

Motorcycle for Indian youth

Submitted in partial fulfillment of the requirements
of the degree of

Masters of Design

by

Navneet Maharana
22M2282

Supervisor:
Prof. Unni Mohan M



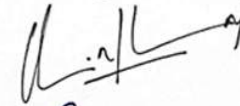
INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

2024

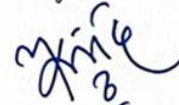
APPROVAL SHEET

This Mobility and Vehicle Design Project 3 titled 'Designing a crossover adventure sports bike' by Navneet Maharana is approved in partial fulfillment of the requirements for Master of Design Degree in Mobility and Vehicle Design, IIT Bombay.

Project Guide-



Chairperson-



Internal Examiner-



External Examiner-



DECLARATION

I declare that this written submission represents my ideas in my own words and where others ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated any idea/ data/ fact/ source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited of from whom proper permission has not been taken when needed.

A handwritten signature in black ink that reads "Navneet". The signature is written in a cursive style with a horizontal line underneath the name.

Navneet Maharana
22M2282

Date: 01 June, 2024

Mobility and Vehicle Design
IDC School of Design, IIT Bombay

ACKNOWLEDGEMENT

My project of 'Designing a crossover adventure sports bike' has been a great experience overall. It has taught me how to look at the problems faced by users on day to day basis and how to design for the people. All these wouldn't be possible without proper guidance so I would like to sincerely thank my guide, Prof. Unni Mohan for his valuable guidance throughout this project. Thank you for all the users and the people who contributed to my project by filling in all the details in the google form and spend hours explaining their riding stories and experiences. A big shout out to all my homies here in IDC for helping me out in every stage of the process from helping me out with the concept selection to 3D modelling to 3D printing to finally assembling the scaled physical model. It was all very overwhelming looking at those helping hands which I'll never forget. Thanks to each and every one of the beautiful souls who have their part in this project. It was a roller coaster and I'll always remember the journey.

ABSTRACT

The main aim of the project was to identify the needs and aspirations of the Indian youth motorcyclists. After the user research, the inference was to provide a fresh motorcycle design which can perform both daily commute as well as weekend long rides and can be launched soon.

A crossover adventure sports motorcycle category was identified in the middle weight segment (popular in the Indian market) and thereafter, numerous ideations were made. The final concept was developed with a design language inspired from the theme board (aspirations of the user persona) and detailed and rendered out in a way that it attracts the Indian youth to purchase and experience it.

CONTENTS

1. Introduction	1
2. Market research	2
2.1 Current scenario	2
2.2 Products study	3
2.2.1 Urban Sportsbike segment	4
2.2.2 Retro classic segment	5
2.2.3 Sports naked segment	6
2.2.4 Adventure segment	7
2.2.5 Cruiser segment	8
3. Design directions	9
3.1 Compact mobility	10
3.2 Crossover	11
3.3 Sports scooter	12
4. User research	13
4.1 Target users	13
4.2 Process of understanding the user	13
4.3 Lifestyle of the user	14
4.4 Questionnaire	16
4.5 User response	17
5. Inference	20
5.1 Crossover design direction	20
5.2 Journey map	21
6. Design brief	22
7. Product study	23
7.1 Motorcycle reviews	24
7.2 Benchmarking	29
8. User persona	31
9. Mood board	32
10. Theme board	33
11. Packaging	34
12. Ideation Sketches	35
12.1 Form development	35
12.2 Conceptual sketches	36

13. Concept renders	41
13.1 Concept 01	41
13.2 Concept 02	42
13.3 Concept 03	43
13.4 Concept 04	44
13.5 Concept 05	45
13.6 Concept 06	46
13.7 Concept 07	47
13.8 Concept 08	48
13.9 Concept 09	49
14. Final design conceptualisation	50
14.1 Frame design	52
14.2 Fairing	53
14.3 Front headlight detail	54
14.4 Fairing detail	55
14.5 Exhaust	56
14.6 Luggage tail rack detail	57
15. Views/ renders	58
16. 3D model	60
16.1 Stage 1 model	60
16.2 Stage 2 model	63
16.3 Stage 3 model	66
17. Final concept renders	69
18. 1/5 scale physical model	79
19. Reference	82

1. INTRODUCTION

Gen Z and millennial kids who are motorcycle enthusiasts use their motorcycles on a very regular basis. Throughout the year, they visit different places and have a different type of riding. They do weekdays ride to their workplaces (college, office etc) and weekends getaways to offbeat places which are on the outskirts of cities. Once in a month or in a couple of months they also do long rides to beaches or mountains as well.

These riders have a specific type of lifestyle which revolves around their motorcycles mostly and thus have specialised needs and requirements.

Most of them already have a motorcycle and are looking forward to another motorcycle which is a upgraded version of the existing one. Upgrade in the sense of engine power delivery, comfort, technologically advanced, electronic assists, better handling, more functional and a overall better experience.

Looking at this growing market, various companies have launched motorcycles in the middle weight segment (Indian premium segment i.e. 400-600cc segment which costs around 5 lakhs Indian rupees) which adds a premium factor to the commuter segment and these riders are getting attracted towards this segment.

Thus, this project is aimed at understanding the lifestyle of these type of users and their specific needs and requirements and then come up with a motorcycle design which will be able to give them a better riding experience. The project will also dive into the study of the current offerings in the market and create an analysis to figure out what lacks and to provide the same to the users, the young Indian motorcycle riders.



2. MARKET RESEARCH

2.1 Current situation

The current state of Indian motorcycle Industry

The Indian motorcycle industry is on the rise and currently we can see numerous companies entering the Indian market with new and fresh models targeting the young riders with middle weight segment. Some of them are also collaborating with the Indian companies for better reach to the customers. Here are some news clips stating the same that there has been a rise in the motorcycle industry.

India 2023. Two-Wheeler Market At The Best Out Of Last 4 Years

By MCD Team - 3 January 2024

76391



Triumph Speed 400

India's mid-size motorcycle market to continue to attract new players and models

Looking at the wholesale data for the first quarter of FY2024, it is clear that barring a few competitors and models, Royal Enfield continues to dominate the sales in the mid-size segment.

Written by Nilesch Wadhwa

July 19, 2023 08:00 IST

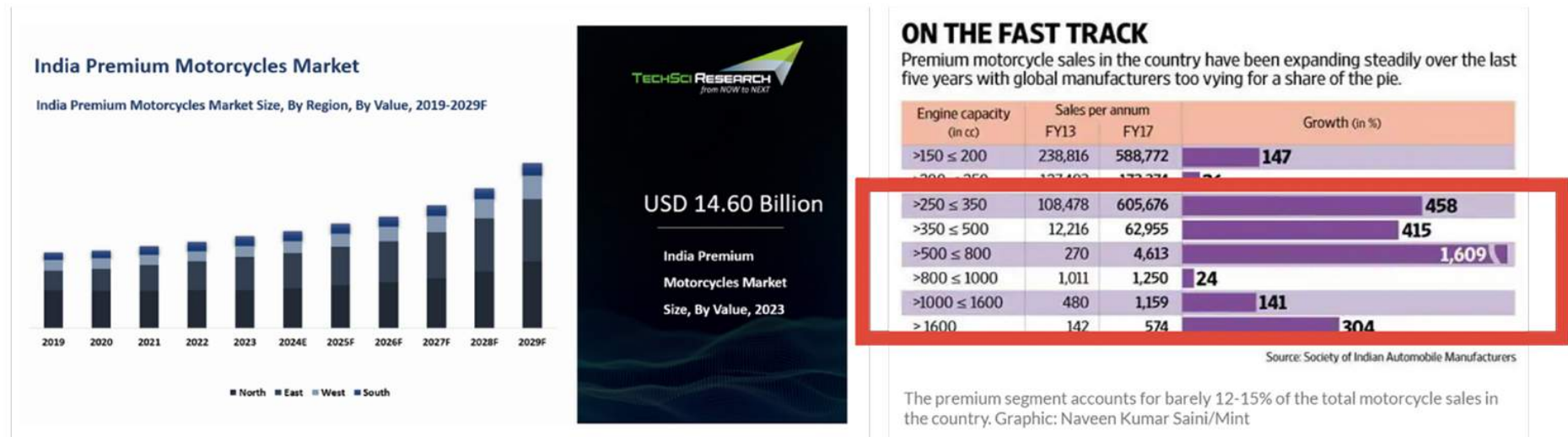


BMW G310R, Honda H'ness cb350, Triumph Speed 400 and Harley-Davidson X440 are key examples of global two-wheeler makers partnering Indian companies to design and manufacture entry-level products in the country.

