

The Laser Soundscape

Final Project Proposal Research and Model

Introduction

For my final project I want to create a sailing soundscape. The objective of my Pd patch is to make the audience feel as if they are sailing, purely using sound. To keep it relatively simple the model boat I will use to create sounds of is a 4-meter long boat that has one main sail and is suitable for single-handed sailing, specifically the laser class sailboat. I chose this boat because I sailed lasers throughout 4 years of high school and I am very familiar with sounds associated with it. (See Figure 1 for image of laser)

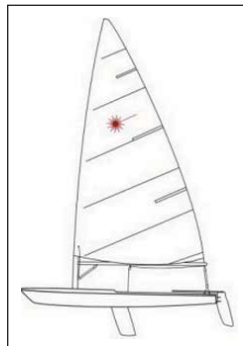


Figure 1. Laser Sailboat Diagram
Taken from Google Images

Courtesy of Wikipedia User: Gustavb. License CC BY 2.5.

The user will be able to select one of the three wind speeds he/she would like to sail at (light, medium, heavy) and then press the start button. By default the user will be sailing upwind on the starboard side. The user will be able to press a tack button, which allows the sail to change direction and the user to switch from starboard to port. This will be the only turn I will consider. The important components I will need to consider to construct this patch are:

1. The Tack
2. Panning
3. Environmental Sounds (i.e wind, waves etc.)

Tacking

Tacking is a term used when the boat turns its head towards the wind and maneuvers the boat so that the direction from which the wind is filling up the sail changes. This is better illustrated in Figure 2. While describing the sounds for each stage of the tack I will refer to the numbers Figure 1.

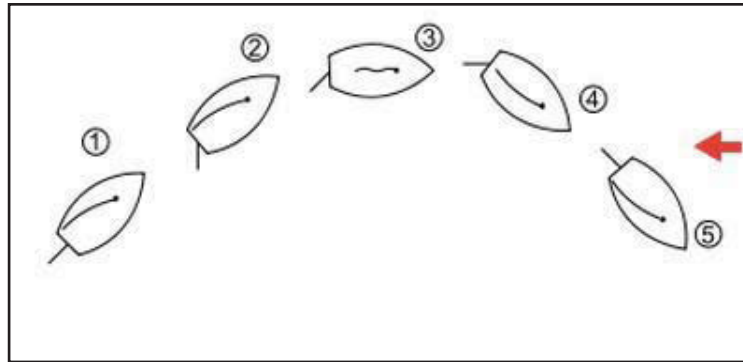


Figure 2. Tacking, bird view.

The red arrow indicates the direction of the wind. Taken from Wikipedia.

Courtesy of Wikipedia users: Jonasz and Kangel. License CC BY 2.5.

When the user opens the patch the boat will be in stage 1 by default, and the user will be sitting on the starboard side. Once the user hits the tack command, a series of events will be triggered. Before tacking it is common to pull the main sail in with a rope. The rope attached to the main sail goes through a pulley, called a block, which has a guard to stop the rope from slipping. This block makes a clicking sound as the rope is pulled on. Although a user that has not sailed before may not understand where this sound is coming from, I have decided to use this sound as a way of indicating the beginning of the turn. As the rudder turns the head of the boat towards the wind (stage 3), this causes the sails to flap freely since they are not filling up with wind. This will be the dominant sound of the turn and the loudest. The frequency and intensity of the flapping will be determined by the wind strength, which is decided by the user at the beginning of the patch. A possible way to implement this sound is to model the sound of a flag flapping in the wind (see Appendix). Farnell also has some example patches for fans, which could be modified to create a flapping sound. As the boat's head keeps turning, it will eventually be filled with air again (stage 4), and the smooth whooshing of the wind over the sails will return to normal. Since adjusting the sails is something done quite frequently in laser sailing the clicking sound will also be present at random times outside of the 'tacking mode'. Farnell has a good patch that sounds very similar to this clicking sound (`slideshow.pd`), and it can be modified to click repeatedly a random amount of times, at random intervals.

The time it takes to complete the tack will vary according to the wind speed of choice. It could take as short as 10 seconds to complete a turn in windy conditions and as long as 30 seconds in light wind. For the sake of keeping things simple I will assume the boat does not tip over or turn upside down during heavy wind conditions (which is very common in laser sailboats)

Panning

In order to make the user feel that they are actually changing sides while tacking, I will pan the sound of the wind depending on what side of the boat you sit as shown in Figure 3.

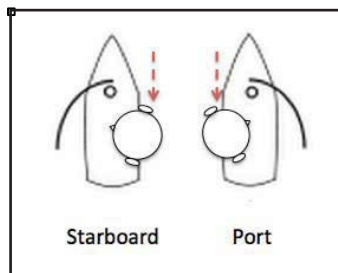


Figure 3. Representation of Starboard and Port positioning.

