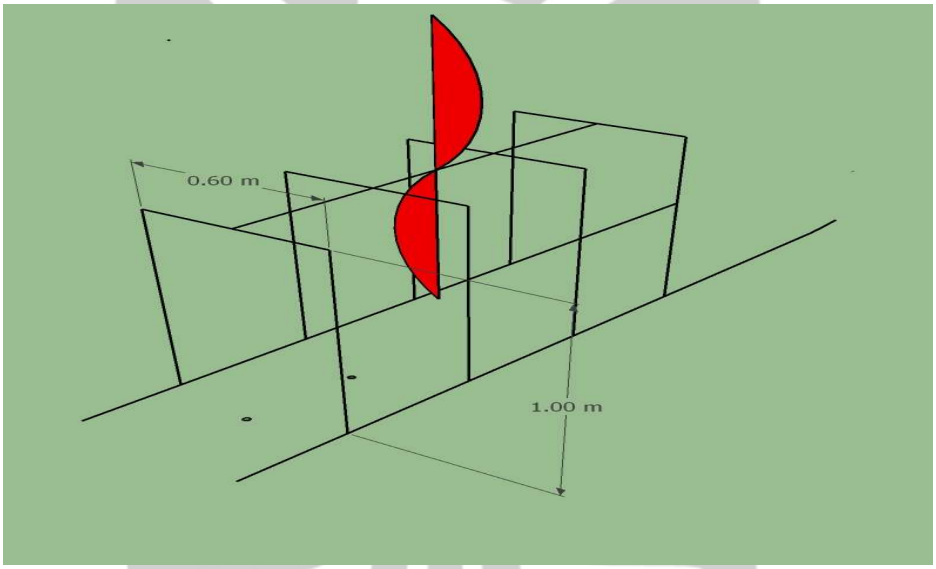
2. Multirotor has to take-off from the take-off zone and land in the landing zone, having dimensions of “40cm x 40cm”.



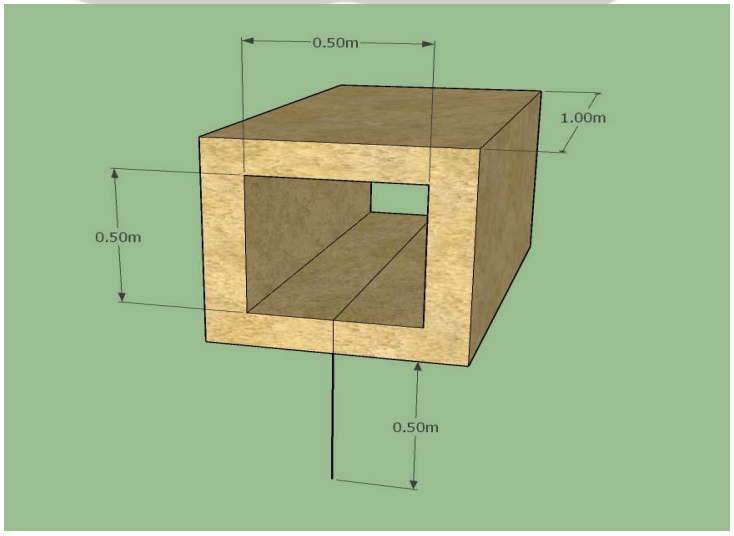
2. After take-off, the multirotor has to pass through “Hurdle-A" which consists of three gates of dimensions 60cmX60cm, 80cmX80cm, 60cmX60cm respectively which are kept apart having empty spaces between them. Participants have the option to skip any gate and points will be awarded for each gate passed accordingly.



