Lighter than Air UAV

The use of Unmanned Air Vehicles (UAV) has proved to be very efficient. They not only save the pilot from being placed in harm's way but the expense is much lower. There are uses of UAV's that have been identified. An example of one of those uses would be to observe a forest fire to provide information so the Forrest Service can determine the best way to fight the fire.

Design a small UAV to carry a cargo through two gates, see below, drop a payload and return to the starting point. This is an initial proof of concept prototype. You must design and build, at a minimum, the propulsion and control system for the UAV yourself. You cannot purchase and modify an existing commercially available vehicle. The device must be able to maneuver around and through obstacles, change height, and pass through a hoop for sizing.

A hoop approximately 0.71-m (28-in) in diameter will be used by the judges to limit the size of the vehicle. It is radio controlled.

Vehicle Requirements

1. The vehicle must be powered by batteries.
2. The device must be controlled through a wireless transmitter/receiver radio link. The following requirements pertain specifically to the device controller:

- A radio transmitter may have its own batteries rechargeable or non- rechargeable.
- The transmitter/receiver radio link may be any commercially available model controller.
- During the trial, the device must be completely controlled via the radio link no other contact, interaction or influence is permitted.
- One team member must control the device throughout the trial.
- All radio controllers will be impounded and shut off during the competition, except during the team's run.

3. All devices must have a readily accessible and clearly labeled master shut-off switch.

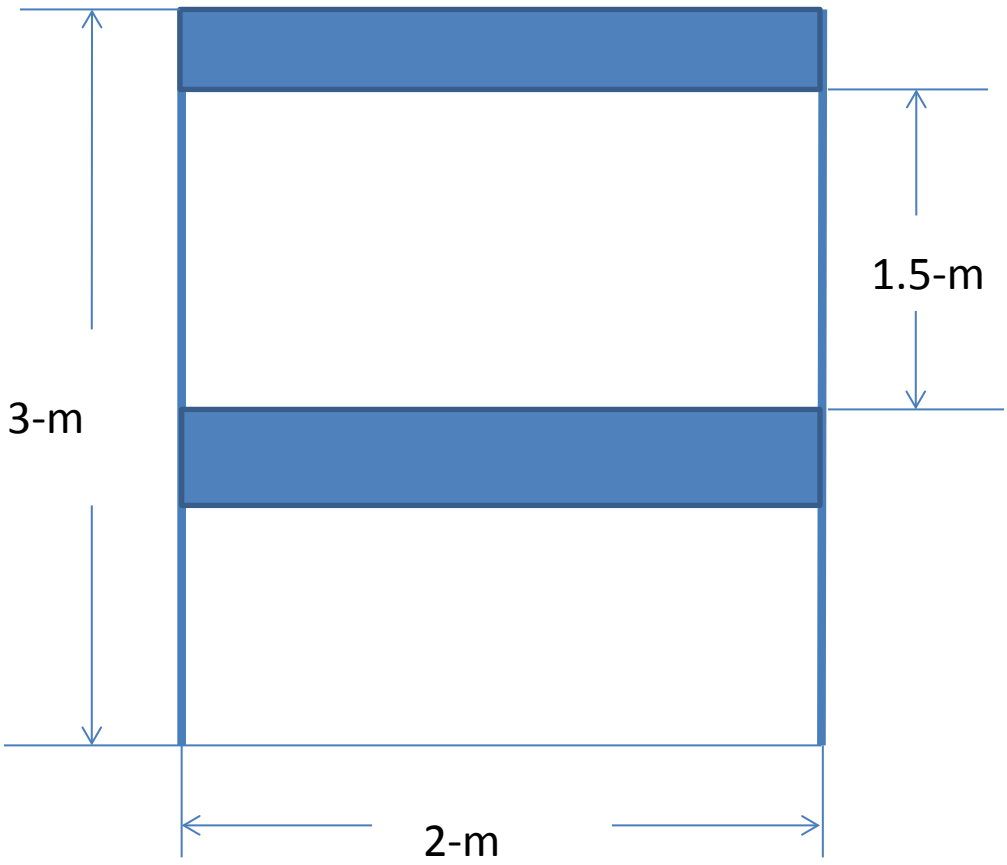
Course Description

The **test course** will consist of a flat, level section of floor marked off with masking tape and the corresponding airspace above that floor. The rectangular course, with the maneuver gates, will be in a space of 5-m by 7.75-m in size. The air space for maneuver will be the room of the venue. There will be no penalty for maneuvering outside the gates course. This will not be consistent district to district. The minimum will be 2-m between gates. The gates can be placed anywhere in the marked off area.

