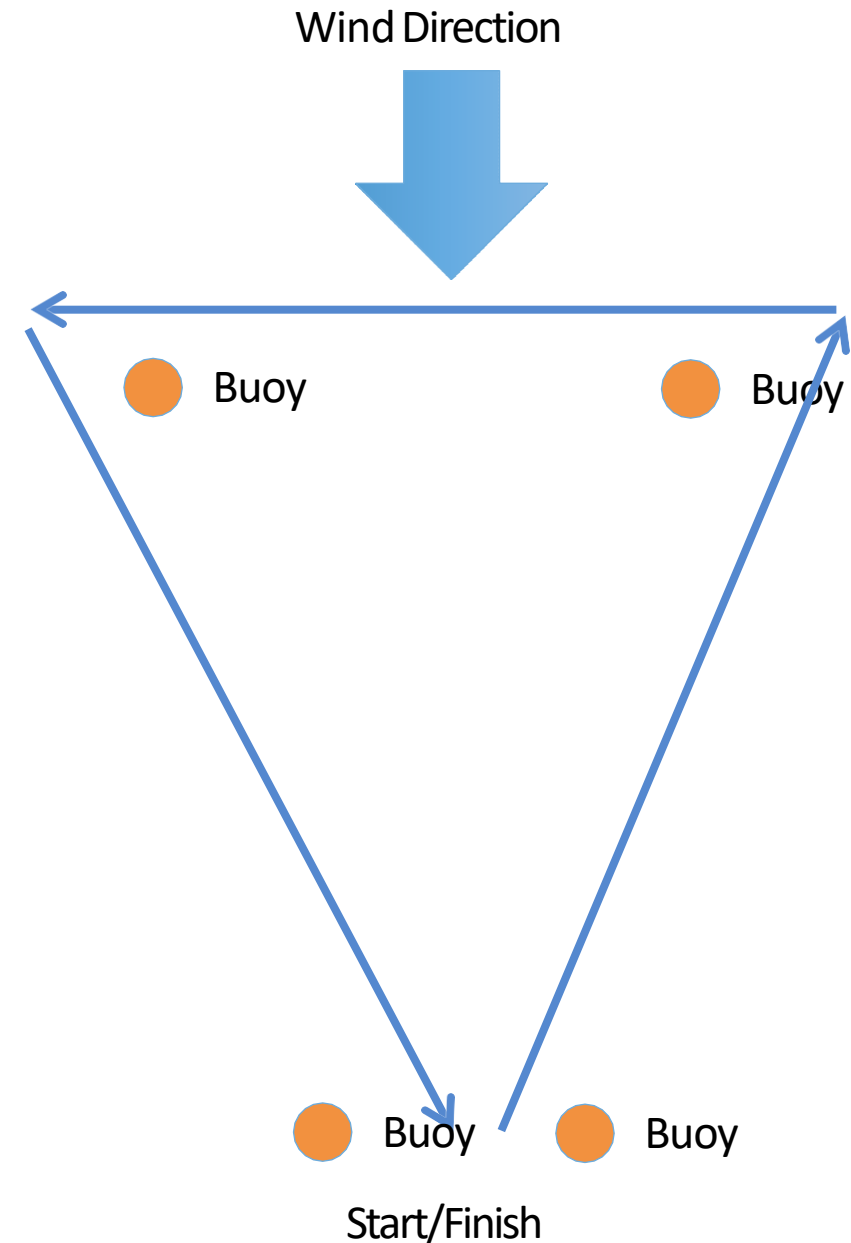


SailBot 2019 – Presentation

- **Challenge Goal:** To inform the judges and other participants of the work your team performed in developing your boat and its systems. Topics to be judged include: Workmanship, Innovation, Control Theory, Boat Design and Student Involvement.
- **Description:** Each team will present their project to a panel of experts in the areas of control theory, systems engineering, and naval architecture. 20 minutes for the presentation and 10 for Q&A.
- **Scoring:** 10 pts max, independent of other teams. One decimal (x.x) precision. Factors will include accomplishment versus team size, amount performed in the past year, and presentation quality and clarity.