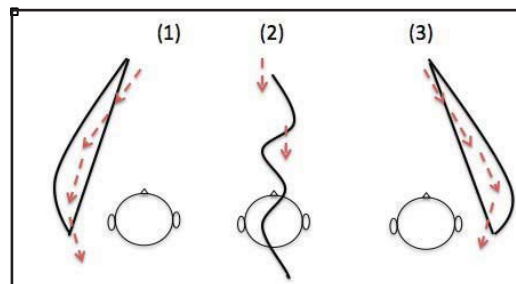


Figure 4. Panning during the Tack

When the user is cruising on the starboard side, the wind will be right panned, since the right ear of the user is turned towards the wind while the sail itself is blocking a lot of the sound for the left ear. For the same reason, when cruising on the port side, the wind will be left panned.

The change of panning will happen through the tack. In stages 1 and 3 of Figure 4 the wind will be mostly right panned and left panned respectively. For stage 2 the sails will be right above the user so both ears will hear the sound equally. This will give the user the sense that the sail is crossing from one end of the boat to the other, which will hopefully convey the motion of tacking.

Environmental Sounds

One sound I want to focus on is the sound of the sailboat and the water interface. This sound will be a dynamic sound and will change according to the speed of the wind, which is a parameter that the user can change. If there is light wind, then the sound of the sailboat cutting through the water is a subtle lapping sound of the water on the boat's hull. This would have a gentle rippling sound and sporadic slapping of the boat on the surface of the water. The slapping sound of the boat would be implemented so there is randomness between the intervals of 'slaps'. If the user chooses to sail in windy conditions, there will naturally be larger waves and therefore the soothing sound of the boat cutting through the water will be replaced by harsher slapping sounds followed by water spraying on the boat.

The boat will be traveling in the open sea with no other motorboats or ships around it, therefore the sounds from the environment I will consider are: the wind, the waves/water and the occasional seagull squawk. Farnell has patches for a bird sound (bird2.pd) and wind sound (wind3.pd). I was not able to find a patch for waves but I am planning on building it from a noise object with filters.

The wind will be the only parameter the user can vary. I decided to do this because the wind speed is very much related to the waves. Fast winds mean higher waves and light wind will mean no waves. I plan to have three wind settings: low (5-10 knots), moderate (10-15 knots) and heavy (20-25 knots). There will be no storm conditions since lightning makes sailing dangerous. I will also assume that the user will not want to go sailing on a rainy day and therefore I will not account for the rain either.

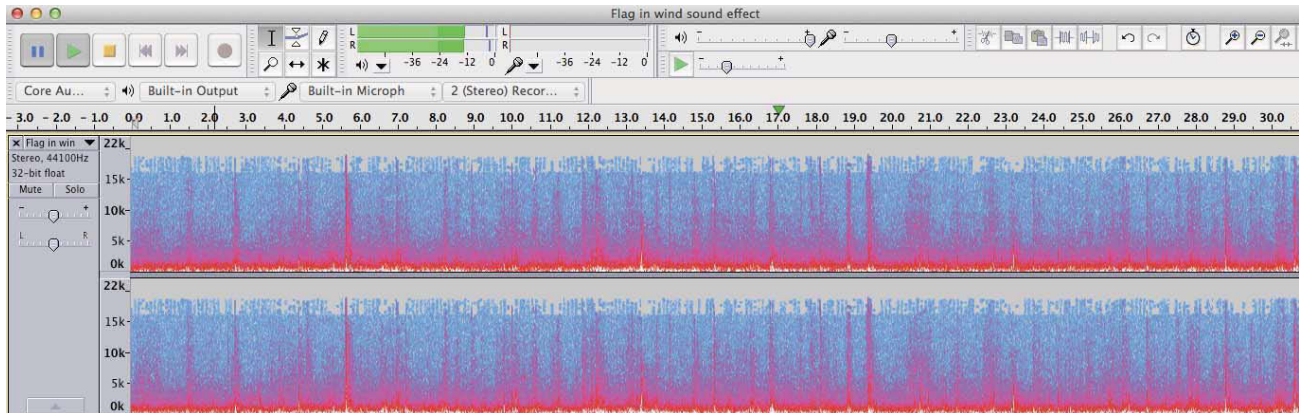
Further Plans

If time allows, I will consider adding a game aspect to the patch where there are shallow parts the boat has to avoid and a beeping alarm lets you know if your hull is getting close to something (like a car beeping to tell you how close you are to the car behind you). The more frequent beeping would indicate the boat is getting closer to a shallow part or rock and the user would then know to press the tack button. If not, the boat will crash into the rock. The sound effects there would involve crashing or bumping depending on the intensity of the wind (i.e. speed of the boat). I would imagine a 'celery breaking' type crushing, since the laser is not made of wood but of glass-reinforced plastic. After the crash the user would be brought back to default settings, which the blow of a horn can indicate. I am thinking of modeling an air horn sound effect since that is what is commonly used during

laser races. It would be high pitched and decay slowly. When the game starts the boat will be moving so I would also incorporate the Doppler effect.

Appendix

Spectrographic Analysis of Flag in Wind



Taken from YouTube (https://www.youtube.com/watch?v=cMtse7_PwUU), analyzed in audacity.

References

1. Farnell, A. (2010). Designing Sound. Cambridge: The MIT Press.

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