UC San Diego
JACOBS SCHOOL OF ENGINEERING

# UC San Diego High Bay Physics Aerodrome Facility

**PURPOSE**

This document establishes procedures for the safe access and use of the High Bay Physics Aerodrome for Unmanned Aircraft Systems (UAS). Based on the risk associated with the use of this facility, the safety procedures outlined below must be followed by all research staff and visitors.

**REQUIREMENTS**

*Conducting Flights:*

- All flights will be conducted within the netted area.
- No flights will be permitted within the enclosed part of the building unless additional netting is present to protect fire sprinkler and lighting systems inside the building.
- No one is permitted in the netted area during flight experimental operations. If the operation requires a person in the netted area during experimental flights, they must wear appropriate personal protective equipment (PPE).
- In the event of a fire, earthquake or evacuation, all flights must be immediately grounded and discontinued.
- Principal Investigators (PIs) and students (graduate or undergraduate) must request a standing approval via https://eforms.ucsd.edu/view.php?id=322150 and acknowledge the roles and responsibilities of flying before commencing any flights. This standing approval excludes the following types of flights:
    - A UAS over 55 lbs.
    - Using hazardous materials.
    - Flights conducted by visitors not employed by or enrolled at UCSD.
    - Special events such as drone racing, exhibitions or other large gatherings.
- Flights outside of the scope of the standing approval require the submission of singular flight requests via https://blink.ucsd.edu/sponsor/EHS/forms-ehs/uas-flight-request-form.html.
- Prior to each flight and before termination of flight, the pilot must verbally announce the flight plan to all crew members and give a countdown prior to launch/landing.
- The project manager must document all activity and submit in email to the Primary Contact listed below, which will be reflected in the Google calendar utility.

*Registration & Licenses:*

- Any UAS flown in navigable airspace (outside of any enclosed area) must follow the following Federal Aviation Administration (FAA) guidelines:
    - UAS between 0.55 pounds and less than 55 pounds used for university-related operations must be registered on behalf of the University and the registering department, unit, or organization must retain evidence of registration.
    - The pilot must obtain a Part 107 airman license for any commercial flights.

*Hazardous Materials and Waste:*

- Used batteries, lead soldering waste and other universal waste generated on campus must be collected by EH&S Environmental Management Facility for recycling or disposal as hazardous waste. See https://blink.ucsd.edu/safety/research-lab/hazardous-waste/battery/index.html .
- Review any applicable manufacturer/vendor safety information, such as a Safety Data Sheet (SDS). Employers are required by law to provide workers with access to SDSs. UC San Diego facilities where hazardous materials are handled are also required by law to either retain hard copies of SDSs provided by manufacturers or teach all personnel how to obtain SDSs electronically.

*Access:*

- Only those staff, faculty and/or students who have received training and permission will be allowed access within the netted area.
- Visitors wishing to fly or enter must fill out a waiver (see http://www.ucop.edu/risk-services/_files/waiver-voluntary.pdf).
- Specific information such as rules, contact information, hours of operation, controls over who can access the space, and general housekeeping rules must be posted.
- Access to the space will be limited with key access, where the main entry port will be locked open, except when in use. Three keys to unlock the gate, allowing closure for use, will be maintained for signout by representatives from the Contextual Robotics Institute and the Office of Environment, Health and Safety. At the time of this writing, those representatives are designated as Tim McConnell, Henrik Christensen and Eric Delucien.

*Workbenches:*

- Propellers will be removed and not mounted while on the workbench.
- Batteries should be charged in a designated area with no daisy-chaining of electrical cords
- Soldering will only be done on benches and adhere to the following guidelines:
    - Substitute non-lead based products whenever possible since lead (or other metals used in soldering) can produce dust and fumes that are hazardous.
    - Wash hands after completing soldering work and do not eat or drink in soldering areas.
    - Use PPE to prevent inadvertent contact with clothes and skin.
    - Clean work surfaces by using wet wipe method or specialized lead cleaning wipes, avoid lead contamination by using common housekeeping brooms, mops, and/or any materials that are being reused.
    - Discard lead contaminated materials as hazardous materials.