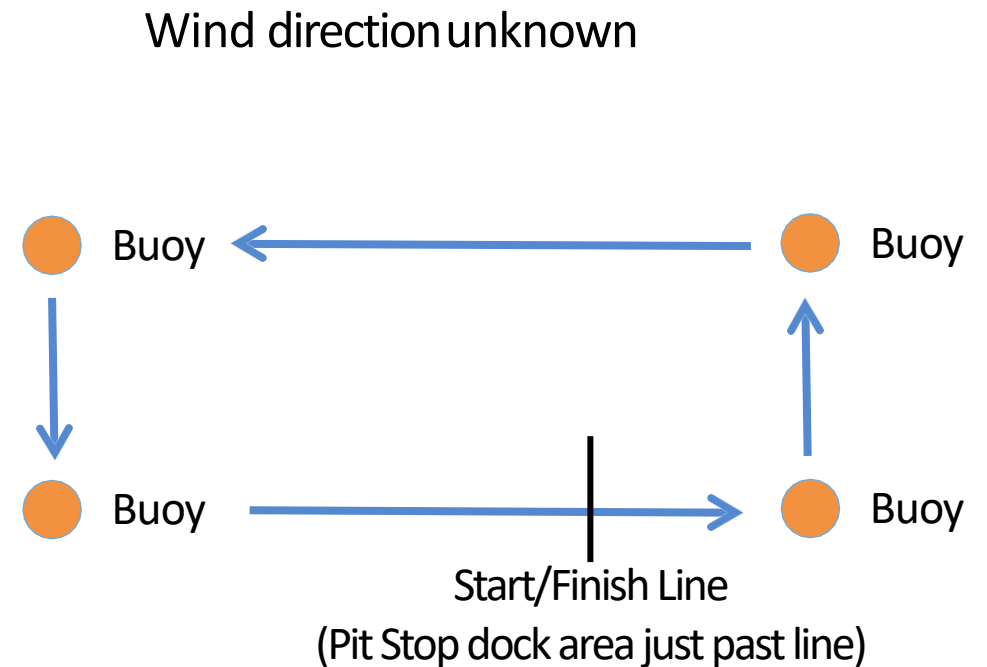
SailBot 2019 – Fleet Race(s)

- **Challenge Goal:** To demonstrate a robust remote control system and the boat's performance.
- **Description:** The boats will sail between two buoys (Start/Finish Line) and then sail around two other buoys before returning to the Start/Finish Line. Remote control must be used for steering. All boats will sail together.
- **Scoring:** 10 pts max. The first to finish* scores 10 pts, the second 9 pts, etc. The minimum score is 5 pts if the boat completes at least one race. (*Open class boats will have their finish times adjusted by the square root of their overall length (m) divided by square root of 2.)



SailBot 2019 – Endurance/Long Distance Event

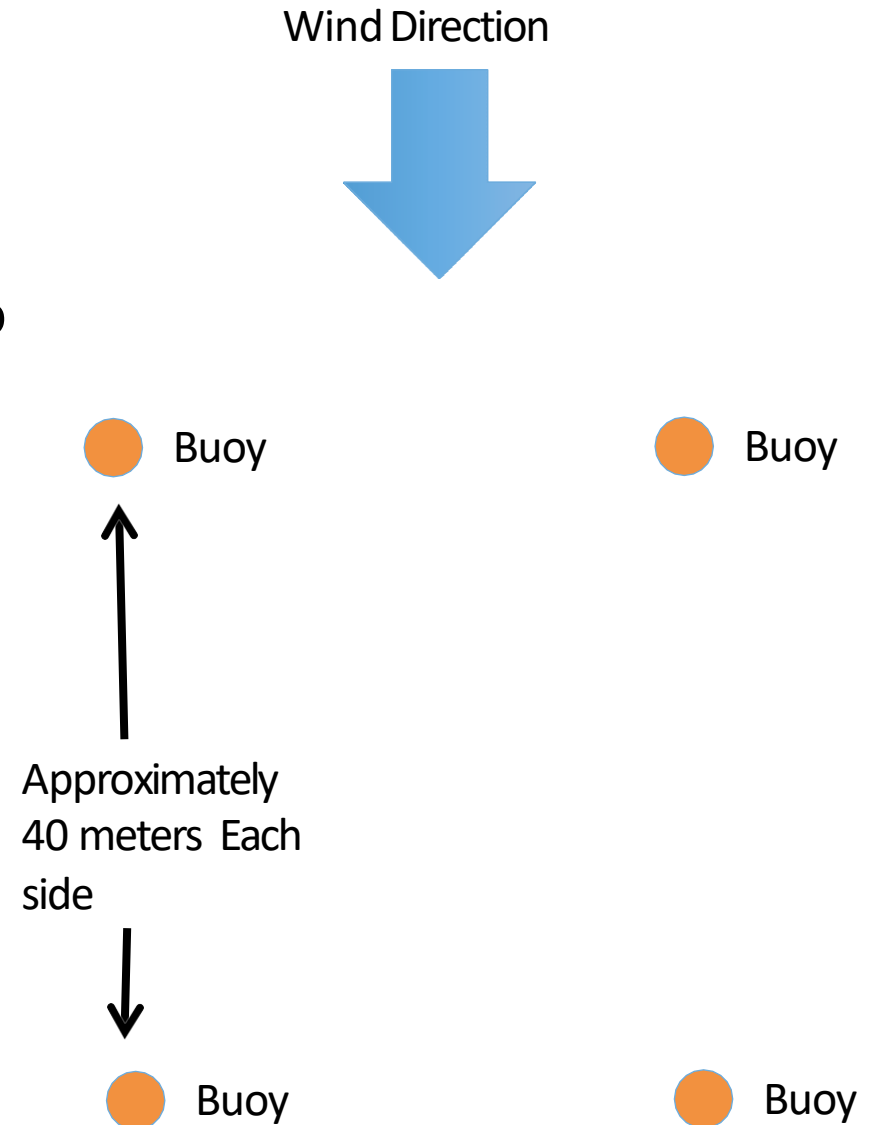
- **Challenge Goal:** To demonstrate the boat's durability and capability to sail some distance.
- **Description:** The boats will sail around 4 buoys (passing within 10 m inside of buoy is OK) for up to 7 hours.
- **Scoring:** 10 pts max. 1 pt for each 1 NM lap completed autonomously (1/2 pt/lap if RC is used at any point during the lap*); up to 4 pts. An additional 1 pt for each continuous (no pit-stop) hr sailed; up to 6 pts. At least one lap must be completed to earn points. All boats must start each subsequent lap at the Start line following a pit stop or support boat rescue. (*No penalty for momentary RC to avoid collisions.)