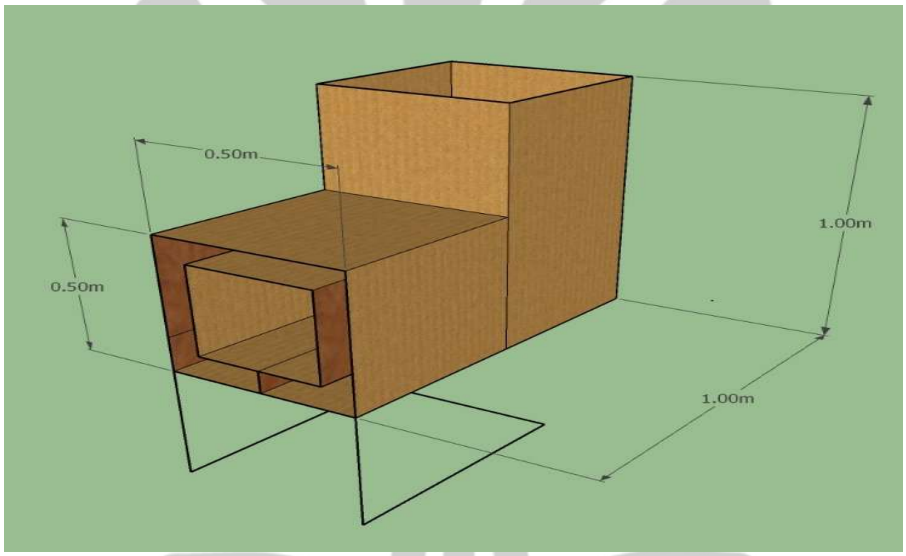
3. "Hurdle-B" is a horizontal tunnel of length 100cmX60cmX80cm which is placed at optimum level above the ground. Fans are placed next to obstacle to simulate high speed wind weather. The fans won't affect any other part of the arena. (refer the figure below for clear understanding)



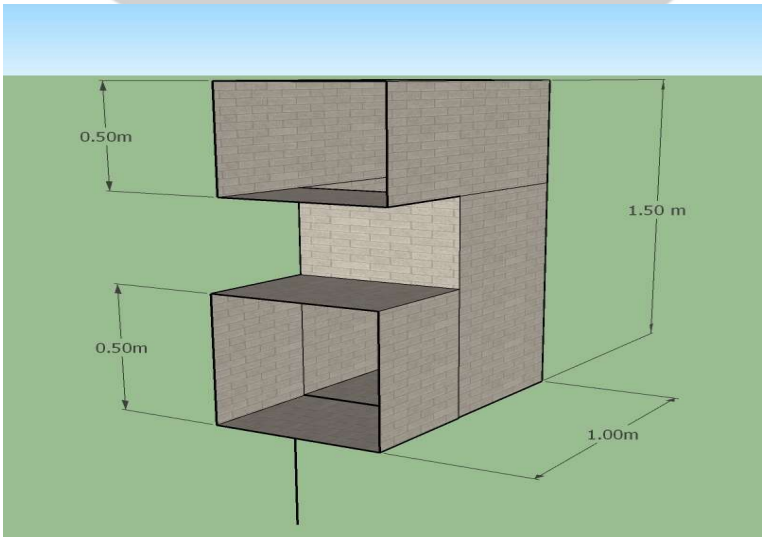
4. "Hurdle-C" is a horizontal cuboidal tunnel of length 100cmX50cmX50cm which is placed at 50cm above the ground. (refer the figure below for clearer view)



5. "Hurdle-D" consists of a three dimensional "L" shaped tunnel, whose one leg is horizontal and other leg is vertical. (refer the figure below for clearer view and dimensions). The participants are supposed to pilot the drone horizontally and take the drone out vertically.



