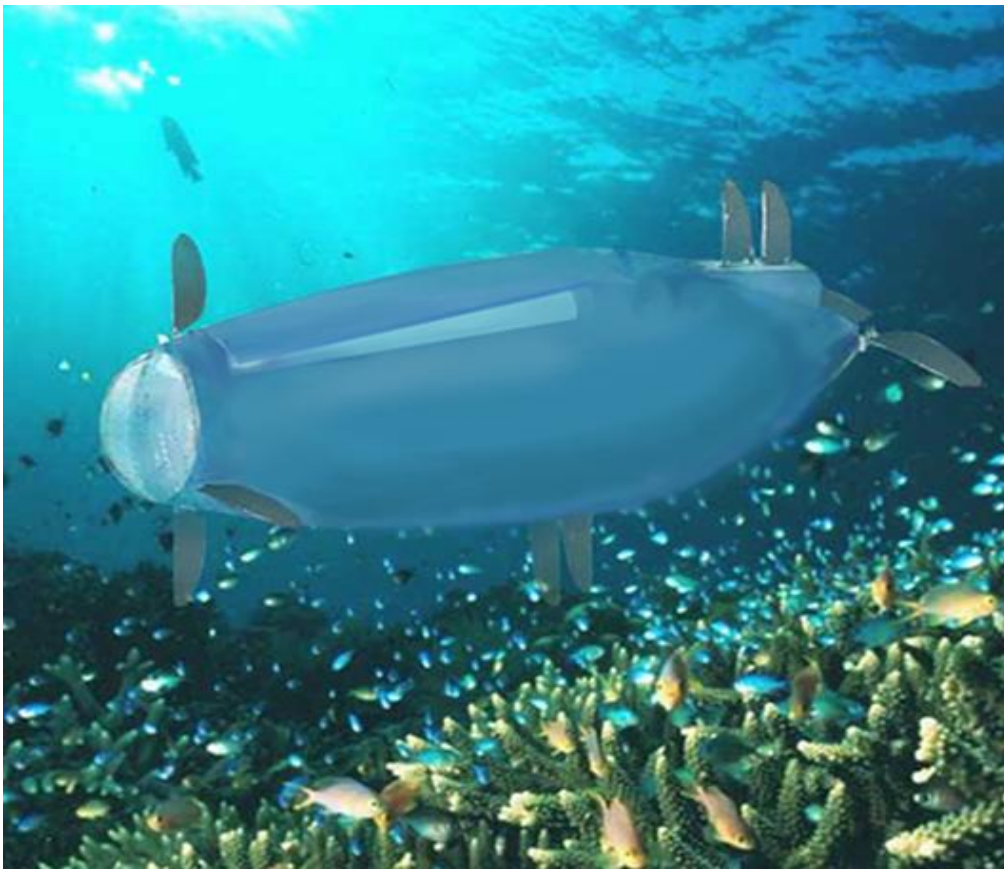




## Human Powered Submarine



MAST Academy is a magnet public school in Miami Florida, The school is located on Virginia Key right on the bay across from down town Miami. We have access to Biscayne Bay and a large swimming pool on campus. Rowing, sailing, water polo and swimming are the primary school sports. The International Human Powered Submarine Race is a unique challenge for our school.



The “PTEROTRACHEIDAE” which is the name of our sub has inspired the simplicity and diversity of our Submarine.

**Team Teamwork** - is made up of four students:

**Nicholas Harrington;**

A junior, a certified life guard, PADI certified SCUBA Diver and captain of the Sailing Team

