Drone Challenge

TASK:

Design a wireless remote controlled flying drone to carry and drop an object for through an obstacle course in minimum time without crashing.This competition will test your drones speed, maneuverability and weight

PATH:

The path will consist of pillars, loops, bends, underpass, turbines and other obstacles placed in random sequence along an aerial track. It will end with drop zone and landing pad for testing maneuverability skills.

ARENA:

1. Start and end zones have dimensions of 1m*1m
2. **Obstacle 1:** consists of 4 rings with 1 in horizontal plane & 3 in vertical plane having an equal diameter of 100.0 cm. Participants have to pass their drone through the horizontal ring from down to up direction & then through the ring which is placed vertically. Then it has to pass through the other part of the obstacle which consists of 2 rings and a turbine with a rotation speed of 10-35 rpm(exact rotation speed will be announced during the competition) which is placed in front of them symmetrical to the 2 rings. The challenge is to pass through any of the rings without crashing and points will be awarded accordingly. (Refer to fig. 5) Diameter of each ring- 100.0cm.
   points for completion of both obstacles = 50 points. Completion of any 1 half of obstacle will be awarded 20 points.
3. **Obstacle 2:** the participants are supposed to pilot the drone in a zigzag pattern around pillars. Fans are placed next to obstacle to simulate high speed wind weather. The fans won't affect any other part of the arena
   Points awarded for completion= 40 points.
4. **Obstacle 3:** It is a platform with a QR code printed on it. This code will be different for every team and will contain the number of their assigned passing zone(Obstacle 5) & drop zone(Obstacle 8) . Participants have to scan the code and find the number (1, 2, 3 or 4) by processing the image. That number will be displayed on LED Matrix attached with the drone or can be wirelessly displayed on a laptop, which would not be allowed to interact with. If they fail to do so then the number will be given to them but no points will be awarded.
   QR Code Size = 45cm x 45cm
   QR Code scanned successfully= 40 points, otherwise 0.
5. **Obstacle 4:** obstacle 4 is a huge rotating circle, rotating at xyz rpm, with 4 smaller circles cut through it. The smaller circles are numbered and the participants are supposed to take their drone through the circle of the number which they got in QR scan. Points will be awarded only if the drone passes through the circle allotted to them.
   points awarded for completion: 70 points.
6. **Obstacle 5:** obstacle 5 consists of two rings kept 8 meters apart with empty space between them. The purpose of this obstacle is to test the speed of drone. The obstacle is compulsory to complete. No points are awarded on completion of this obstacle as the participants are expected to earn points in the form of the time they save.

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7. **Obstacle 6:** it consists of two long hollow tubes of radius 50cm. one tube is of length 150cm while the other tube is of length 250cm. participants have to choose a tube and have to pass their drone through the tube. Damaging the tube would lead to a penalty of 10 points each time they damage the tube.
   completion of 150cm tube= 25 points
   completion of 250cm tube= 50 points
8. **Obstacle 7:** is the rotating drop zone area. It consists of circular area divided into quadrants. The drop zone will be covered with 4 walls surrounding the zone so that the driver can't see the drop zone. Participants are required to drop the package with the help of on-board camera that sends live feed. Participants have to drop their medical kit in the platform zone assigned by the QR code scanning. Points will be awarded based according to the accuracy of the kit dropped.
   Speed of rotation = 15-35 rpm (exact speed of rotation will be announced during the competition) Radius of Circular drop zone = 35 cm
   Medical kit dropped in the desired area = 60 points (in the correct location)
9. Participants have to land successfully in a given area.
   Landing zone size= 1m X 1m
   Successful landing = 10 Points.
   Points will also be awarded on the time taken to complete the task.
10. **If a team skips any obstacles, they will not be awarded any time bonus.**
11. Maximum time of a run = 5 minutes.
12. **There might be a few surprise obstacles too. Hence your drone should be prepared for any challenge.**

