



**The 6th International Robotic Sailboat
Championship**

11-14 June 2012

Event Outline
Notice of Competition and Sailing Instructions

Revised August 29th 2011

Hosted by:
University of British Columbia and the Royal Vancouver Yacht Club

Vancouver BC CANADA

The 6th International Robotic Sailing Championship

Event Outline - 2012

Competition Overview

The International Robotic Sailing Championship is open to teams wishing to design, build and compete with robotic sailboats. The University of British Columbia and the Royal Vancouver Yacht Club will host the event from June 11 to 14, 2012 in Vancouver British Columbia.



Background

In 2004 students from the University of British Columbia demonstrated as part of a fourth-year design project that an autonomous sailboat was possible. Based on their work the SailBot Class rules were developed for friendly competition among university teams. The first SailBot International Championship was held in 2006.

Competitions have been held in Canada and the United States. The winner of the event has the responsibility to select the next host site in North America. In 2010 the U. S. Naval Academy won in Kingston, Ontario and hosted the 2011 event. After winning again in 2011 the U S Naval Academy selected Vancouver as the site for the 2012 event.

The detailed rules of competition are in the Sailing Instructions; however, the basic concept is to build a 2 meter or Open Class boat which can sail robotically by making its own on-board decisions about sail trim and course direction without human assistance. Due to the complexities involved in this task, only one event will be required to be fully autonomous. At the cost of some points the other events permit the rudder and sails to be controlled from off the vessel. This allows teams to gradually increase the complexity of their boat. For instance, a first-year effort would be to build a boat and possibly an autonomous sail trim system. For safety reasons one event stresses reliable standby manual remote control.

Events

The competition will consist of five parts to test various aspects of the design, construction and control logic.

1. Fleet Racing (manual rudder and/or sail control incurs no points penalty)
2. Station keeping to test logic (manual control incurs 50% points penalty)
3. Autonomous navigation contest to test precision (no manual control allowed).
4. Judges evaluation of a presentation on the design, construction and innovation
5. Long Distance Race (manual control incurs 50% points penalty)

Weather

<http://jsca.bc.ca/aboutus/weather/> Vancouver sailing weather



Team Spirit

While competing and to encourage team spirit, competitors are encouraged to wear clothing that identifies them with their school and/or team.

Accommodations and Travel

The UBC campus residences are within a ten minute drive of R.V.Y.C. There is a Vancouver youth hostel which is a 5 minute walk from the sailing site. No cost hosted housing is available on a limited first-requested basis with local families associated with the hosts. The nearest airport is YVR, about 30 minutes away from R.V.Y.C. R.V.Y.C. is 15 minutes by car from downtown Vancouver.

Design Assistance

Information describing sailbot development is located at:

<http://www.usna.edu/Users/naome/phmiller/SailBot/SailBot.htm>.

Or on the 2012 event website at:

The papers include enough information for a team to design and build a competitive SailBot. Additionally, a hull mold is available for loan or a hull shell could be built for a nominal fee.

Contact Information/Website

If you are interested in finding out more about the competition or SailBots in general, please contact us at: gaelengk@gmail.com



SailBot 2012 – Notice of Competition & Sailing Instructions

Rules

The competition shall be governed by the current SailBot Class Rules, the 2009-2012 Racing Rules of Sailing, this Notice of Competition and Sailing Instructions.

Organizers

The event is organized by the Royal Vancouver Yacht Club in cooperation with the University of British Columbia Department of Mechanical Engineering.

Eligibility

Entries will be accepted in both the Sailbot Class and the Open Class as set out in the Sailbot Class Rules. The Open Class has no limits on team membership. For the SailBot Class at least 50% of all team members must be students representing a secondary or post-secondary undergraduate institution. Faculty Advisors are not included in the calculation of team membership. The remote yacht, its hull(s), sail(s) and control systems must be substantially an original design, subject to the scrutiny of the judges. Kit boats and controls are permitted but are subject to reduced points in the Presentation Event. Teams may enter as many boats as they wish in each of the two classes. A boat may only be entered in one class.

