

KERALA BOAT DESIGN PROJECT

MOBILITY & VEHICLE DESIGN PROJECT I

MVD I-32

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THE KERALA BOAT PROJECT

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For
Samudra shipyard



APPROVAL SHEET

This vehicle design project titled “Urban personal transport for India”, by Rohit Kartha is approved
In partial fulfilment of the requirements for the Masters of Design degree in Mobility & Vehicle
Design

Project Guide

Chair Person

Internal Examiner

External Examiner

Preamble

In the summer of 2015 I travelled to Kerala with the intention of studying traditional Kerala boats. I was keen on understanding the design, its manufacturing and the social implications and importance it holds to the people of Kerala.

Alappuzha

Alappuzha, also known as Alleppey, is the administrative headquarters of Alappuzha District in the south Indian state of Kerala. Alappuzha is the sixth largest city in Kerala with an urban population of 177,029.

Alappuzha is also an important tourist destination in India. It tops the list in Kerala with the district clocking 60337 foreign tourists and 246156 domestic tourists flocking to the Backwaters of Alappuzha in 2014 (data source - keralatourism.org/tourismstatistics)

Kerala boats

The different types of Traditional Kerala boats found in the waters of Alappuzha can be broadly classified into these categories

kettu vallam (stitched boats) –

These boats like the name suggests are made by stitching long pieces of timber up to make the hull of the boat. The boat is made completely of natural elements; coir ropes tied in knots hold the entire structure of the boat together. During the entire assembling work of the boat, not a single nail is used. The boat is made of huge planks of Jack wood (*Artocarpus hirsuta*) or 'Aanjili' and joined with coir. Cashew oil used to waterproof the wood





Shikara

These boats were originally inspired from the Kashmiri boats found in the dal lake, but over time were influenced by the Kerala style of boat design and now are a mix of the two vastly different cultures. They are used to take tourist on short day cruises around the backwaters and can occupy about 5-8 people.



House boats

Houseboats were traditionally, rice grain barges that were formerly used to transport rice from the wetland paddies to the coast. Made with thatched roofs and over 25 meters long, the boats are quite elegant, and used to be the preferred way of merchant travel prior to the coming of paved roads and motorized vehicles

These houseboats can be further sub classified into three different categories based on their size and occupant capacity.

Small house boats- these boats although considered basic, have a bedroom with air-conditioning, modern toilets, an open living room, a kitchen and a balcony. Most of the boats are poled by local oarsmen while some are powered by engines.



Large house boats- these boats are meant typically for larger families or multiple micro families. They usually consist of 2-3 bedrooms with multiple toilets and balconies. They usually are multi-level house boats with stairs to access the upper deck.

Luxury house boats- these are the biggest boats and are usually equipped to handle 30-40 passengers. They have everything from onboard professional conference rooms for MNC meetings to a decked up party area full with dance floors and a bar.



Small boats- these boats are usually owned by most households in Kuttanad and Champakulam and Are used for nearby commutes including crossing from one bank to the other to get to the town, go to school or the local market etc. it can accommodate 4-6 people and is usually paddled by the oarsmen or in some cases they also have a small propeller attached to a diesel motor.





Chundan Vallam (Beaked Boat)

known outside of Kerala as Kerala snake boats, are one of the icons of Kerala culture used in the Vallamkali boat race.

Constructed according to specifications taken from the Sthapathya Veda, an ancient treatise for the building of wooden boats, these boats vary from 100 to 138 feet in length. With the rear portion rising to a height of about 20 feet, and a long tapering front portion, it resembles a snake with its hood raised. Hulls are built of planks precisely 83 feet in length and six inches wide. The boats are a good example of ancient Indians' prowess in naval architecture.

Traditionally a boat will be commanded by a Kaarnavan (village leader) with First Adanayampu, and under him there will be three main oarsmen who control the movement of the boat with a 12-foot-long (3.7 m) main rudder-oar. Sitting two to a row along the length of the boat, there will be 64 oarsmen, representing 64 art forms (or on occasion 128 oarsmen). There will be around 25 singers in a row at the middle between the oarsmen. In the middle of the second half of the boat is a platform for eight people to stand from where the cantor will lead the song. They represent the Ashtadikpalakas (the Devas or Gods who guard the eight directions)



Boat manufacturing

The boats are made of natural products like bamboo, coir and anjili tree wood with cashew oil used to waterproof the wood. Originally all boats were stitched together and not a single nail was used in the whole construction of the boat. Over time many ship yards have started using nails and rivets as it is easier and less time consuming. Modern advances in technology have allowed ship building firms to use fiber reinforced plastic or simply FRP [a composite material made of a polymer matrix reinforced with glass fibers] as a replacement for wood. Large moulds are used to make the FRP hulls of these boats. The advantages of modern FRP hulls include lesser maintenance costs and cheaper manufacturing costs.

Opportunity for Design intervention

At present in Alappuzha a small house boat is rented out to tourists for one day at the cost of 5000-12000 Rs (including food). A larger house boat might set you back anywhere from 15000 to 30000Rs for one day onboard. And the luxury houseboats costs upwards of 30000 for one days cruise.

For a small family of 4-6 individuals who do not want to spend so much money on a single days cruise, the only other option is the smaller shikara boats. These boats do not have amenities like toilets, bedrooms or even a small kitchen but instead there are cane chairs onboard the small boat from which the tourist can relax and view the backwaters. These boats costs anywhere between 400-600Rs per hour of the cruise.

Design brief

To design a traditional Kerala boat that can accommodate a small family (of 6 individuals) meant for tourist day cruises in the backwaters of Kerala. The design should adhere to the basic onboard sanitation, refreshment, comfort and safety necessities.

Visual language

The boat should derive visual and aesthetic elements from traditional Kerala products, furniture and architecture to make a truly Kerala style boat.

Traditional Kerala elements

To derive visual elements from traditional Kerala products, furniture and architecture, I went about trying to make a visual directory of all these elements. I tried to collect as many pictures as I could within the given amount of time of everything traditional that I came across.