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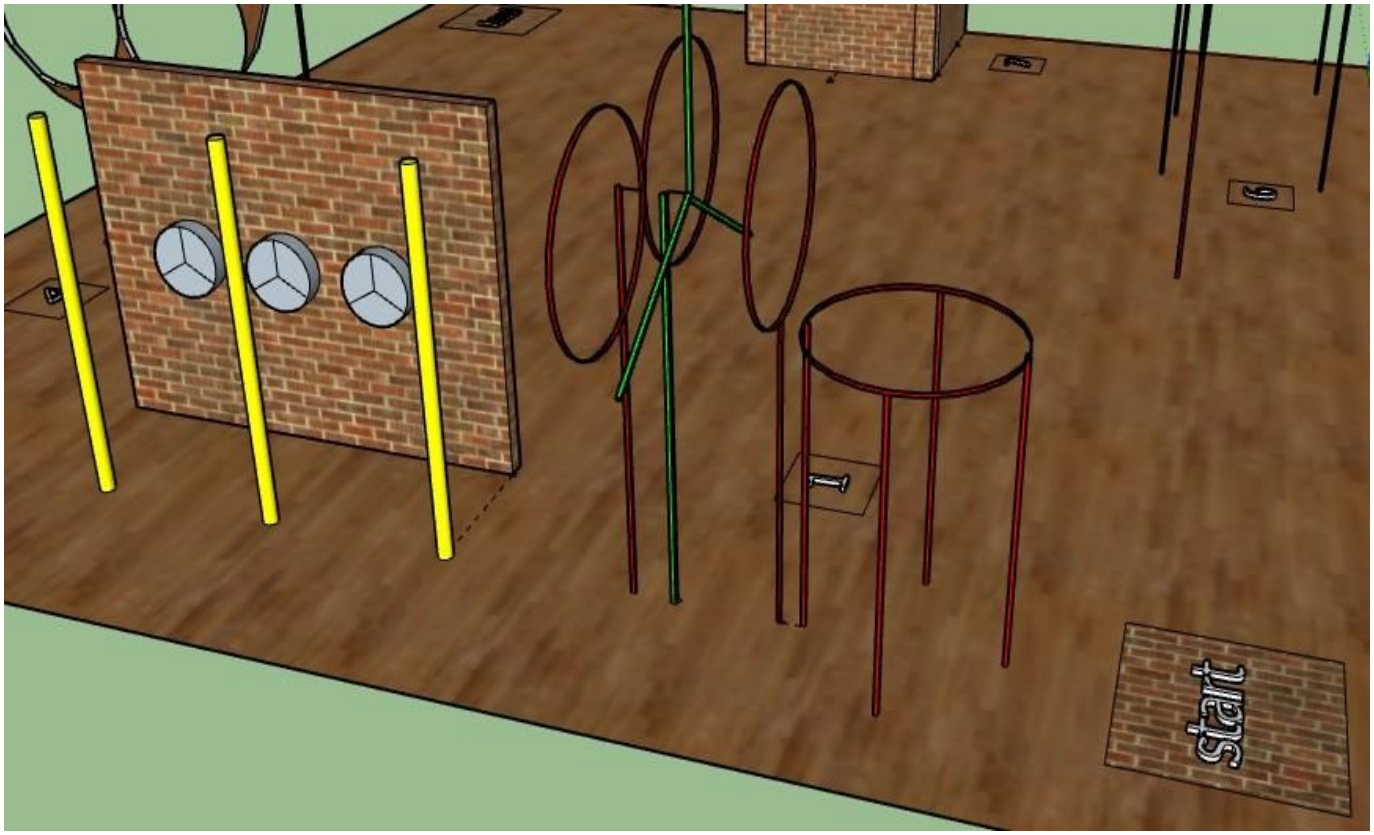