Location

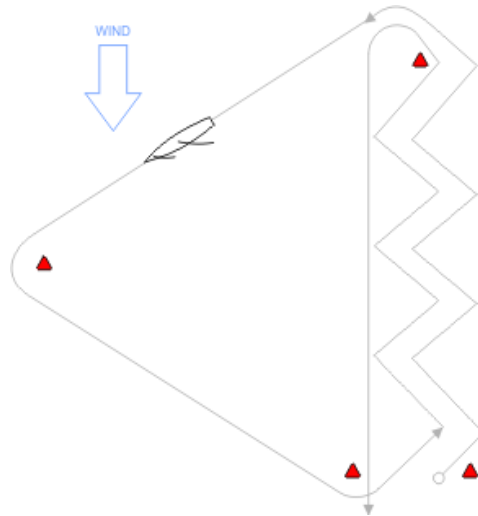
All sailing competitions will be held in English Bay in the waters adjacent to the Royal Vancouver Yacht Club, 3811 Point Grey Road, Vancouver British Columbia V6R 1B3.

Competition Events

The competition will consist of four on-water competitions and one on-shore event to test various design attributes.

1) Fleet Race Event - (Maximum points: 10)

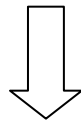
The entire fleet will race together on the course shown below. Due to the close quarters of this event, to minimize the risk of collisions, boats are expected to sail with manual rudder control. No penalty will be applied if autonomous rudder control is used, however all competitors are reminded that they must comply with the Racing Rules of Sailing in regards to the rights-of-way of vessels. Boats may race with either manual or automatic sail control. Two races are planned and the event score will be based on a combination of their scores from the two races. 1st place in the event will score 10 points, 2nd will score 9 points and so on. If two races are sailed and two teams have the same combined points, they will receive equal points for the event. Actual finish times will be changed to “corrected” times by multiplying each boat’s actual finish time by the square root of its overall hull length.



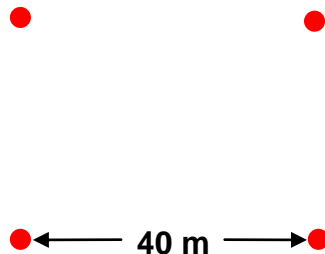
Note: All marks will be left to port.

2) Station Keeping (Maximum points: 10)

Boats will sail into a 40 m x 40 m "box" formed by four buoys. The boats are to remain in the box for five minutes, then exit the box. Boats that complete these requirements will receive 9 points. If a boat leaves the box its score will be proportional to the amount of time it is in the box during the five minute period, rounded to the nearest tenth of a point. For example, if a boat remains in the box for three of the five minutes it will score 5.4 points. The boat sailing autonomously that stays in the box the least amount of time over five minutes will receive a bonus of one point. In other words a bonus is given for a quick exit. Manual rudder or sail control after the boat enters the box will incur a 50% penalty for all points scored in this event. The minimum score for a boat that enters and leaves the box, regardless of whether manual or autonomous is two points. Subject to time available, boats may make multiple scoring runs in the station keeping contest. Starting priority will be given to the boat with the least number of completed runs. If the number of completed runs is equal, priority will be given to the boat with the best score in the first fleet race. Only one boat will be allowed in the box at a time.