Everyday things like the velaku(oil lamp), the border decorations on the doors, the chaari kasera(wooden easy chair), the bamboo hand fans all had a sense of keralanness to it.





Note. There are 40+ pictures of Kerala forms and designs, will be added in the final document

User study - boat owners in Alappuzha



Bony George

Owner/ Driver
Shikara boat- 8 seater
Boat costs 7 lakhs
Makes on an average 4 trips daily
Charge 400/ per hr
Onboard toilet or refreshments- Nil



Jose Thomas

Owns 3 boats
Shikara boats 6 seater(1), 8 seater(2)
Boat costs 5-8 lakhs
Makes on an average 3 trips daily
Charge 300-500/per hr
Onboard toilet or refreshments- Nil



Moris

Owner/ Driver
Shikara boat- 6 seater
Boat cost 5 lakhs
Makes on an average 3 trips daily
Charge 400/per hr
Onboard toilet or refreshments- Nil



Tourist day cruises

These barges with thatched roofs are used to take tourists on day Cruises around the backwaters of Allepy and nearby areas. The Oarsmen take foreign tourist to get a of the village life and the lush green fields nearby. Each trip lasts about 3 to 4 hours depending on the tourists and costs about 300 per hour.

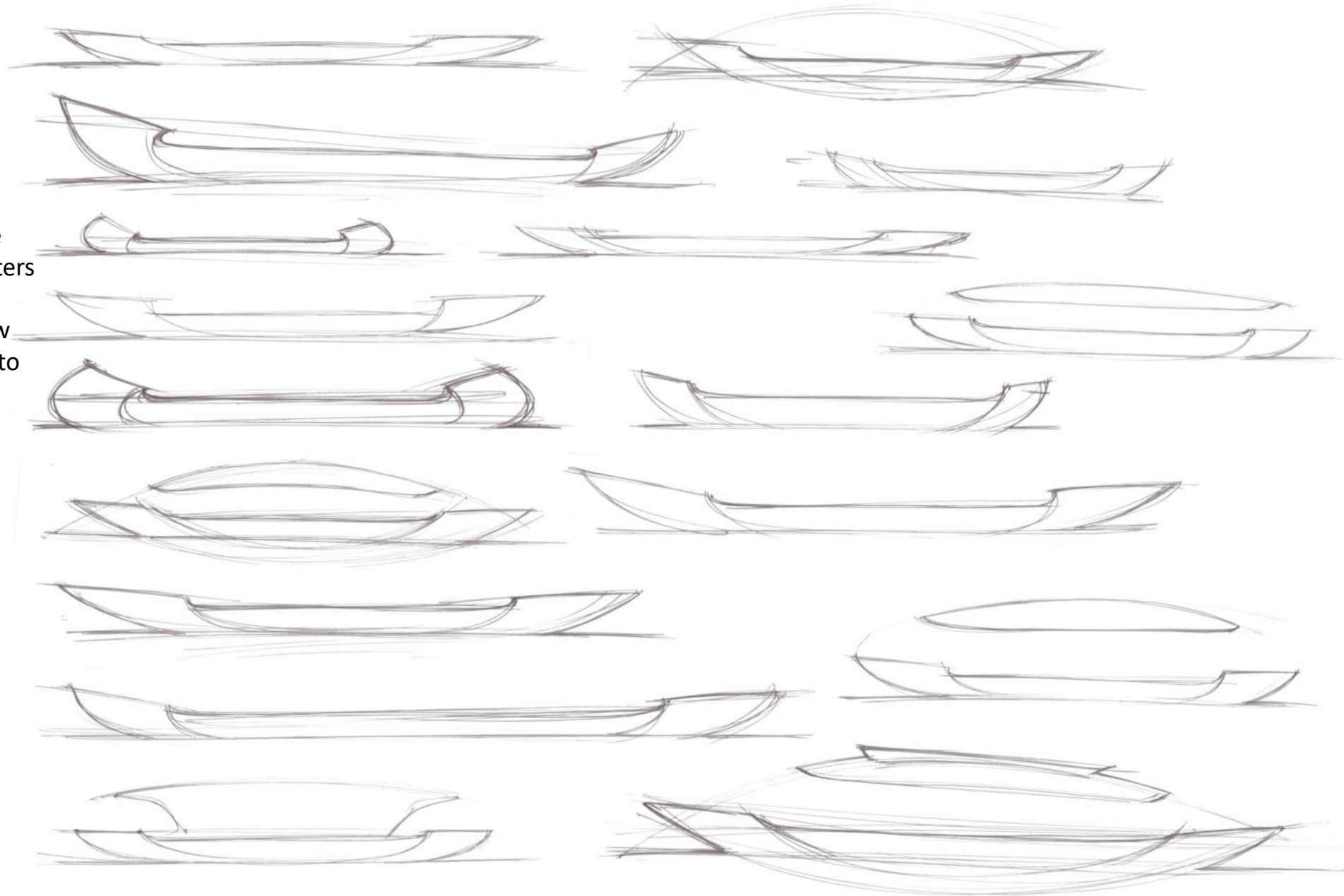


These boats have cane chairs placed inside for the tourists to sit and relax. Some boats may even have a few small tables and a diwan.