The lap distance will be about 1 NM.

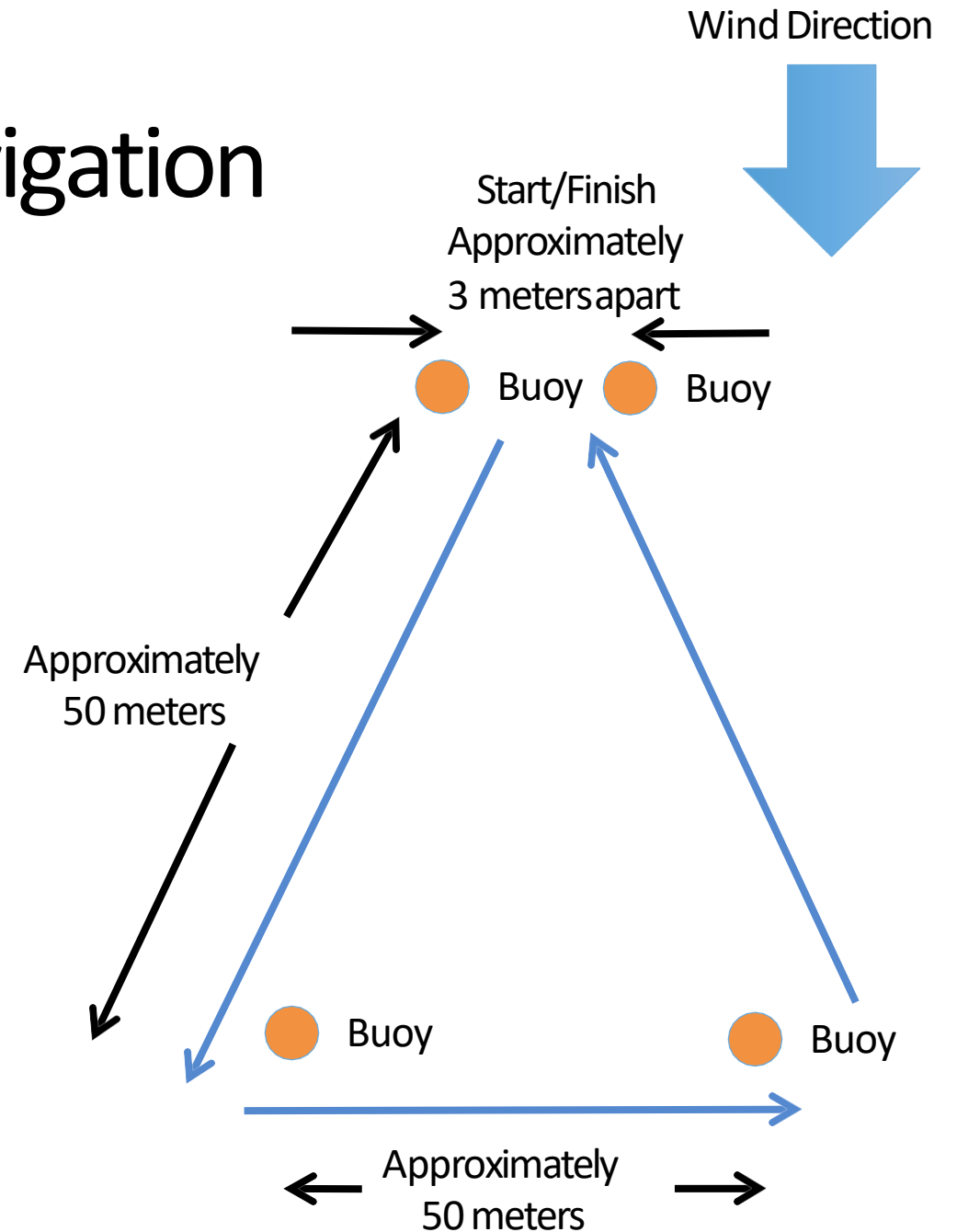
SailBot 2019 – Station Keeping

- **Challenge Goal:** To demonstrate the ability of the boat to remain close to one position and respond to time-based commands.
- **Description:** The boat will enter a 40 x 40 m box and attempt to stay inside the box for 5 minutes. It must then exit within 30 seconds to avoid a penalty.
- **Scoring:** 10 pts max. 2 pts per minute within the box during the 5 minute test (the boat may exit and reenter multiple times). 2 pts per minute will be *deducted* for time within the box after 5 ½ minutes. The final score will be reduced by 50% if any RC is