

OPERATION RAHAT

Task:

Design a wireless remote controlled flying platform to carry and drop a medical kit for trapped refugees in a disaster-affected area through an obstacle course in minimum time without crashing.

Path:

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

Arena:

1. Dimensions of arena are 10m X 10m (lxb).

Before taking off, the payload will be attached to your proposed mechanism.

2. Start and End-zone has a dimension of 1m x 1m.

3. **Obstacle 1** signifies the various ways to reach to the refugees. It consists of an L-shaped tunnel, a cuboidal tunnel & a circular ring. The participants have to choose to maneuver through one of these and the points will be awarded accordingly.

L-shaped tunnel - 30 Points (Dimensions are given in fig 4)

A cuboidal tunnel - 20 Points (65 cm x 65 cm x 165 cm)

Ring - 10 Points (Diameter 100.0cm)

4. **Obstacle 2** 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

Completion points- 15 points

5. **Obstacle 3** consists of 2 rings with 1 in horizontal plane & 1 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. (Refer to fig. 5)

Completion Points- 20 Points

6. **Obstacle 4** signifies the signal given by refugees for marking their location. 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= 60 points, otherwise 0.

7. **Obstacle 5** signifies turbulent air conditions. It consists of fans which provide strong air & rectangular frame as shown in fig.6. There will be a wall opposite to the fans to restrict these conditions in a part of the course. The challenge will be successfully completed once the participant is able to pass through the rectangular frame placed behind the wall through portion with the number (1,2,3 or 4) corresponding to the QR code scanned. Points will be awarded accordingly:

Fan speed will be approx. 12-15 km/hr

Completion points- 20 Points

8. **Obstacle 6** signifies the crumbling buildings in disaster-affected urban areas. It consists of pillars (refer fig.7) erected in a random order. The participants have to traverse the obstacle along a zigzag course avoiding the pillars. The challenge is to pass between 2 rods in the order A, B and then C as shown in the figure 6.. Points will be awarded accordingly.

Distance between 2 pillars having A (or B or C) on the top = 1m

Completion points = 15 (5 points each)

9. **Obstacle 7** consists of a rectangular structure which is divided into 4 identical square partitions. Participants have to maneuver through each of the rectangles as shown in the figure 7.

Length and breadth of the rectangles are 65 cm and 60 cm respectively.

Completion points= 40 (10 points for passing through each square)

Total completion points will be awarded only if a drone follows the same path as shown in fig.7

10. **Obstacle 8** is the rotating drop zone area. It consists of circular area divided into quadrants. 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 = 20 points (in the correct location)

11. Participants have to land successfully in a given area.

Landing zone size= 1m X 1m

Successful landing = 10 Points.

12. Points will also be awarded on the time taken to complete the task. **If a team skips any obstacles, they will not be awarded any time bonus.**

Maximum time of a run = 5 minutes.

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.

Package Specification:

Size : 10 cm X 2 cm X 2cm (l x b x h)

Weight: 30 +/- 2 gram

Carrying payload: 10 per hurdle (from obstacle 1-7)

0 all other cases

If the drone, successfully crosses an obstacle without dropping the kit, then it will be awarded 10 points as mentioned above.

If drone drops the kit while crossing an obstacle, then only Points for crossing the obstacle will be awarded, points for carrying a payload (10 points) will not be awarded.

Game Rules:

1. The no-fly zone is the area excluding the rectangle of 10m X 10m as shown in Figure 2)

2. During departure and approach to landing, the pilot must not fly the aircraft in a pattern that will allow the drone to enter any of the “no fly zones”. The run would be counted as null and void whenever the drone enters into any one of the no-fly zones. The participant shall then have no further flying attempts. Weight of drone must be same before takeoff and after landing.(+/50gm)