Image 1

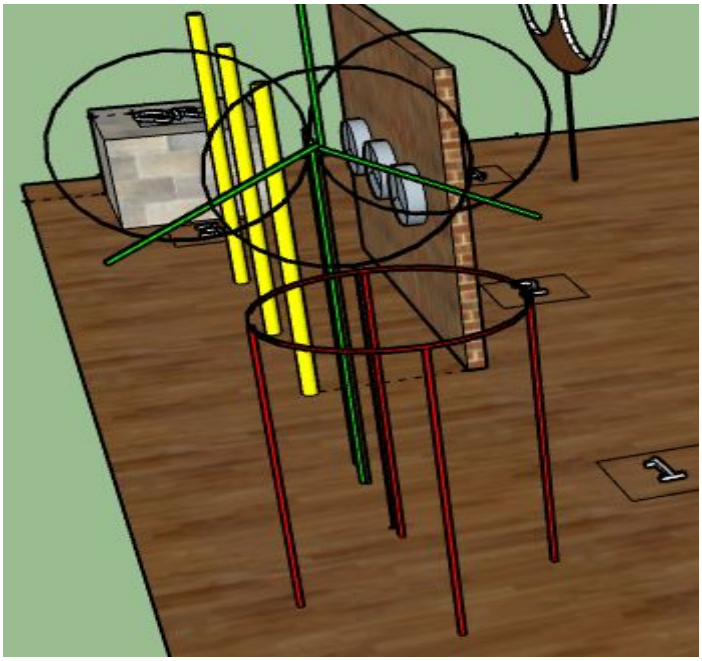

Image 2

