

Concept Studies

PandaModium

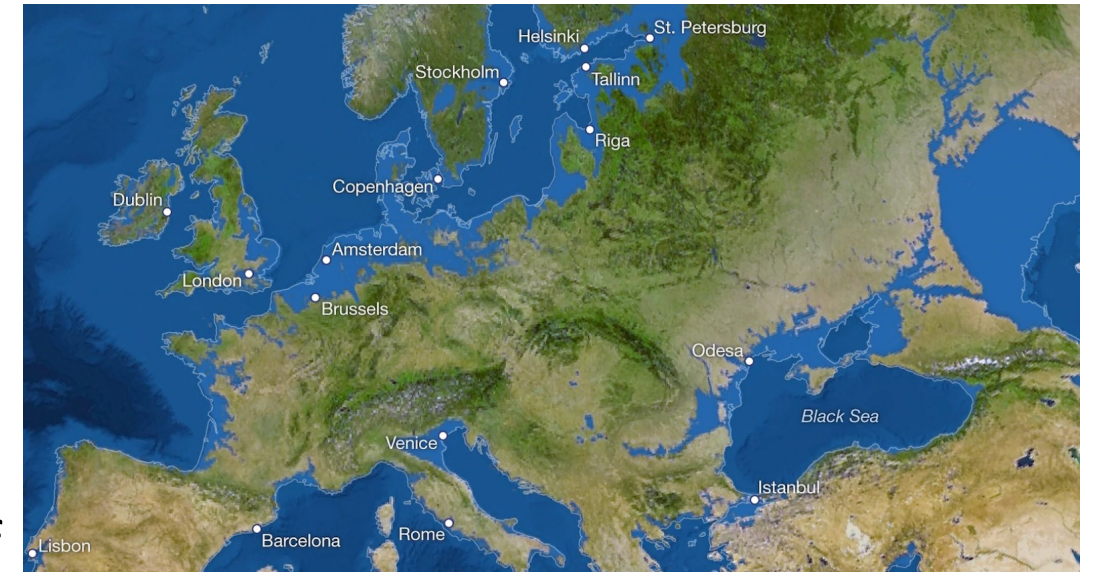
Transportation Futures

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Project Rationale / Description

The future of the earth is being impacted by climate change and global warming. Inevitably, this will lead to rising sea levels and greater uninhabitable desert areas. National Geographic have stated that should all the polar ice caps melt then sea levels would rise by approximately 70m (230ft) (National Geographic, 2013). This will lead to vast swathes of coastal areas being flooded and as a result the population would be condensed into significantly smaller geographic areas. In order to survive and flourish, the human race would need more diverse habitat solutions. It is expected that they would migrate to undersea cities and subsequently require alternative energy sources.



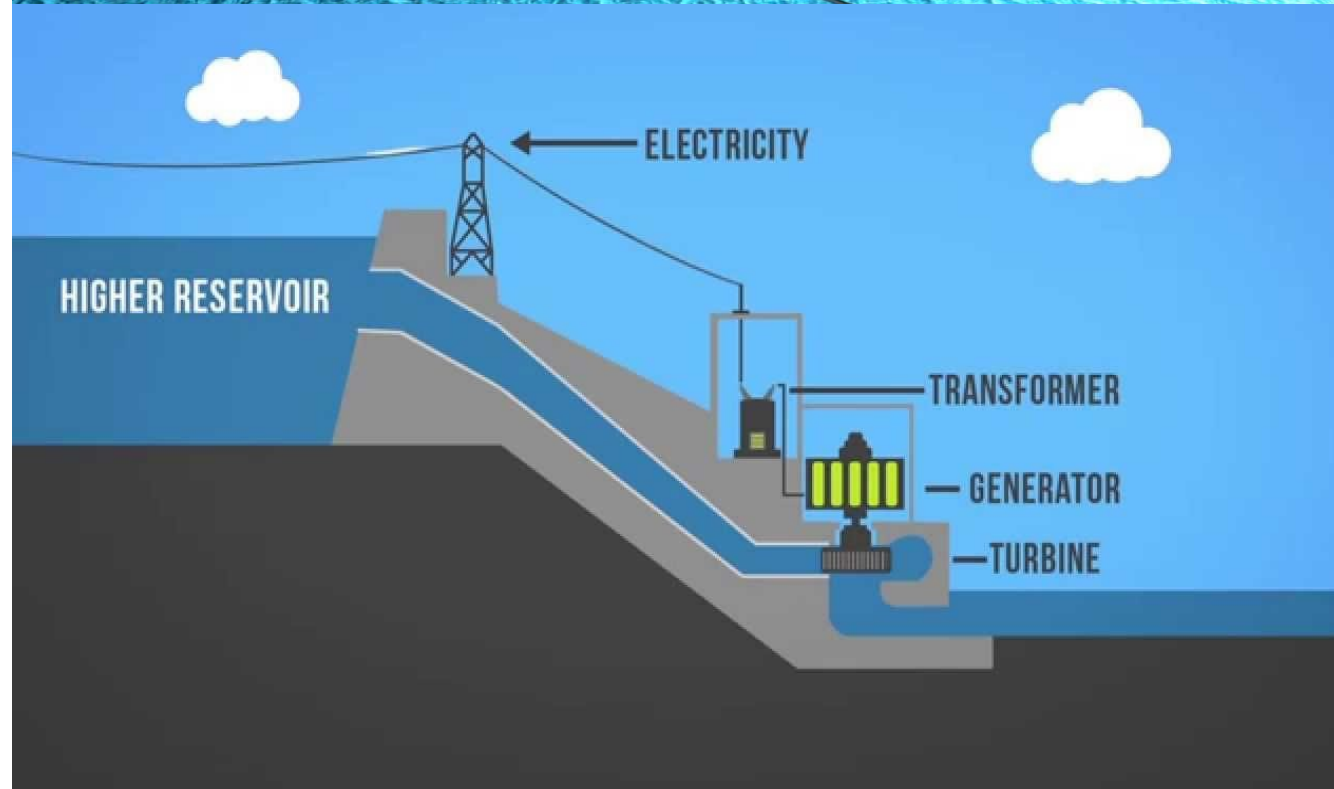
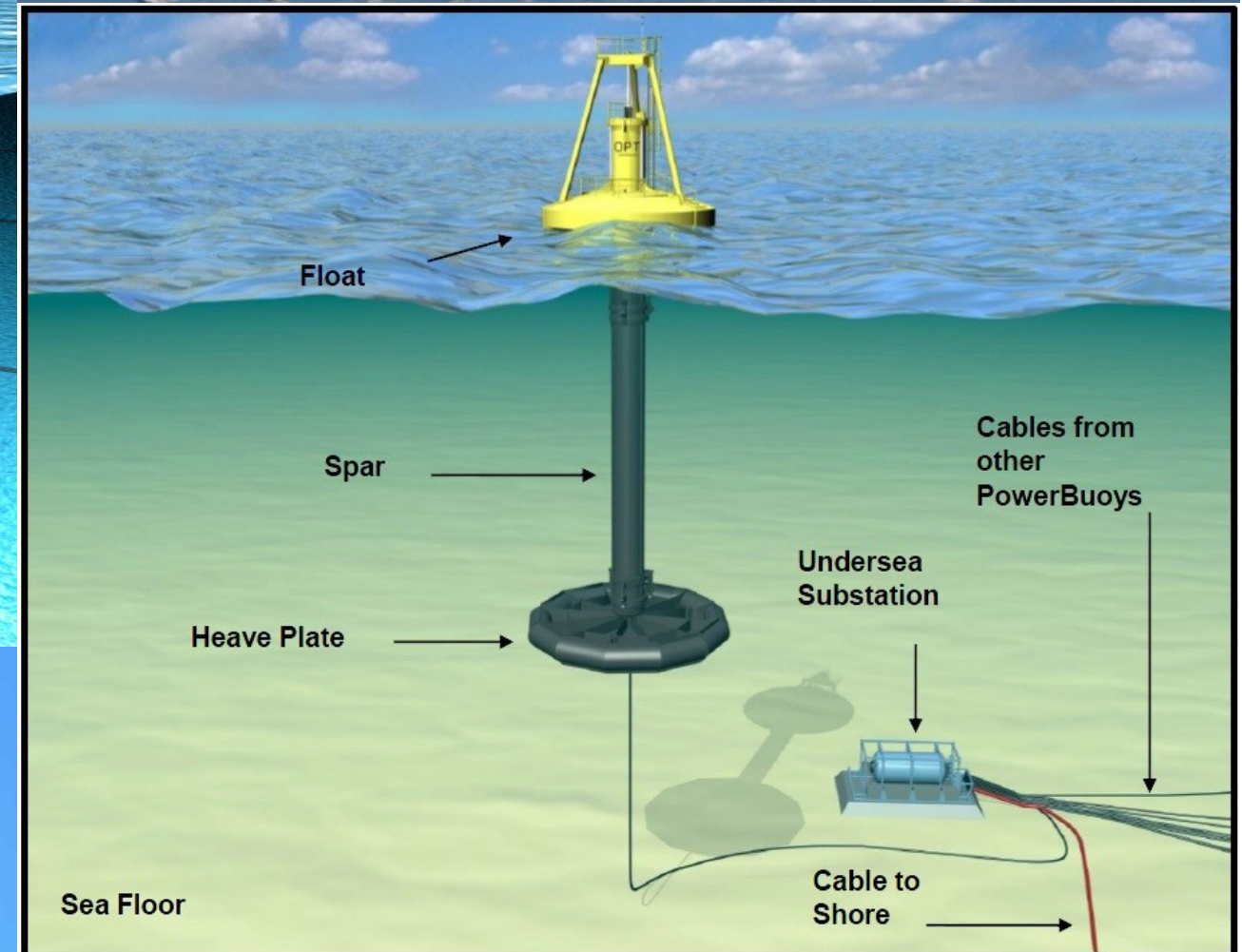
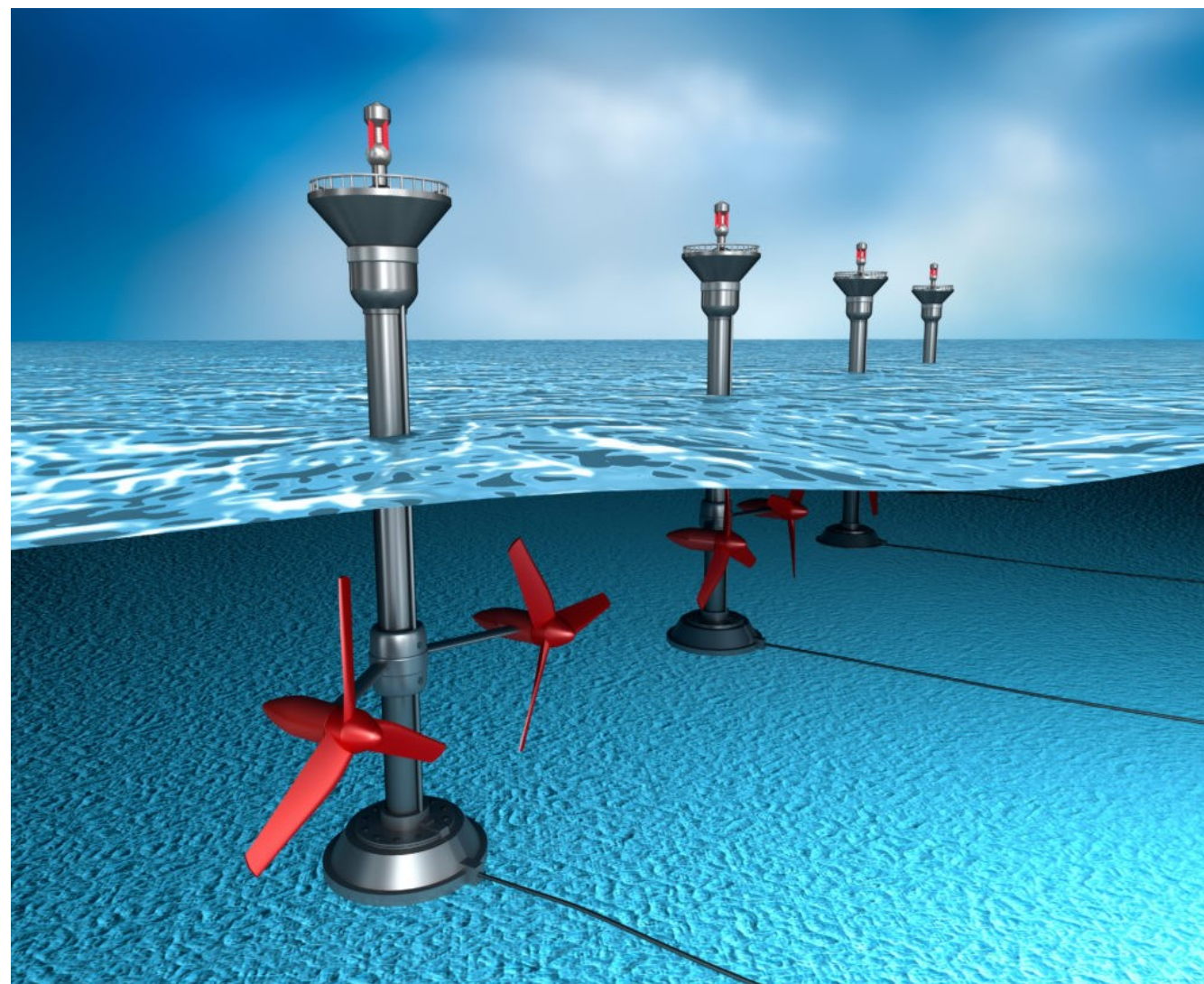
Following this rationale, future transport requirements would change from the existing modes to those which could travel between undersea cities and/or new coastal ports. The potential power sources of these vehicles would be developments of existing sustainable sources, for example: wind, tidal and hydro-electric power generation. Therefore, future transport solutions would need to be electrically powered and capable of both surface and subsurface movement. The vehicle must be capable of travelling across large bodies of water, however submerged travel is inherently slower than surface travel. Therefore, the vehicle will have to be able to surface and move at speed, before descending or docking at its destination. The design will need to be scalable to take small or large passenger and cargo numbers.