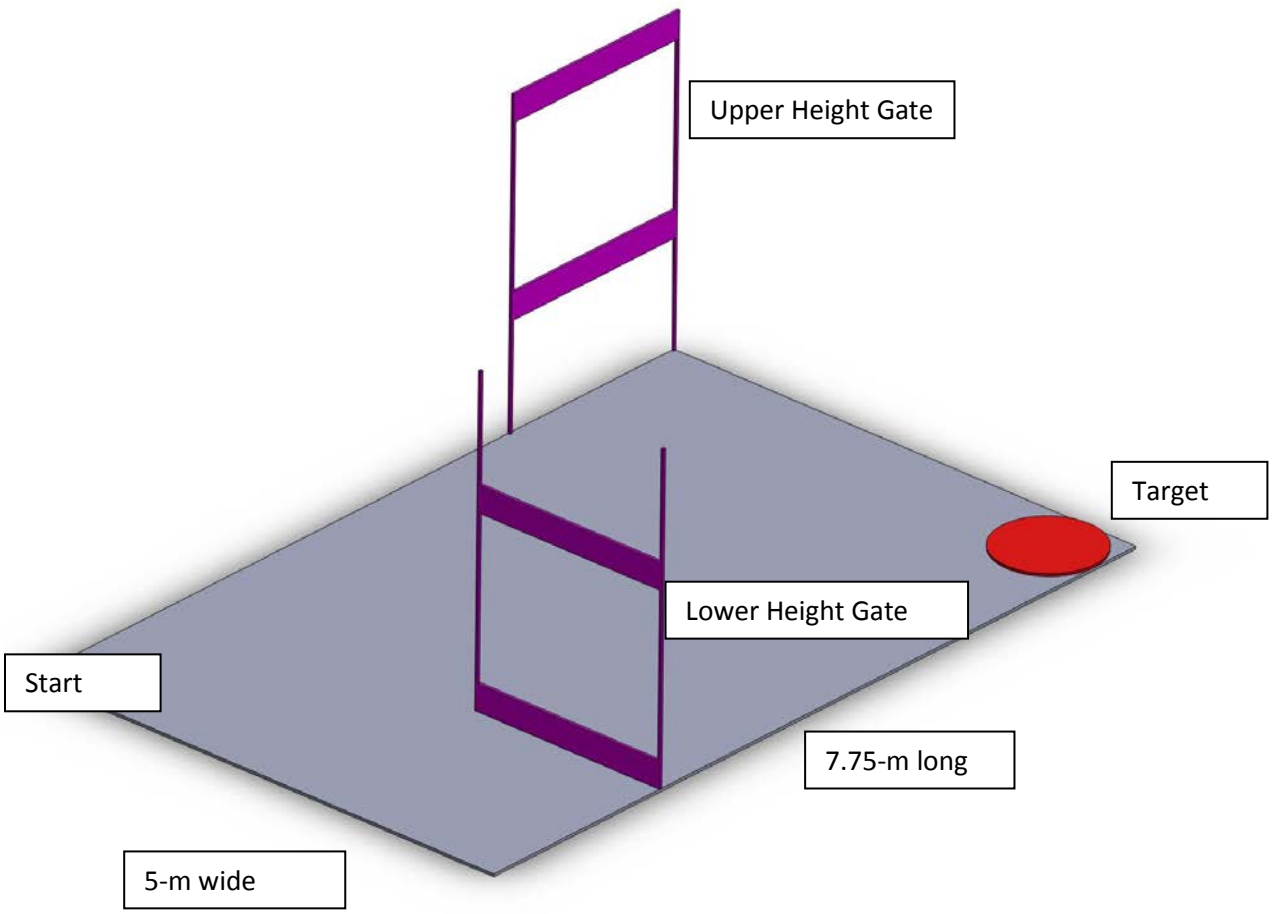
The UAV must go through two gates drop a payload and return to the starting point. Extra points will be awarded for going through the same two gates after dropping the payload. Each

gate will be 2M wide and 3M in height with a 1.5-M high opening. One gate will have the opening high and the other gate will have the opening low. See schematic of the gate.

Example of Gate and Opening



Example Layout of Course



Tasks to be accomplished.

1. Navigate through the gates in the fastest time.
2. Teams will be scored on the maximum cargo carried.
3. Bonus: Release a simulated 1-gm water bladder. (Note: Use a bag of sand.)
4. Bonus: Does the canister hit the intended fire? Target is 1-m in diameter.
5. Hitting or touching the gates will incur a penalty.
6. Provide photographic visual evidence of the construction of your vehicle.
7. Signed Ethical Statement that you constructed the vehicle.
8. One page Design Calculations.

Run Score = Max(300 s – Trial Time, 0)
+ (Number of gates successfully negotiated)x200
+ (Number of grams carried) x50
+(release of bladder)x20
+(bladder hits target)x100
+(Lighter than air)x100
-(number of gates hit)x20
-(unacceptable design calculations)x100