preformed from the start of the 5 minute event until the boat's final exit. The final score will be to X.X precision.



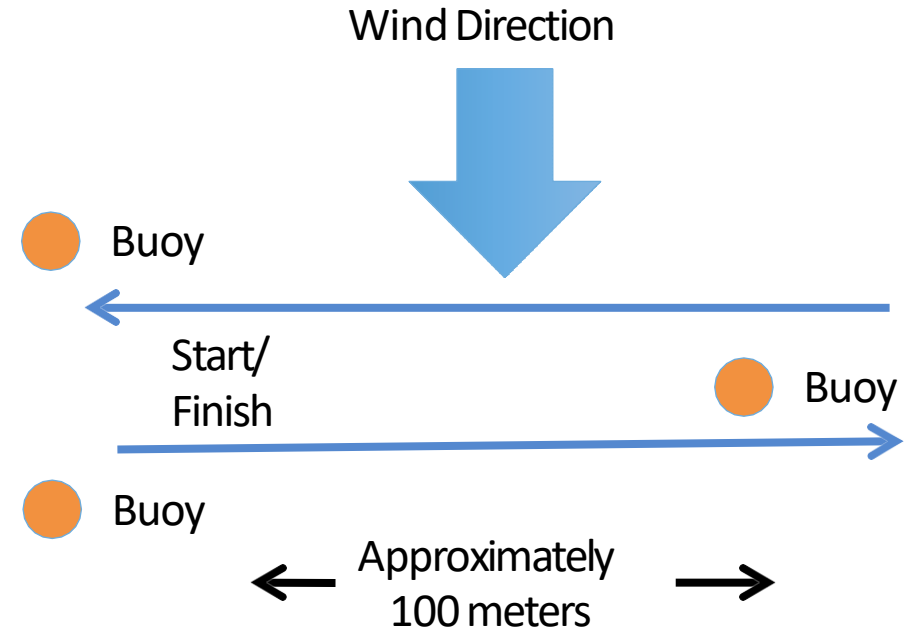
SailBot 2019 – Precision Navigation

- **Challenge Goal:** To demonstrate the boat's ability to autonomously navigate a course within tight tolerances.
- **Description:** The boat will start between two buoys and then will autonomously sail a course around two buoys and then return between the two start buoys.
- **Scoring:** 10 pts max. 2 pts/each for rounding the first two buoys. 6 pts more for finishing between the start buoys or 4 pts more for crossing the line outside of the start buoys.