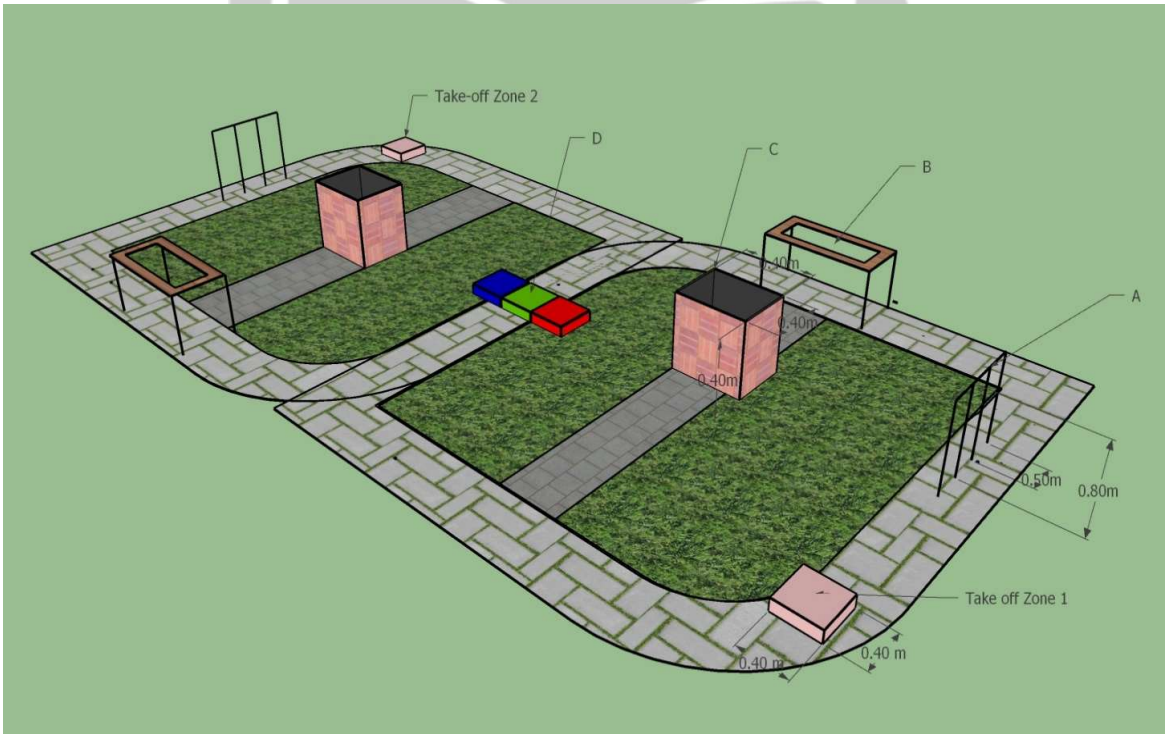
6. "Hurdle-E" consists of a three-dimensional model of "C" shaped tunnel. (refer the figure below for clearer view and dimensions). The participants are supposed to pilot the drone through any of the opening and take the drone out from other.