Manufacturing capabilities will change due to the loss of industrial centres. Therefore, development of existing technologies alongside development of new technologies supporting underwater living, will need to occur. Economical high-speed travel across water can be attained using existing boat, hydrofoil and ground effect technologies. Submersible design has been well established through both military and civilian applications. Scalable vehicles already exist through the development of aeroplanes and commercial airliners. A combination of all these technologies leads to the development of a Ground Effect Hydrofoil Submersible (GEHS)

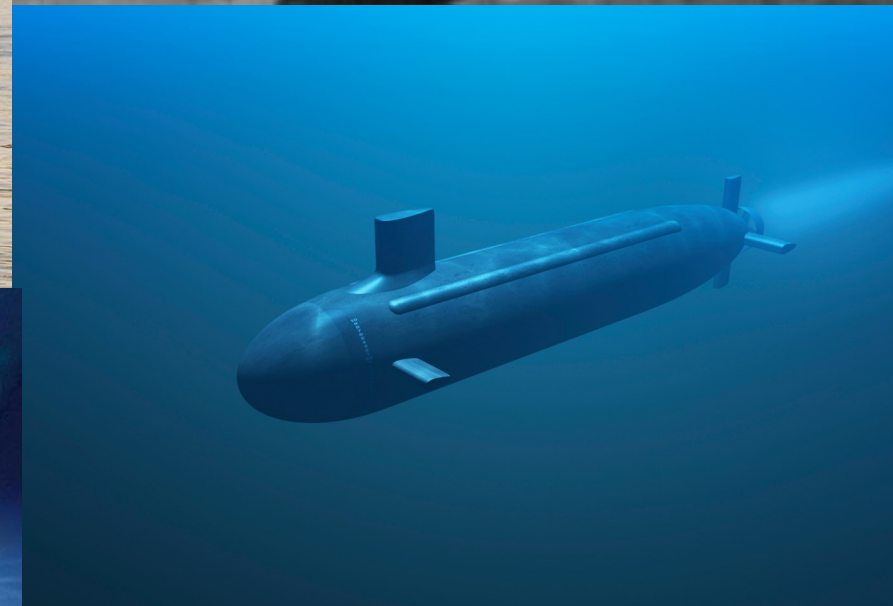
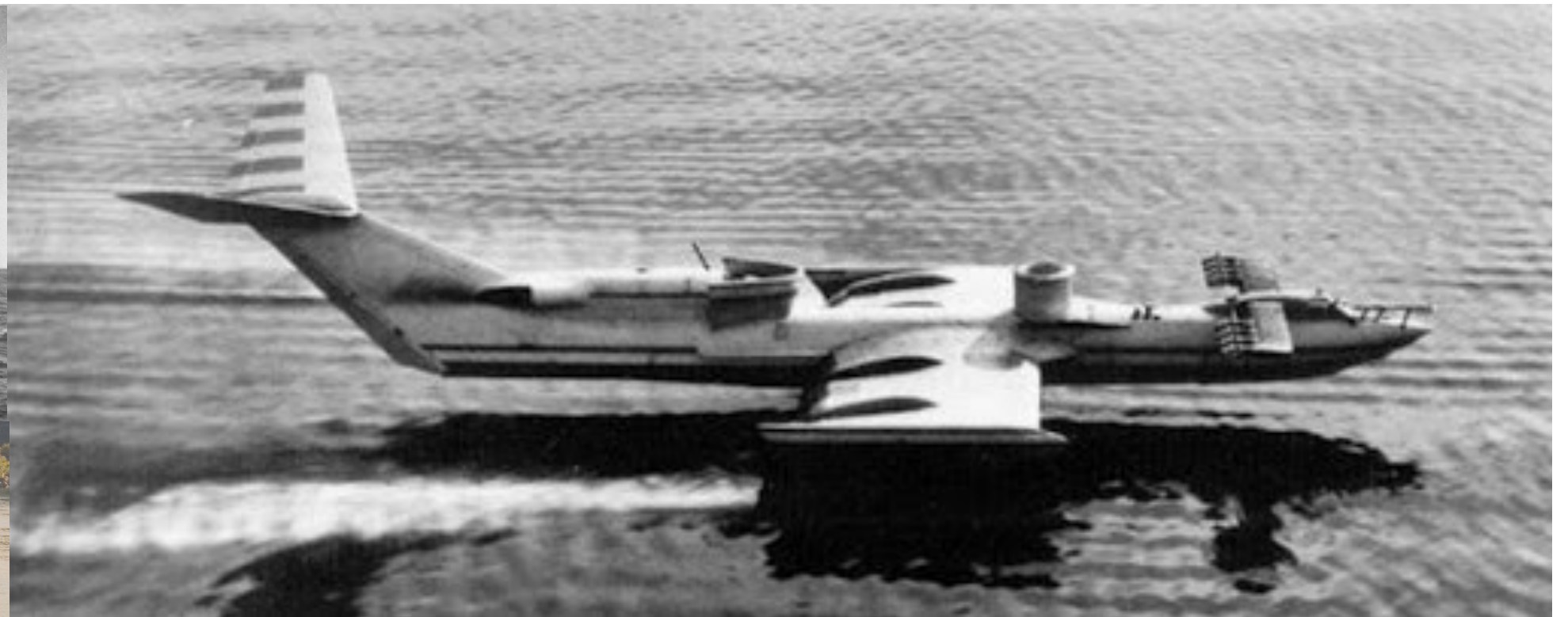
Moodboard— The future of cities



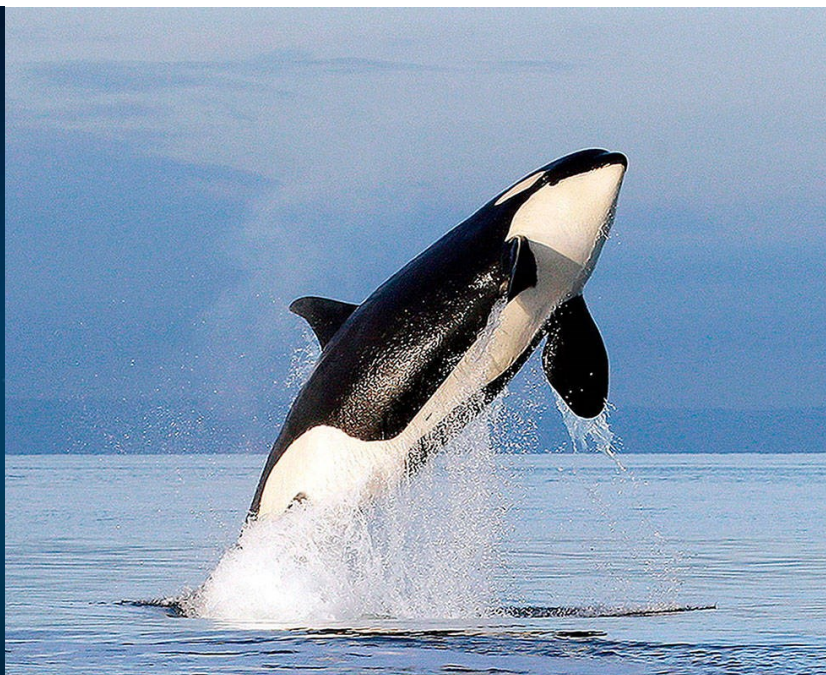
Moodboard— The future of power generation



Moodboard— Transport Solutions

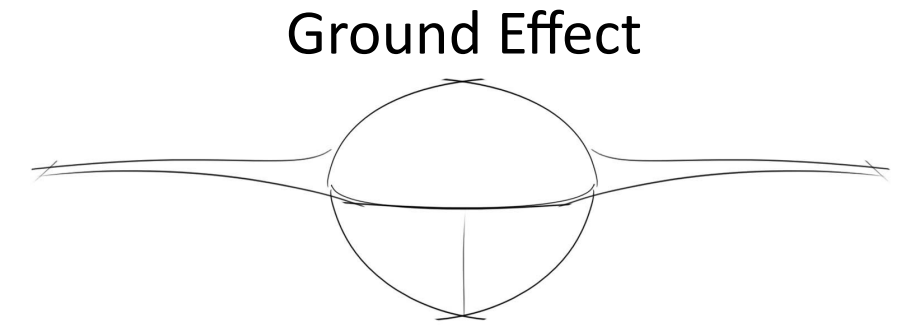


Moodboard— Natural Influences

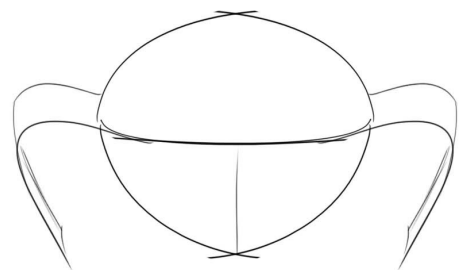


Design Of Ground Effect Hydrofoil Submersible (GEHS)

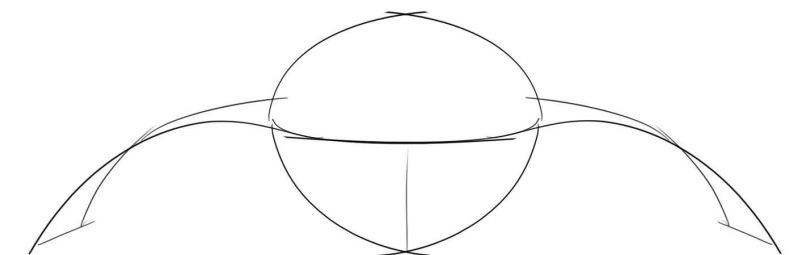
The design takes its styling from the Manta Ray whose pectoral fins emulate a moveable wing. A control surface imbedded with programmable graphene could be adjusted to give multiple effects of lift, decent and steering that when applied to a vehicle could support flight, surface and submerged operations



- Ground effect enables the vehicle to travel above the surface of the water at high speeds.
- Hydroplaning acts as a transition stage for the vehicle. It uses it at slow speeds on the surface of the water to gain enough lift when transitioning to the flying stage or to slow down in order to submerge.
- Programmable graphene allows the wings to adapt for each stage by contracting one side in opposition to the other.
- Power is supplied by electric motors supported by battery storage that forms the base of the vehicle
- The vehicle will be propelled in two different ways. When it is underwater, the thrust will be provided by an impeller; the water is sucked through the vehicle and pushed out the back. When above the surface the engine converts to a compressed air turbine.
- The vehicle is scalable both in length and width accommodate larger numbers or cargo with the addition of multiple power units.

