

OP. RAHAT

Task:

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

Path:

The path will consist of pillars, loops, bends, underpass, turbines, overpass and secret elements placed in random sequence along an aerial track ending to a drop zone and landing pad, testing pilot and machine manoeuvrability skills.

Arena:

1. Arena is of dimension 10m X 10m

Before taking off 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 2 rings, one smaller than the other, and a cuboid tunnel. The participants have to choose to maneuver one of these and the points will be awarded accordingly.

Tunnel - 30 points (0.65m X 0.65m X 0.65m)

Smaller ring - 20 points (diameter 0.6m)

Larger ring - 10 points (diameter 1m)

4. **Obstacle 2** signifies the crumbling buildings in disaster affected urban areas. It consists of pillars erected in a random order. The participants have to transverse the obstacle along a zigzag course avoiding the pillars. Entering between the Blue pillars and leaving from Red. Points will be awarded accordingly.

Distance between 2 parallel pillars = 1m

Distance between 2 adjacent pillars (different colour pillars) = 1m

Completion Points - 30 points

5. **Obstacle 3** signifies the turbulent air conditions. It consists of fans which provide strong wind. There will be a wall opposite to the fans to restrict these conditions in a part of the

course. The challenge is to cross this area without crashing and points will be awarded accordingly.

Fan Speed will be approx. 12-15 Km/hr

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 will be different for each team and will contain the number of their assigned drop zone(Obstacle 6) . Participants have to **scan the code** and find the number by **processing the image**. That number would be displayed on LED Matrix attached with the drone or can be wirelessly displayed on 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 the uncertainty of disaster. It is a surprise element. It will not require any extra components (eg. Gripper etc.).

Course Done - 40 points

8. **Obstacle 6** is the drop zone area. Participants have to **drop their kit** on the platform assigned to them, whose location they found from the QR code scanning. Points will be awarded based on the accuracy of the kit dropped .

Size of each Numbered location= 20cm X 20cm

Medical kit dropped in the desired area = 20 points (in the correct location)

9. **Obstacle 7** is the landing zone where the participants have to land.

Landing zone size= 1m X 1m

Successful landing = 20 Points.

10. Points will also be awarded on the time taken to complete the task. **If a team skips any obstacles, then 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 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 1-5)
0 all other cases

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

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

Game Rules:

1. 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 in the event 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 landing. (+/-50gm)
2. Broken propellers are allowed, and will not invalidate a flight attempt. (Note: The no fly zone is the area excluding the rectangle of 20m X 20m as shown in the Figure 2)