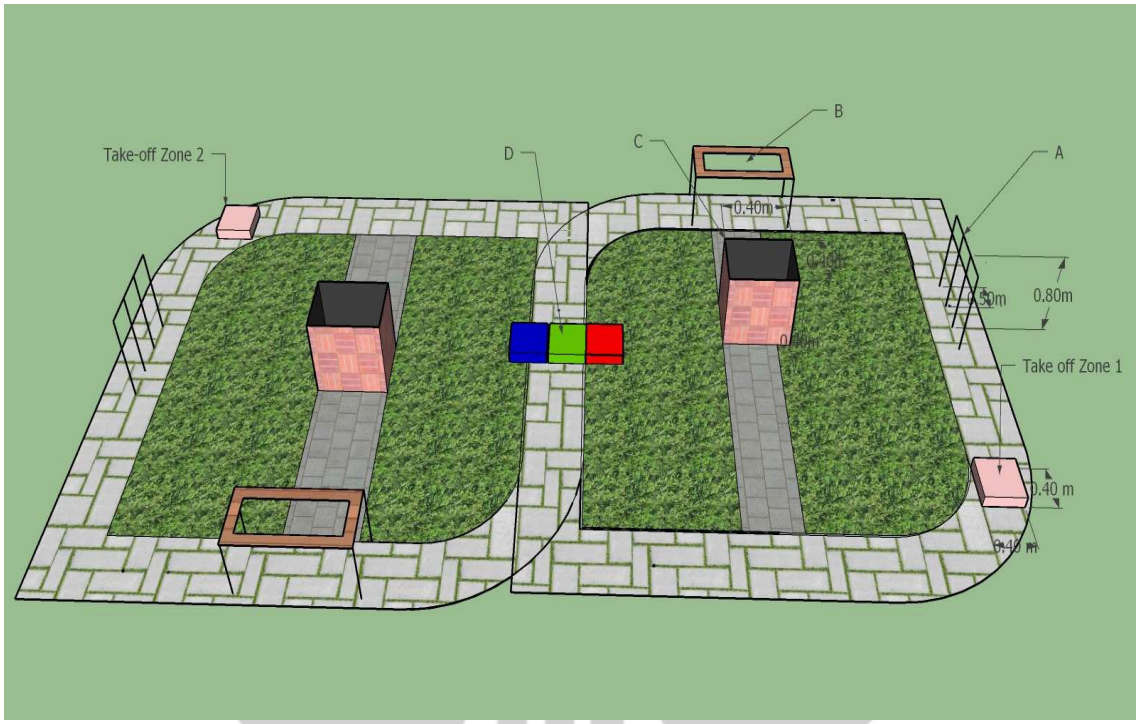


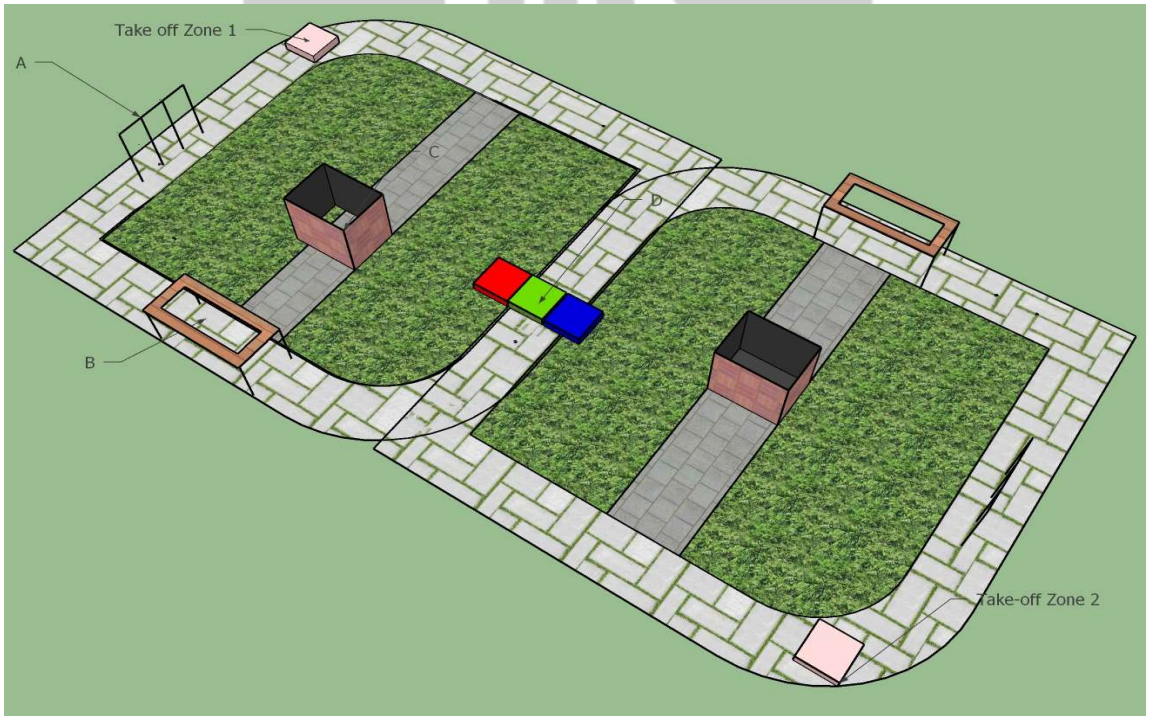
After completing this, the copter has to finally land smoothly on the landing zone (which is the same as the take-off zone).