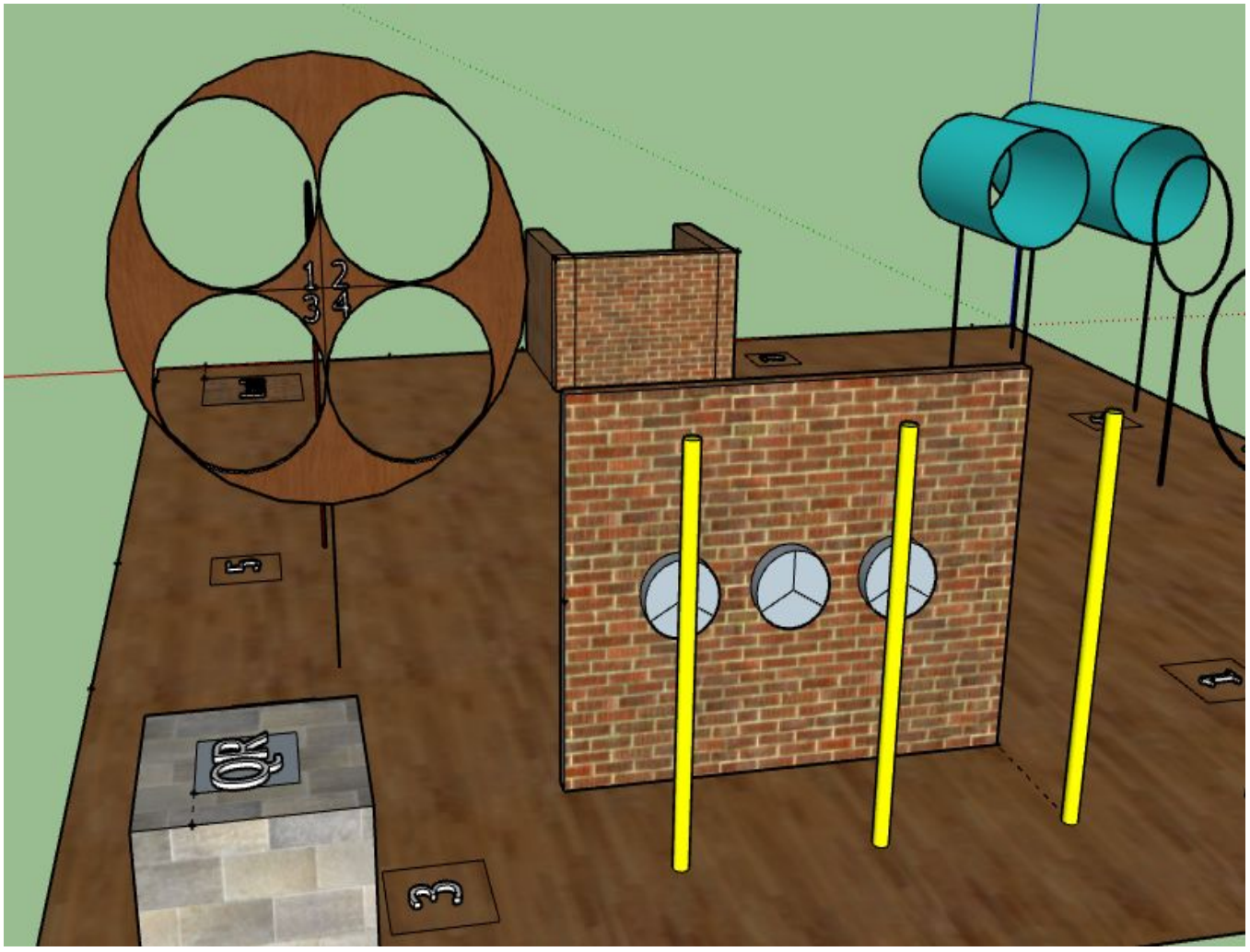

image 3

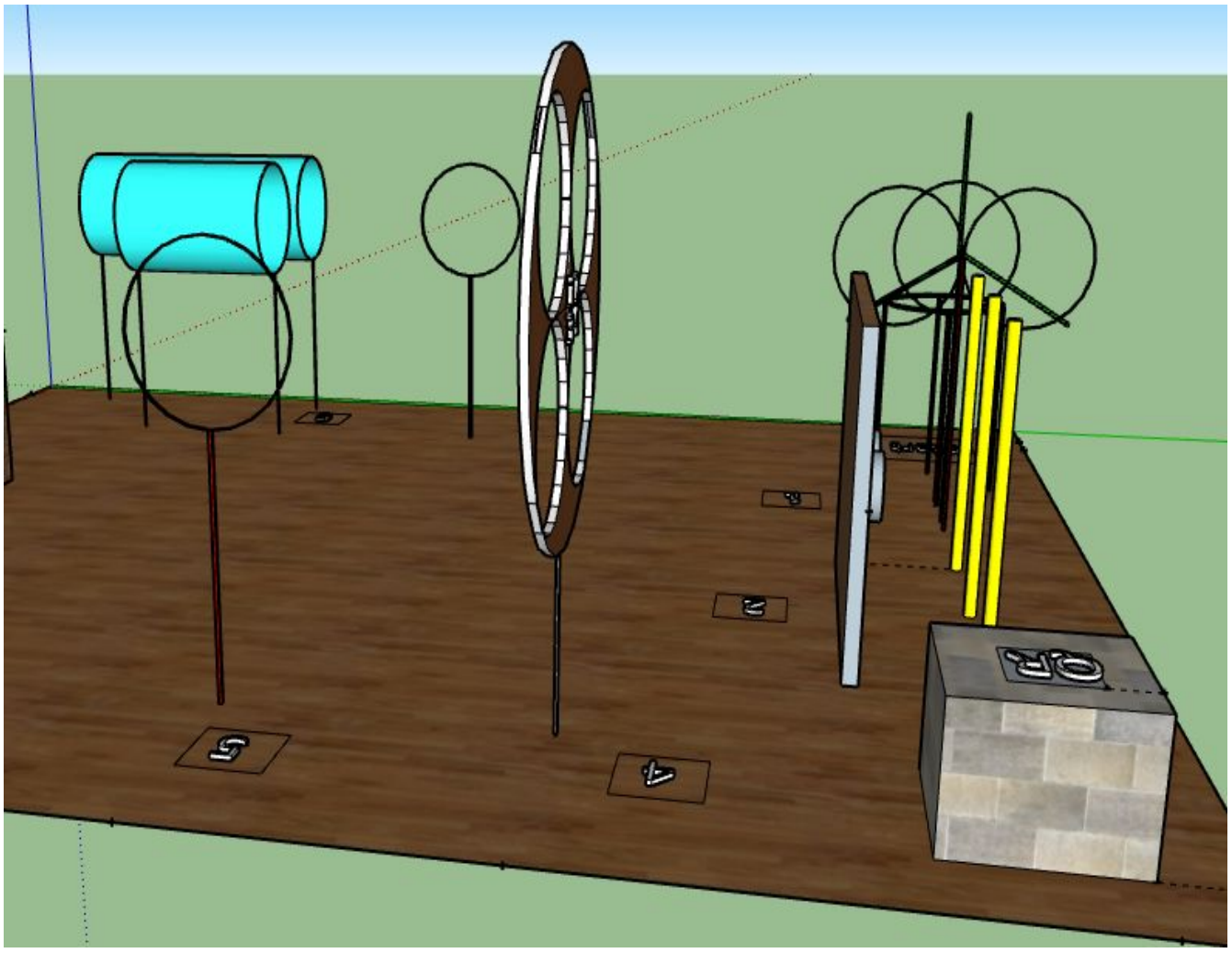