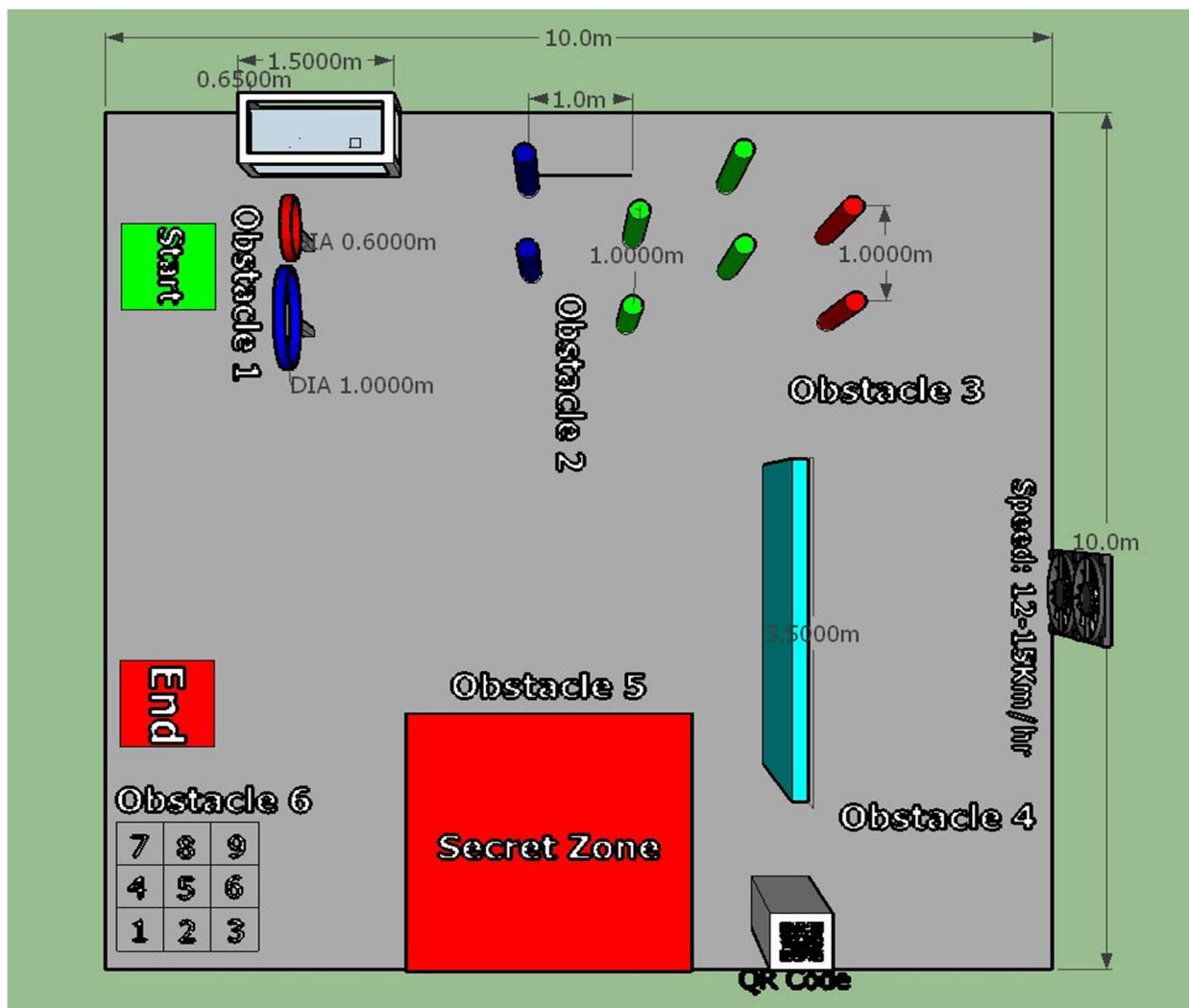


Fig. 1 Top View

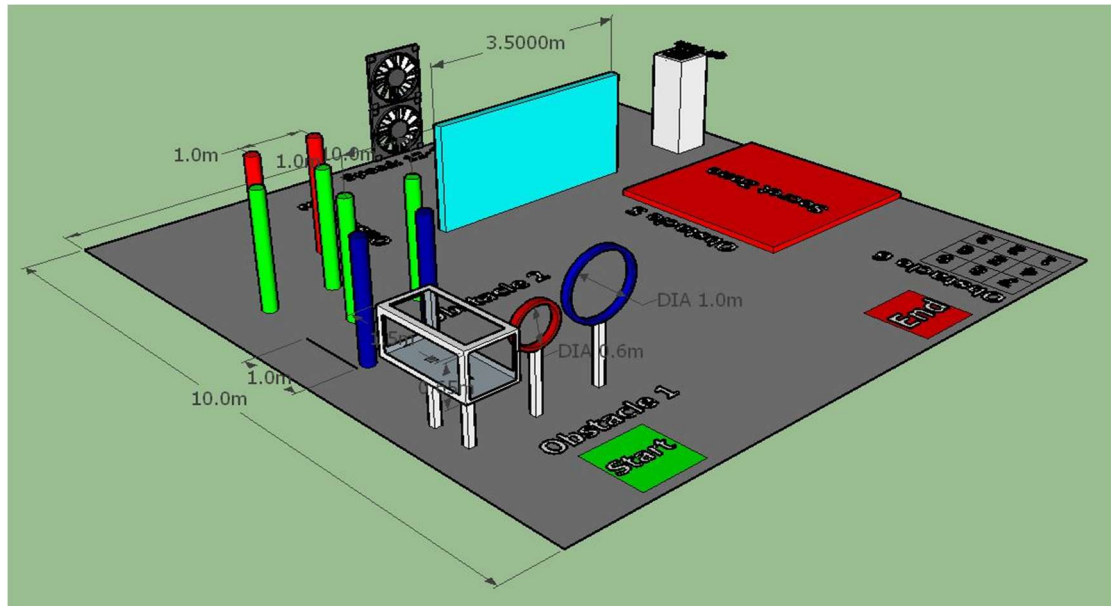


Fig. 2 Isometric View

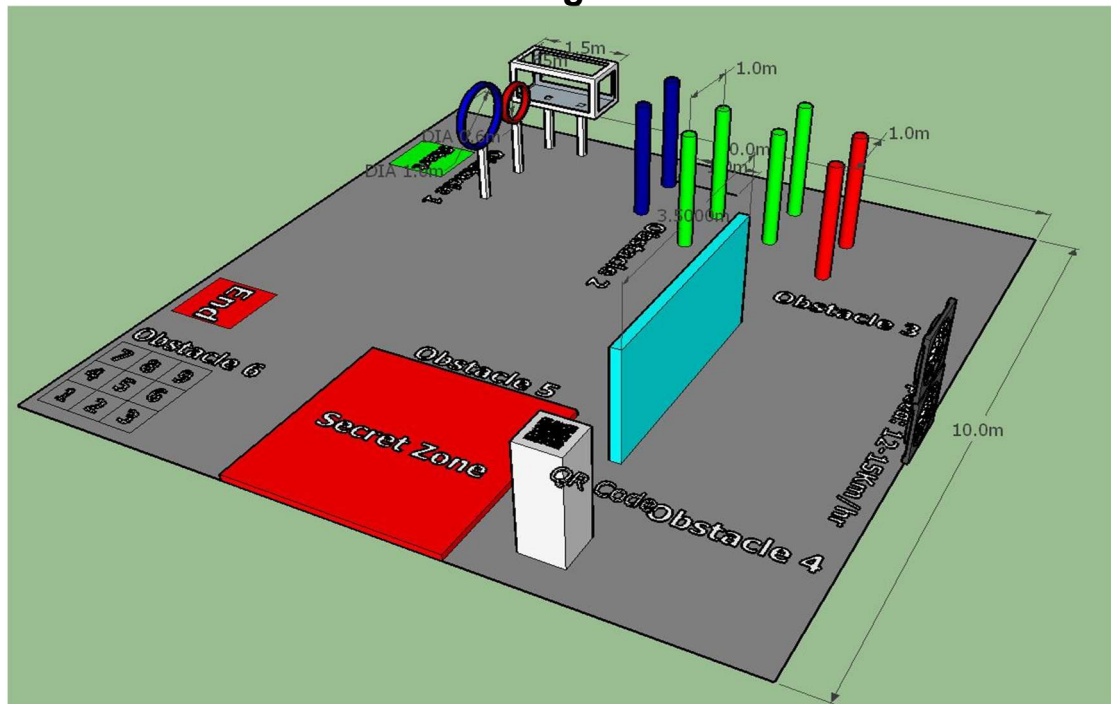


Fig. 3

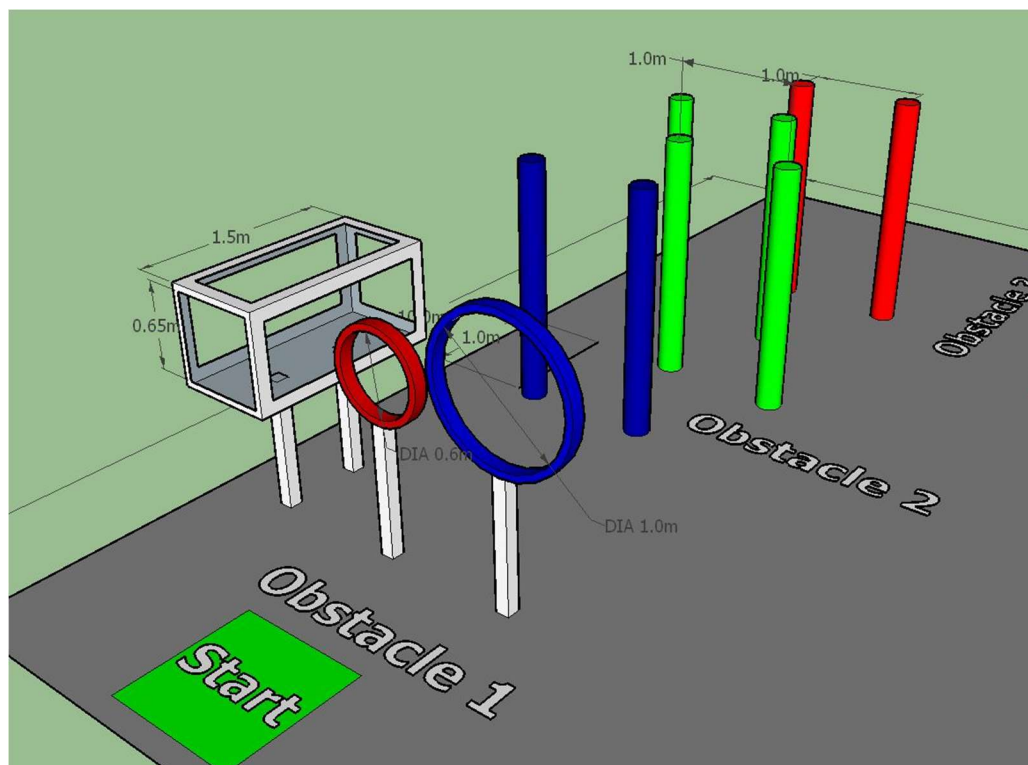


Fig. 4

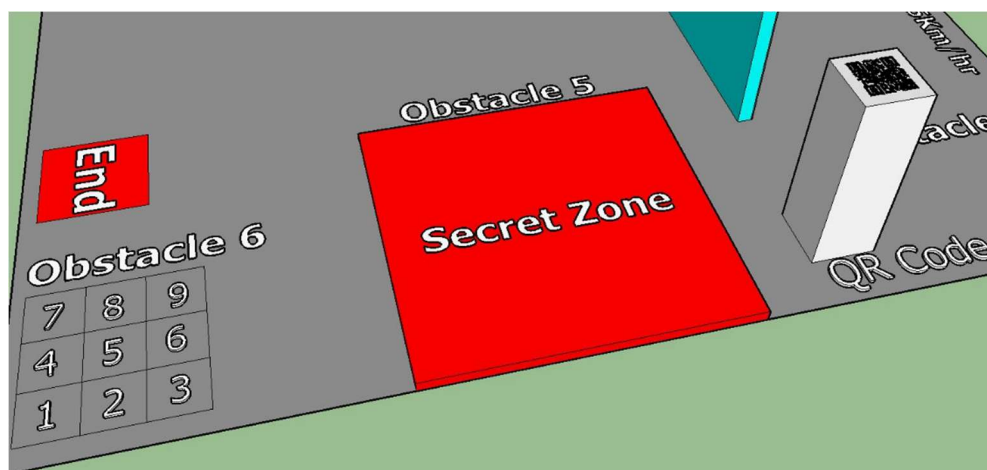


Fig. 5

Abstract Outline:

The competition will be held in 2 rounds, 1st for the submission of complete design of the device/project (abstract) and the qualifying teams will be eligible for the second round, wherein they have to submit their final working models as per the design and features already specified by the team.

Round1:

Submission consisting of:

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

Round 2:

- If the teams clears the round 1, they are required to submit a working model of their design
- In case any modification/corrections are there to round 1, the corrected files have to be resubmitted

General Rules:

1. Flight time for a run is defined as the time taken by the drone to follow the mentioned path and drop the package.
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 finish.
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.** Change 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 it has completed **atleast two obstacles** 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 crosses 2 or more Obstacles, then it will not be allowed for second run, the organizers decision will be final.

Judging:

1. Teams will be judged based on Scoring, Design, Construction, Technology and implementation.

2. 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, Zigzag Path= 30 points

C= Obstacle 3, Turbulent Air = 20 points

D= Obstacle 4, QR Scan= 60 points

E= Obstacle 5, Secret= 40 points

F= Obstacle 6, Drop Kit in correct location= 20 points

L= Landing Safely= 20 points

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

P= Penalties

Total Points scored = A + B + C + D + E + F + 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. Certificate of Participation will be given to those teams who complete the track at least once, without being disqualified.