Round 2:

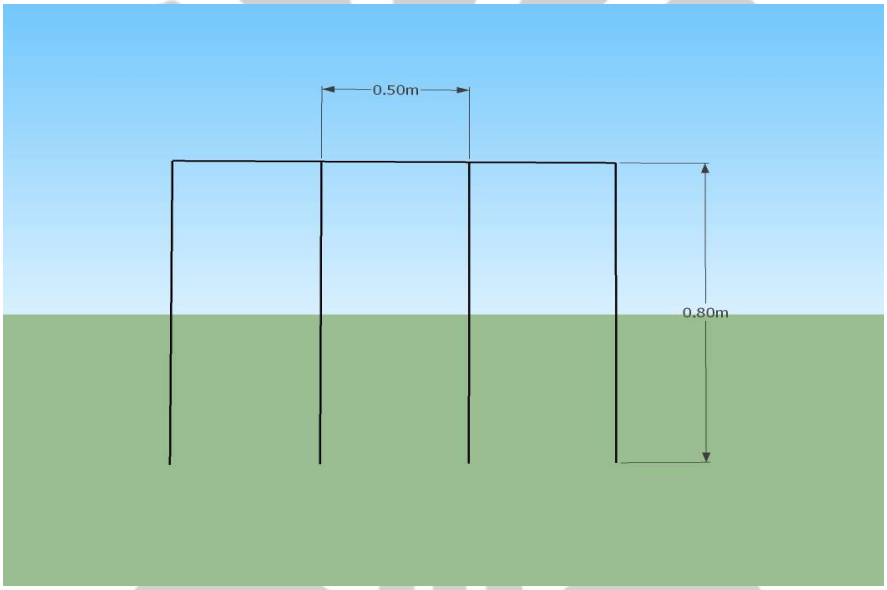
In this round, there will be one to one combat amongst the participants of first round qualifiers. The individual participants are supposed to take-off drone from their respective position and complete the task.