2.2 Products study

In the Indian motorcycle market, there are numerous motorcycles which are being offered by different manufacturers which lie in the middle weight segment and it is growing exponentially. There are various reasons why this is happening as the Indian youth's purchasing power is increasing. Below shown graphics also show that the Indian premium motorcycle market is on the rise and is predicted to rise exponentially and that too numbers are showing that the 500-800cc is the most preferred and go to segment as the largest growth is shown in that particular segment.

Thus, it is required to do an analysis amongst the competition of what all categories of motorcycles are being offered in the market and what is the price range and which motorcycle is most preferred and the reason behind it.



2.2.1 Sportsbike segment

There are various companies offering sportsbike in their product line which lies in the middle weight segment. These are single cylinder or parallel twin 300-500cc motorcycles which attract the young Indian customers because they provide better experience than the commuters segment. Below mentioned are some motorbikes in the competition in the Indian market.

KAWASAKI NINJA 300 3.43 L/-



BMW G 310RR 2.90 L/-



APRILIA RS457 4.10 L/-



YAMAHA R3 4.65 L/-



SPORTSBIKE

2.2.2 Retro classic segment

There are various companies offering retro classic segment motorbikes in their product line which lies in the middle weight segment. These are single cylinder or parallel twin 300-650cc motorcycles which attract the young Indian customers because they provide better experience than the commuters segment. Below mentioned are some motorbikes in the competition in the Indian market.

TRIUMPH SPEED 400 2.30 L/-



HARLEY DAVIDSON X440 2.40 L/-



HONDA CB 350 RS 2.00 L/-



RE CONTINENTAL GT 650 3.20 L/-



RETRO CLASSIC

2.2.3 Sports naked segment

There are various companies offering sports naked segment motorbikes in their product line which lies in the middle weight segment. These are single cylinder or parallel twin 300-500cc motorcycles which attract the young Indian customers because they provide better experience than the commuters segment. Below mentioned are some motorbikes in the competition in the Indian market.

KTM DUKE 390

2.95 L/-



TVS APACHE RTR 310

2.43 L/-



YAMAHA MT-03

4.60 L/-



HUSQVARNA SVARTPILEN 401

2.92 L/-



SPORTS NAKED

2.2.4 Adventure segment

There are various companies offering adventure segment motorbikes in their product line which lies in the middle weight segment. These are single cylinder or parallel twin 300-500cc motorcycles which attract the young Indian customers because they provide better experience than the commuters segment. Below mentioned are some motorbikes in the competition in the Indian market.

RE HIMALAYAN 450

2.85 L/-



BMW G310 GS

3.29 L/-



KTM 390 ADV

3.39 L/-



YEZDI ADVENTURE

2.18 L/-



ADVENTURE

2.2.5 Cruiser segment

There are various companies offering cruiser segment motorbikes in their product line which lies in the middle weight segment. These are single cylinder or parallel twin 300-650cc motorcycles which attract the young Indian customers because they provide better experience than the commuters segment. Below mentioned are some motorbikes in the competition in the Indian market.

RE SHOTGUN 650

3.59 L/-



RE SUPER METEOR

3.64 L/-



JAWA PERAK

2.09 L/-



KEEWAY V302C

3.89 L/-



CRUISER

3. DESIGN DIRECTIONS

There can be different design directions depending on the user needs and aspirations. Right now 3 different directions can be thought of after understanding the case.

3.1 Compact Mobility

There can be a possibility of exploring this design direction as this aims to design a contemporary vehicle which as the name suggests is compact in dimensions and caters to the needs of urban mobility. This type of mobility has its own advantages and disadvantages and thus needs to be studied and understood in depth in order to explore and develop it further as a solution.

3.2 Crossover

This design direction suggests that there is a need of amalgamating 2 or 3 different categories of motorcycle to develop another category which has the positives of both the worlds. Understanding the needs, wants and aspirations of the user and their day to day experience will lead to certain inferences through which it will be clear which particular segments of motorcycles to be experimented with.

3.3 Scooter

Scooter has been there in the Indian market since very long and has been widely accepted by the Indian youth as well. And thus, there are various manufacturers who have different models of scooters in their product lineup. Scooter also has its own advantages and disadvantages and thus after user study is done, it will be clear whether or not this direction should be proceeded with.

3.1 Compact Mobility



Designing a compact mobility can be one of the certain design direction due to the fact that the Indian cities have been over populated with people and vehicles and thus compact mobility can resolve a lot of issues. Lesser footprint will lead to easy traffic filtering and easy maneuverability which will definitely enhance the user experience.

BMW CE 02 E-Bike- This is the latest design by BMW aimed for the generation Z. They have designed this e-bike in a compact proportions and have incorporated technological and fun elements to it.

3.2 Crossover



A crossover motorcycle between 2 or 3 categories of motorcycles can also be a certain design direction that can be worked upon. Depending on the user research and their wants and aspirations, different categories of motorcycles can be identified and married together for a perfect amalgamation which can function the best for the user.

BMW S1000 XR- This motorcycle is considered as a crossover between an adventure motorcycle and a sportsbike which enables the rider to do both tasks smoothly and efficiently.

3.3 Sports scooter



Different platforms and categories of 2 wheelers are being experimented with in the recent times and one such platform is stepthrough scooter with a modern design. Yamaha Aerox, for example, has a different road presence altogether and thus riders are attracted towards the vehicle which inturn increases its selling point.

Yamaha Aerox- This scooter has been launched in the Indian market targetting the youth and thus the design of the scooter is also made in such a way which caters to the Indian youth.

4. USER RESEARCH

4.1 The target users

The target users are millennials and Gen Z kids who are motorcycle enthusiasts who ride their motorbikes on a regular basis. Understanding what they do and how their lifestyle is which is majorly influenced by their riding habits will provide data which will help in providing design solutions.

These users already have their first motorcycle and have a lot of experience in city riding and some experience in long rides as well. They mostly use their motorbikes to commute on weekdays to their workplace and back at home and go for weekend rides to offbeat places which are located on the outskirts of the cities they live in. Some of them have also ridden their motorbikes to long distances such as mountains etc.

And thus they are in the position of buying their second bike which can perform the above mentioned in the best efficient way providing them the comfort and better riding experience.

4.2 The process

Users will be asked to share their past riding experiences which will include their profession, their hobbies, the bike they own currently and the bike they aspire to own in the future. They will also be asked which motorcycle they are planning to buy next and their dream motorbike and the segment which they think suits them the best.