3. Broken propellers are allowed, and will not invalidate a flight attempt.

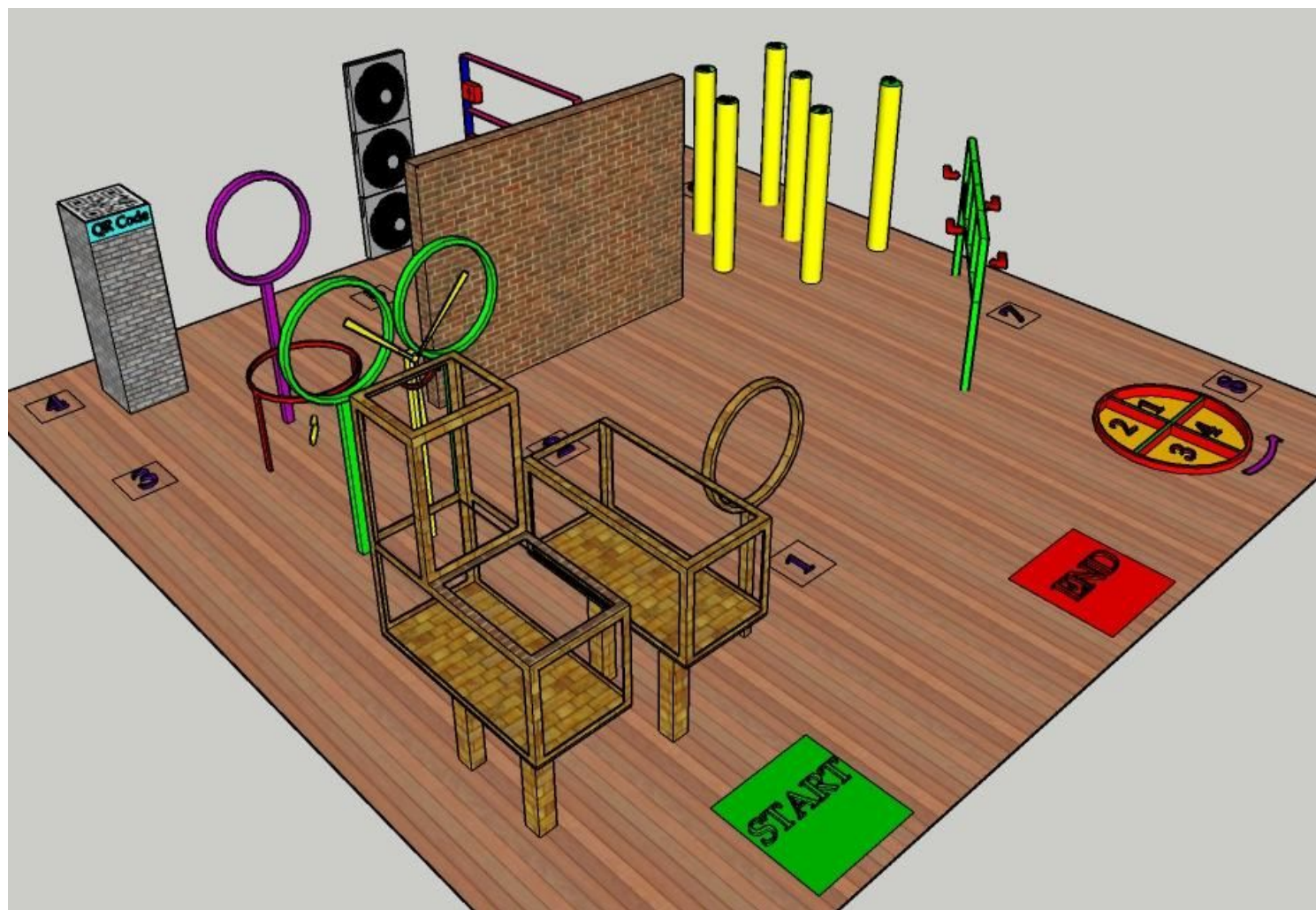


Fig. 1

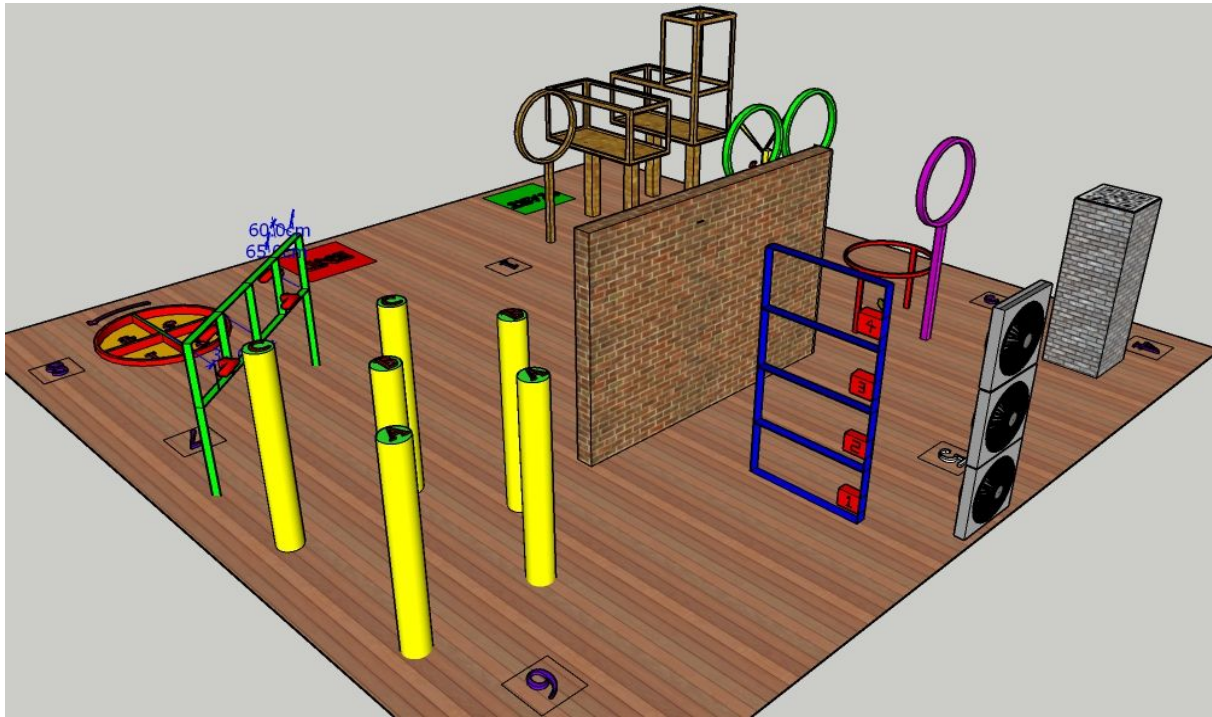


Fig. 2

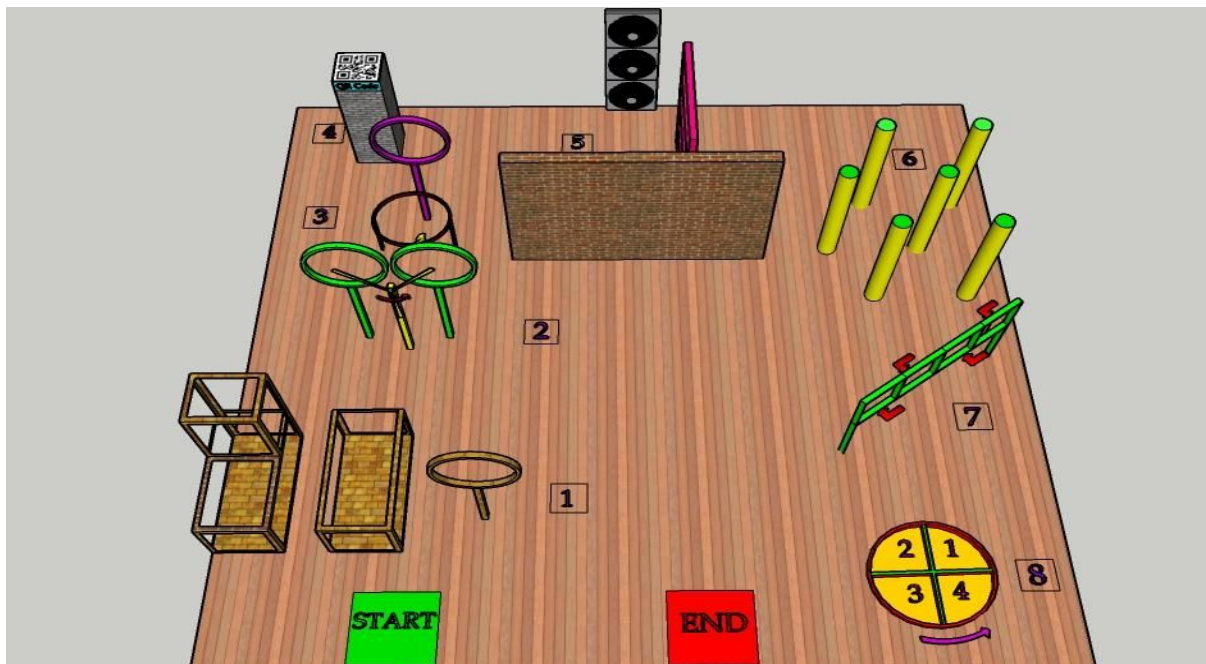


Fig. 3

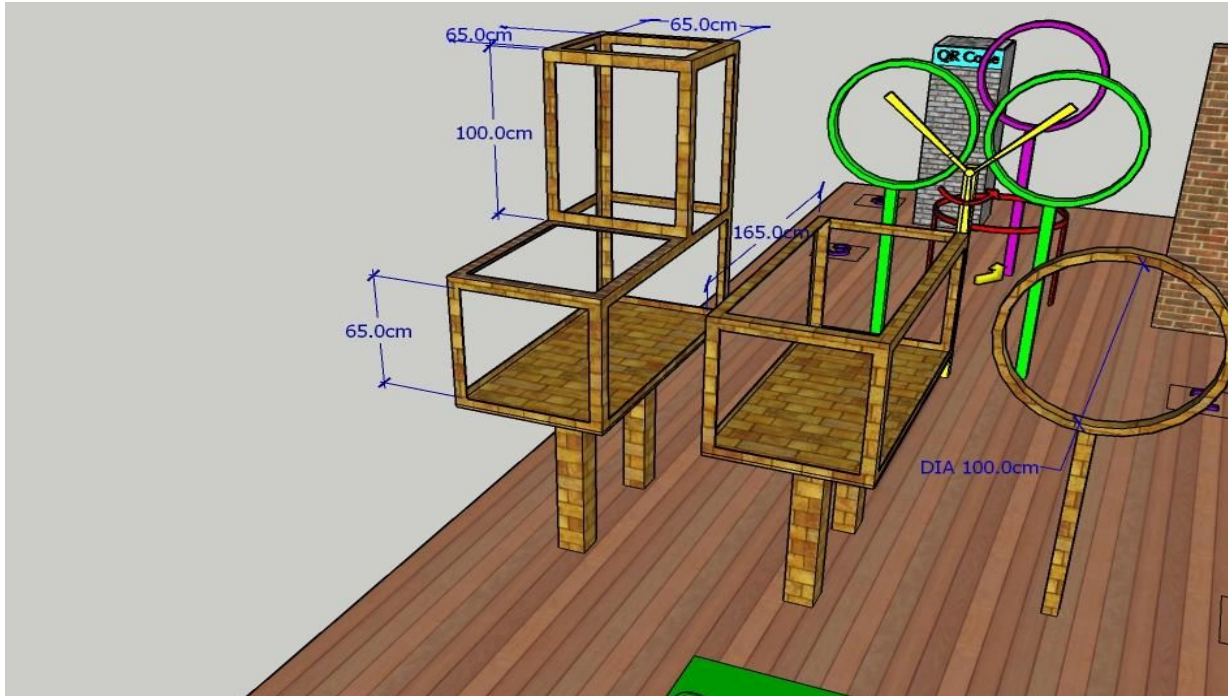


Fig. 4

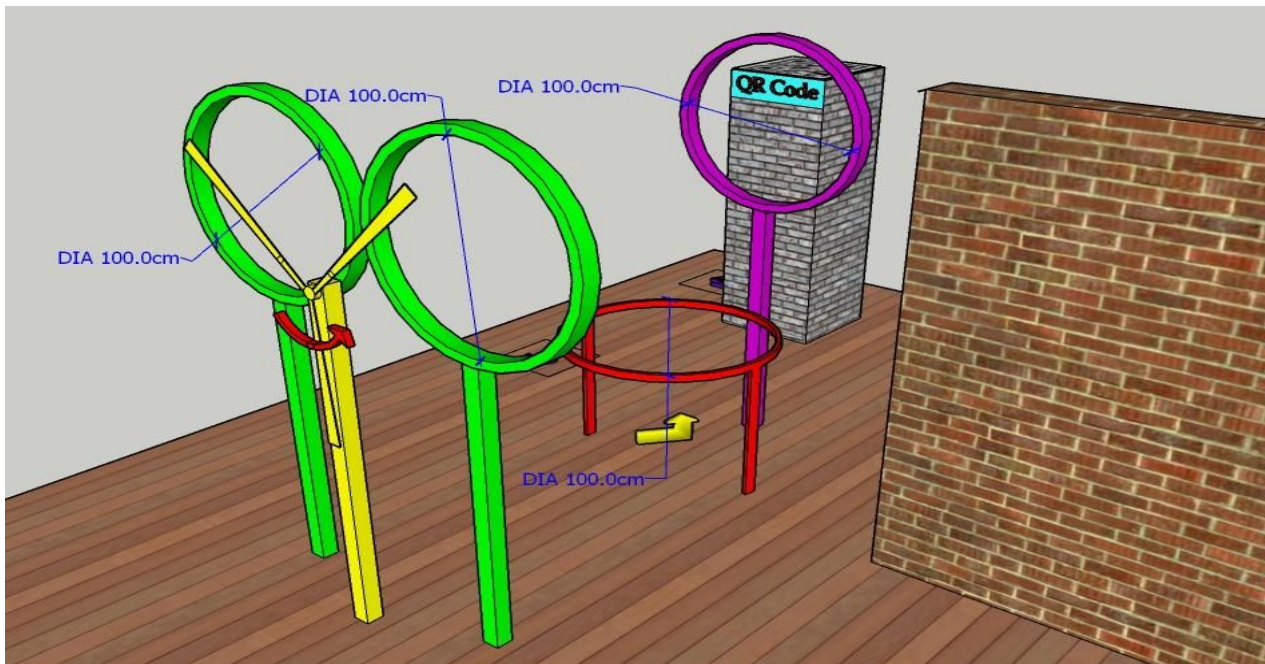


Fig. 5

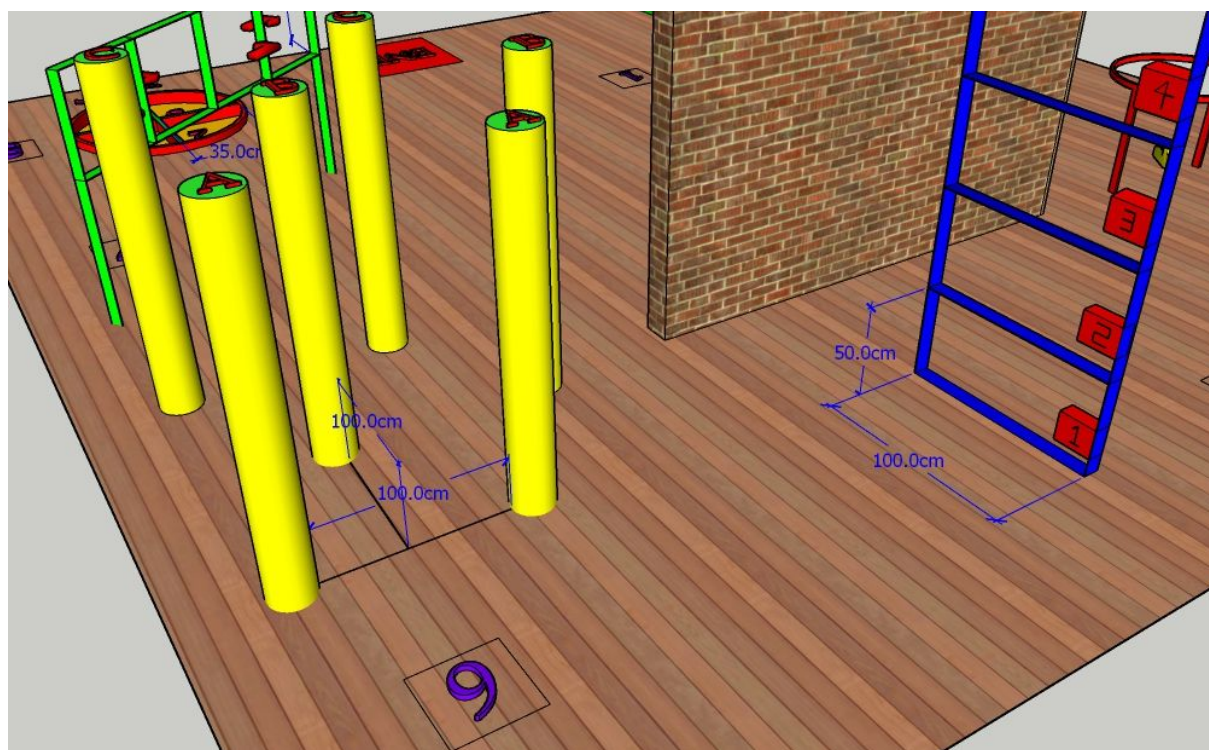


Fig.6

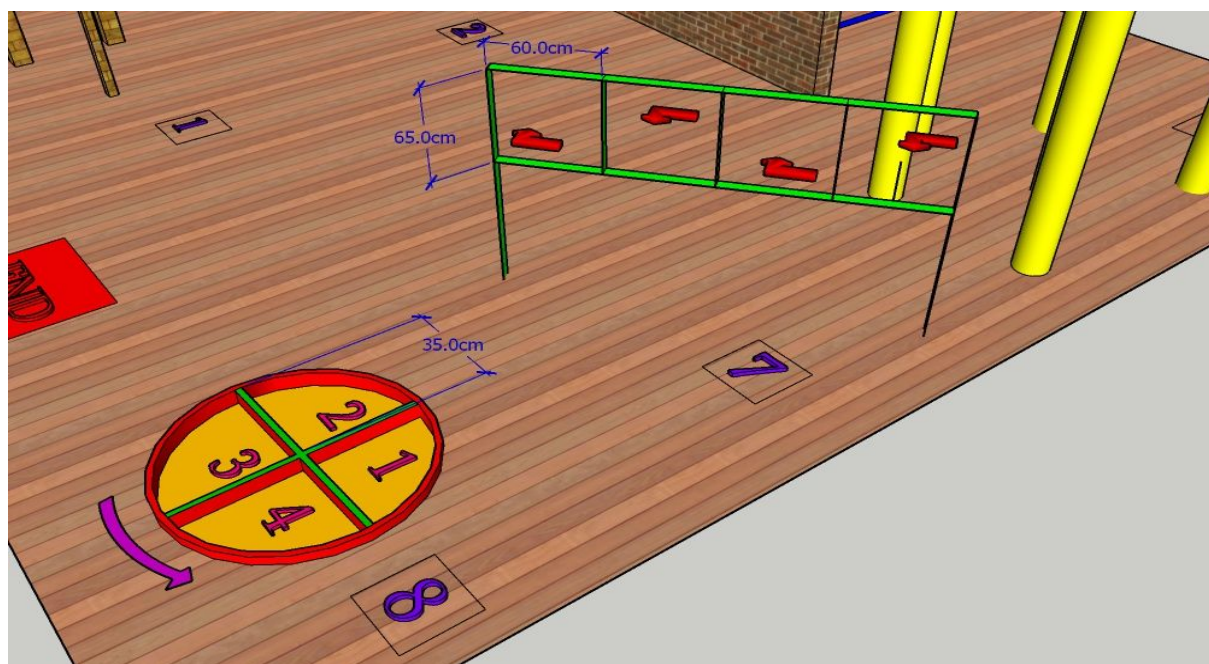


Fig. 7

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 2018-19.