Sketchbook #1

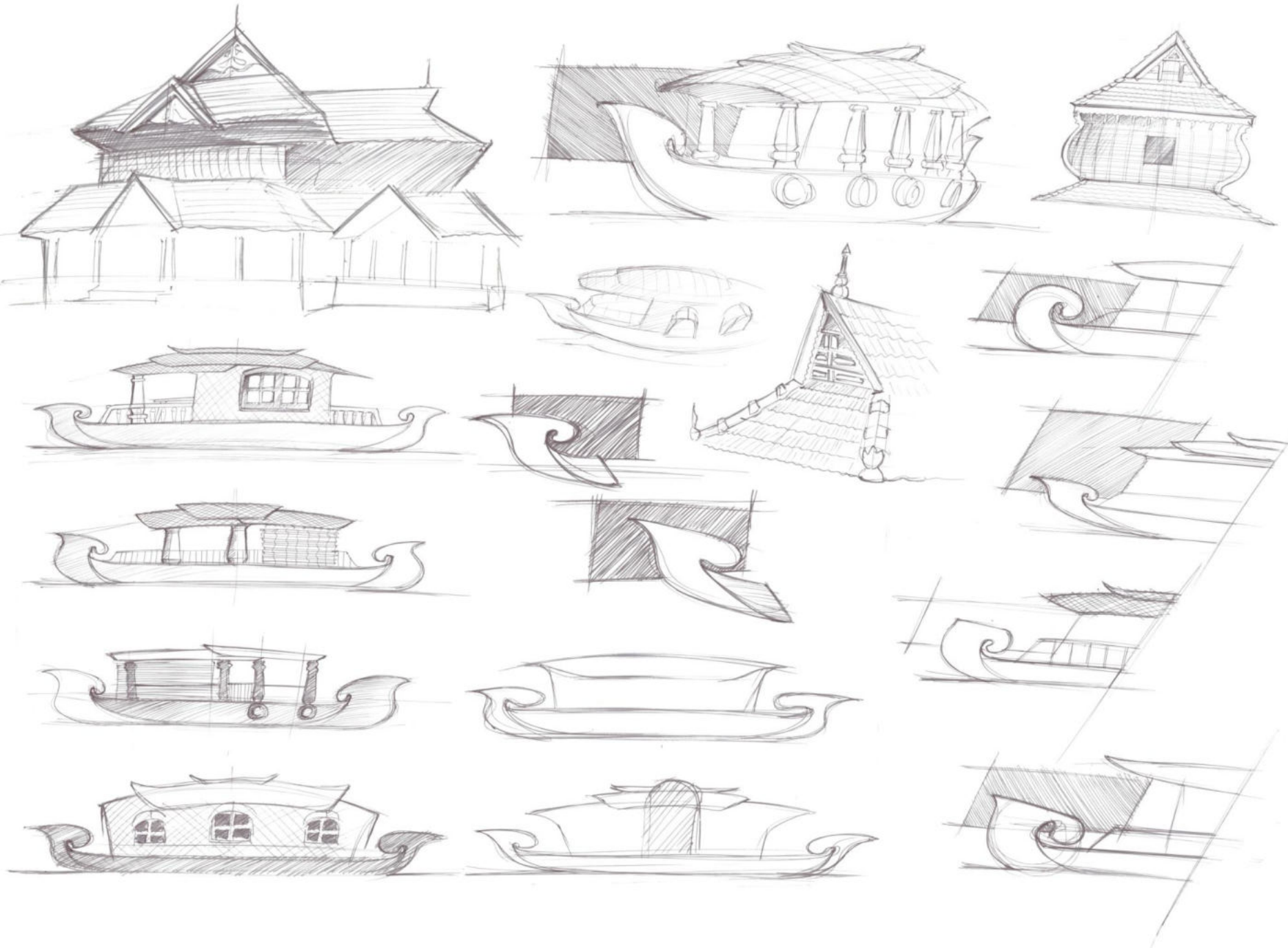
Initial doodles

I started sketching and doodling on my sketchbook in Alappuzha to get an idea of the proportions of the boats. Sketching while looking at the boats from the banks of the backwaters was an amazing experience as the boats would only be in sight for a few minutes before they disappeared into the greenery

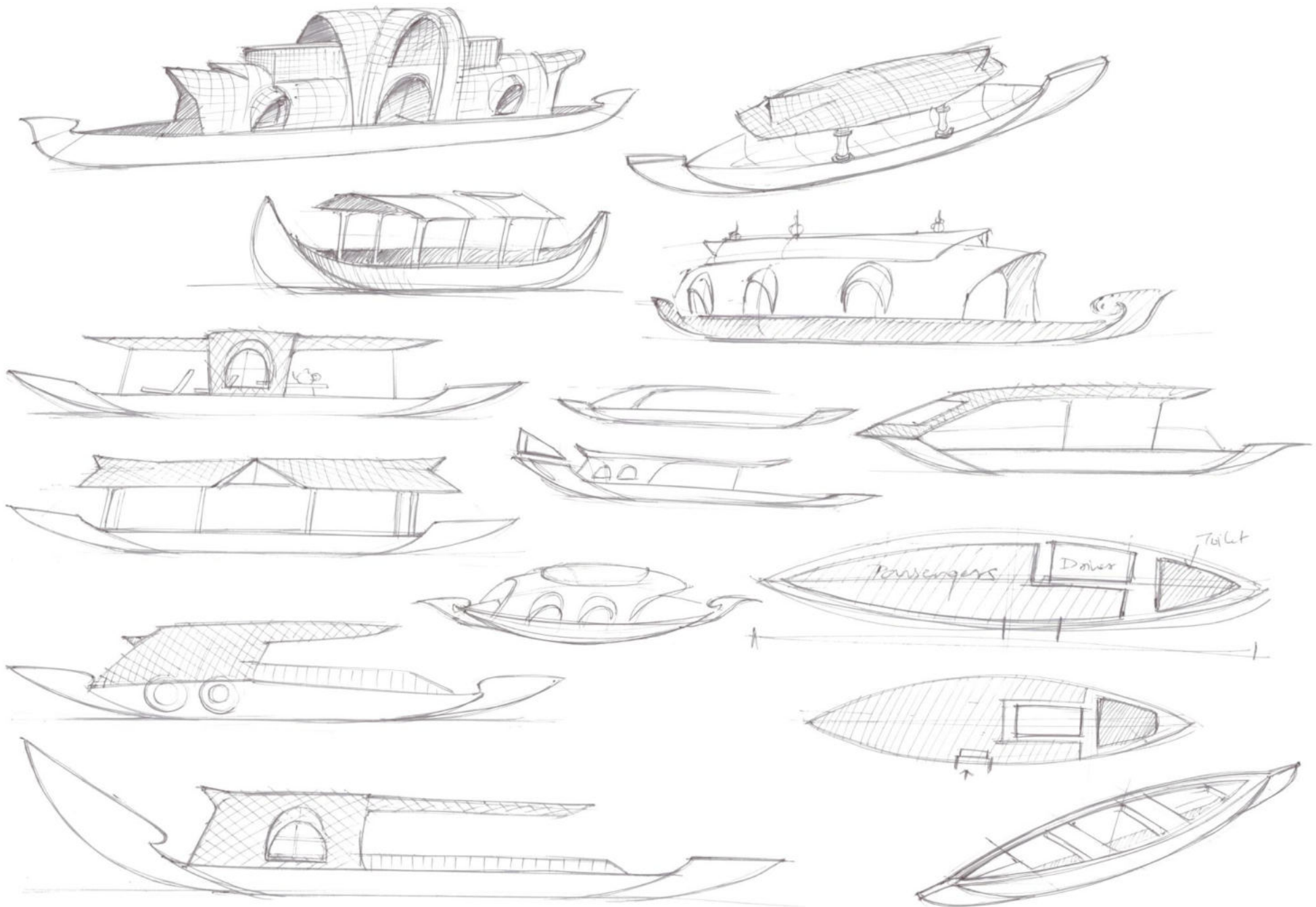


Sketchbook #2

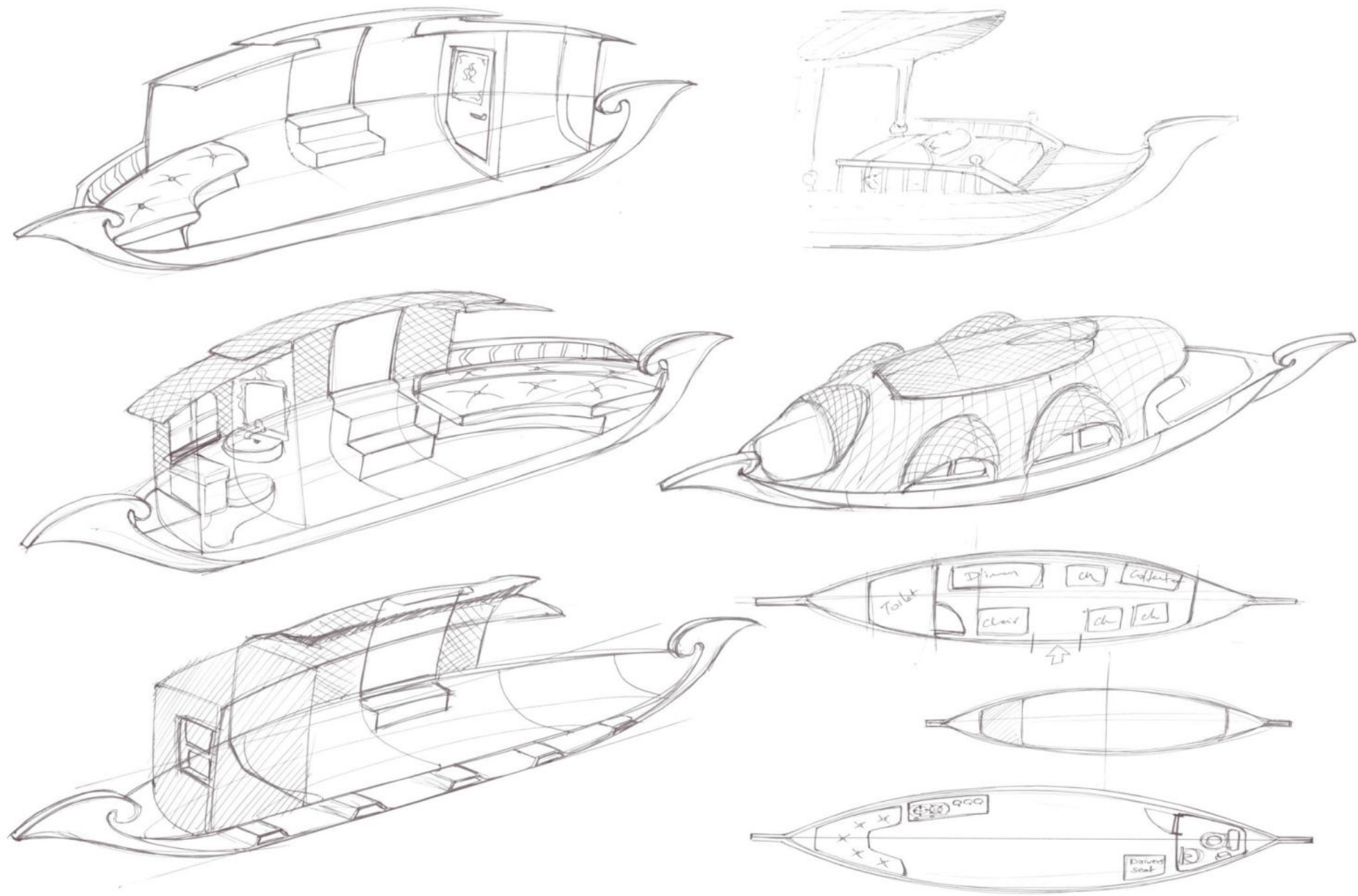
I tried to get an idea of the existing style of boat design by copying the boats I saw, traditional Kerala houses and the designs on them also caught my eye. It became clear to me that to be able to successfully design a traditional Kerala boat, one must first have a good understanding of traditional Kerala architecture.



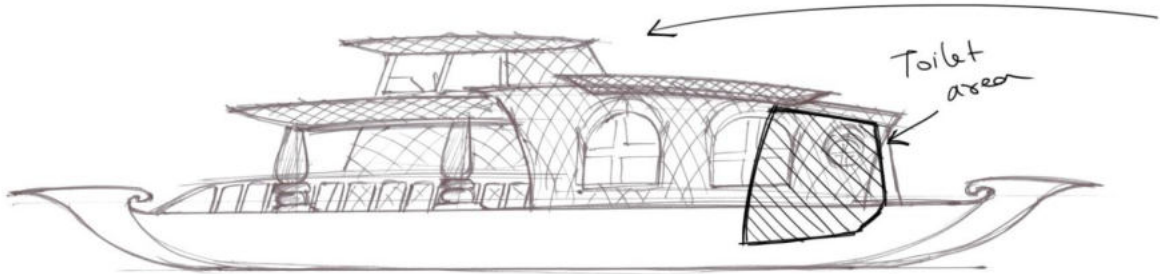
Ideation sketches #1



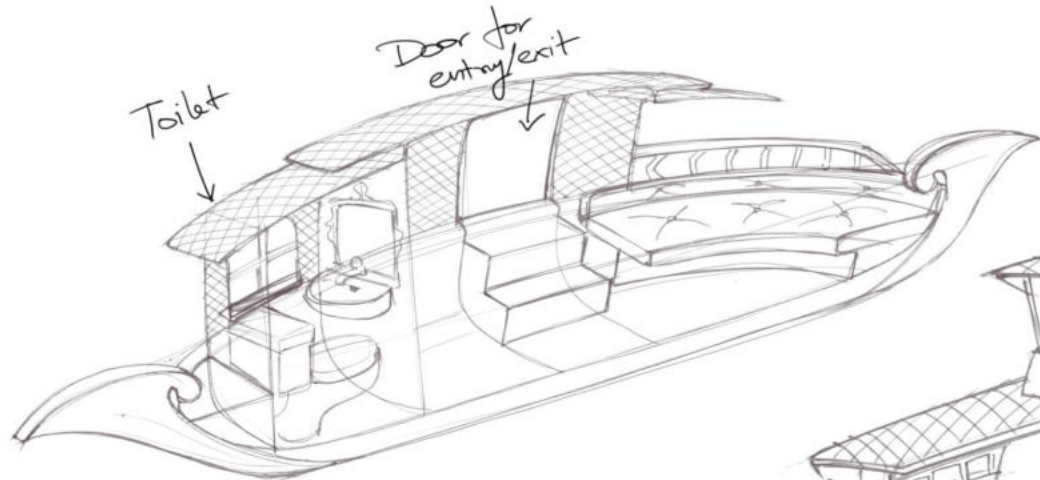
Ideation sketches #2



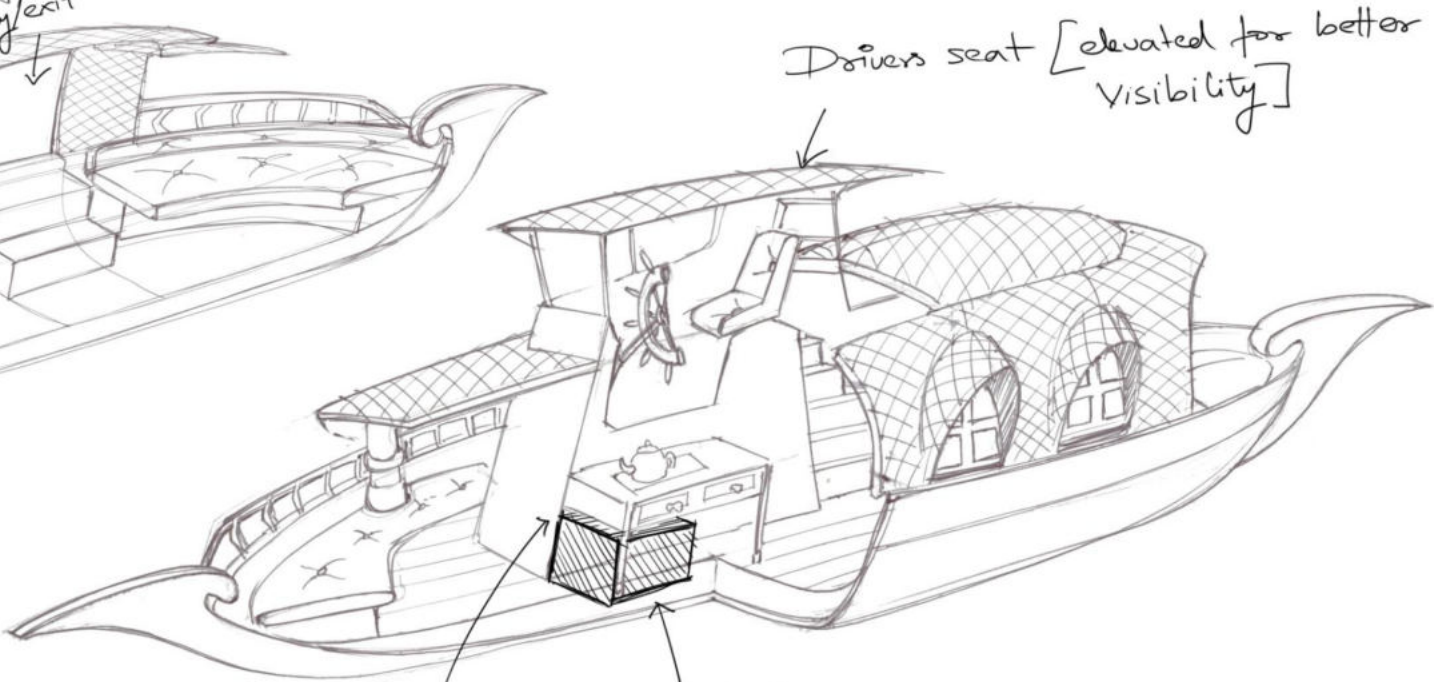
Concept sketches #1



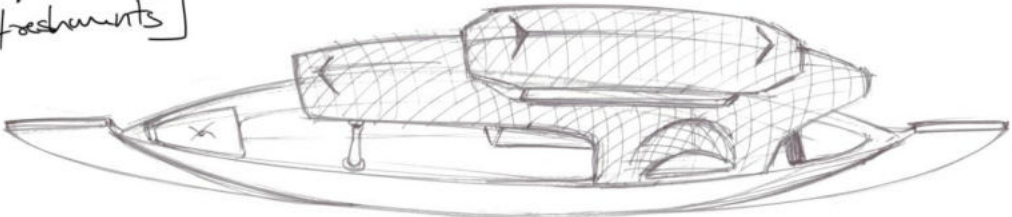
[Driver usually sits in the rear, Since the toilet is there in the new design → the drivers seat is moved to the front]



Rear 3/4 view.