Lastly more information will be gathered from them regarding their needs, wants and aspirations related to motorcycles, the problem they face and what solutions they think can mitigate the same.



4.3 Lifestyle of the users

As mentioned earlier, most of the users already own a motorcycle and are now planning to buy their second motorcycle.

Referring to the image earlier, it shows the lifestyle of the user. He works in a corporate environment and thus needs to constantly show his status quo to his peers through his personality and the products he possess. His lifestyle includes working in a corporate office on weekdays and partying on weekends.

As a motorcycle enthusiast, his life revolves more or less around motorcycles only as he prefers to go on weekend rides with his group of friends. He also goes to automotive events regularly. He is very active on social media and has an instagram account where he posts about his life and mostly his motorcycle and the vlogs he make. He is a content creator and has a youtube channel as well where he posts long videos of the vlogs. He also tries to keep himself in shape and goes to gym regularly.

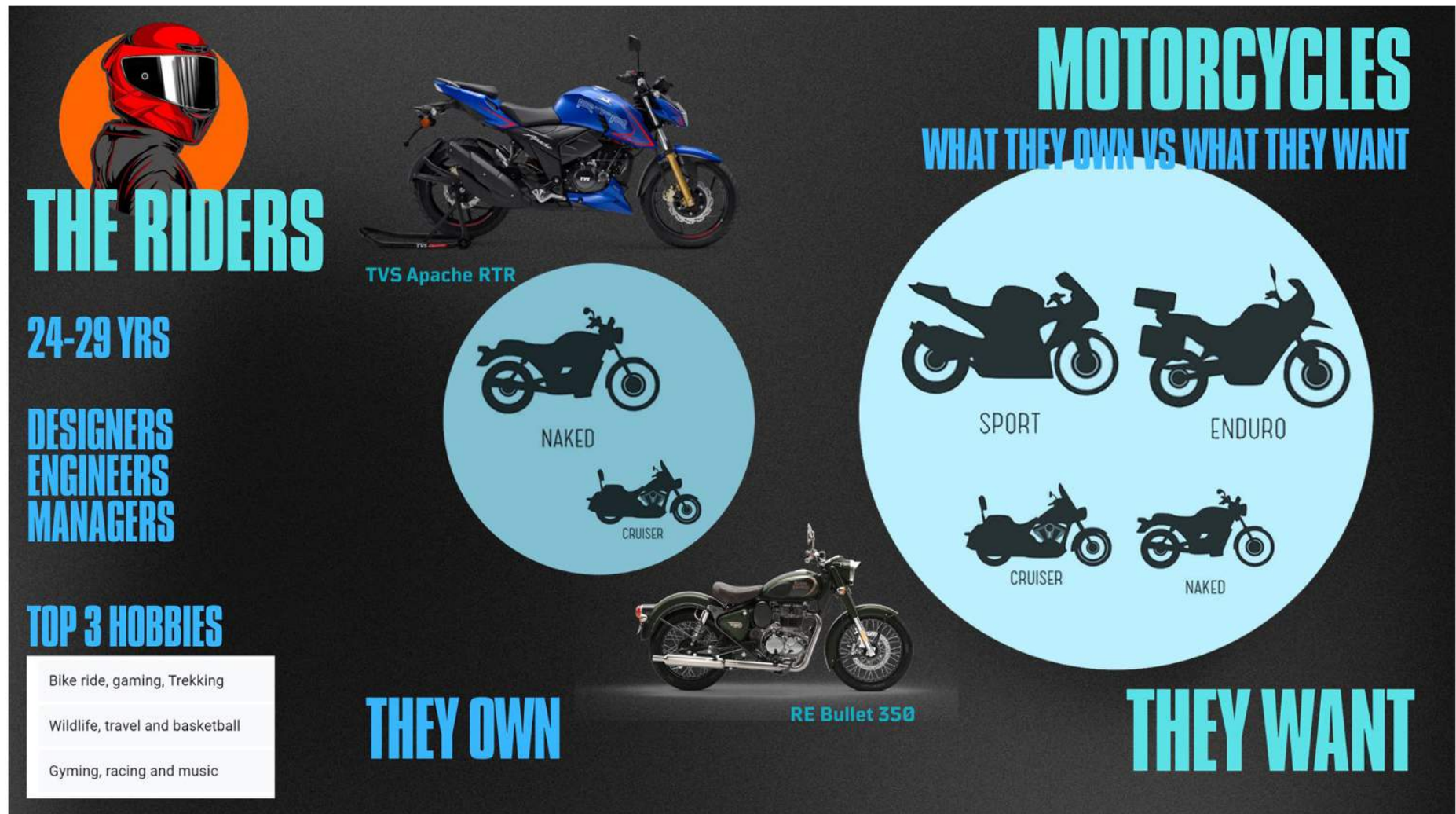


4.4 Questionnaire

1. Name
2. Age
3. Gender
4. Profession
5. Top 3 hobbies/ interests
6. Do you love motorcycles?
7. Do you own a motorcycle? If yes, which beast?
8. Which motorcycle are you planning to buy next? or wish to own one day?
9. Which segment of motorcycle will be best suited for you?
10. What is frequency of your motorcycle riding?
11. On an average how much distance you travel in a day?
12. For what all purposes do you use your motorcycle? (select multiple if you wish)
13. What is the craziest thing you did with your motorcycle?
14. As per your experience, what changes you'd like to have to your bike for better experience. Anything.
15. What are your aspirations/ wants/ needs related to the upcoming new motorcycles in the Indian market? How new motorcycle design can help you?
16. What are your opinions on electric motorcycles? Will you buy one for yourself or will you still stick to the petrol engine?

4.5 User response

The below image is a condensed response of the questionnaire by numerous target users. Most of the users have TVS Apache RTR and RE Bullet 350 as their current motorcycle. When asked which segment they prefer to own, they responded with Sportsbike segment and Adventure segment but currently they own a completely different segment as shown below.



Other responses to the questions were as follows- they were asked which motorcycle segment they think suit them the best, and the response were- naked sports, city-sports and adventure motorbikes. They think these segments will perform the way they way efficiently and comfortably.

They were also asked about their riding experiences and their travel stories which explained a lot about the problems they faced and how they coped up with them.

MOTORCYCLES

WHICH SEGMENT BEST SUITED?

RETRO

SPORT

ENDURO

STORIES

Travel to Ladakh

Recently we went on an off road trip in Karnataka. Definitely not recommended for cruisers. Crazienes come down with maturity 🤔

modifying lights then adding some stock gears for adventure

Rode for 22 hours in a day, Explored some off-road trails in Uttarakhand.

Riding solo in the hinterlands of Himalayas.

Racing unknown drivers on the road.

I ride.

Every ride tbh

Went to shimla from delhi

RIDE RIDE RIDE

DAILY COMMUTE WEEKEND RIDES

When asked about their needs, wants and aspirations regarding motorcycles, these were some of their responses in the image shown below. These responses have come through their experiences and what all they require in their next motorcycle which they are planning to buy keeping in mind the available options in the market.

As seen in the responses below, most of them are leaning towards the sub 5 lakh category which has been mentioned earlier in the report.

MOTORCYCLES WANTS/NEEDS/ASPIRATIONS

With increasing buying power , the sub 5 lakh market seems like a sweet spot with a lot of potential for enthusiasts but is still largely vacant . The aspirational premium in this range would be amazing .