Image 4

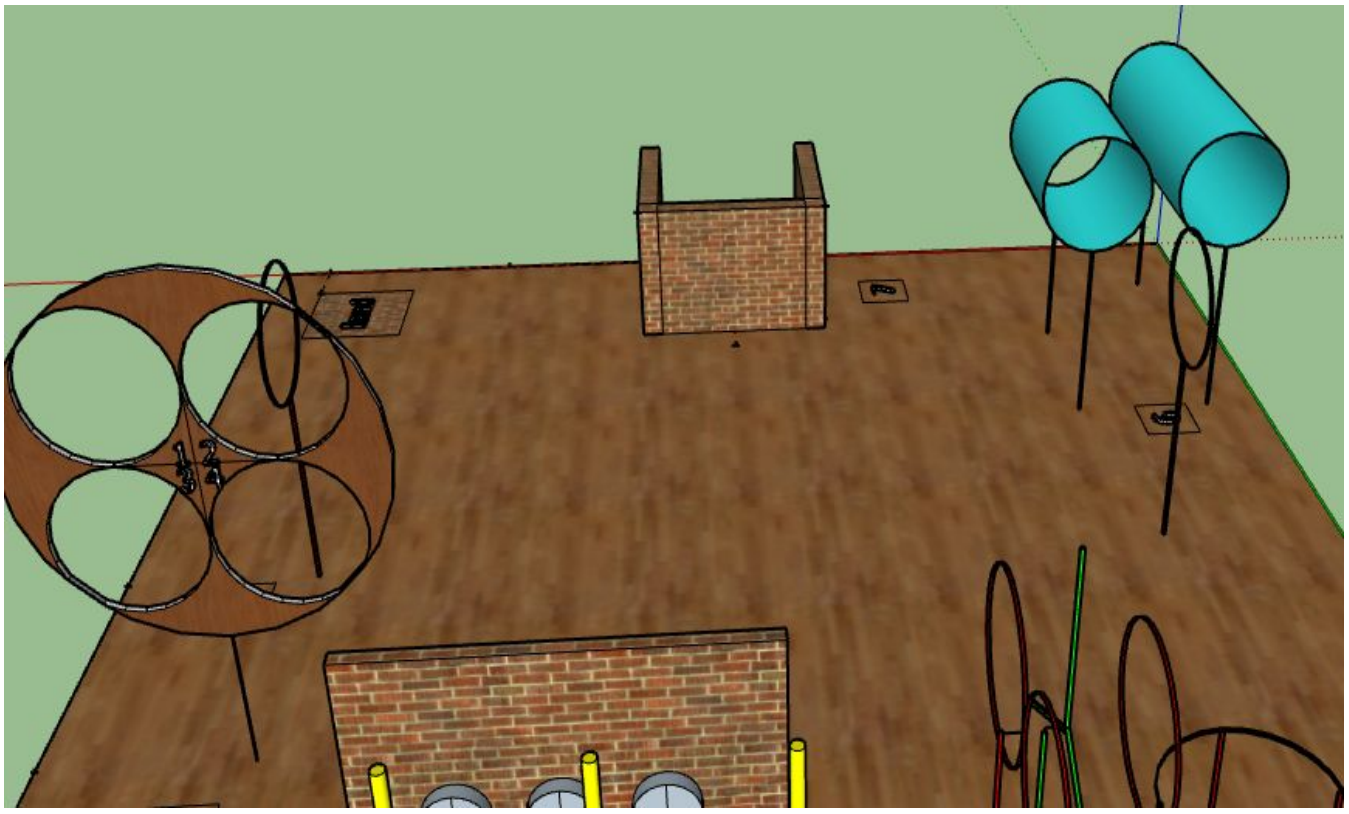

Image 5

