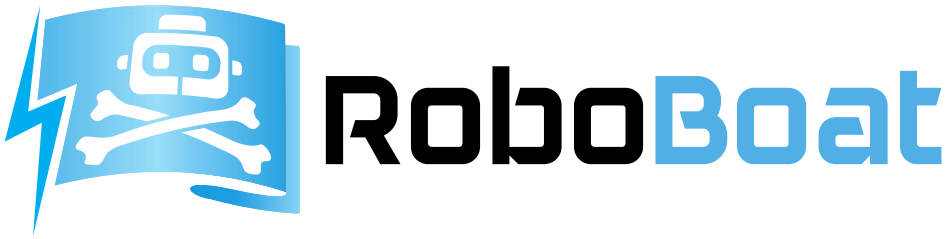

Unmanned Aerial Vehicle Guidelines

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www.roboboat.org

RoboBoat 2019 Aerial Vehicle Guidelines

Teams intending to fly an Unmanned Aerial Vehicle (UAV) at RoboBoat 2019 must first obtain a flight-ready status. To obtain this status, teams must adhere to the UAV system requirements, in addition to successfully completing the on-site safety inspection. **Teams that arrive at the competition failing to meet these requirements will not be permitted on fly, until they modify their vehicle to meet all the requirements.**

1 Vehicle

1.1 Requirements

- **Autonomy**: Vehicle shall be fully autonomous and shall have all autonomy decisions made onboard or on the Autonomous Surface Vehicle (ASV).
- **Buoyancy**: The vehicle shall be positively buoyant.
- **Communication**: The vehicle cannot send or receive any **control** information while in autonomous mode (to and from Operators Control Station). Communication is allowed between the vehicle and subsystems (ASV in this case).
- **Documentation**: Teams shall read and understand the following documents:
    - 14 CFR 107 – Small Unmanned Aircraft Systems
    - AMA Safety Handbook
    - Document #560 of the AMA
    - Know before you Fly (All sections)
- **Energy source**: The vehicle must be battery powered. All batteries must be sealed to reduce the hazard from acid or caustic electrolytes. Extra precaution must be taken to seal the batteries from water damage (in case of a water landing).
- **e-Kill Switch**: The vehicle must have at least one remote kill switch which, when actuated, must return the vehicle to a prescribed "home" location. If the remote kill switch system is powered off, UAV shall default to the above mentioned state and return to a prescribed "home" location.
- **Flight Software**: Flight software shall have allocations to hard code the following parameters:
    - Max Ceiling: maximum useable altitude for flight operations.
    - Geo-Fence**:** Limiting flight operations to a pre-defined bounded area.
    - Return to Launch**:** A pre-defined "home" point allowing the UAV to return to this point during emergency procedures.
- **Platform**: UAV shall be a rotary platform. Configuration of this rotary platform is left to the team's discretion (tri, quad, hex, or octo).
- **Propellers:** It is **recommended** that all propellers be shrouded.
- **Registration:** UAV shall be registered with the FAA, and the FAA issued registration number shall be clearly visible on the vehicle.
- **Remote-controllable**: The UAV must be remote-controllable (tele-operated). If the remote controller is turned off (or power is interrupted), UAV shall default to a "**e-Kill Switch**" state and return to a prescribed "home" location. Controlling vehicle through a laptop is discouraged.

- **Safety**: All sharp, pointy, moving or sensitive parts must be covered and marked.
- **Size**: The ASV platform, with the UAV onboard, shall fit within six feet, by three feet, by three feet "box".
- **Weight**: UAV shall weight less than 10 lbs.

1.2 Recovery

No team member is allowed in the pond at any time. Competition officials will be responsible for recovering lost vehicles. Officials will make all reasonable efforts to recover a lost vehicle but cannot guarantee that they will be able to do so. All teams recognize that by entering the competition, they risk damage to, or the loss of, their vehicle. The judges, officials, host and sponsors can take no responsibility for such damage or loss.

1.3 Operations

All UAV operations at RoboBoat 2019 shall be within Line of Sight (LOS).

2 Onsite Safety Inspection

Teams intending to fly at RoboBoat 2019 must pass the flight safety inspection to achieve a flight-ready status. Criteria for this inspection is listed below.

2.1 Documents

- An important part of flight operations is the documented protocols followed for normal and emergency procedures. Teams shall provide documentation capturing their normal and emergency flight operations.

2.2 Weight Test

- The UAV shall weigh less than 10 lbs.

2.3 Tele-Operation

- Verify tele-operation of UAV.
- Emergency kill switch (from remote control) test.
    - Vehicle should return to “home” (within 5 seconds of “loss of signal”).
- Loss of Power test.
    - Turning off the remote control, vehicle shall return to “home” (within 5 seconds of “loss of signal”).

2.4 Autonomous Flight

- Manual takeover when vehicle is flying in autonomous mode
- Emergency kill switch (from remote control) test.
    - Vehicle should return to “home” (within 5 seconds of “loss of signal”).
- Loss of Power test.
    - Turning off the remote control, vehicle shall return to “home” (within 5 seconds of “loss of signal”
- Ensure UAV is not violating geo-fence.