**Joseph Nieves;**

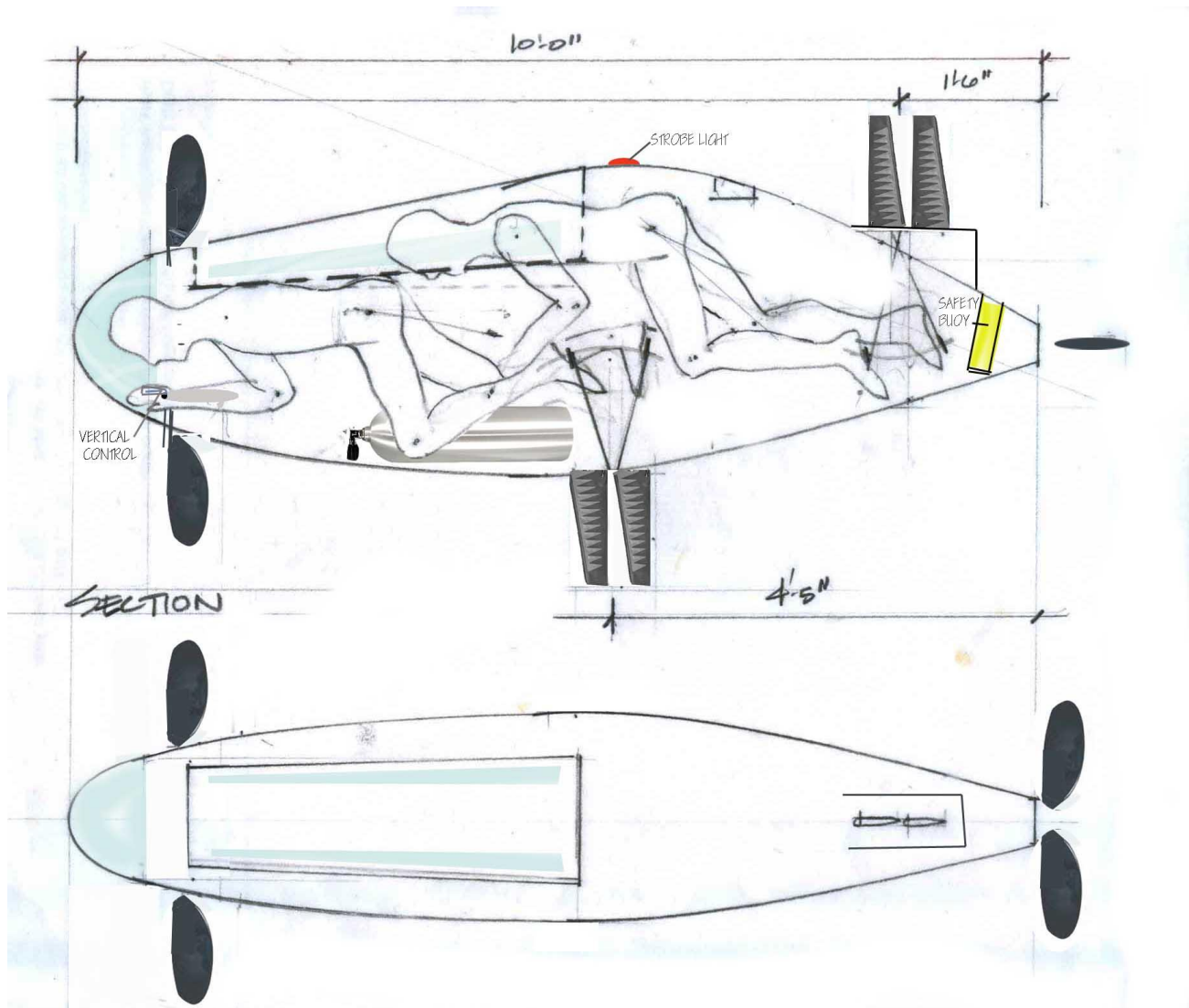
A sophomore, PADI certified SCUBA Diver, and sailor

**Andrew Harrington;**

A 2010 MAST graduate , PADI certified SCUBA Diver , a certified life guard.

**Veronica Nieves;**

A senior ,PADI certified SCUBA Diver



## Two person non propeller category

### HULL

We have retrofitted an existing 3 meter fiberglass hull. Although the existing hull created limitations having to conform to its existing specs, it gave us a head start in the construction of our submarine. We calculated the best positions for our crew and determined the existing Hobie Mirage drive system to be our best option for a propulsion system. We had to form up a new fiberglass canopy, mount the drives and install safety systems and we were ready to test the sub.

## **EMERGENCY BOUY**

Our Emergency Buoy is a 3inch diameter by 9 inch float mounted in a PVC tube recessed into the stern of the Submarine . A pin attached to a release cord (which is attached to the inside wall of the sub) allows both crew members access to the release cord.

## **STROBE LIGHT**

A battery powered led strobe is to be recessed into of the top hull. This is easily removable to replace batteries.