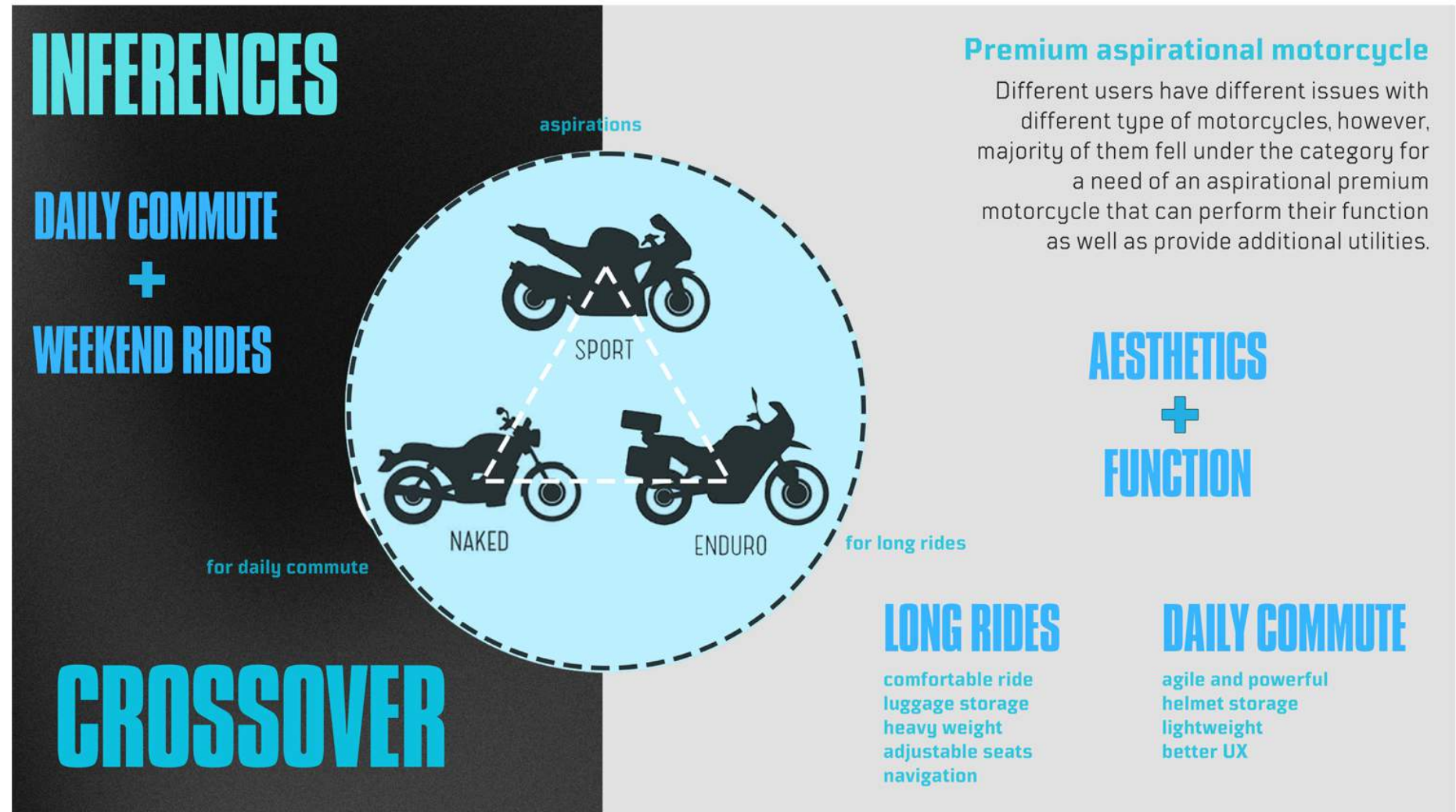
- Design , comfort long rides , tailored for Indian potholes
- I think a compartment for racking up my jacket /helmet
- Adaptive Suspensions
- Seat adjustments, for long rides. Have more comfortable seats for long rides.
- If it came with easy swap tail rack and saddle stay.
- Better seating position with nice cushion seat
- may be in-built screen to access maps
- Lower vibration, comfortable seating/posture, silent and smooth travel, storage space, enhanced micro interaction and tangible user experience.
- A better riding position.
- More distance and less charge time in EV, Better helmet and other accessories placement
- riding position and speed throttle
- Adjustable handle bars and foot peg
- Navigation
- Seat. Ass should not pain after a ride.
- Customisation feature
- Small interactions with the roads and traffic, attention to details of riding user experience.
- Adventure bike Design similar to bmw and triumph
- Better tech integration and focus on driver safety and rider behaviour.
- New motorcycles should have some more safety features like, ADAS , Airbags in cars. Motorcycles are fun but they should become safer.
- MINIMAL AND DECENT DESIGN EDGY AND SPORTY
- more efficient and experience providing
- Better build quality , sleeker design , use of modern technology
- Vehicle adjust itself for the riders best ergonomic posture and ride modes
- Comfortable seats
- Green commute options and safety
- Looks, reliability and smoothness
- Able to modify bikes with ease.
- Indian motorcycle industry has grown so much following that I would expect more collaborations and great engineering from Indian motorcycles makers.
- Some makeshift safe addons which can make the bike more utility friendly.

5. INFERENCE

5.1 Crossover design direction

According to the user research, it has been found that the users need a motorcycle which can perform both in weekdays as well as weekends in the best efficient and comfortable way.

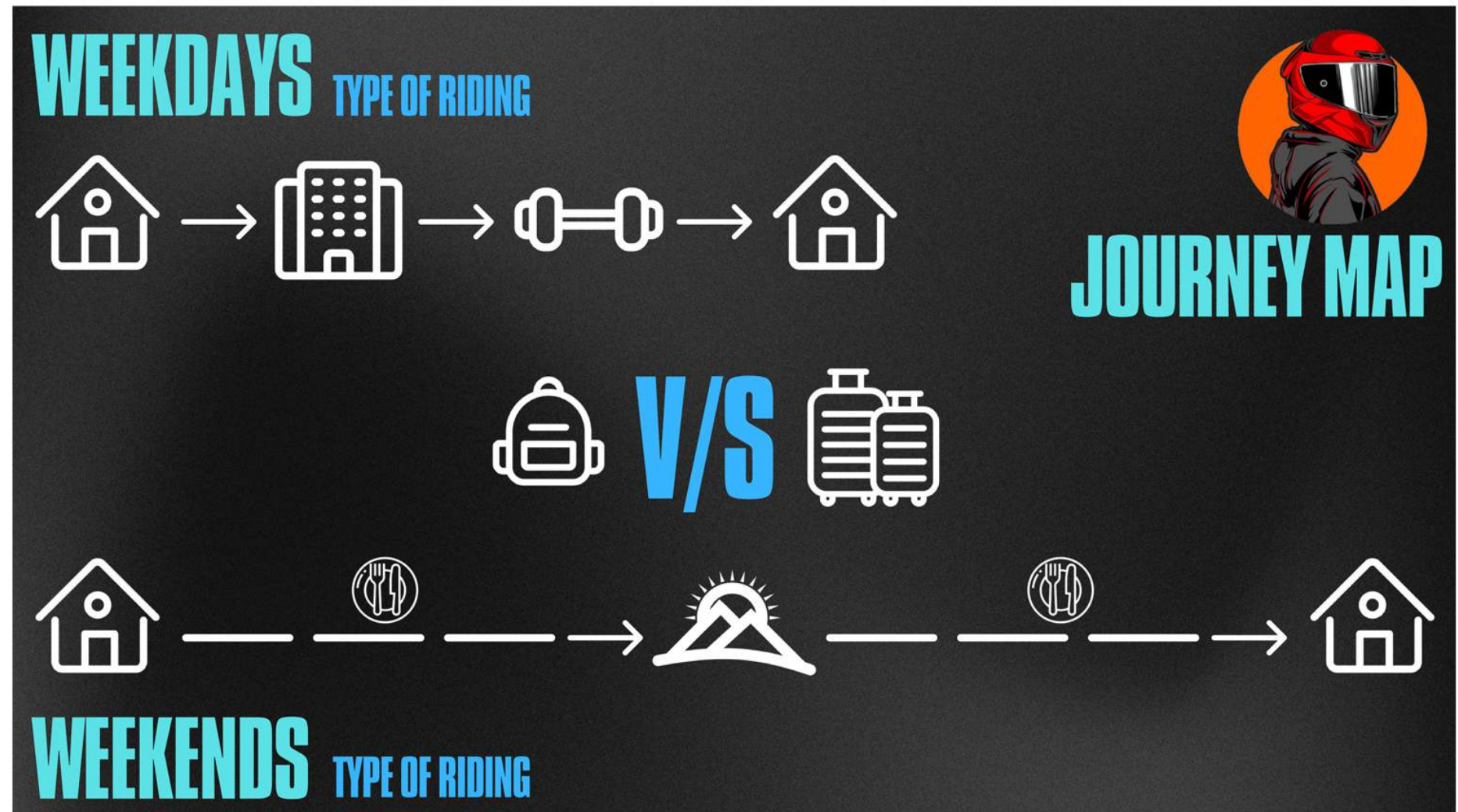
They are looking forward to a motorcycle which can do daily commute and long rides both. They need a motorbike which is agile and powerful for riding and maneuvering in city traffic and should be comfortable enough for long weekend rides. It should also provide functions of luggage storage etc which is beneficial for riding long distances with luggage.



