Arial Vehicle Design

Problem Statement

EVENT DESCRIPTION

INTRODUCTION

Drones are now becoming handy. From door to door deliveries for Amazon to managing goods inside a big store of Walmart, photography and video shooting someone for movies to mapping a threat area blindly for military, immediate medical response to a remote village in Africa to secure a highly populated area aerially. Even small micro multicopters are used to produce a special effect for an artist, to form a specific varying shape. Multicopters are everywhere. Even space exploration agencies and organizations working on exploring interplanetary life are working on these concepts. These are all possible only through their automation and communication of them to their surroundings and themselves.

In this format of competition, we invite participants to make an autonomous multicopter to any extent of automation and make them communicate to us remotely via a wireless means by sending us a data.

FORMAT OF THE COMPETITION

> **It consists of two rounds**

Round 1: Maneuver Round

Here you are required to show your skills in maneuvering. You can use a dedicated flight controller or can make one from scratch.

Task:

1) You have to **lift a block by a gripper attached to your multi-copter while in flight,** and fly to a specified position to drop it there.

   Total1 = 600 - Total time taken in this task (in sec)

2) You have to fly your multicopter through a number of obstacles arranged randomly.

   a) First some **vertical bars** arranged randomly. You have to **pass without touching them.**

   Score1 = Number of times you touched the bars X 10

   b) You have to then go through a **rectangular tunnel of dimensions 1500mm X 700mm X 1000mm (LxBxH).** Height of the tunnel will be about 1 m from ground.

   Score2 = Number of times you touched the boundaries X 10

   c) Scoring Criteria

   Total2 = 1200 - Total time taken in this task (in sec) - (Score1 + Score2)

Round 2: Communication Round

You need to **use a sensor onboard and display their live data on your laptop or any other display** during fly. Sensor can be anything like GPS, Humidity or Temperature sensor, Ultrasonic sensor, IR sensor or a Camera etc.

- → **Scoring criteria:**
  - ◆ 100 marks will be given to the team for completing the round.
- → **Overall Scoring criteria:**
  - ◆ Based on weight (minimum weight will have maximum score)
    - **Score3 = Weight (in grams) X 10**
  - ◆ Based on economy
    - **Score4 = Cost X 20**
  - ◆ Based on flight controller (if flight controller has been made from scratch it will also be considered, and will be awarded accordingly)

Total Score = Total1+ Total2 - Score3 - Score4

General Information:

- ◆ Open for all the years.
- ◆ The use of **2.4 GHz radio** is required for all aircraft competing in the competition. If the participants want to use any other frequency, they will have to inform the organizers in advance.
- ◆ A limited number of 2.4 GHz radios will be available with the organizers for use by the teams. (Teams who do not have access to radios can inform the organizers in advance to request use of these radios.)
- ◆ **Metal propellers are not allowed**.
- ◆ The models can have powered take-off with a landing gear or can be launched manually by a person standing at ground level.
- ◆ Plane should **be built from scratch and not purchased models.**
- ◆ A team member can't be a part of more than one team at any one given competition.
- ◆ Team members of the team should be preferably interdisciplinary to make our work easier. **Only same college members are allowed per team.**
- ◆ Maximum of 5 members per team is allowed.
- ◆ **Bring your college/student I-Card at the time of competition**.
- ◆ If any of the above mentioned rules are violated, the concerned teams will not be allowed to participate in the event.

Design Constraints:

◆ The **multicopter should fit inside a box of dimensions 450X450X300mm (excluding your gripper)**.

◆ The dimension of the block to be dropped is a cube of 5 cm and weight of 50+/-5 grams.

◆ The **maximum voltage between any two points on the plane should be 12V** at any point of time

◆ Use of gyroscopes (gyros) and data transmission over mobile communication is permitted. A **Wi-Fi module can also be used**. We will provide a router to connect to.

◆ One of the team members should fly the aircraft and another should call the stunts just before they are about to be performed.

Revisions

Any revisions to the Scope of the Competition would be intimated to all the participants via registered email and on the website of Avishkar-2018.

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