## **AIR SUPPLY**

A 3000 PSI tank is strapped to bottom of the sub with two regulators supplying air to the crew and a pressure gage in view of the pilot.

A Emergency air supply will be strapped to each crew member.

## **CANOPY LATCH**

Our canopy is presently not latched. Bungee cords holds the hinged canopy in position during operation and can be opened from inside or outside at any time form either side. This is a very easy operation, a 3/8 inch by 48 inch lip running the length of the canopy is used as the point to grab the canopy from the outside, see attached photo.

## **WINDOWS**

The front of our sub is a clear lexan dome. The canopy has two 2.5 inch by 42 inch horizontal windows. These are presently bronze Plexiglas but we plan to cast them in clear resin.

## **PILOT RESTRAINT SYSTEM**

The only restraint we have found necessary is two handles for the rear for the pilot to maintain his position and resist the force against the pedals. At this point the rear pilot has the option to hold on to pedals of the front pilot. This helps to maintain his position adding power to his stroke and maintaining the rhythm of the stroke. It is also a way for the rear pilot to signal the front pilot if he is experiencing any difficulties.

## **BALASTING**

Our target is to achieve neutral, level buoyancy at a depth of 12 ft. We have achieved this by adding in floatation and adjusting 2 lb ballast weights to accommodate the changes in buoyancy of the air cylinder.

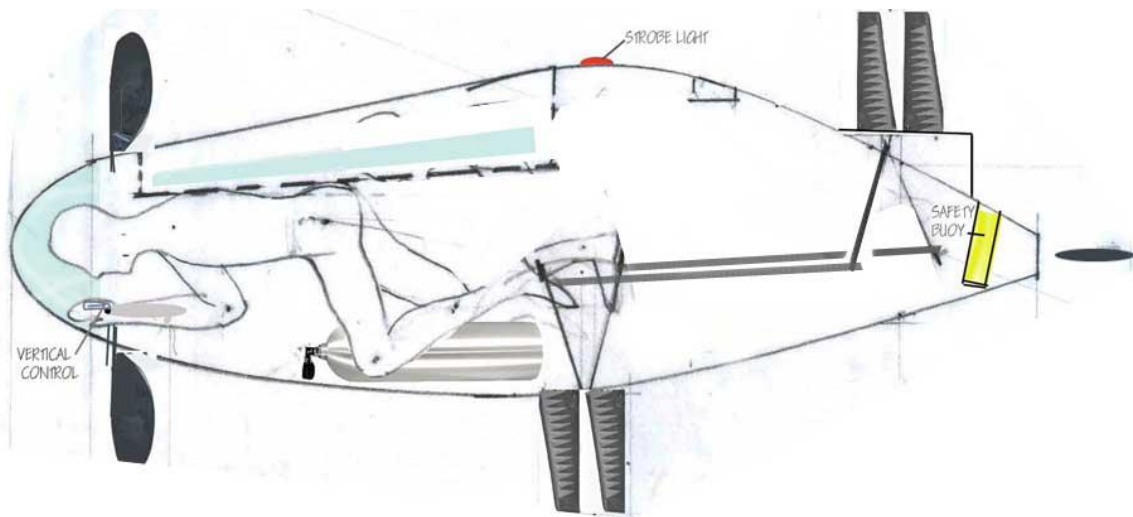
## **CLIP IN PEDALS**

We presently have strapped pedals for the front pilot and, clip in pedals for the rear pilot.

## **TWO PERSON AND SINGLE PERSON RACING CATEGORIES**

Our sub will race in the “Two person non propeller category” and the “Single person non propeller category” it is uniquely flexible to be easily convertible to be a one or two person sub. This will give additional team members an opportunity to pilot the sub and present an additional challenge to engineer the quick conversion of the sub to this category.

We have designed two rods that connect the pedals so that the front and back propulsion units move simultaneously. These rods take advantage of the clip in pedals in the rear for quick installation.



## **Single person non propeller category**

## **TESTING**

Initial Test revealed many adjustments; location of ballast, air supply, modification of canopy lockdown, but proved that crew positioning and functionality were quite successful. Every time we put the sub in the water we come out with a list of modifications. We are planning many more tests to improve the efficiency of our operation as both a one person and two person submarine.