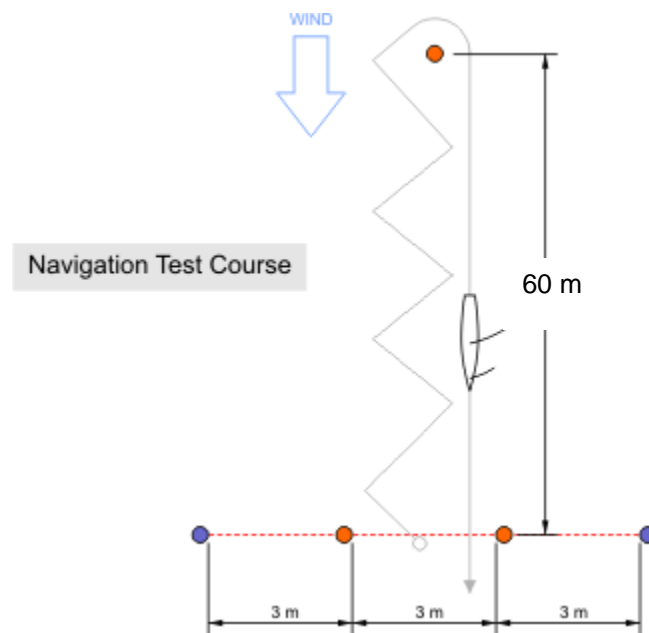
Wind



3) Navigation Test (Maximum points: 10)

This event will be performed with the boat in full autonomous mode. No external control of the boats is allowed once the boat has crossed the start line. Each boat will be required to sail between the two central start marks, complete an upwind leg of approximately 60m, round a mark and pass back through the start marks. There is no penalty for touching any of the marks. Boats will score 0, 2, 5, 7 or 10 points according to the following:

- Accuracy: 10 points for finishing between the central start marks, 7 points for finishing between the outer marks, and 5 points for crossing the finish line outside all marks.
- Mark Rounding: 2 points for rounding the windward mark in the correct direction. – A boat has rounded the windward mark when, after bearing away around the mark, any part of her equipment passes through a line extending from the mark perpendicular to the leeward leg



Notes:

- a) Direction of windward mark rounding will be announced on the day of the event.
- b) There will be no obstructions within 10m of any mark.
- c) Boats must ask Race Official for permission to enter the navigation course area.
- d) With permission of the Race Officials, boats may make non-scoring trial runs over the Navigation course.
- e) Boats may make only two official scoring runs and use their best result for scoring purposes. Boats must declare to Race Officials when they are about to start an official scoring run. Priority on the course will be given to boats that are starting

their first scoring run. For boats that have started an equal number of runs priority will be given to the boat with the best score in the first fleet race.

- f) If in the opinion of the Race Officers, weather conditions have unduly prejudiced the result of a boat in a Navigation run, the Race Officers may grant that boat an additional run.
- g) At the discretion of the Race Officers, more than one boat may be allowed on the course at a time. In that case right of way shall always be given to the boat that entered the course first.
- h) Any boat using manual control for collision avoidance with a boat underway must abandon her run and may re-sail that run later without penalty.

4) Presentation (On-Shore Event) (Maximum points: 10)

Each team will present their boat to the panel of judges. In the SailBot Class the presentation must be completed by secondary or undergraduate students. The intention is that the presentation be informal so no particular format is required. However, the judges should be able to grasp how the boat was designed, built, and tested. Feel free to bring a poster or binder of pictures and drawings to help explain the design or construction process. A projector will be available. Judges will be marking on the following areas:

- Aesthetics and workmanship
- Innovation (in design and/or manufacture)
- Control theory (completeness and robustness)
- Student involvement in the project – how much did the students complete themselves?
- Design and testing methodology

5) Long distance race (Maximum Points 10)

The approximately 10 km race will be sailed in English Bay off the R.V.Y.C. marina. The start and finish line will be between a starting line flag located on the north face of the breakwater and a mark located approximately 40 Meters north of the starting line flag. Marks 1 and 2 will be left to port. Mark 1 will be located approximately 0.6 Km. west of the starting line. The boats are then required to sail back through the Start-Finish Line. The second mark will be located approximately 1.9 Km. east of the starting line. The boats will then sail back through the Start/Finish line. The race will consist of two laps of the course. The exact locations of the starting line and of marks 1 and 2 will be posted not less than 24 hours before the scheduled start. Marks 1 & 2 shall be left to port. For this event only, boats sailing autonomously may be considered to have “rounded” the mark if they pass within 10 meters of the mark, including the start/finish line. The race consists of eight “legs”. Each boat will receive 1 point for each leg it completes, for instance from the Start/Finish Line to Mark #1. The boat in each scoring category that completes the entire course autonomously in the shortest elapsed time after the starting signal will receive two bonus points and the autonomous boat in each scoring category that finishes with the second fastest elapsed time after the starting signal will receive one bonus point. Use of manual rudder and/or sail control after crossing the starting line will incur a 50% penalty on all points scored for this event.