*Accidents or Injuries:*

- Any serious crash or aircraft incidents must be reported immediately to ehsfaa@ucsd.edu. This includes fires and hazardous material spills.
- Any injuries must be reported by visiting http://blink.ucsd.edu/safety/occupational/reporting.html.
- Administer proper first aid and ensure first-aid kit is stocked. Call 911 for emergencies.

- Injured students should visit Student Health Services, or UCSD's Thornton Hospital for emergencies. Injured employees should visit the UCSD Center for Occupational & Environmental Medicine (COEM) clinic during UCSD Business Hours or Thornton Hospital for emergencies or after-hours care.
- Do not attempt to clean up any spill or release for which you are not fully trained and equipped.

*Training:*

- All pilots must do a site-specific orientation and complete trainings required by the facility manager .
- Complete Fire Safety training https://uc.sumtotal.host/core/pillarRedirect?relyingParty=LM&url=app/management/LMS_ActDetails.aspx%3FActivityId%3D232762%26UserMode%3D0 .

*Fire Prevention:*

- Place evacuation and fire plan map clearly visible in the facility.
- An ABC fire extinguisher must be mounted near bay door.
- A fire proof LiPo safety bag must be available for disposed batteries and a fire-retardant battery recycle bucket to ensure batteries are not thrown in trash.

**ABOUT**

The University of California San Diego currently occupies an area designated as the "UC San Diego Aerodrome". This area contains a 55 ft × 44 ft × 25 ft netted hangar.

Under the netted hangar, research on autonomous flight will be conducted to test new technologies in a controlled, instrumented environment. The netting enclosure allows true outdoor flight, but with a containment system that avoids the need for regulatory approval. Research and testing will be entail collaboration between the Jacobs School of Engineering, as well as outside organizations, including local corporations and national research facilities. Example programs include research by the UCSD Cultural Heritage Engineering Initiative (CHEI), performing airborne imaging for the study and preservation of monuments, historic structures and archealogical sites. Other initiatives will include research in the realm of multi-vehicle control and non-GPS localization.

**SITE MAINTENANCE**

- Audits will be conducted looking for possible issues with chemical storage, electrical safety and UAS Safety and strength of netting. The site will be maintained and inspected by the following entities:
    - Fire and Life Safety
    - Research Safety
    - Department Safety Officer (DSO)
- Site must be cleared of all brush and dirt before flights.

**ROLES AND RESPONSIBILITIES**

- Principal Investigators
    - Ensures the project is conducted in compliance with applicable laws and regulations and institutional policy governing the conduct of sponsored research.
- Facility Manager
    - Ensures that all documentation has been submitted and trainings/orientation have been completed.
    - Overseas flights and scheduling
    - Enforces rules and regulations
- Department Safety Officer
    - Facilitates the flow of health and safety information and programs
    - Performs annual workplace inspections to identify and correct hazards
- UAS Pilot
    - Must be satisfactorily trained
    - Must maintain a safe operating environment
- UC Center of Excellence on UAS Safety
    - Provides authorizations/waivers for test flights in controlled airspace
- Local Designated UAS Authority (EH&S)
    - Performs an inspection of facility annually
    - Provides guidance on policy and regulatory matters

**CONTACTS**

- Primary contact – Tim McConnell tmcconnell@eng.ucsd.edu 858-717-1113
- Secondary contact – Prof. Henrik Christensen hichristensen@eng.ucsd.edu (858) 534-0229
- Department Safety Officer – Tyler Allen tyallen@eng.ucsd.edu (858) 226-5243
- Emergencies – (On campus and SIO) dial 911 or 858-534-HELP (4357)
- Drone incidents – Eric Delucien edelucien@ucsd.edu 858-717-5793