5.2 Journey map

Through user research it has been identified that there are 2 types of journeys that the riders perform.

First is the weekdays type of riding which involves short distance commutes with less luggage and the second is weekends type of riding which includes long distances with more luggage as shown in the graphics below.



6. DESIGN BRIEF

Designing a motorcycle that caters to the needs and aspirations of the Indian youth who are motorcycle enthusiasts.

This will require identifying a crossover platform which is an amalgamation and a perfect blend for daily commute as well as long rides.

The design should have the positives of both the worlds i.e. agile and powerful for quick maneuverability in city traffic while doing daily commute and also should be comfortable and have luggage storage for large distances while doing weekends getaways.

Crossover adventure sports motorcycle

According to the user research, a crossover adventure sports motorcycle is the platform that should be explored. This design direction will help mitigate the current problems faced by the users and parallelly caters to the special needs and aspirations of the young Indian motorcycle riders.

And as per the Indian motorcycles' market research, the motorcycle should be in the middle-weight segment i.e. 400-600cc segment which is currently booming and the price range would be sub 5 lakhs which will be competitive with the market.

Also the dimensions and specifications of the motorcycle will be decided after studying the products and benchmarkings which will provide a concrete base for the specifications.

Premium motorcycle

To design a motorcycle in the premium Indian segment which caters to the aspirations and needs of the young riders. Development of a crossover platform which is an amalgamation and a perfect blend for daily commute as well as long trips.

An amalgamation

It has to have the positives of both the worlds. Agile and powerful for quick maneuverability and comfortable plus storage for large distances especially the weekend rides.

COMFORTABLE RIDING DYNAMICS

AGILE

MODULAR STORAGE

POWERFUL

BETTER INTERACTION AND UX

7. PRODUCT STUDY

7.1 Motorcycle reviews

It is now required to analyse in-depth the motorcycles that are available in the Indian market and compare them on the basis of the criterias that are required to design a new motorcycle.

It should be noted that both the primary and secondary analysis has been considered in this process. There are a lot of information online by motorcycle reviewers which has been considered as secondary data while in person riding of some of the motorcycles has also been done to collect the primary data.

Listed below are the motorcycles that were ridden to get the first hand experience -

1. Royal Enfield Himalayan 450
2. Royal Enfield Scram 411
3. KTM Adventure 390
4. Honda CB200X
5. Hero Karizma XMR

The reason behind riding these particular segment of motorcycles is due to the fact that the design brief is to design a crossover adventure sports motorbike and thus some of the available motorcycle in the Indian market in these segment and under the category of sub 5 lakhs are mentioned above which were test ridden to get the first hand experience.

1. Royal Enfield Himalayan 450

This motorcycle is designed for adventure purpose. And this is the updated version of the Himalayan 450. The soul purpose of introducing Himalayan in Royal Enfield product line-up is due to the fact that they want a motorcycle which is designed solely for the purpose of adventure through Hiamalyas. The inferences after getting the test ride are stated below-

PRODUCTS STUDY

RE HIMALAYAN 450



WEEKDAYS

4

WEEKENDS

10

Inference

The motorcycle feels way too big, very big tank, wide handlebars. It does feels like a heavy motorcycle. The updated instrument cluster is very big and attracts attention. The motorcycle feels very stable though perfect for weekend rides for very large distances. The upright position and dynamics are upright but it feels very difficult to maneuver through traffic.

2. Royal Enfield Scram 411

This motorcycle is a toned down version of the Himalayan. A toned down adventure motorcycle that can be used in the city daily commuting is what this motorcycle is for. As stated in the inference also, the overall dynamics of the motorcycle tends to aim for the perfect amalgamation. The inferences after getting the test ride are stated below-

RE SCRAM 411



PRODUCTS STUDY

WEEKDAYS

6

WEEKENDS

8

Inference

The motorcycle feels less intimidating than Himalayan 450.

It lacks the feel of premium-ness that RE tends to offer in their products.

The handlebar is perfect for both weekdays and weekends rides but the tank feels way too small and compact.

The overall dynamics of the motorcycle tends to aim for the perfect amalgamation.

3. KTM Adventure 390

This motorcycle is also designed for the purpose of adventure. KTM Adventure as a product has been acclaimed as one of the best motorcycle for adventure all over the world. Also due to its perfect dynamics it performed very well in the city daily traffic as well and thus has been given an almost perfect score. The inferences after getting the test ride are stated below-

PRODUCTS STUDY

KTM ADV 390



WEEKDAYS

9

WEEKENDS

10

Inference

The motorcycle has the perfect balance all over.
Saddle is hard but the Apex suspensions work very great.
The saddle height is a bit high but the handlebar and foot pegs are perfectly balanced.
The motorcycle can be very easily controlled in traffic due to the perfect dynamics.

4. Honda CB200X

This motorcycle does not come under the category of middle weight motorcycle but the ergonomics that this motorcycle provides comes very close to what the design brief intends to find. The inferences after getting the test ride done on this motorcycle is stated as below-

HONDA CB200X



PRODUCTS STUDY

WEEKDAYS

7

WEEKENDS

8

Inference


The motorcycle has the perfect dynamics for both weekdays riding as well as weekend rides. The power delivery was something that lacked. The motorcycle overall has a perfect balance and weight for traffic riding as well.

5. Hero Karizma XMR

This motorcycle also does not come under the category of middle weight motorcycle. This motorcycle is a city sports motorcycle which in part is the requirement of the design brief as it comes under the aspiration of the users. The inferences after getting the test ride done on this motorcycle is stated as below-

PRODUCTS STUDY

HERO KARIZMA XMR



WEEKDAYS	WEEKENDS
8	3

Inference

The motorcycle has the sportsbike dynamics which is different from other bikes. The handlebars are not that attacking but has a comfortable upright position. The motorcycle gives confidence for quick and fast riding and stopping.