Boats may temporarily use manual control to avoid moving objects without penalty. There is no handicapping for this event. The time limit is 6 hours. Note that the straight line course between marks will keep the boats out of shallow water. The course does have obstructions such as aids-to-navigation. Teams are encouraged to consult a nautical chart. In addition, prior to the event, teams will be allowed a minimum of one hour to tour the course by power boat.

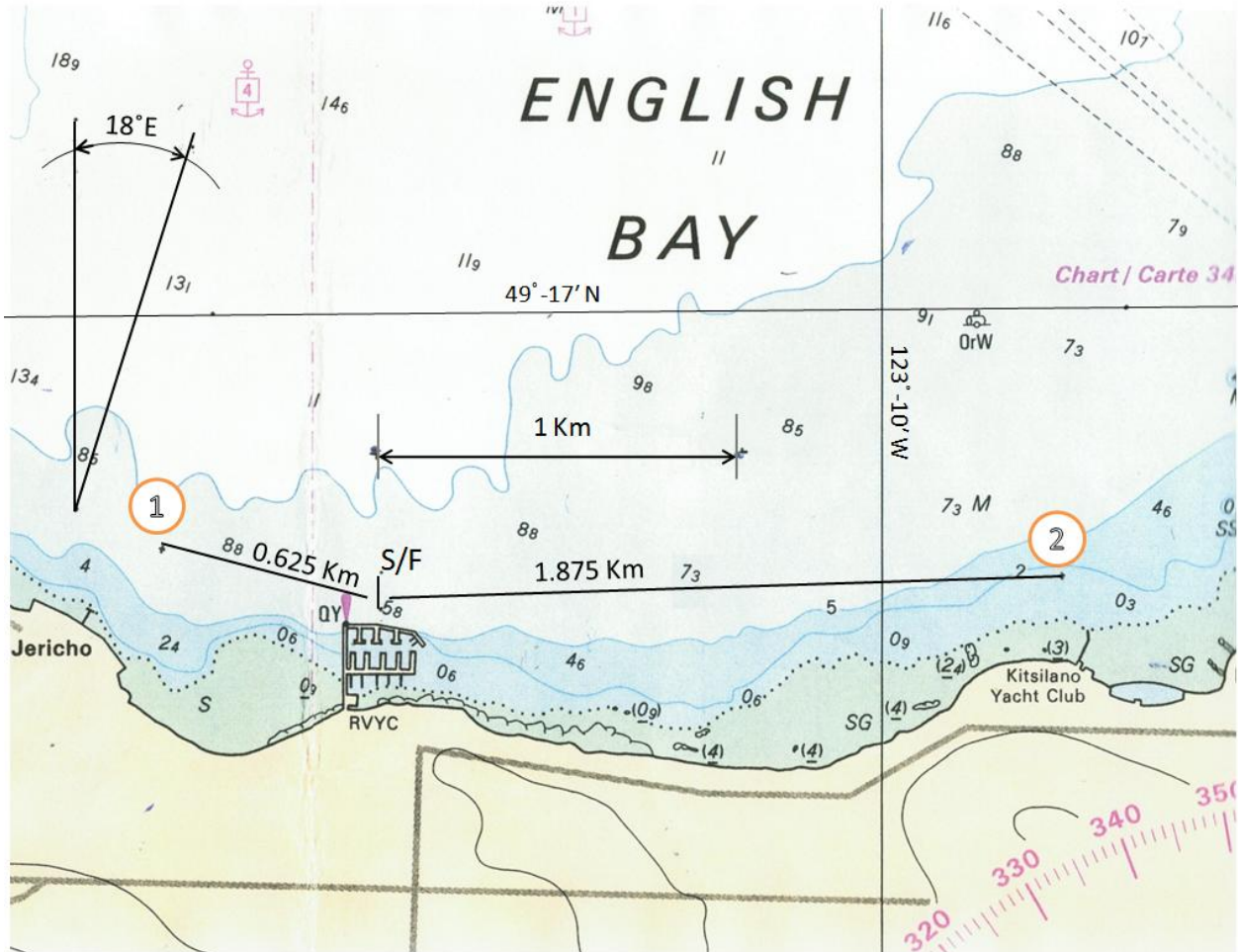


Chart of English Bay

Tentative Schedule

The competition shall be held over four days. The final order of events is dependent on weather conditions. Unless agreed upon by all teams, on-the-water events will not be started if the average wind speed is 15 knots or above for a period of 20 seconds during the 15 minutes prior to the scheduled start. Races in progress will be cancelled if the wind speed exceeds 20 knots for more than 30 seconds. Races will not be started if the wind speed is less than 2 knots. The regatta headquarters will be the Royal Vancouver Yacht Club.

April 1, 2012 – Deadline for indicating intention to compete including a Design Summary Sheet.

Sat./Sun. June 9 & 10 – Optional pre-event practice days

1000-1700 Teams may set up at R.V.Y.C. and practice.

Sunday June 10 - 1800-2200 Informal BBQ at the Martin's for all competitors.

Monday June 11 – Registration & Measurement (0900-1000)

Fleet race #1 (1100-1300)

Station Keeping Contest (1400-1800)

Tuesday June 12 – Fleet Race #2 (1100-1300)

Navigation Contest (1400-1800)

Wed June 13 – Presentations (1000-1200)

Make up events as needed* (1400-1800)

Sailing / watching local sailboat races

Thursday June 14 – Long Distance Race (1000-1600)

Evening – Awards dinner at R.V.Y.C.

* The “make-up” period is intended primarily for events that were not completed due to unacceptable weather conditions. It may also be used, if time permits, to allow teams a chance to complete their Station Keeping or Navigation events. Additional makeup periods may be scheduled as time permits on Wednesday and Thursday for the Navigation and Station Keeping contests.

Changes

By mutual consent of all the teams a competition may be moved or modified.

Judging