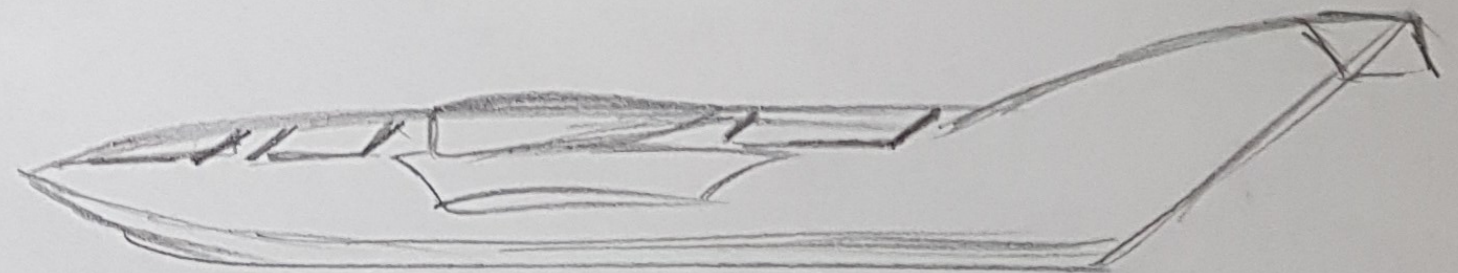
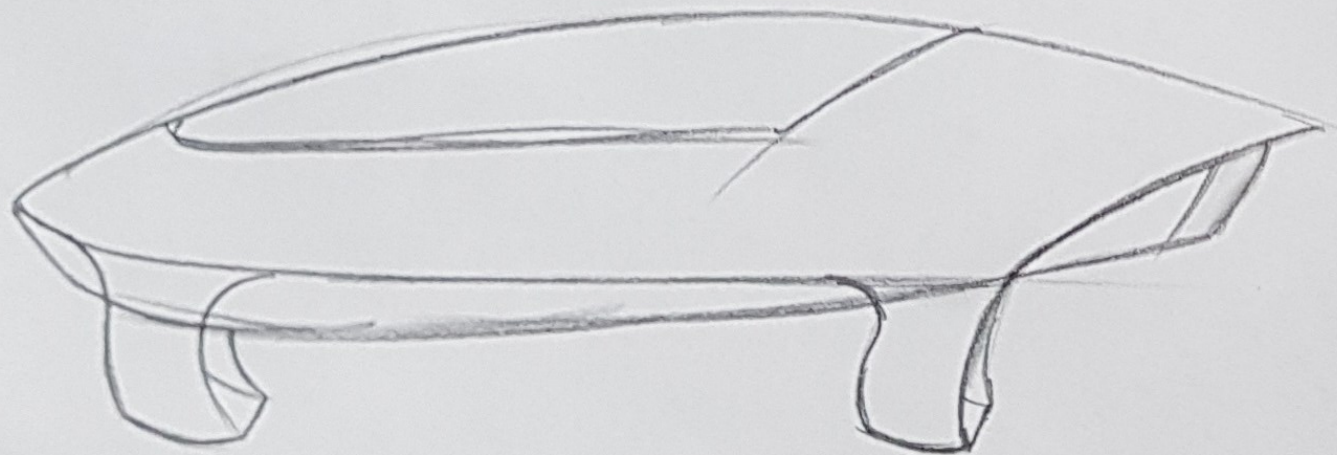
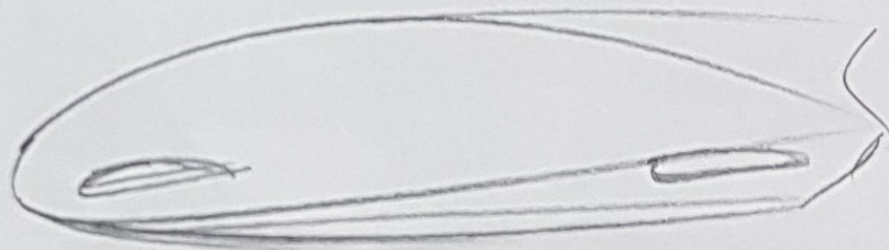
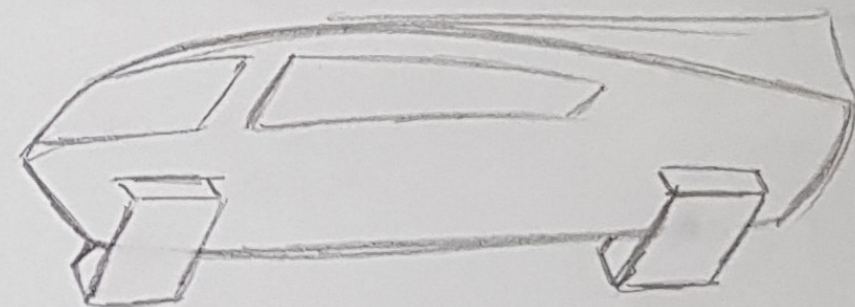
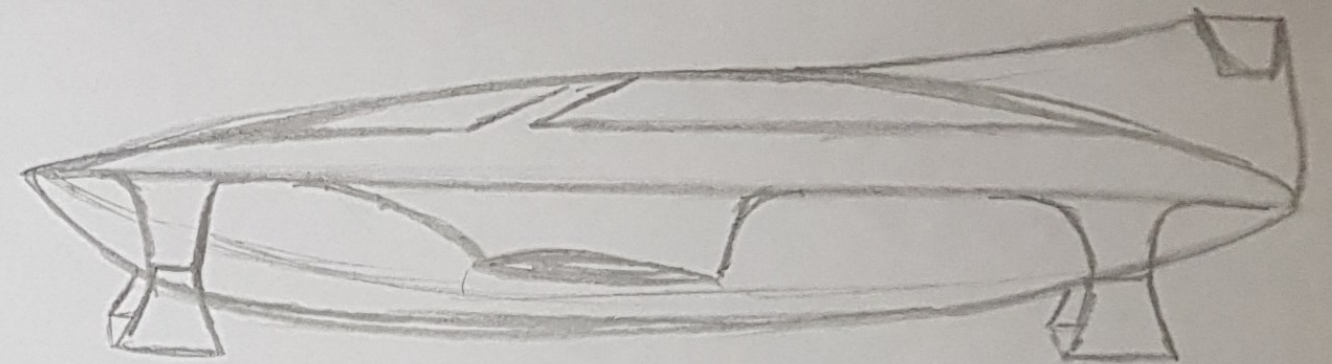


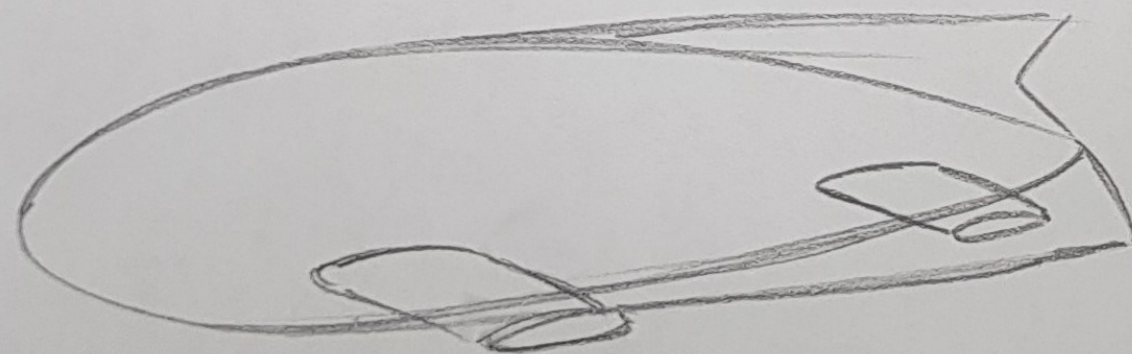
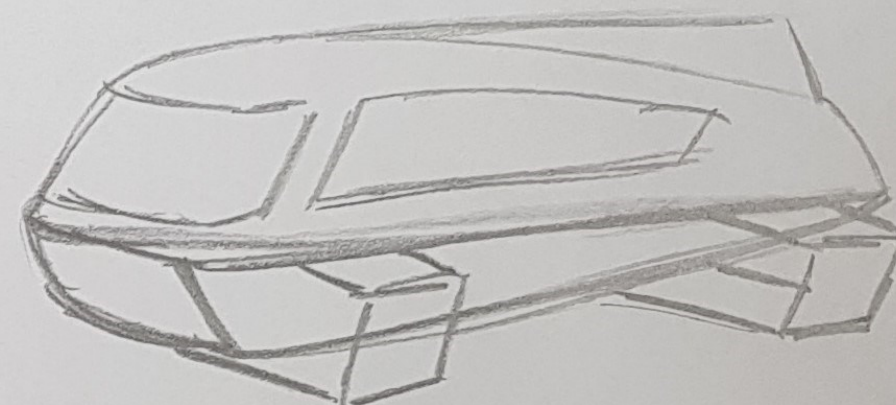
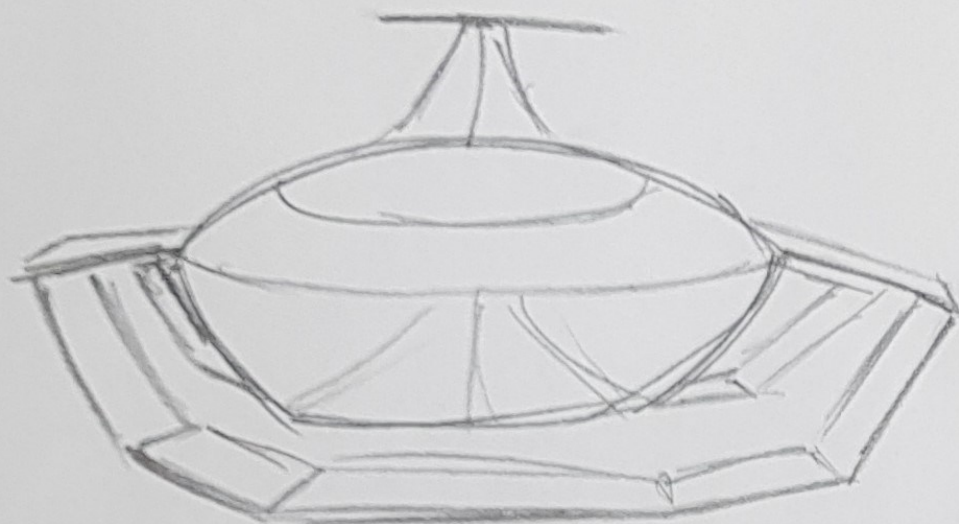
Submersible