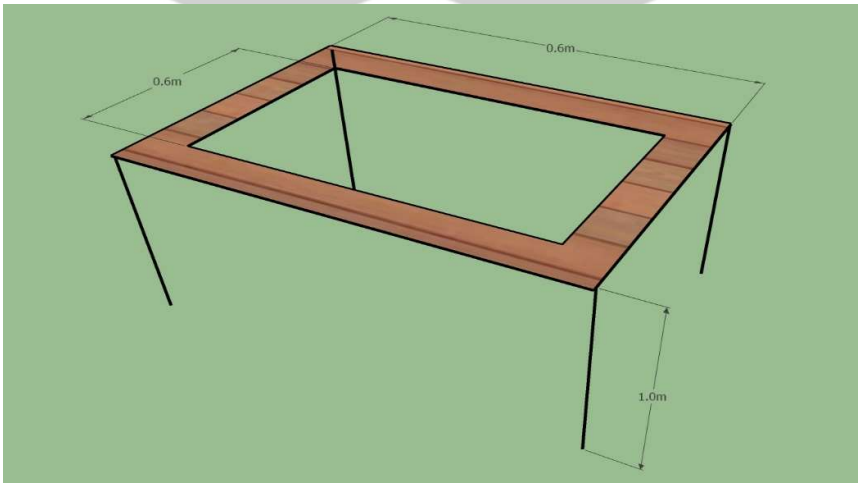

B
C
D
Take-off Zone 2
A
0.40m
0.80m
Take off Zone 1
0.40 m


Take off Zone 1
A
C
D
B
Take-off Zone 2

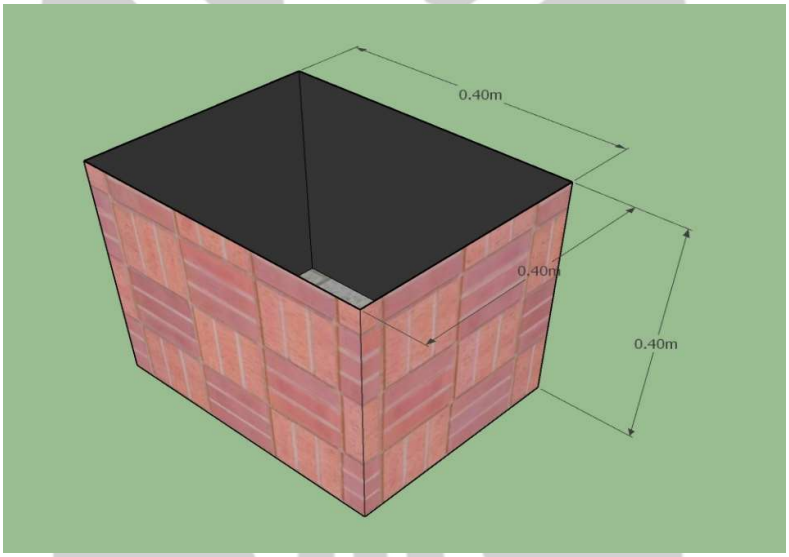
1. After take-off, the multirotor has to pass through “Hurdle-A" which consists of four vertical poles of height 80cm parallel to each other with a distance of 50cm between two adjacent poles (refer the figure below for clearer view). The participants are supposed to pilot the drone in a zigzag pattern around pillars.



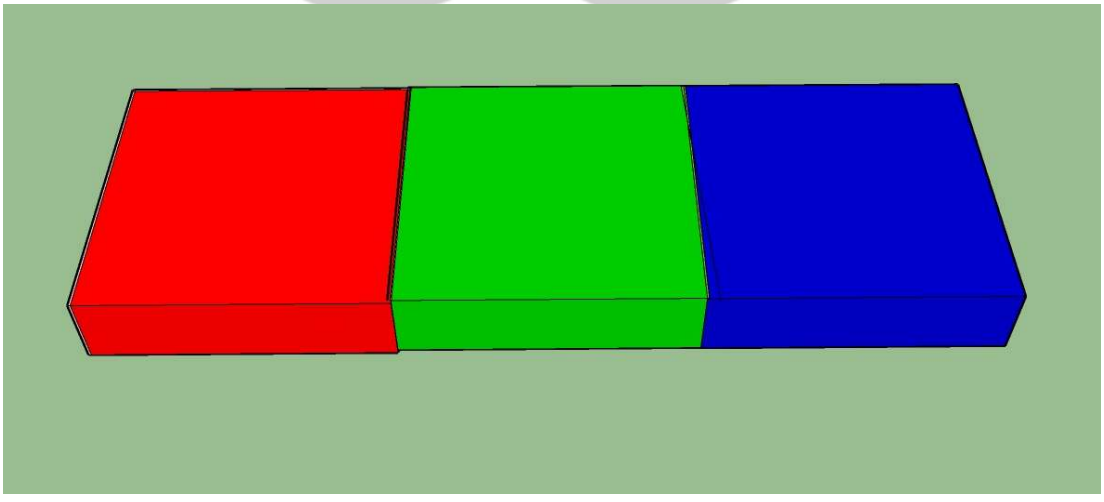
2. ” Hurdle-B” is a vertical hollow table of length 60cmX60cm which is placed at 100cm above the ground. (refer the figure below for clearer view).



6. In "Hurdle-C" teams will maneuver their drone into a Cuboid shaped container (open only from the top side) of dimension 40cmX40cmX40cm placed at optimum height above the ground, after that the drone sensor is required to sense the colour within the Cuboid and display the respective colour on their LED lights.