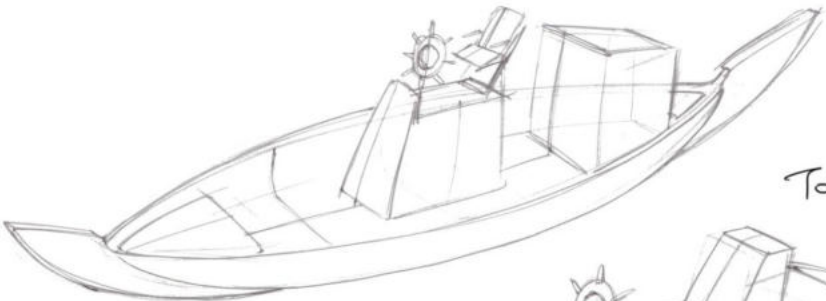
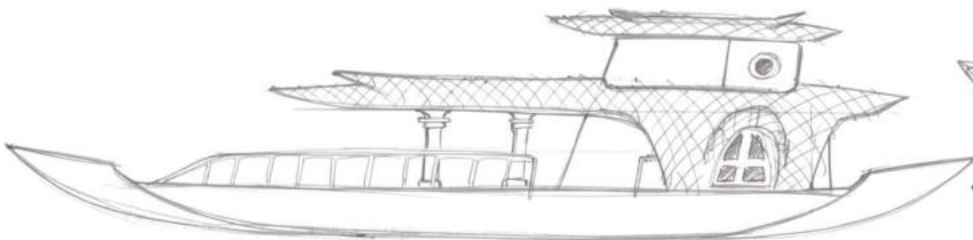


Front 3/4 view.



Concept sketches #2

[Kerala boat + Modern Yacht design]