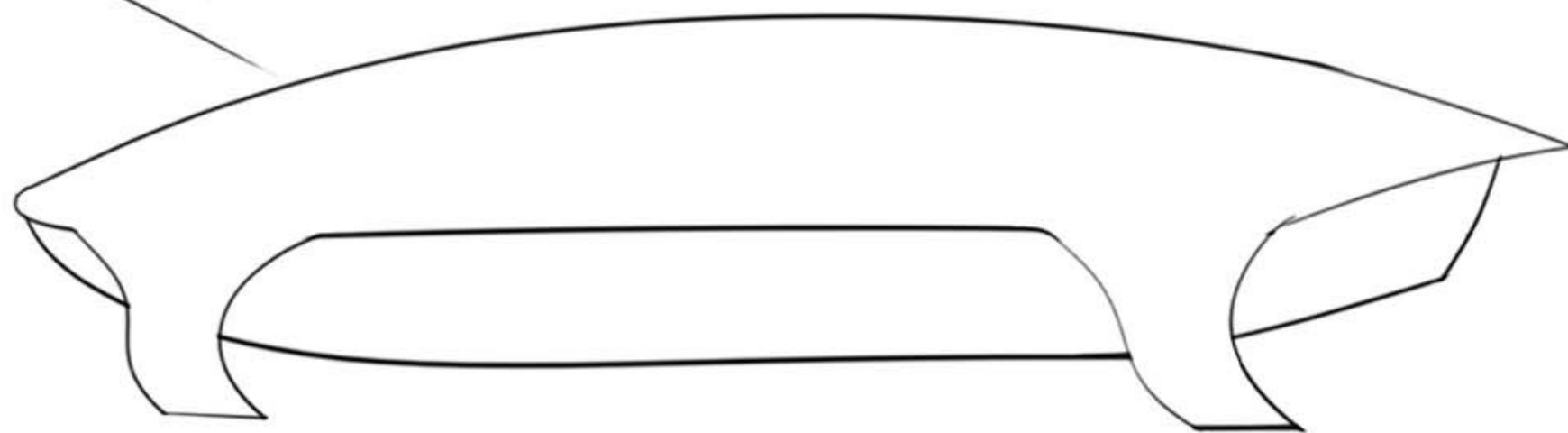
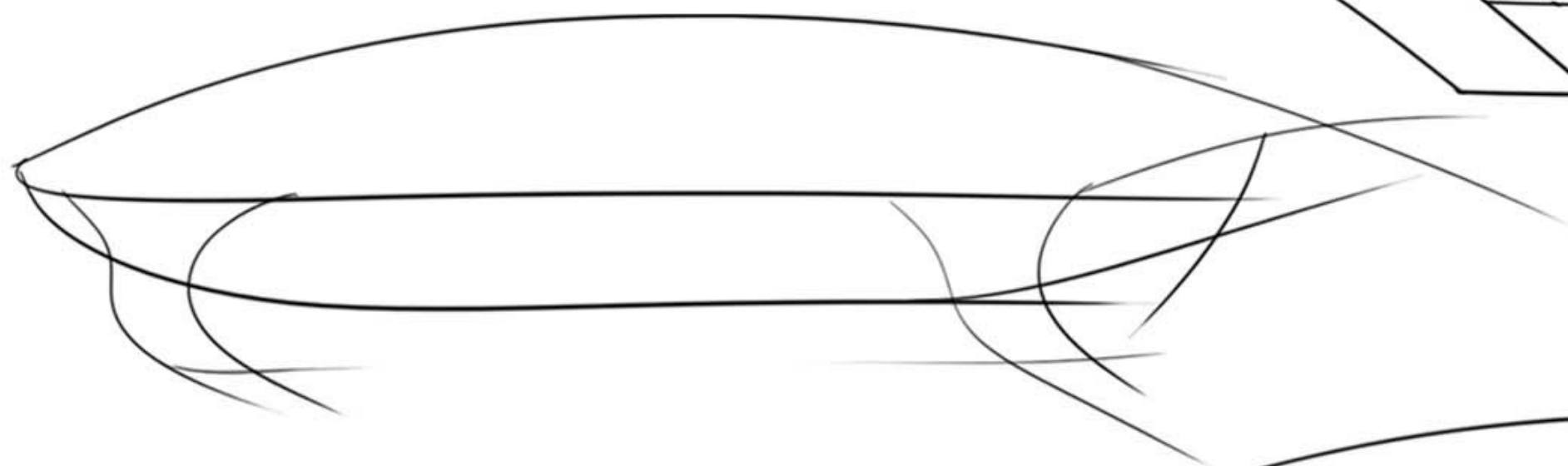
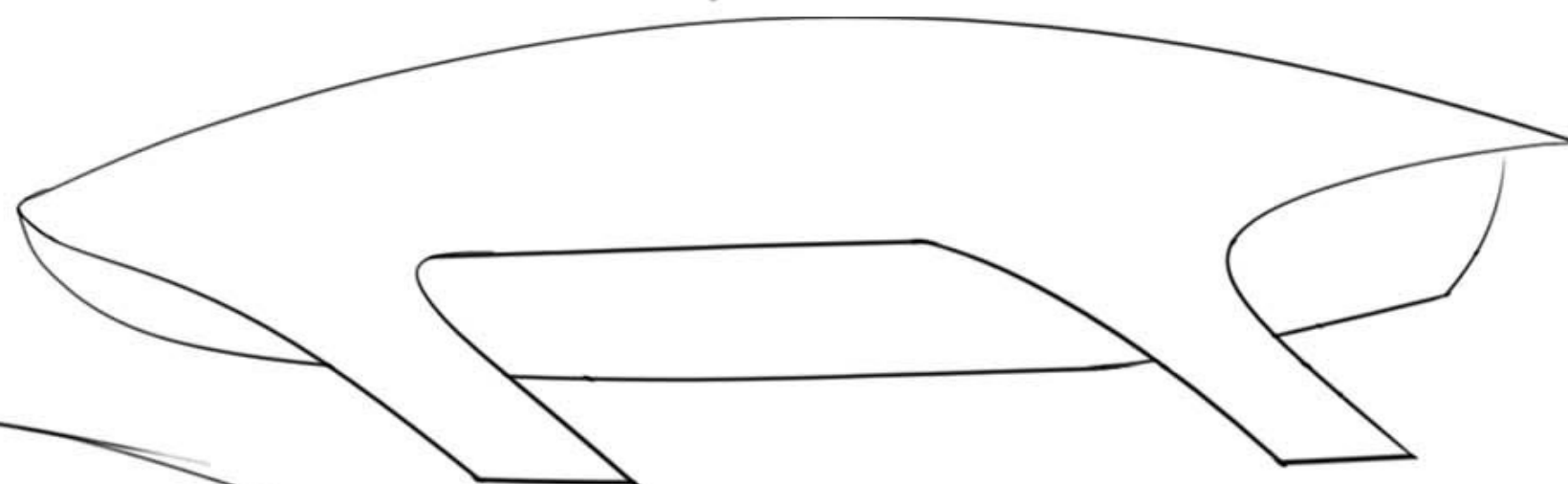
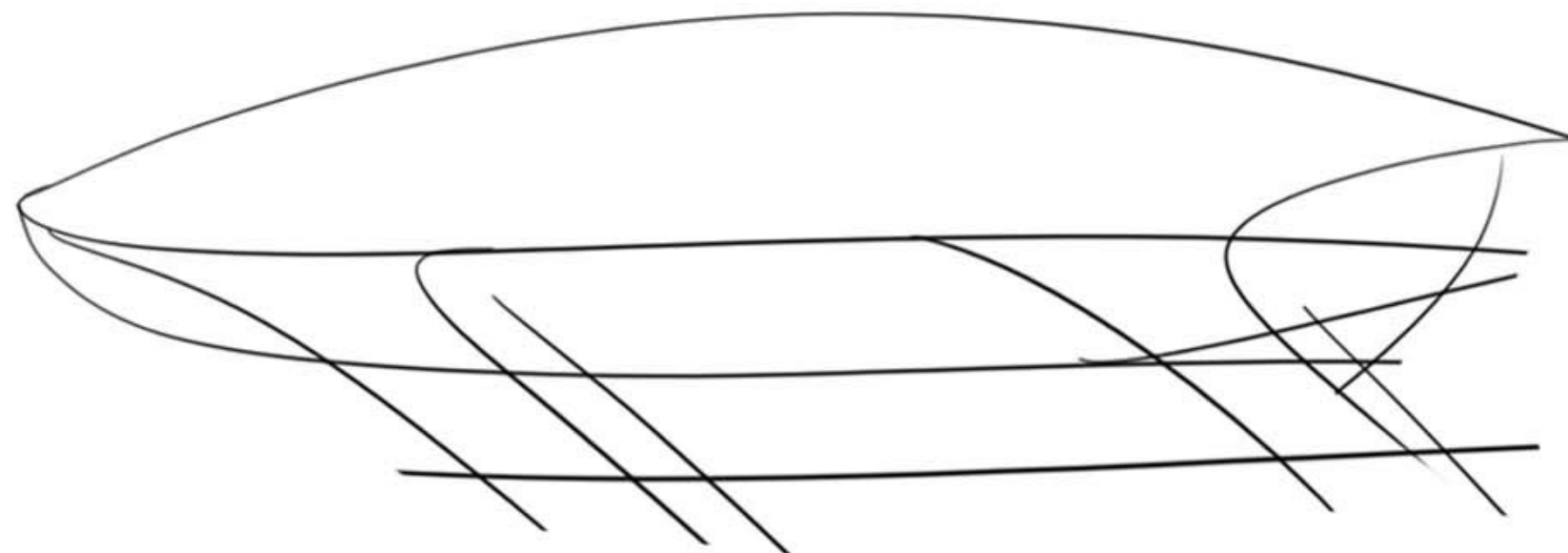
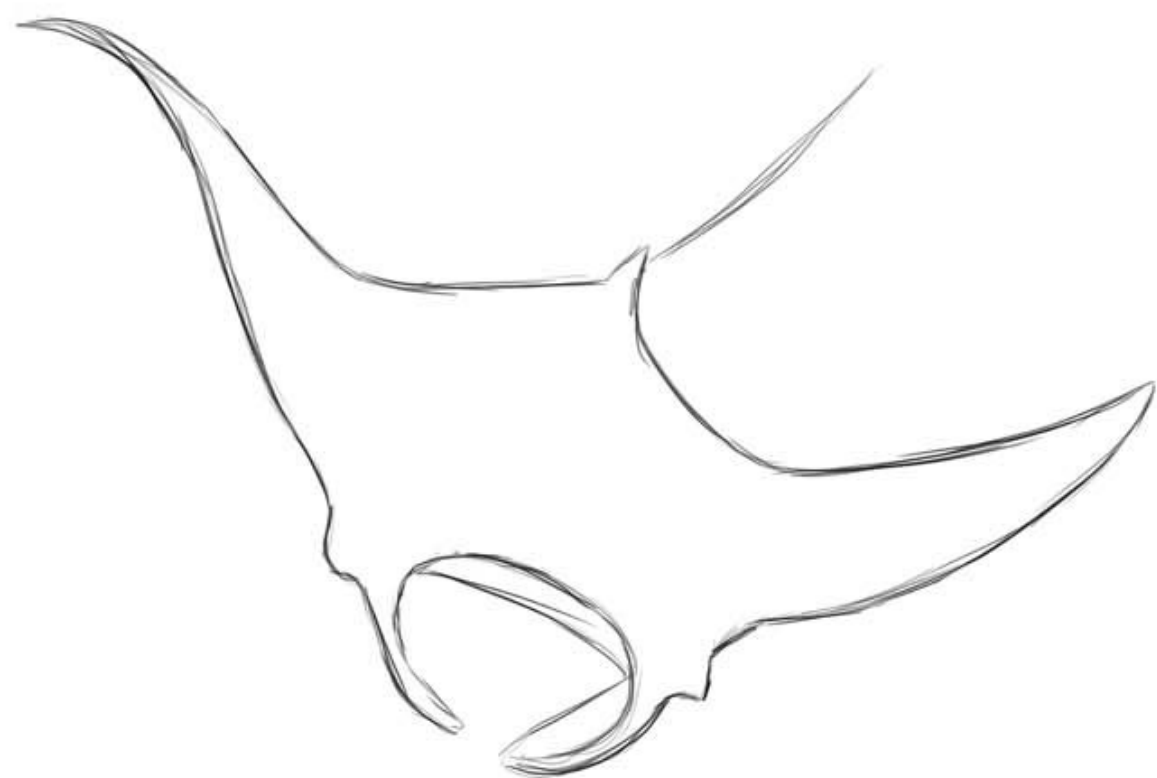


Hydrofoil

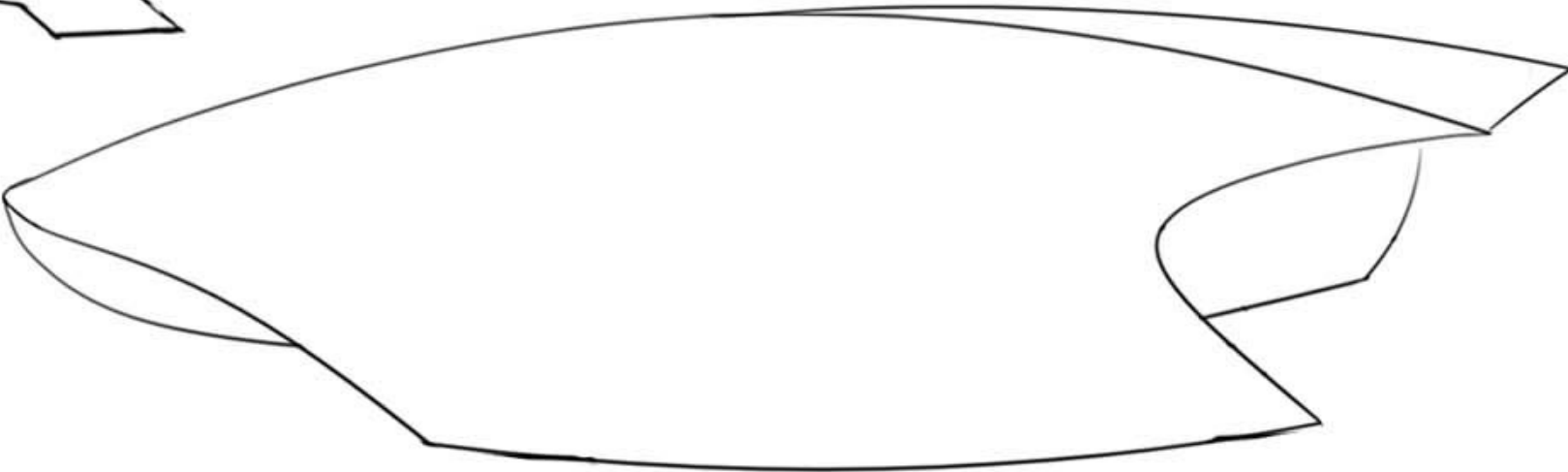
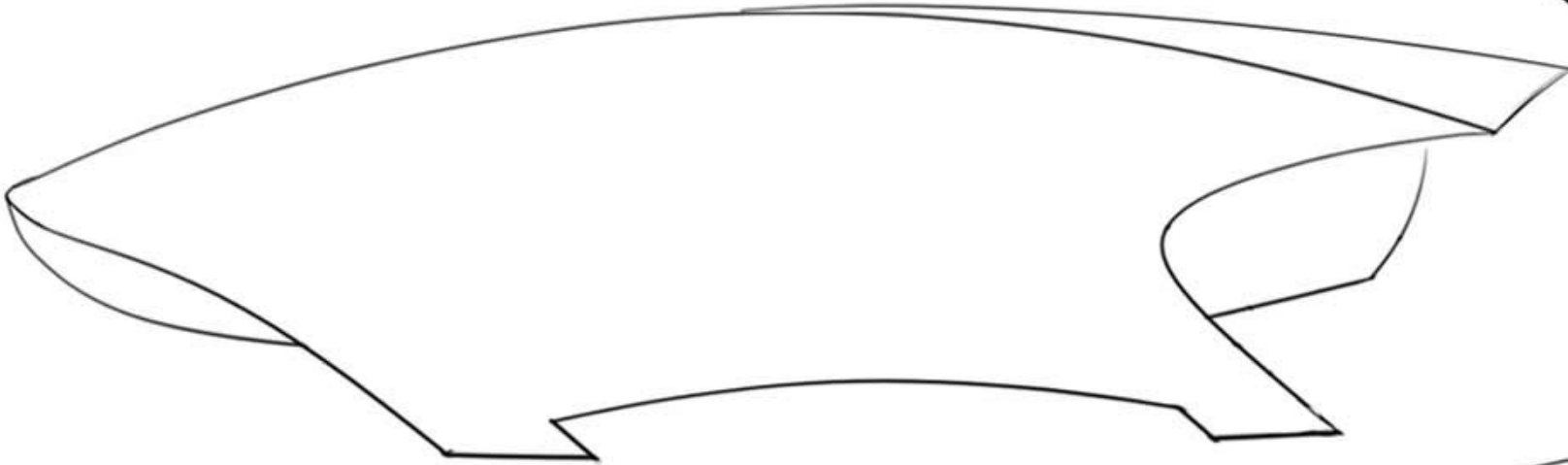
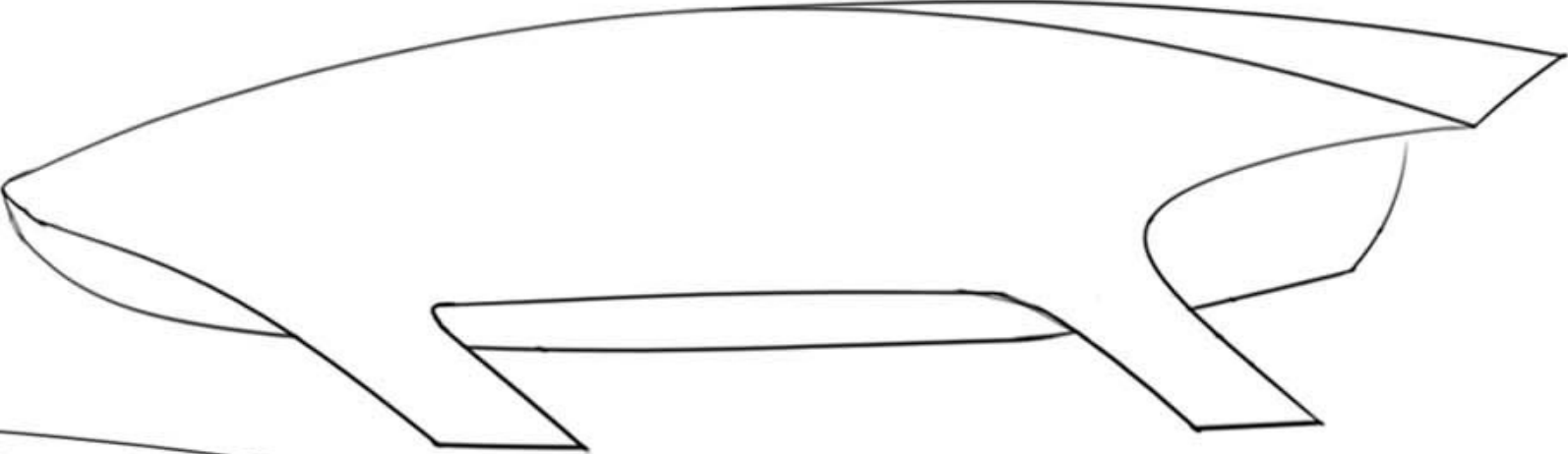
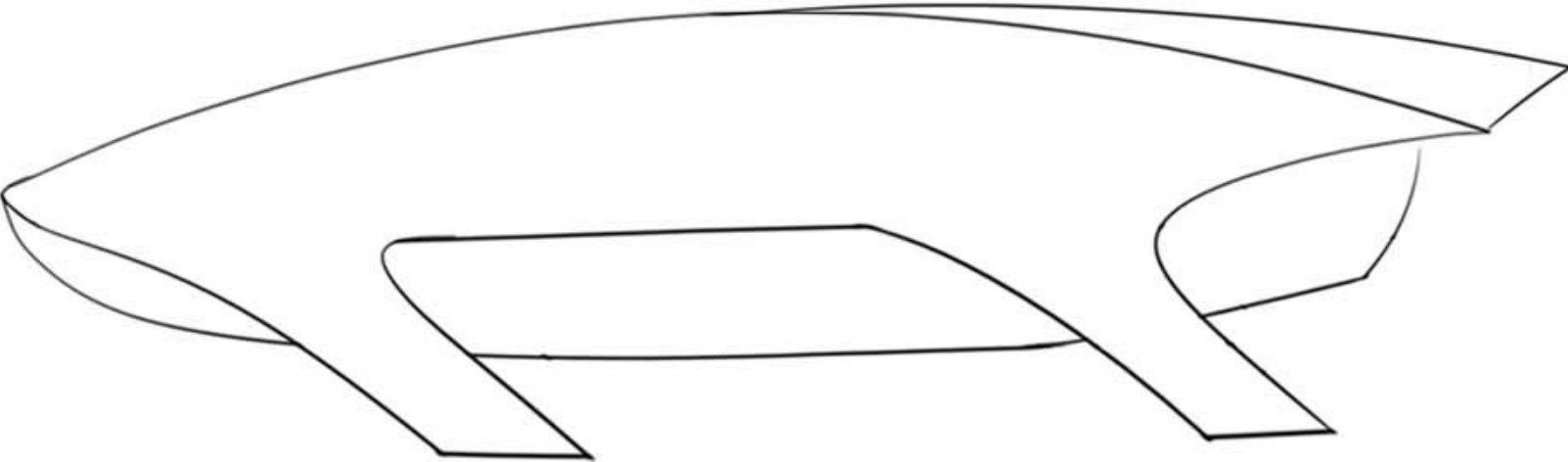
Initial Sketches



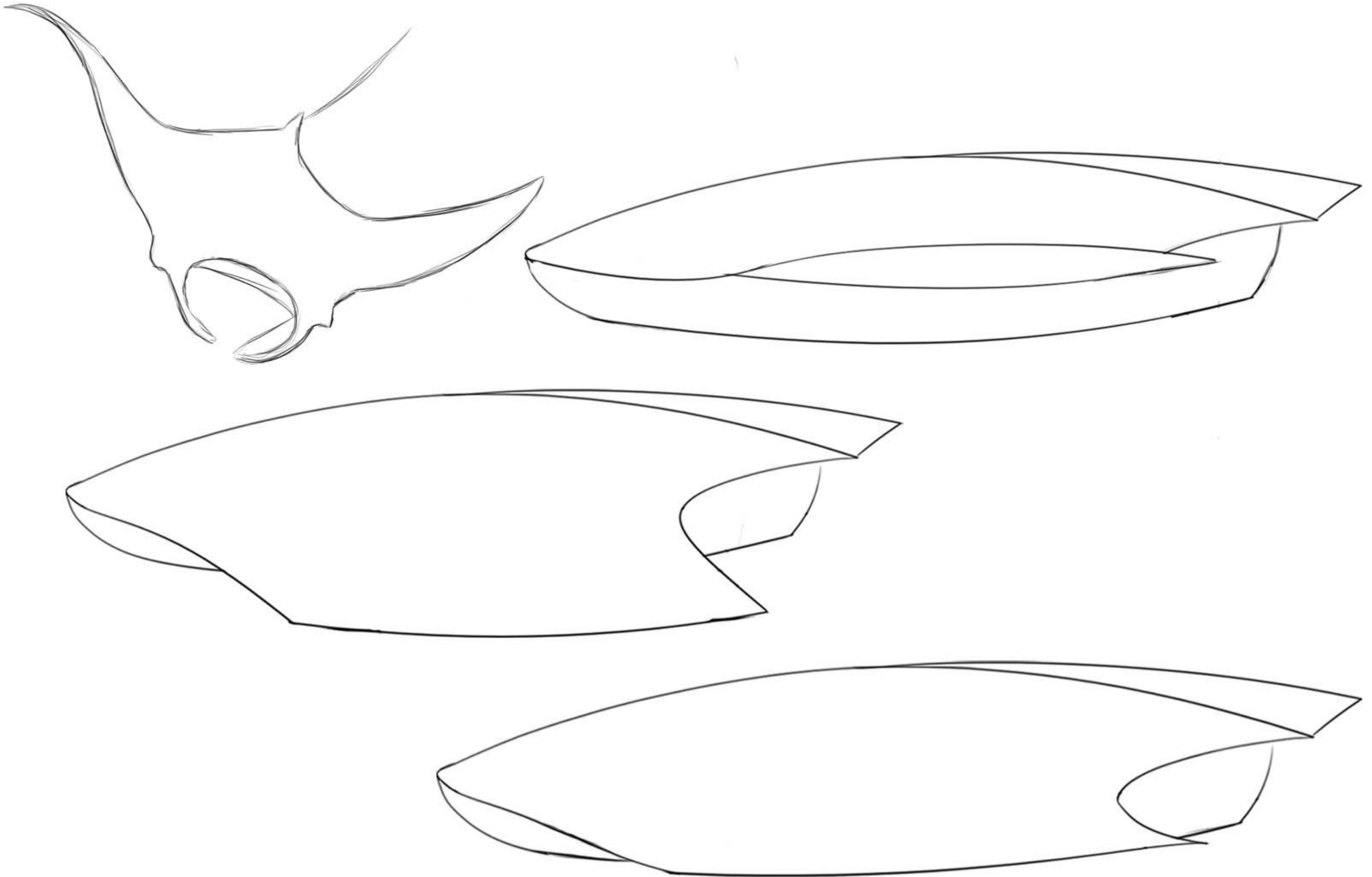


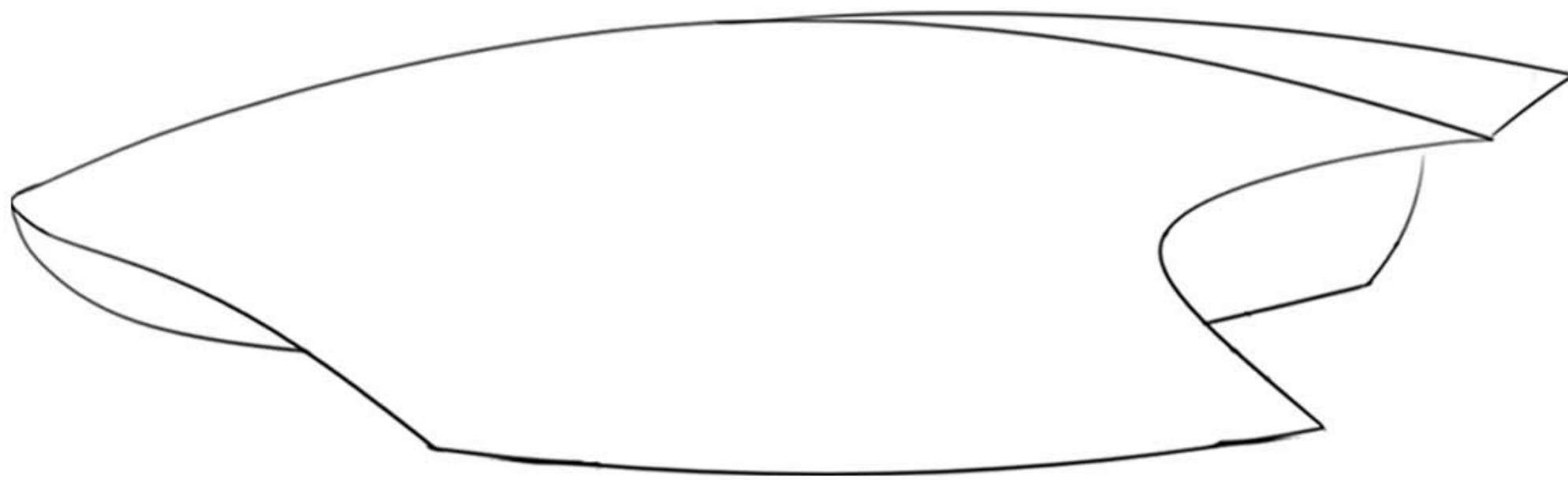
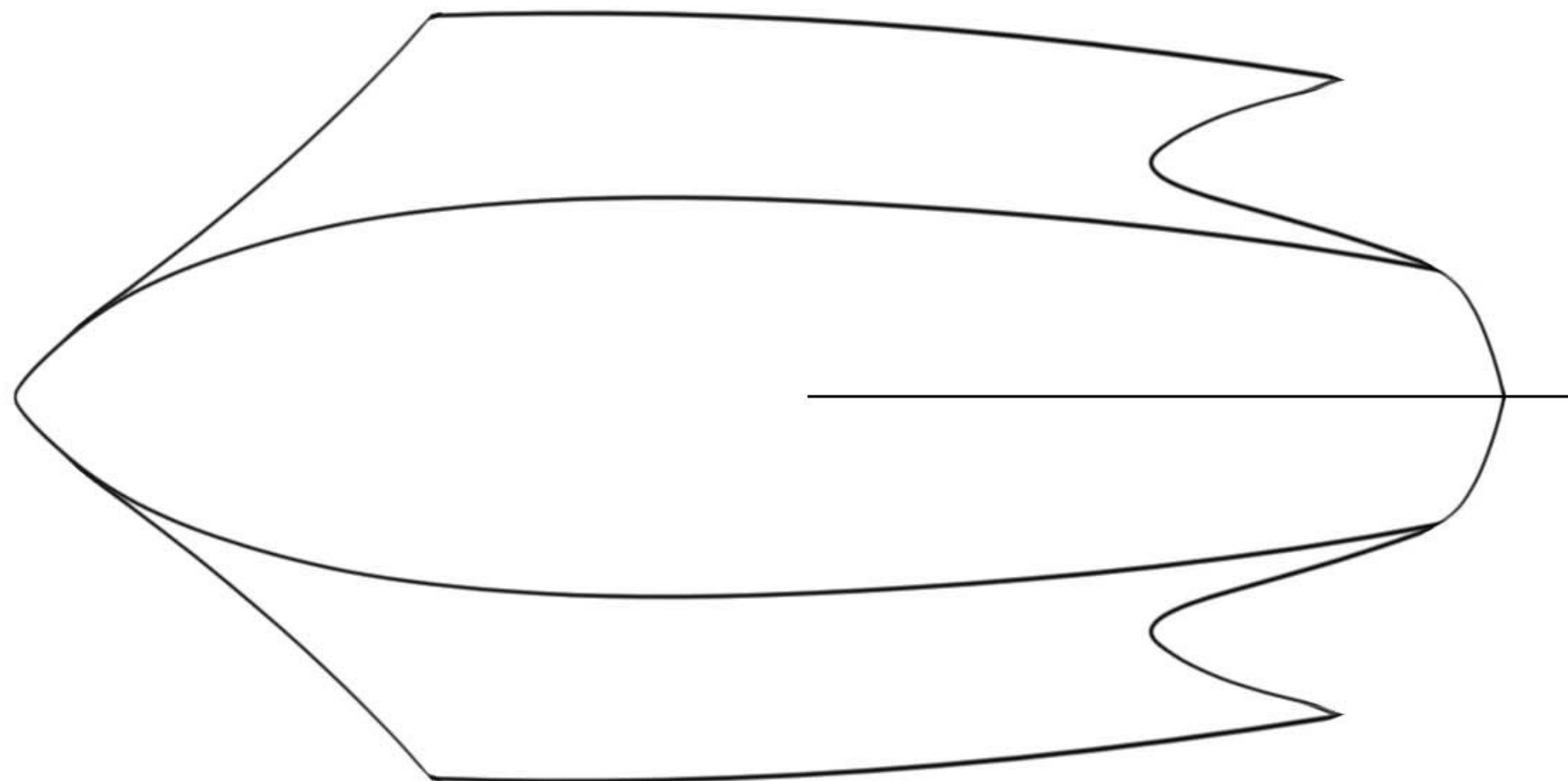


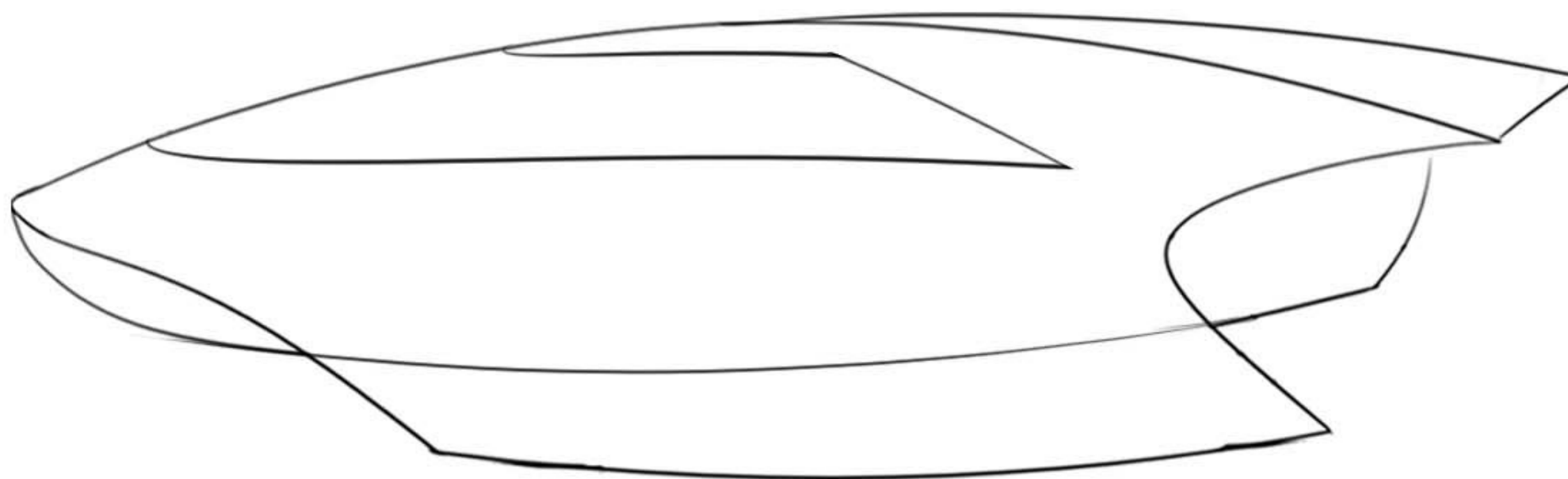
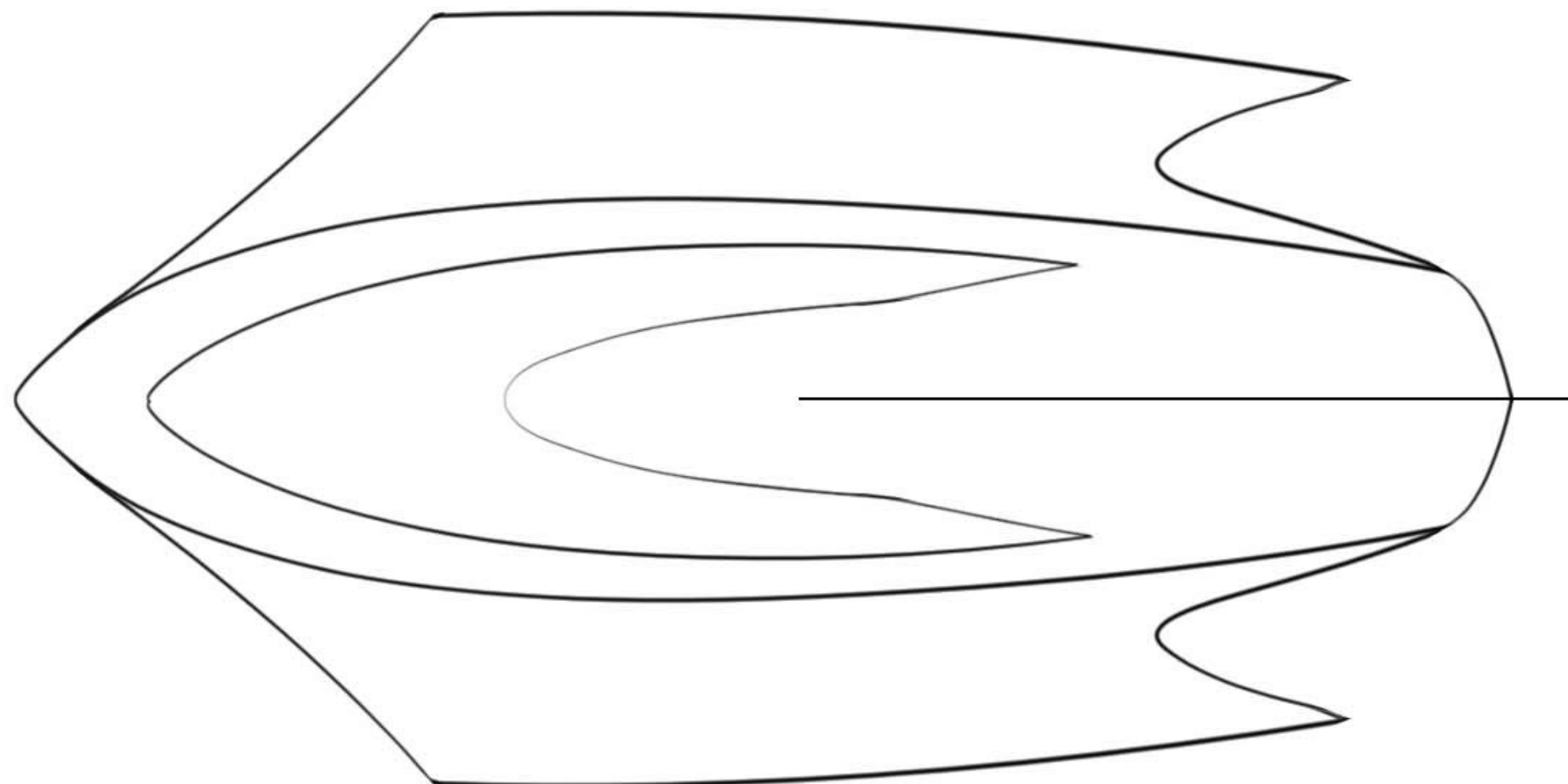
Developed Ideas