Each school is entitled to appoint one (1) judge to the panel. Judges must be professors or instructors in the Faculty of Engineering with a strong grasp of naval architecture and/or systems engineering concepts. Other members on the panel of judges will include up to three industry professionals appointed by the host team, reflecting experience in the Racing Rules of Sailing, SailBots or other skills.

Scoring

Each class with 3 or more entries will be scored separately and the team with the most points shall be the winner of that class. In addition; if either class has less than 3 entries, all entries from both classes shall be scored together for the purpose of overall scoring and the team with the most points shall be the overall winner of the event. Any class with less than 3 entries will not be scored separately.

In the event of a tie, a single race off will be held without handicapping to resolve the tie.

Chase Boats

The hosts will provide chase boats for each team, for the practice days and for each day of competition. Drivers may be provided.

Prizes

The Queen's University perpetual trophy will be presented to the winning SailBot team. Keeper trophies will be presented for the winners of each scoring category and for other achievements.

Protests and Fair Play

A boat and team shall compete in compliance with recognized principles of sportsmanship and fair play. A boat may be penalized under this rule only if it is clearly established that these principles have been violated. A disqualification under this rule, as specified by the jury, in any event shall disqualify the team from all other events.

By participating in an event conducted under these rules, each team agrees to:

- a) be governed by these rules, the Racing Rules of Sailing, and the Sailbot class rules;
- b) accept the penalties imposed and other actions taken under the rules.

Intent to Compete

Teams intending to compete shall inform the host institution prior to April 1st 2012. Each team shall submit with their registration a completed design summary form as attached to this document.

Entry Fee There is no entry fee.

Design Summary

School/Firm:

Boat Name:

Team Members:

Faculty Advisors:

Length: m (in)

Beam: m (in)

Displacement: kg (lb)

Draft: m (in)

Sail Area: m² (ft²)

Team History:

Boat Design Summary:

Navigation System Summary:

Sail Control System Summary: