GRID 4.0

Objective

This competition aims to test 2 main capabilities of contestants:

1. Ability to create a quadcopter that can hover stably and uses image processing to find and pick an object using an electromagnet.
2. Navigate to the bin and drop the picked object in a bin based on either image processing.

Timeline

1. September 8th - Registration opens
2. September 19th - FAQ Session - Registration - With questions
3. September 21st - FAQ Session I
4. October 15th - FAQ Session - Registration - With questions
5. November 6th - FAQ Session II
6. November 27th - FAQ Session III
7. December 7th - Registration end date
8. December 11th - FAQ Session IV
9. January 1st to 4th - Round 1 submission window
10. January 10th - Round 1 Results
11. January 28th - Finale Round

Team Criteria

1. All team members must be from the same college.

2. Team size must be limited to a maximum of 8 members.

3. Changes to the team will be allowed till the close of Elimination Round 1 submission.

4. All teams must build 1 drone and demonstrate their working.

5. Participation certificates for all team members who demonstrate working robot for Elimination round 1.

Drone Specifications

- A multirotor flying drone must be used with one or more cameras mounted to track the parcel, pick it and drop in the drop-off area

- A picking device - claw or electromagnet mounted on the drone to pick up a package weight (**< 50 g)**.

- The drone must have a push button switch to signal the start of the competition.

NO pre-manufactured drones should be used*

Round I

The drone must-

1. Take off from the designated Drone landing pad
    a. Landing pad has an Aruco Code on top of it.

2. Pick the packages in the arena 1 at a time
    a. Package 1 has an Aruco Code on top of it.
    b. Package 2 needs to be detected via Image processing. Colours on the side of the package is left to participants.
    c. Packages are randomly placed in the arena.
    d. Package size is ~ 3x3x3 inch
        1. Package is a thermacol block with a thin MS sheet on top to make it magnetic. The metal can be covered with a coloured paper.

3. Drop it in the drop zone
    a. Drop zone can have Aruco code markers around it as well as on the top in case needed for navigation.

4. Come back to the base

Neither the drone or the package should touch the ground, once it has been lifted, till it is dropped in the dropzone.

Round I Arena
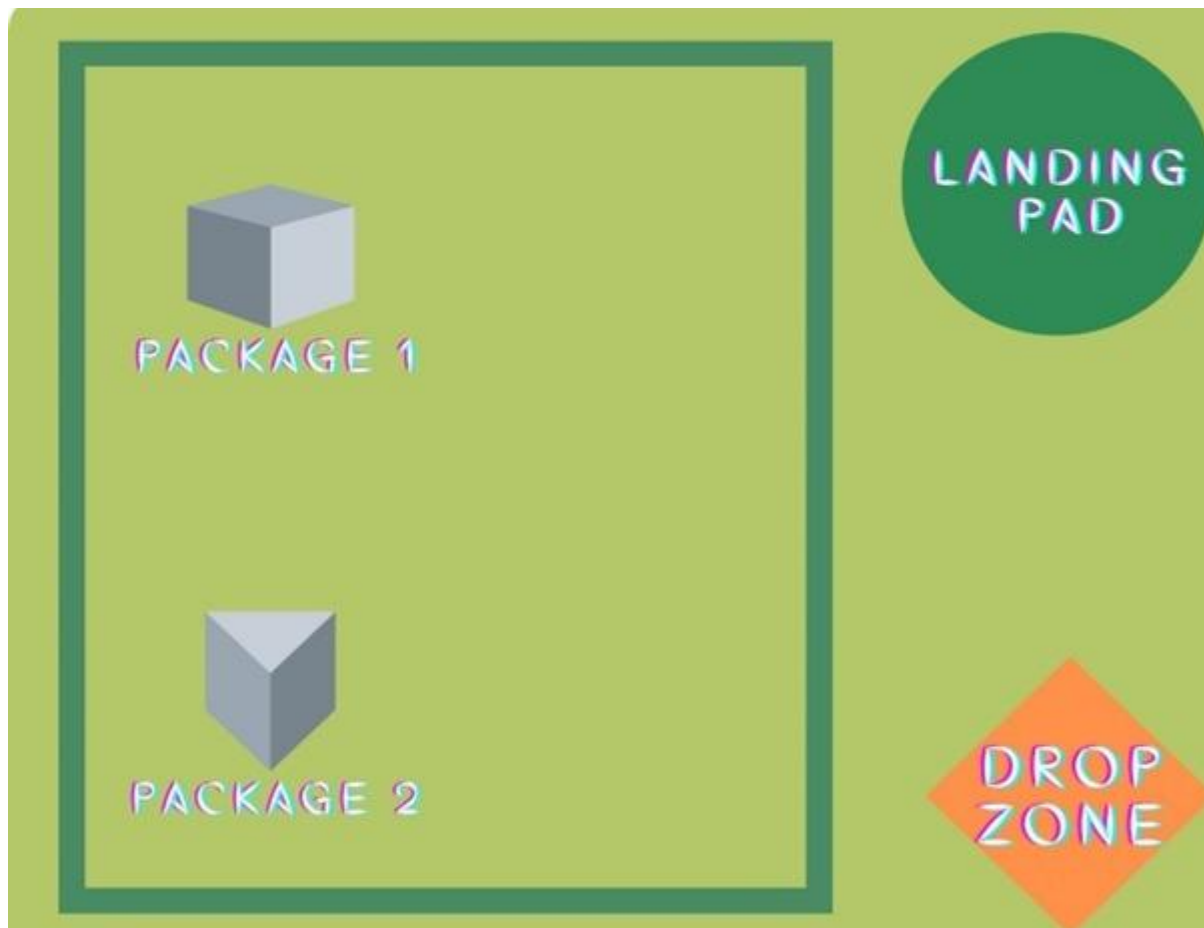
Arena Requirements

● Overall, Arena size is 10x10ft with a 12 inches wall around it.

● Landing pad is circle of diameter 2 feet.

● Dropzone is 2x2 ft.

  • Dropzone will have a 1-inch wall around it

No Sensors to be placed on Arena, Landing Pad, or Dropzone. *

Judging Criteria for Round I

Teams that successfully demonstrate at least movement of one package to drop zone will move to round 2. In case there are more than 50 teams that demonstrate movement of both packages to the drop zone the Priority will be given to the teams as follows:

- Teams that dropped 2 packages in shortest time
- Teams that dropped 1 package in the shortest time

Teams that do not demonstrate the ability to pick at least 1 package, lift it up, and drop it in the drop zone will not make it to the next round.

Any touching of the drone after the trial starts will lead to entry being disqualified. The drone should not be operated with a manual remote control.

Deliverables for Round I

1. Pictures of Drone.
2. BOM of equipment used along with sourcing.
3. Short explanation of how you built the hardware and software - Less than 1 min.
4. **Uninterrupted & unedited** Video of the Drone performing the task - with timer overlayed to indicate start and end - This can be shot with a handheld or phone camera.
5. **Uninterrupted & unedited** Video of Live Image Processing from the drone - with timer overlayed to show how arena is being analysed in real-time.

Round II

This will be held in person at IIT Madras. The problem statement for this will be released with the Round 1 result.