7.2 Benchmarking



BMW S1000 XR



Ducati Multistrada pikes peak



Kawasaki Versys 1000



Suzuki GSX S1000 GX

MOTORCYCLE SPECIFICATIONS



BMW S1000 XR

After understanding the products available in the Indian market which are majorly adventure motorcycles and the benchmarks which are top end 1000cc Adventure tourer, mentioned earlier, which lies closest to the segment to be designed- crossover sports adventure motorcycle, the motorcycle dimensions and specifications are decided and mentioned.



KTM ADV 390

Motorcycle dimensions-

- Width- 900 mm
- Length- 2100 mm
- Height- 1300 mm
- Saddle Height- 820 mm
- Ground Clearance- 200 mm
- Wheelbase- 1400 mm

Engine specifications-

- Hybrid powertrain- ICE + Battery
- ICE- 500cc twin parallel
- Battery- 10kW traction motor

8. USER PERSONA

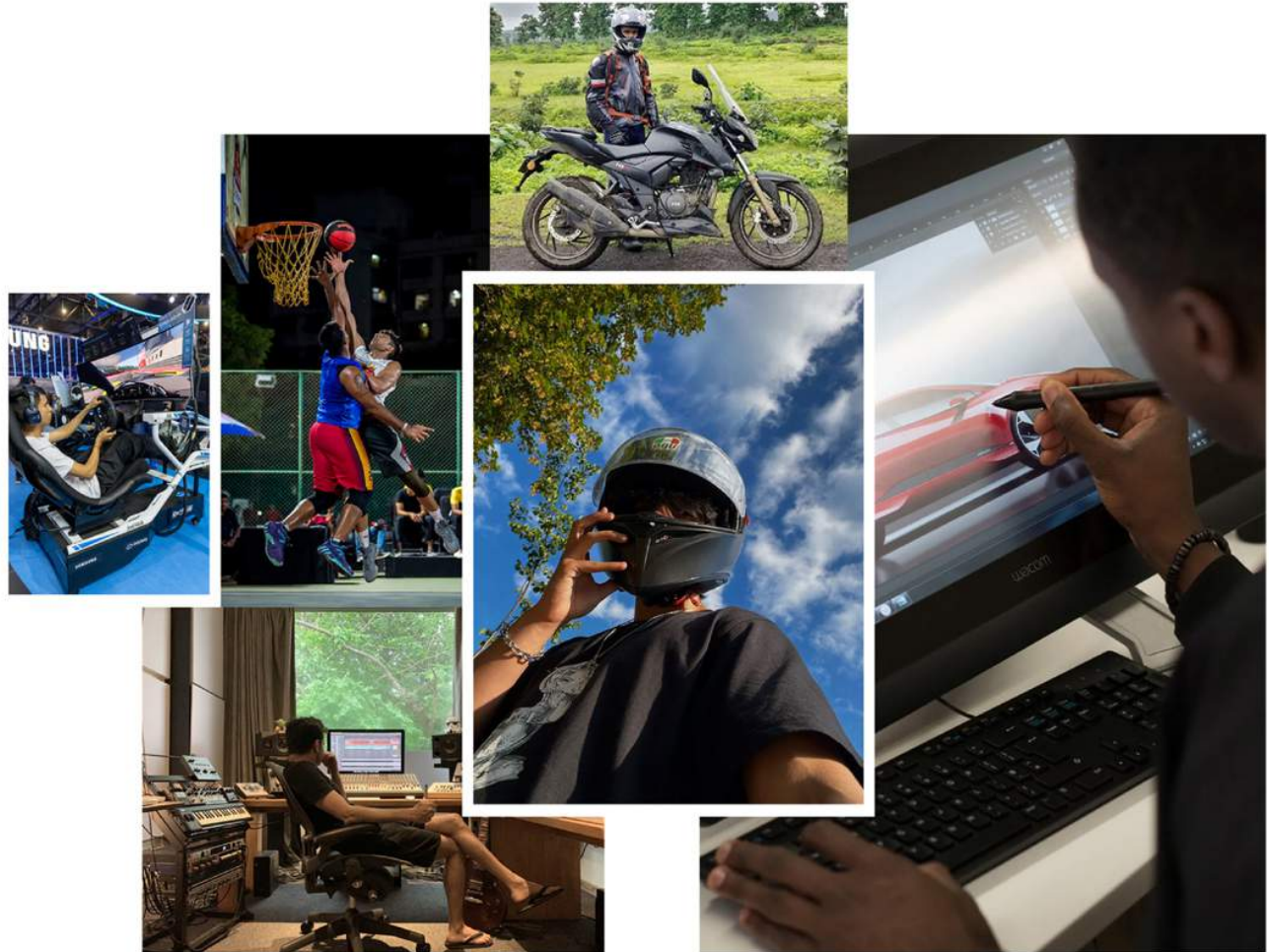
Arpit Aggarwal

The user persona is a 28 yr old boy who lives in Delhi and has just joined a corporate office as an automotive designer. He has Apache RT 200V as his first motorbike and is now looking forward to buy a new motorcycle.

His hobbies are playing basketball and music production. He also goes out with his friends to play and party during the weekends. His personality is unique and wants to stand out everywhere he goes and thus likes to own products which are unique and stands out.

He is financially stable and is earning 12 LPA and thus is looking to buy his second motorcycle in the middle weight category. His preference is to buy an adventure bike which can also do the daily commute very efficiently. Also the design of the motorbike should be unique and stands out from the rest of the motorbikes on the road.