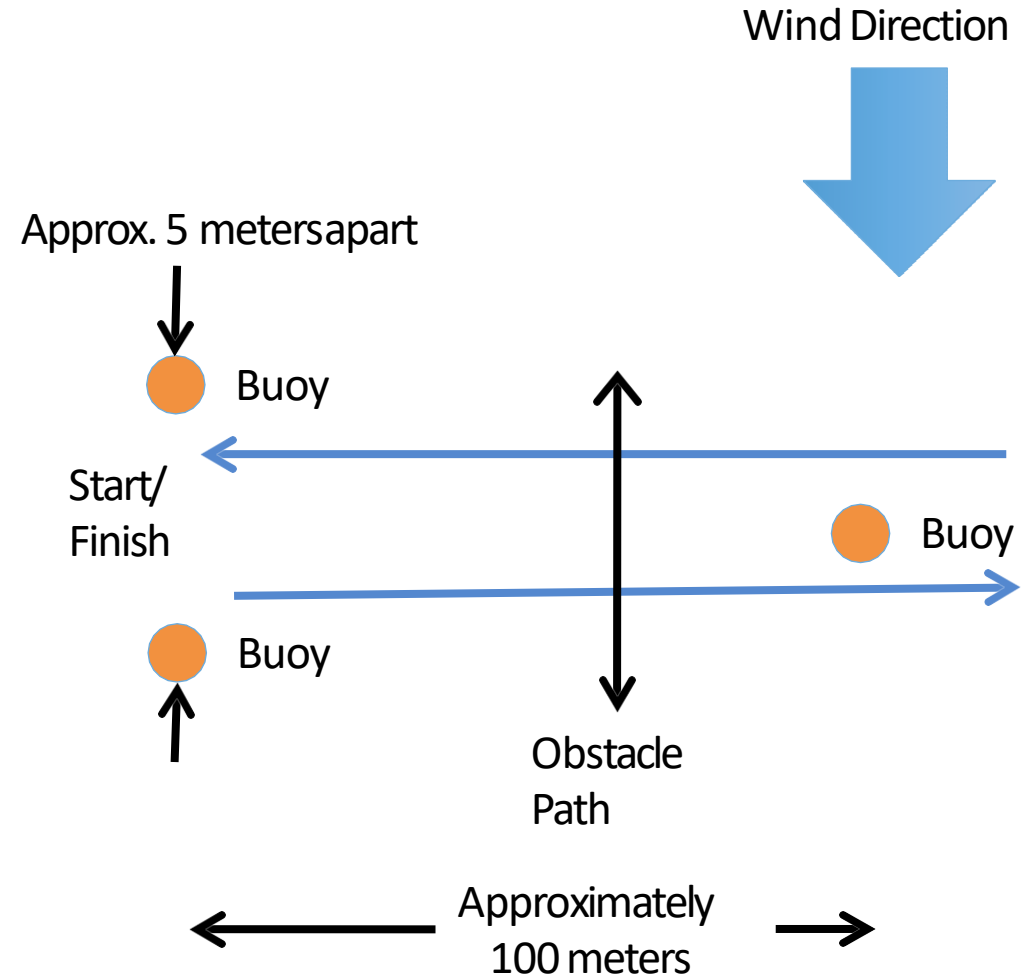
SailBot 2019 – Payload

- **Challenge Goal:** To demonstrate the boat's ability to move cargo.
- **Description:** Each boat starts between two buoys and will load a (non-human) cargo of their choice and sail around a buoy and return. RC or autonomous control is allowed.
- **Scoring:** 5 pts max. The score is based on the the cargo's weight , C , as a percentage of the boat's empty weight, W . $C=5-40\%W$: 1 pt, $C=41-60\%W$: 2 pts, $C=61-80\%W$: 3 pts, $C=81-100\%W$: 4 pts, $C>100\%W$: 5 pts.



SailBot 2019 – Collision Avoidance

- **Challenge Goal:** Demonstrate a successful autonomous collision avoidance system.
- **Description:** The boat will start between two buoys and will sail autonomously on a reach to another buoy and return. Sometime during the trip a manned boat will approach on a collision course. RC is not permitted after the start.
- **Scoring:** 10 pts max. 7 pts if the boat responds but a collision still occurs. 2 pt deduction if the respective buoy(s) are not reached following the avoidance maneuver. 3 pts max by alternative dry-land demo of appropriate sensor/rudder interaction.



SailBot 2019 – Search

- **Challenge Goal:** To demonstrate the boat's ability to autonomously locate an object.
- **Description:** An orange buoy will be placed somewhere within 100 m of a reference position. The boat must locate, touch, and signal* such within 10 minutes of entering the search area. RC is not allowed after entering the search area. (*Signal means 1) white strobe on boat and/or signal to a shore station and 2) either turn into wind or assume station-keeping mode.)
- **Scoring:** 15 pts max. 12 pts for for touching (w/o signal). 9 pts for passing within 1 m. 6 pts for performing a search pattern (creeping line, expanding square, direct tracking to buoy, etc).

Wind Direction