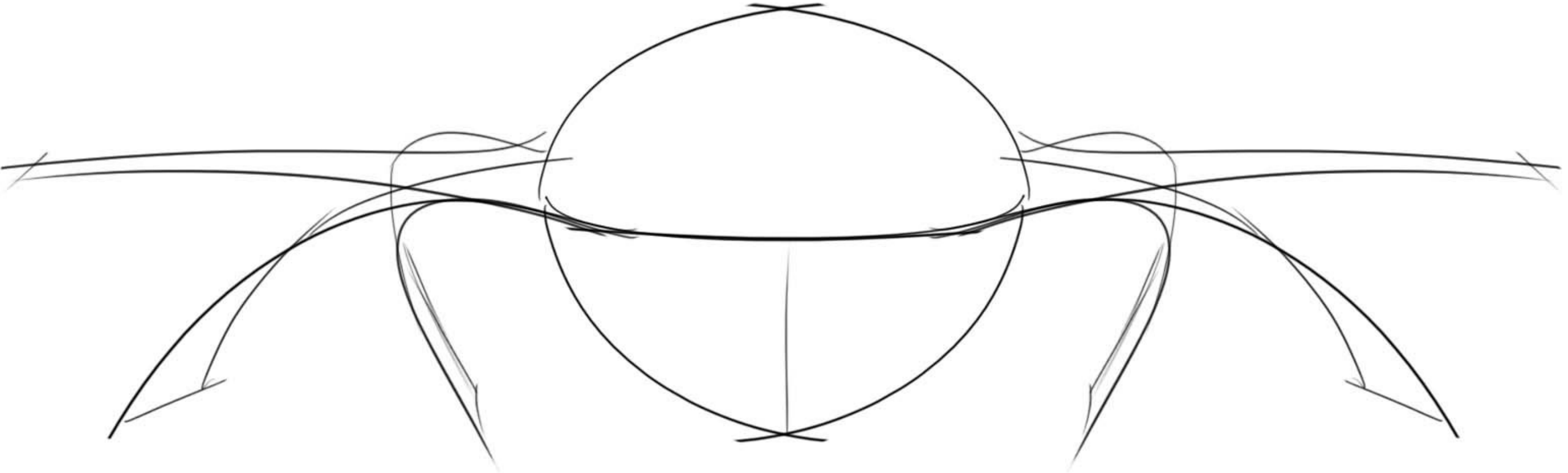
Developed Final Concept



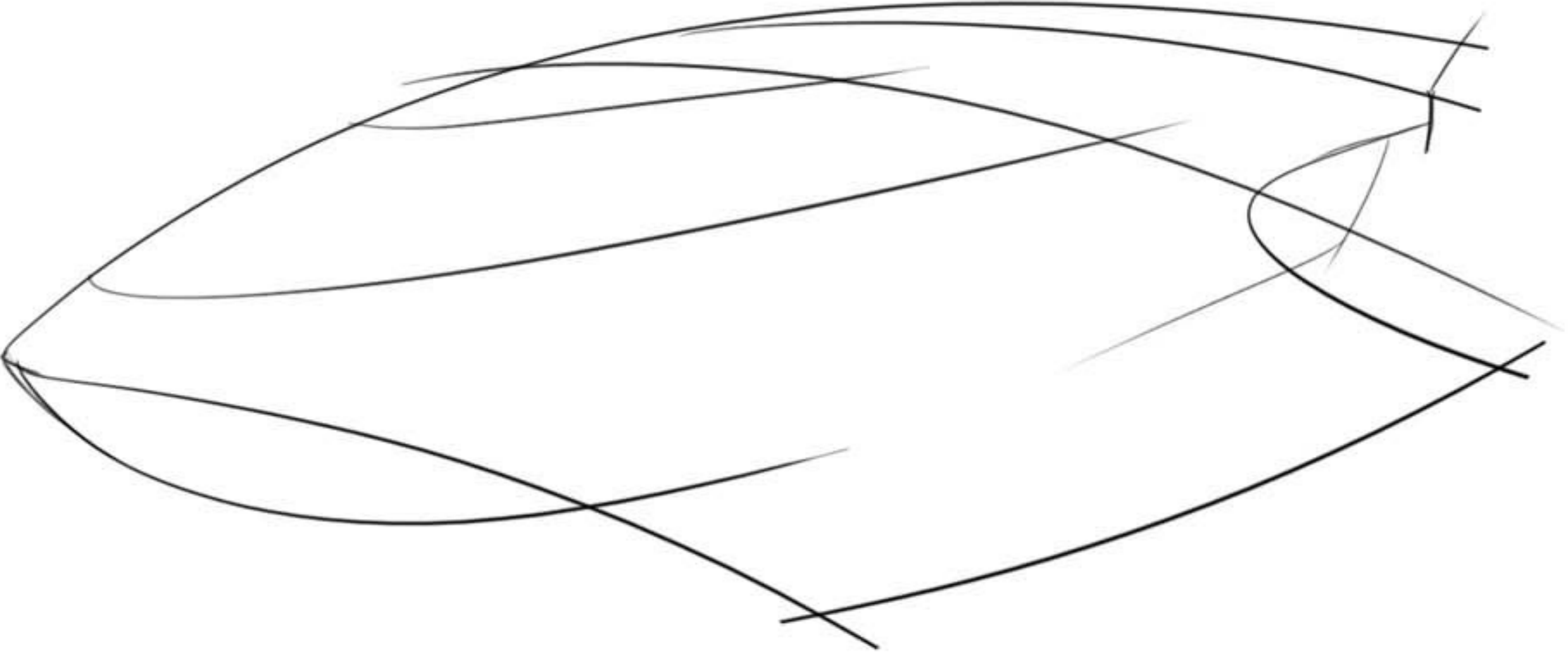




Wing Overview



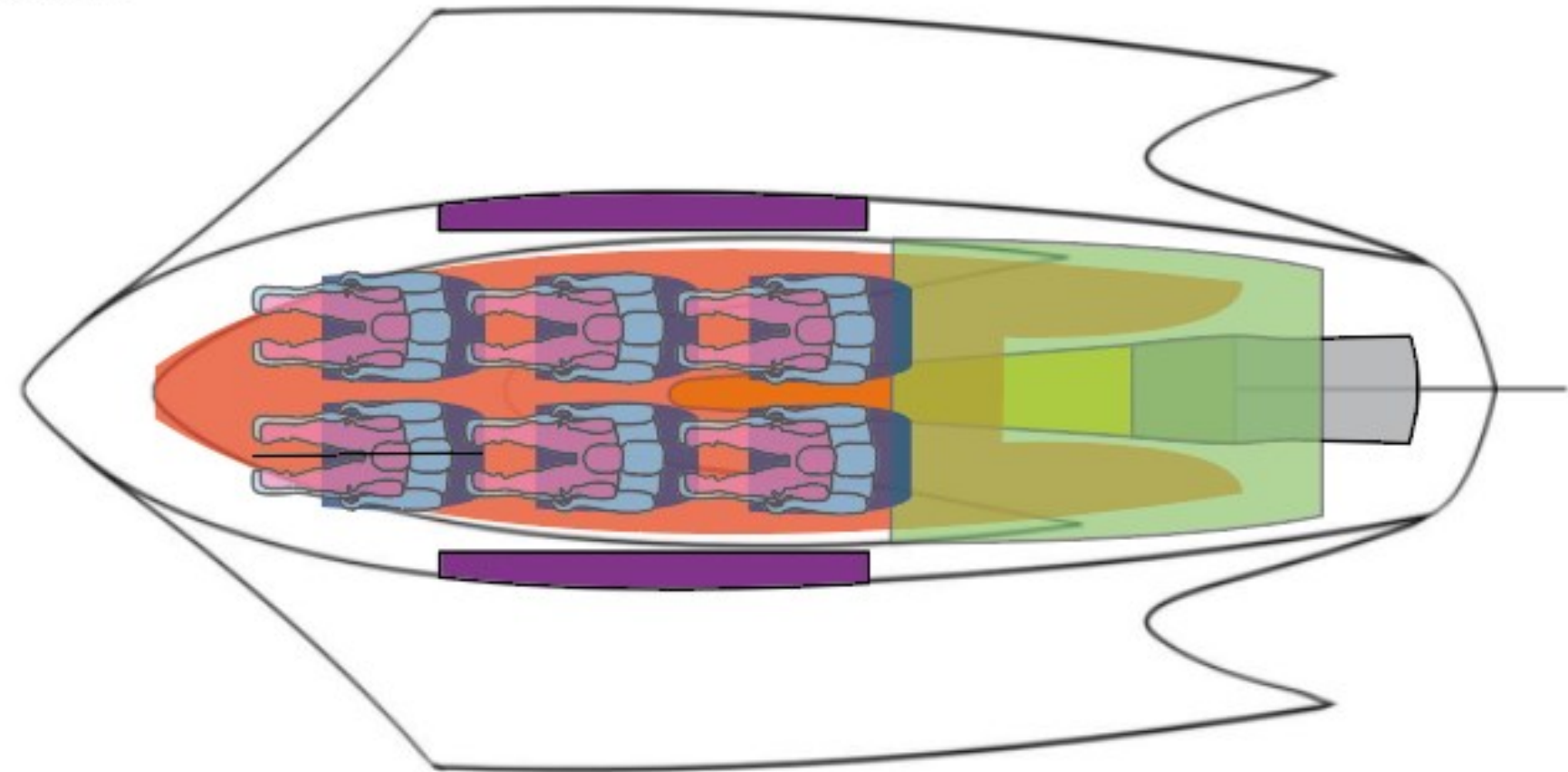
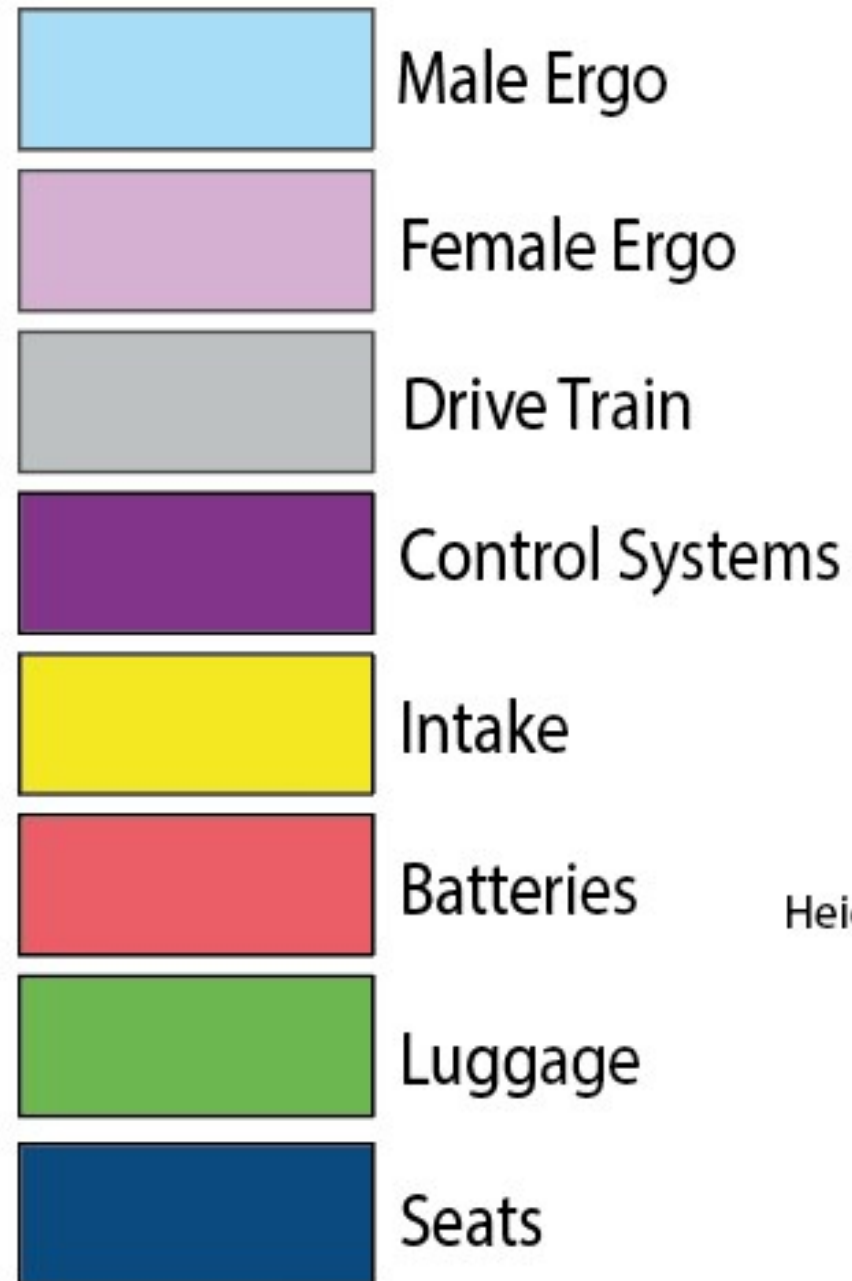
Final Concept Sketch