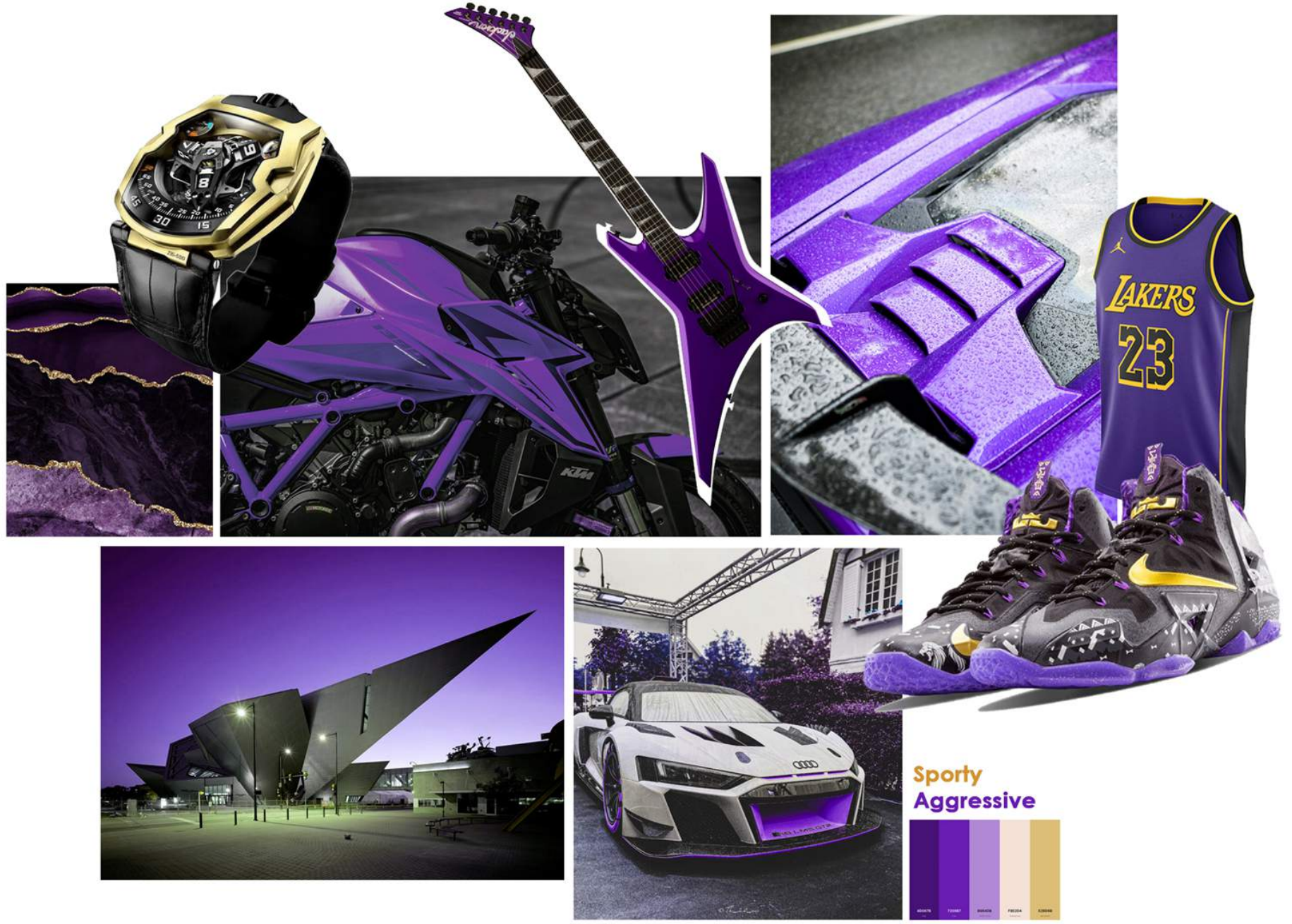
And thus to design a motorcycle for such a user will be a challenge.