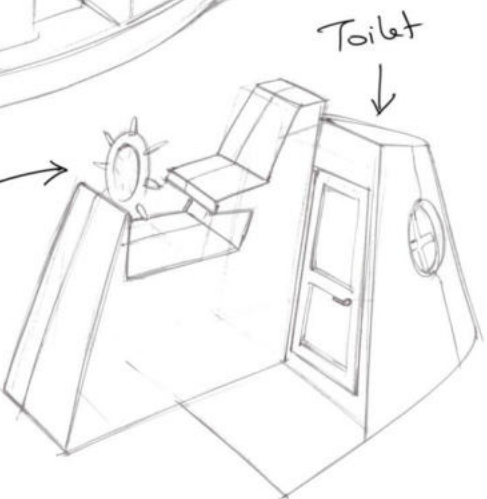


Frees up space in the front of the boat

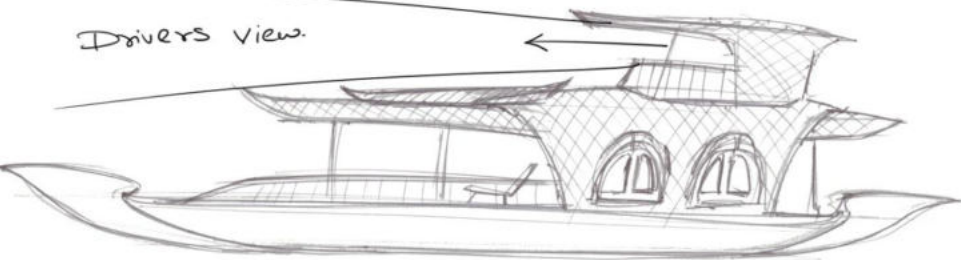


Drivers Cabin

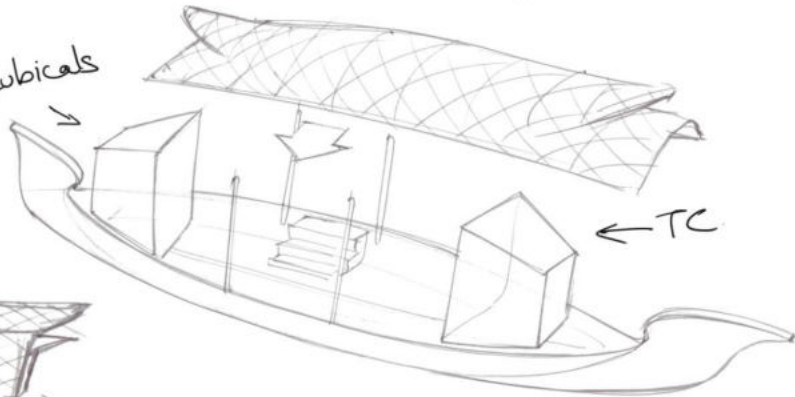
Toilet



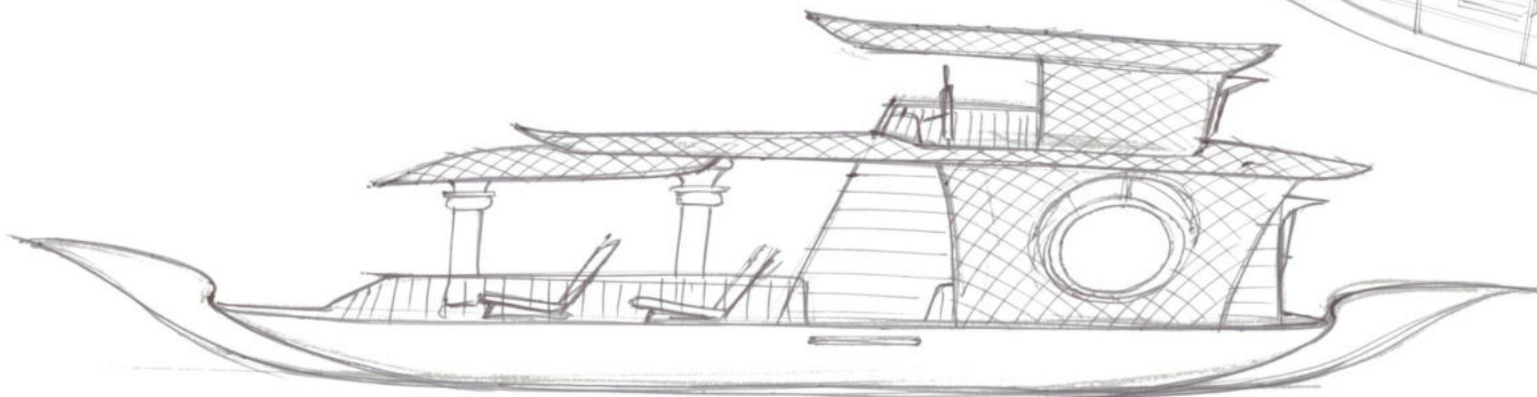
Drivers view.



Toilet Cubicals



TC



Commercial viability

Proposed boat

Manufacturing cost for one boat - 10,00,000 INR

Charge - 1000 for 2hrs/ 1400 for 3hrs/ 1700 for 4hrs and so on.
-Onboard refreshments, kitchen, toilet.

Daily earnings = 3,000 – 3,400 INR

Diesel price in Kerala - 60/litre * 5 litres a day
= 300 on fuel

One time cost of stove, icebox, crockery = 5,000

5kg LPG non subsidised cylinder = 360 (change every month)

Driver fee per day - 1000

That leaves 1800 – 2000 for maintenance/servicing, and the
Profit earned that day

= **500 days** or one and a half years to recover the initial boat cost.

Current boat

cost for one boat - 7,00,000 INR

Charge - 400/per hr
Average of 2hrs per trip and 3 trips a day

Daily earnings = 2,400 INR

Diesel price in Kerala - 60/litre * 5 litres a day
= 300 on fuel

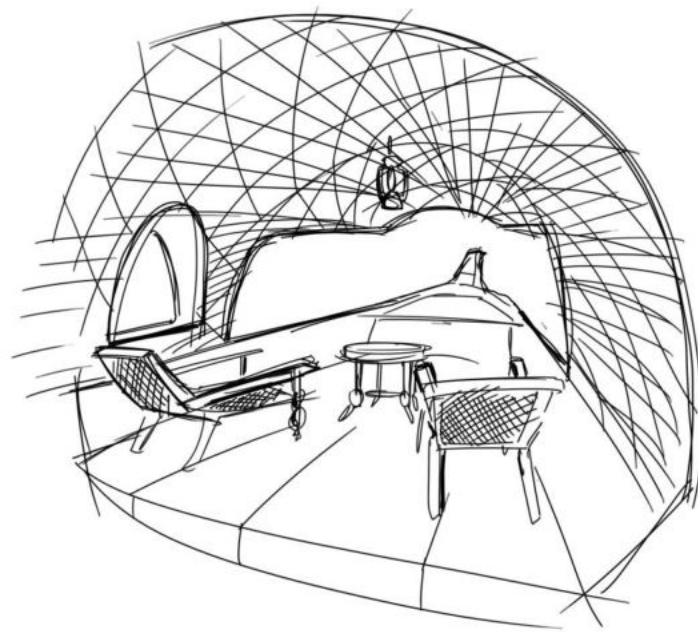
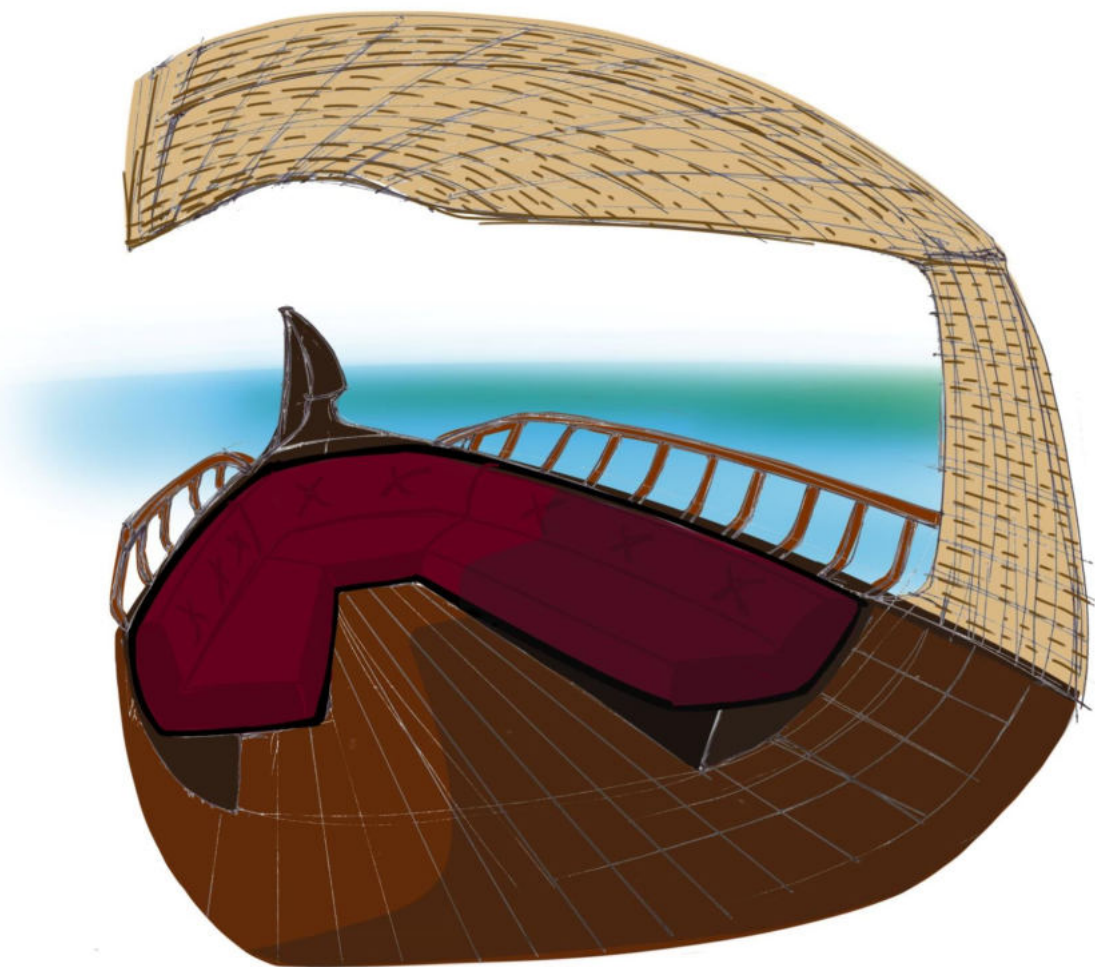
Driver fee per day - 1000