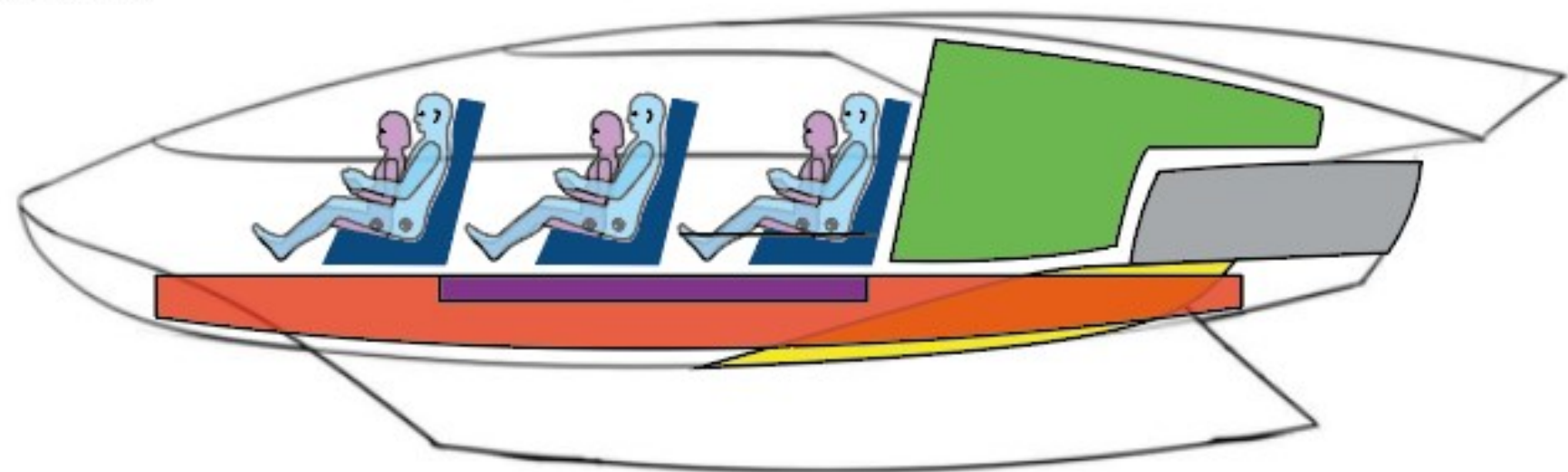
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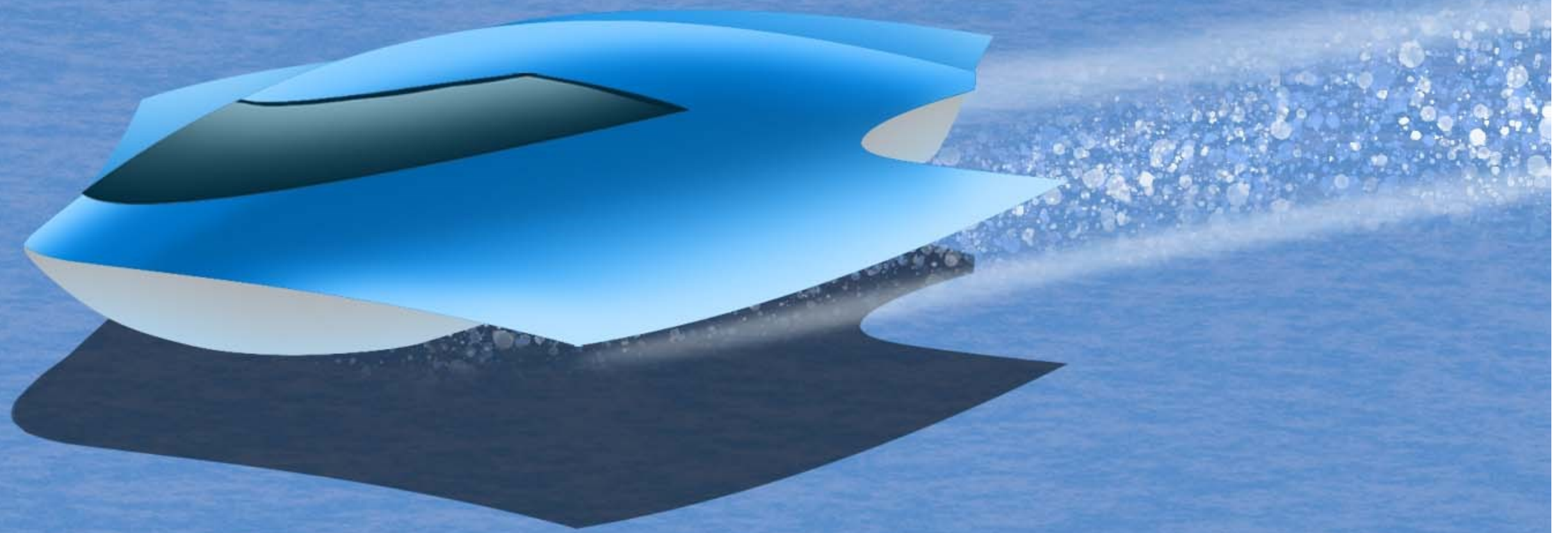
Width 5,050.5mm



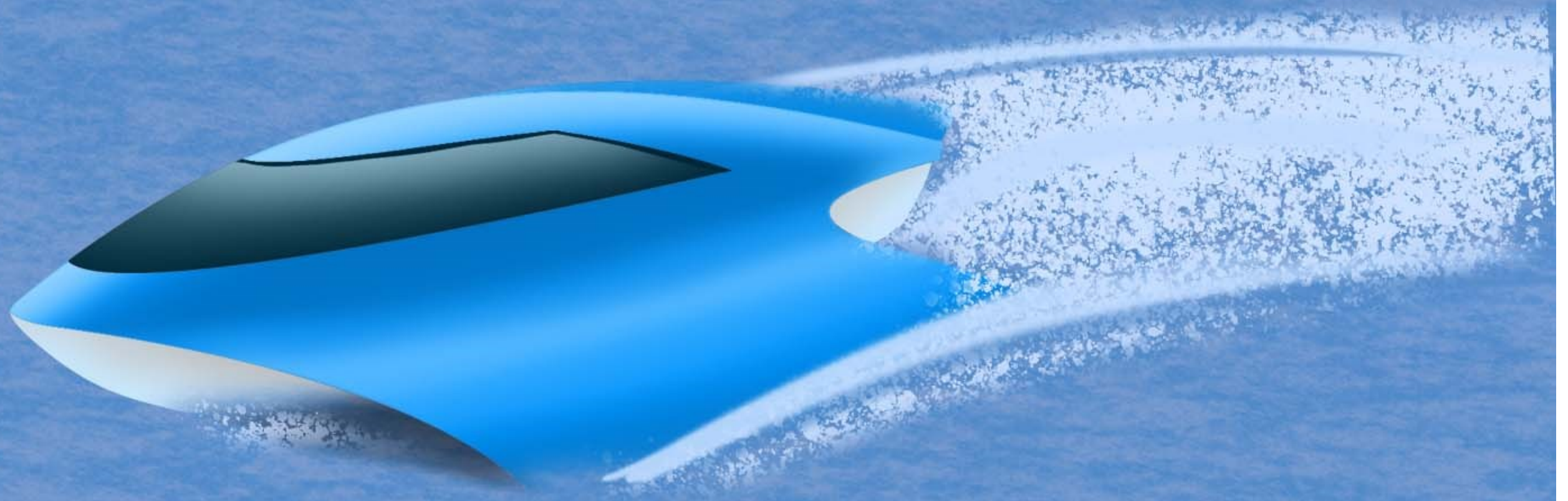
Height 3,050.0mm



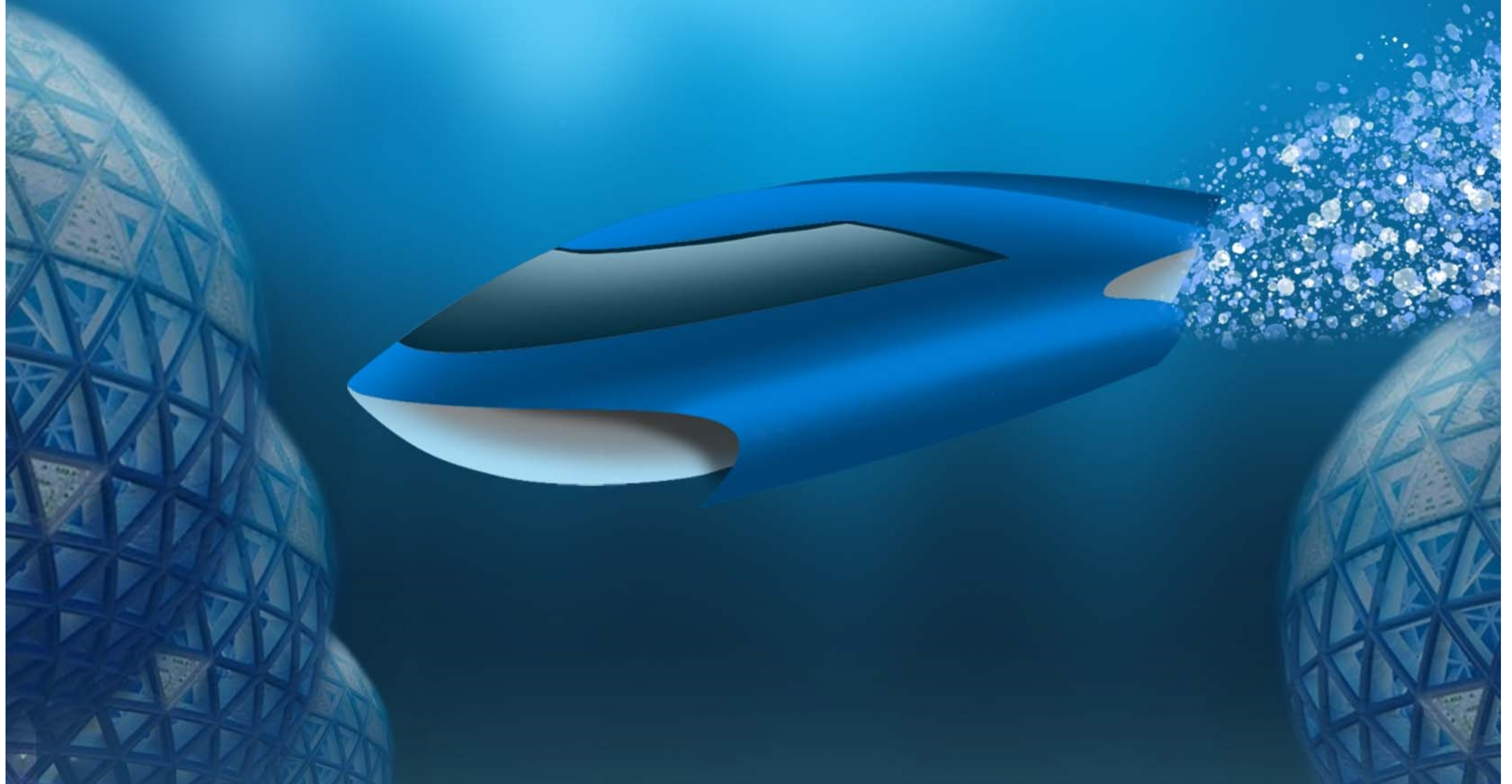
Ground Effect



Hydrofoil



Submersible



Reference

National Geographic (2013) What the World Would Look Like if All the Ice Melted

Available at: <https://www.nationalgeographic.com/magazine/article/rising-seas-ice-melt-new-shoreline-maps>

(Accessed : 2 March 2021)