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 researches, if available)
- Photographs of Drone from different angles.

The Abstract and the zip file containing the photographs have to be sent by email to oprahat@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 2nd November.

General Rules:

1. Flight time for a run is defined as the time taken by the drone to complete the path from start zone to end zone.
2. A maximum time of 5 minutes from take off to landing will be given to complete the circuit.
3. The timer will start from the moment the countdown finishes.
4. The timer will stop only when the drone finally lands on the landing zone.
5. The time measured by the organizers will be final and will be used for scoring the teams.
6. Time measured by any contestant by any other means is not acceptable for scoring.
7. **In case of any disputes / discrepancies, the organizers' decision will be final and binding.**
8. **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.

9. 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, Tunnel= 30 points, Small Ring= 20 points, Big Ring= 10 points

B= Obstacle 2, 15 points

C= Obstacle 3, 20 points

D= Obstacle 4, QR Scan= 60 points

E= Obstacle 5, Turbulent air = 20 points

F= Obstacle 6, Zigzag Path= 15 points

G= Obstacle 7, 40 Points

H= Obstacle 8, Drop kit in correct location=20 Points

L= Landing Safely= 10 points

T= Time Bonus = 300 - time taken(in sec)

P= Penalties

Points scored = (A + B + C + D + E + F + G + H + L + T) - P

Team Specifications:

A team can consist of a maximum of 4 participants. Students from different educational institutions can form a team.

Eligibility:

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

Certificate Policy:

1. Certificate of excellence will be awarded to the top 3 teams.
2. 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 rohan@techfest.org.

Subject: Op Rahat, team id- your position (example- Op Rahat, OP1005- 3rd Position)

Body of mail-

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