That leaves 1000 – 1100 for maintenance/servicing
And the profit earned that day

Cost of boat/profit earned in one day= 7,00,000/1000

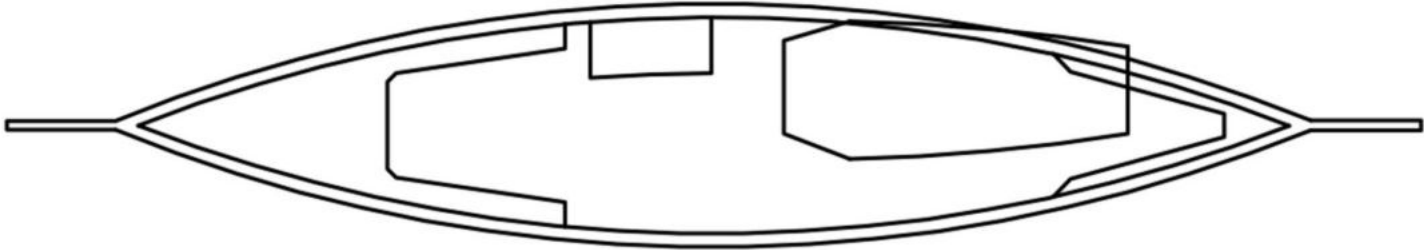
= **700 days** or close to 2years to recover initial boat cost.



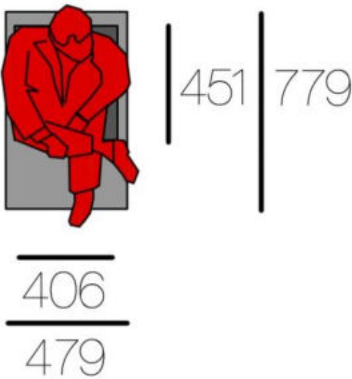




Packaging

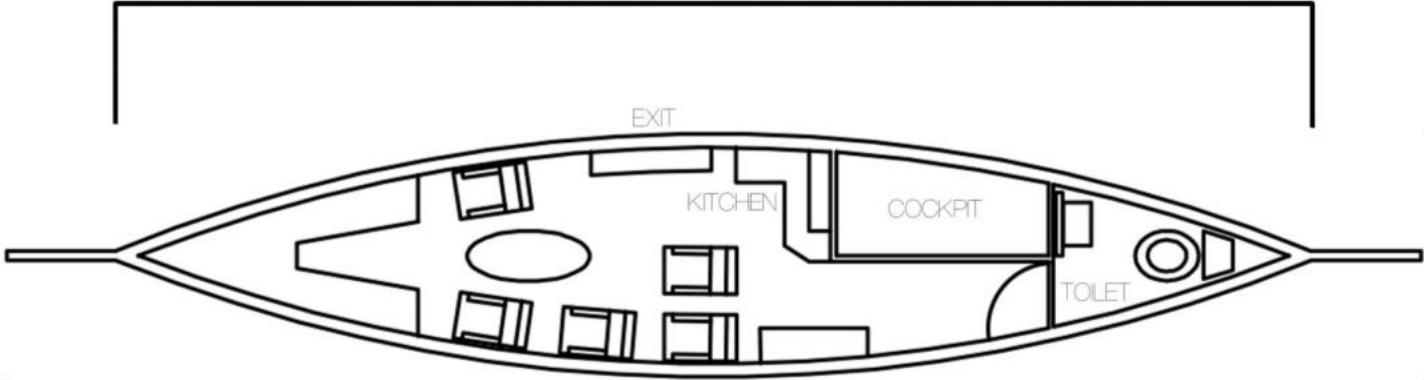


30 ft
9144 mm



Buttock to leg length, normal sitting - 779 mm
Buttock to popliteal length, normal sitting - 451 mm
Bi-deltoid - 406 mm
Seat width - 479 mm

Measurements taken from
"Indian anthropometric dimensions for ergonomic
design practice" - by Debkumar Chakrabarti



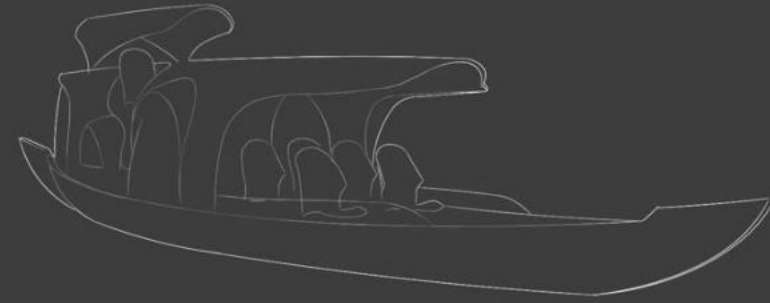
9 ft
2743 mm

35 ft
10668 mm

*diagram not to scale



Original concept by Rohit Karta)(DC,IITB)



Concept-detailing



Kopro vallam



Samudra

Ko  pra
vallam