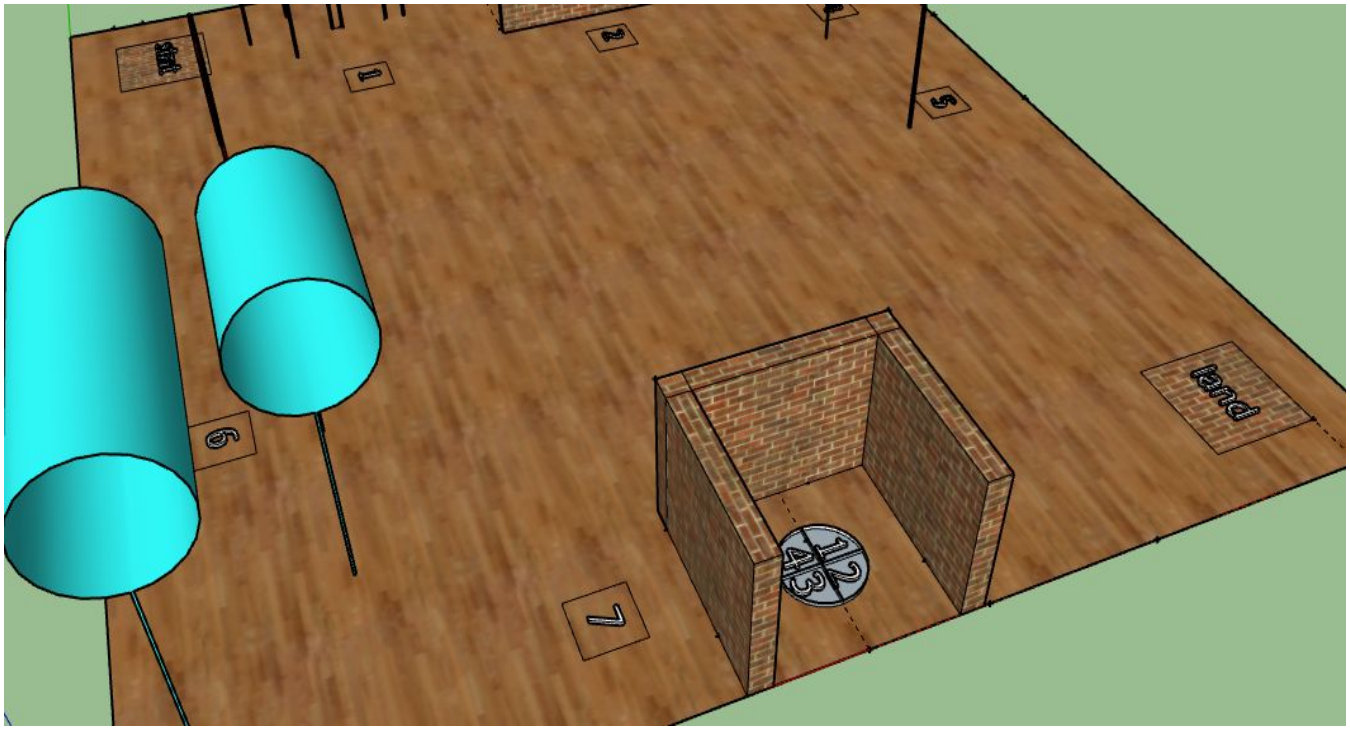

Image 6

PAYLOAD SPECIFICATIONS:

