

# MIT Sailing Pavilion Autonomy Lab: Rules and Guidelines

28 September 2012

*The autonomy lab at the MIT Sailing Pavilion (SP) presents researchers in marine robotics and related fields with an unusual opportunity for regular access to a large but protected body of water, the Charles River Basin. As a lab, the facility is subject to general safety rules in accordance with Institute policies, and that should be consistent with the practices at other labs. Because the Charles River Basin itself is a public space, we need to act in a manner that will protect the viability of this facility in the future – one bad event can have a big impact. Note also that the facility is used by several research groups, so that operations and management need to be coordinated.*

Authority rests with the Sailing Master (Fran Charles) and the PI's using the Facility (Mike Benjamin, Henrik Schmidt, Franz Hover, and John Leonard), who have mutually agreed to these rules and guidelines. We maintain that any autonomous operation can be terminated, for any reason, and that any person can be prohibited from using the Facility, for any reason.

- Safety in the Lab Space.
  - Many fire extinguishers are located in the Pavilion, as well as one each in all of the motorboats. In the lab, there is a fire extinguisher next to the inside door.
  - If you are working in the lab, the bay doors should be unlocked to allow for easy exit in an emergency.
  - The lab is subject to the Institute Working Alone Policy. Do not use power tools when you are alone.
  - Any hazardous materials are subject to EHS rules concerning MSDS, containment, spills, and removal.
  - Batteries:
    - Chemistries that are a fire hazard during charging require a person to be present during charging, and for that person to

have specific knowledge of normal procedures and emergency actions.

- Chemistries that are not fire hazards during charging do not require a person to be present during charging, but a clearly-marked sign should be placed to indicate that charging is underway.
- Researchers are responsible for any other special considerations concerning storage or handling of batteries.
- In no case should a battery charging hookup clutter the space.
- Minimize clutter as this can create unsafe working conditions.
- Safety on the Deck.
  - If you are near the water edge alone, wear a life-vest.
  - If you are operating the hoist, wear a hard-hat and a life-vest. Do not operate the hoist unless other people are close enough to help in an emergency.
  - On wet or cold days, be aware of slippery conditions.
- Safety on the Water. (see also items below on Coordination with SP)
  - Powered autonomous vehicles have the potential to injure or kill people, and to cause significant property damage. Crew shells are fast but largely blind, and have hit autonomous craft several times already this year; our vehicles have also made physical contact with a fishing boat and a State Police boat. If the river is busy, do not operate autonomously. If you must “push the limits”, have a spotter watching over the vehicle(s), ready to take over manual control or to advise of imminent problems.
  - Under US Boating Rules, boats under sail have the right-of-way; autonomous vehicles have no rights at all, legally or practically. This is most critical close to the Pavilion, where on a busy day there can be many sailboats and many skill levels. On some days, simply moving autonomous operations away from the Pavilion may give you adequate space.

- Try to make your vessel highly visible through flags, lights, etc.
- Please report any significant incidents or boat contacts to a PI.
- Motorboats: Only the Sailing Master, or a designated SP staff member, can give researchers permission to operate the motorboats. Users agree to abide by SP rules regarding their use, including use when SP staff are not present (e.g., prepping or securing overnight). *Take a means of communication on the motorboat: cell phone or radio.*
- Security.
  - The door on Memorial Drive should be unlocked only by SP staff, except perhaps in instances of loading and unloading gear.
  - If you open doors to the rooftop areas, or to the autonomy lab, you must later make sure they are secure.
- Coordination in the Lab Space.
  - Each user needs to be respectful that the space used by others. Usual etiquette applies about cleaning up messes, keeping ways clear, and not interfering with the work of others. Any conflicts should be brought to the attention of the PI's.
- Coordination with the Sailing Pavilion.
  - Dockmaster.
    - Before operating vehicles, find the Dockmaster, and let them know what you're planning to do, where on the river and for how long. If an issue comes up with the vehicles, the Dockmaster –
      - shouldn't be surprised that there were autonomous vehicles out there, and
      - should know who to find on the dock to convey the problem.
    - If the Dockmaster indicates that the river will have a high level of activity, use common sense: yield to the sailors completely

and come back another time, or at least operate away from the sailboats as much as possible.

- Etiquette. Operating on the river is NOT first-come-first-serve. MIT Sailing has regular classes and practices. Although you may have been operating a vehicle already for some period, yield to the sailing classes and teams and clear the area if they are starting a class or practice.
- General Scheduling. You should not plan to operate sunrise-9am on any day (crew shells traveling fast in open water), 3pm-sunset on nice weekdays (sailing), or noon-sunset on Saturdays or Sundays. If you do need to operate in these hours, talk to the SP staff and gauge the activity in this period.
- Loans. If you borrow SP equipment, return it. This includes life vests at the end of the day or period of use.

*Improvements or corrections to this document should be directed to Franz Hover, hover@mit.edu.*