7. " Hurdle-D" consists of three landing zones with three different colours, all teams are required to land their drones according to the colour of Cuboid in "Hurdle-C".



Point Table:

TASK	POINTS
Passing through Hurdle "A":	
• Gate 1 only	**10**
• Gate 2 only	**15**
• Gate 3 only	**10**
	(+5 bonus points for passing through all gates)
Passing through hurdle "B":	**30**
Passing through hurdle "C":	**45**
Passing through hurdle "D"	**60**
Passing through "Hurdle-E"	**80**
Total	**255**

TASK:

Design a wireless remote-controlled flying drone to maneuver through various obstacles and equipped with sensors and LED to sense colour and blink correspondingly.

1. Multirotor has to take-off from the take-off zone in both round as explained Earlier.
2. It has to pass through hurdle "A", "B", "C"," D"," E" in the same order in round first as shown in the figure.

3. It has to pass through the hurdle “A”,” B” and “C” in the same order in round second as shown by the arrows in the diagram.
4. It has to land safely and smoothly on the landing zone. After landing the copter should be completed within the zone and in case it is partially outside then the points will be awarded as per the organizing team's judgment.

RULES:

1. Only one attempts will be given to each team without any pre-condition in both round and that will be considered for evaluation.
2. Each team will have maximum 8 minutes per attempt to complete all the tasks in round first. Completion of 8 minutes will mark the end of that attempt and the points till then will be counted. No points will be awarded after the time constraint of 8 minutes. There will no time constraints.
3. Breaking of propellers will be counted as the end of the attempt.
4. In case a team fails to pass a hurdle and crashes, the team can reattempt the hurdle.
5. If multirotor remains within radius of 1m from the center of the starting zone after the take-off and crashes, the team can opt for a re-attempt. Judges will decide the validity of the reason for re-attempt.
6. If the multirotor flies outside the arena, it will be considered as end of the attempt.
7. In first round and second round, only 3 & 5 touches respectively of the multirotor and arena (including ground) are permissible. The next touch (fourth touch) will be considered final touchdown point and it will be counted as end of the attempt and the points scored till then will be considered.

8. Teams can skip any hurdle/tunnel as per their convenience; however, they will not be awarded any points for that hurdle. There is no negative scoring for skipping the hurdles.
9. Any Damage to the arena may lead to Disqualification.
10. If the package detaches during the attempt, the teams cannot re-attach the package.
11. If any part detaches in the air (except the package) while performing the tasks, it will be considered as end of the attempt.
12. If two (or more than two) teams have same score then the time of flight will be considered. The team with least time of flight will be winner.
13. Once a hurdle is skipped it cannot be re attempted.

Certificate Policy:

Top 3 teams will be awarded with certificate of excellence, and the other announced awards. Certificate of participation will be awarded to each team for at least one successful attempt.

Eligibility:

1. A team can have maximum of 5 members which may or may not be of same educational Institution
2. All the team members should necessarily have a valid Identity card issued by the educational institution to which they belong.

Safety Tips:

The teams are strictly instructed to follow all the safety rules, failing to do so may lead to compensation and/or disqualification.

1. Do not keep or fly the multirotor in the restricted area.
2. Have a disarming switch for the multirotor in case anything goes wrong.
3. Do not fly the multirotor outside permissible area. Testing or flying multirotor out of the permissible region can lead to disqualification.
4. Only one member of each team is permitted in the flying zone.

Note:

The Organizing team holds all the right to change any rules, condition declared according to the circumstances and the Organizing team is not answerable to anyone. If any fraudulent behaviour from any team is noticed in terms of model specifications or wrong information provided or any other, the organization holds the power to disqualify or deregister the team without being answerable to anyone. You are advised to keep a pair of charged batteries. Any change in problem statement would be notified to you.

Technex'20

Team Drone-Tech

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