Dimensions:
10*2*2cm
Weight:
30 +/-2 gms

BOT SPECIFICATIONS:

1. Machine should fit into the dimension box of 400mm x 400mm x 300mm
2. Machines should be powered/propelled by a non-hydrocarbon engine.
3. Teams can bring not only Drones but other flying machines as mentioned : Zeplin, Co-axial chopper, Tail rotor chopper, Quadcopter, Hexacopter, Tricopter, and Octorotor.
4. The Machine MUST have an on-board camera that sends live feed to a screen. (one can use any available device for it.)
5. You CAN use phone application to decode QR as long as the phone isn't attached to the drone.

ABSTRACT OUTLINE:

Participants have to submit complete abstract with design of the device/project. The qualifying teams will be eligible for the final round to be conducted in Techfest 2019-20.

Submission must consist of:

- Design as a soft copy along with detailed description of device/project
- Details of image processing mechanism and the reason to implement this mechanism.
- Unique Selling Point (USP) of the device
- Estimation of the total cost of the device with all its components
- Estimation of the capacity and efficiency of device (based on theoretical research, if available)
- Photographs of Drone from different angles.

The Abstract and the zip file containing the photographs have to be sent by email to dronechallenge@techfest.org with the team details clearly mentioned in the email. The Team ID should be explicitly mentioned in the email subject as well as the filename for both Abstract and zip file. **Last date for Abstract Submission is 25th November.**

GENERAL RULES:

- Flight time for a run is defined as the time taken by the drone to complete the path from start zone to end zone.
- A maximum time of 5 minutes from take-off to landing will be given to complete the circuit.
- The timer will start from the moment the countdown finishes.
- The timer will stop only when the drone finally lands on the landing zone.
- The time measured by the organizers will be final and will be used for scoring the teams.
- Time measured by any contestant by any other means is not acceptable for scoring.
- **In case of any disputes / discrepancies, the organizers' decision will be final and binding.**

- **The organizers reserve the rights to change any or all of the above rules as they deem fit. Changes in rules, if any will be highlighted on the website and notified to the registered teams.**
- Each team will be given two runs if drone couldn't complete the path, provided it has completed at least one obstacle in its first run
- If a team goes for a second run, only the points scored by it in the second run will be counted.
- If a team doesn't cross 1 or more Obstacles, then it will not be allowed for the second run, the organizer's decision will be final.

JUDGING:

Scoring of mentioned path will be:
Score = (300 - time taken) + Points earned - Penalty

SCORING:

A = Obstacle 1, any one half = 20 points, Complete obstacle=50 points
B = Obstacle 2, zig-zag path = 25 points
C = Obstacle 3, 60 points
D = Obstacle 4, QR Scan = 40 points
E = Obstacle 5, long Tunnel = 50 points, short tunnel = 25points
F = Obstacle 8, Drop kit in correct location = 60 Points
L = Landing Safely = 10 points
T = Time Bonus = 300 - time taken(in sec)
P = Penalties
Points scored = (A + B + C + D + E + F + L + T) - P

TEAM SPECIFICATIONS:

- A team may consist of a maximum of 4 members.
- Students from different educational institutes can form a team.

ELIGIBILITY:

- All students with a valid identity card of their respective educational institutes are eligible to participate.

CERTIFICATE POLICY:

- Certificate of excellence will be awarded to the top 3 teams.
- E-Certificate of Participation will be given to those teams who complete the track at least once, without being disqualified.

PRIZES:

The Prize money will be awarded to top 3 Winners via NEFT and will be processed within 30 working days after the receiving the Prize Money from Sponsors.
The Winners have to mail the following information (immediately after the announcement of results) to vibhav@techfest.org.
Subject: Drone Challenge, team id- your position (example- Drone Challenge, DC10005- 3 rd Position)
Body of mail-

1. Account Holder's Name
2. Account Number
3. Bank name and Branch name.
4. IFSC Code

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