9. MOOD BOARD

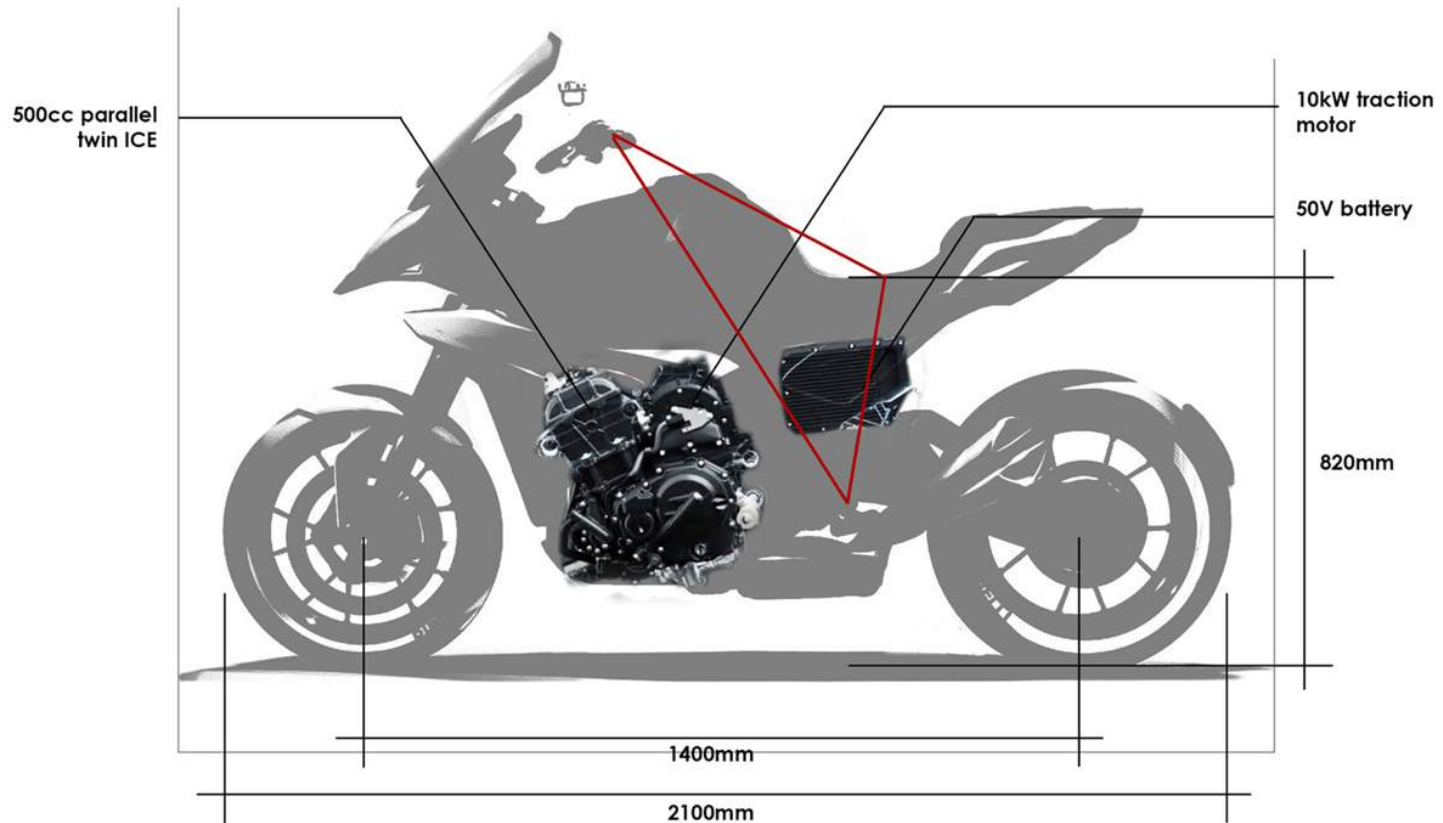


10. THEME BOARD



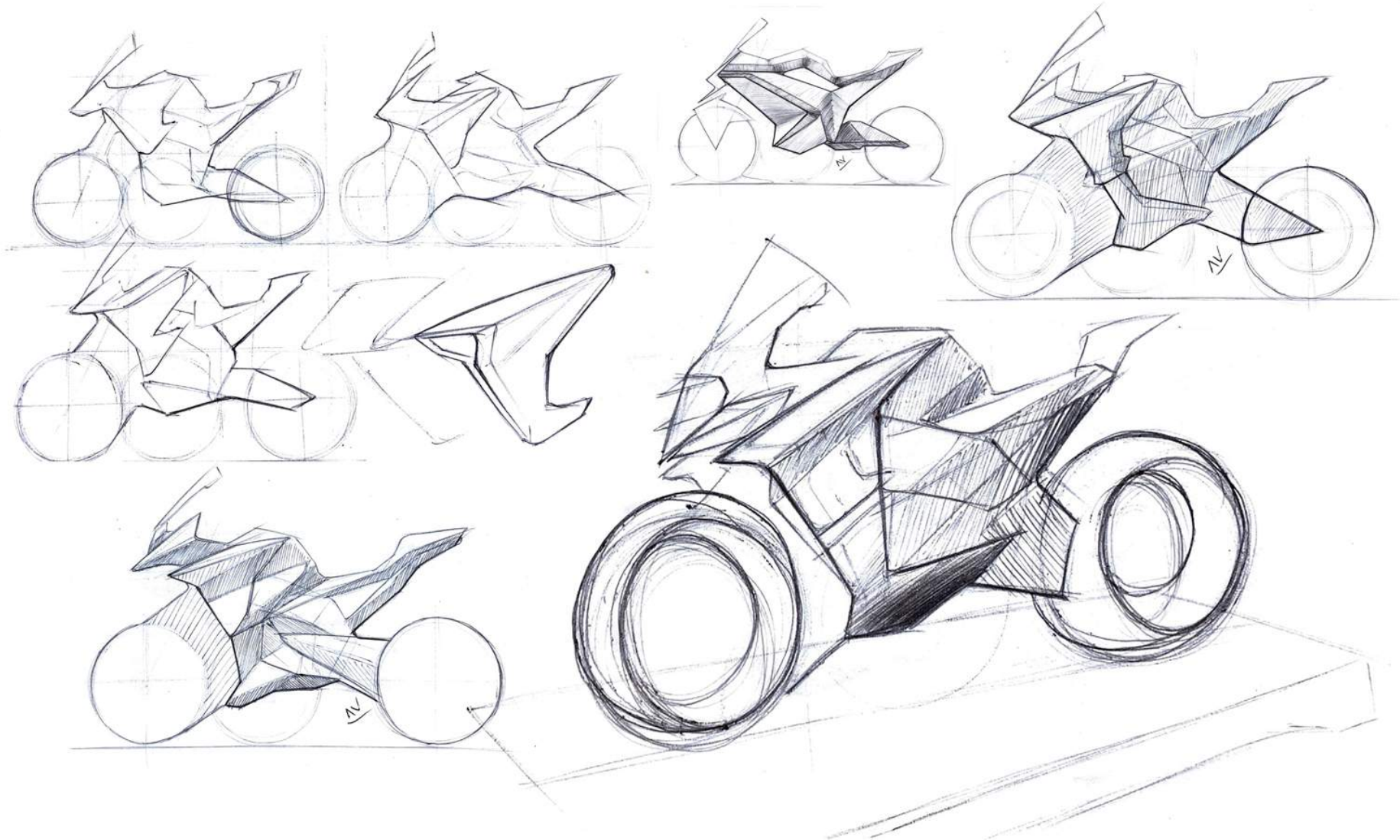
11. PACKAGING

As the motorcycle will be crossover adventure sports bike, under the 5L category, the powertrain will be a hybrid powertrain of 500cc parallel twin and a 10kW traction motor. It will be parallel hybrid and thus the vehicle can run via gasoline engine only or electric motor only or via both. The traction motor is placed right behind the ICE in order to set the COG in the centre only. And the overall dimensions of the motorcycle is given below in the image.

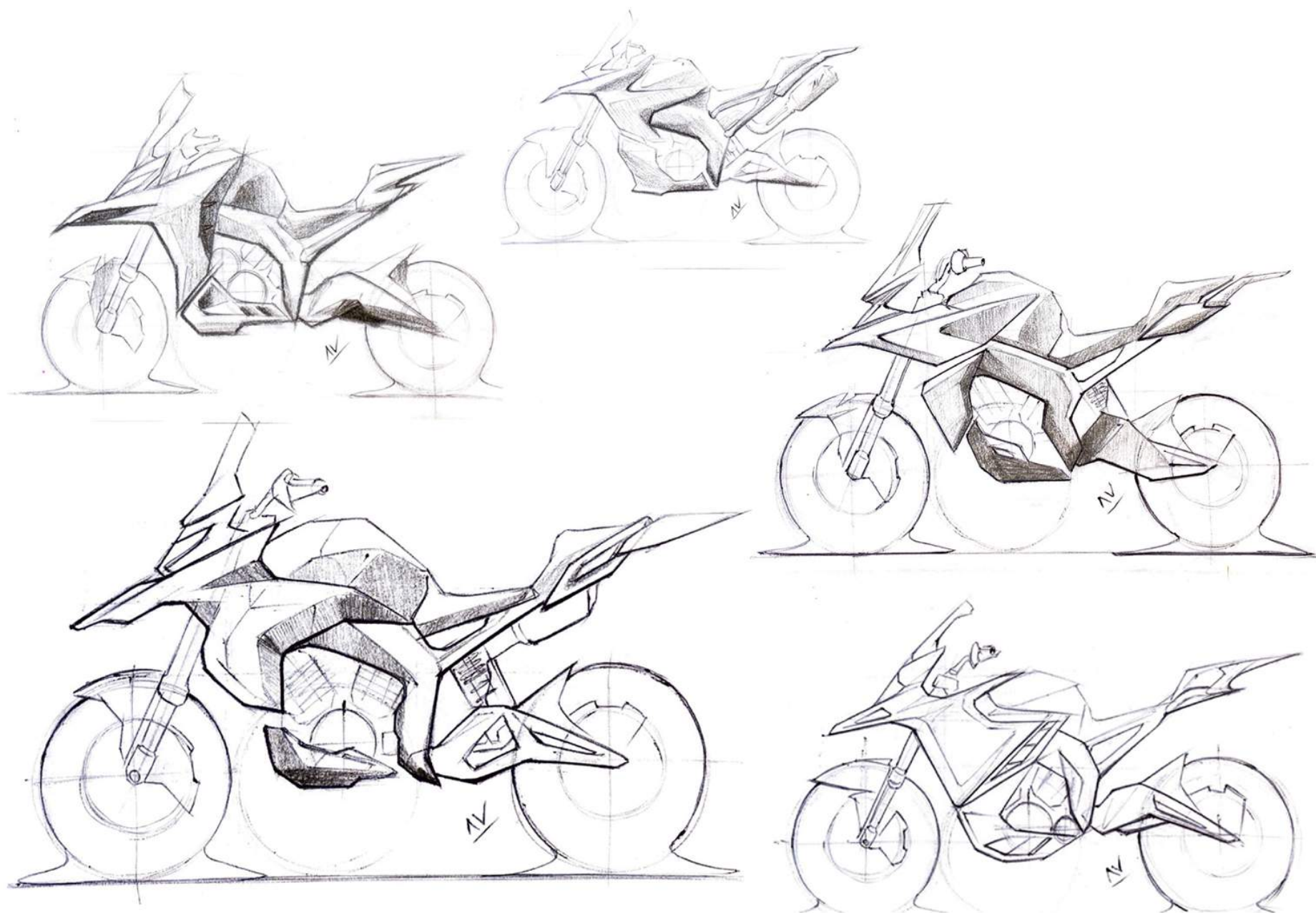


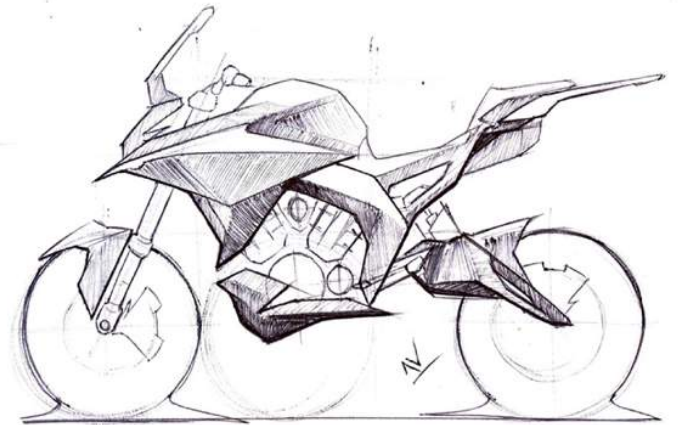
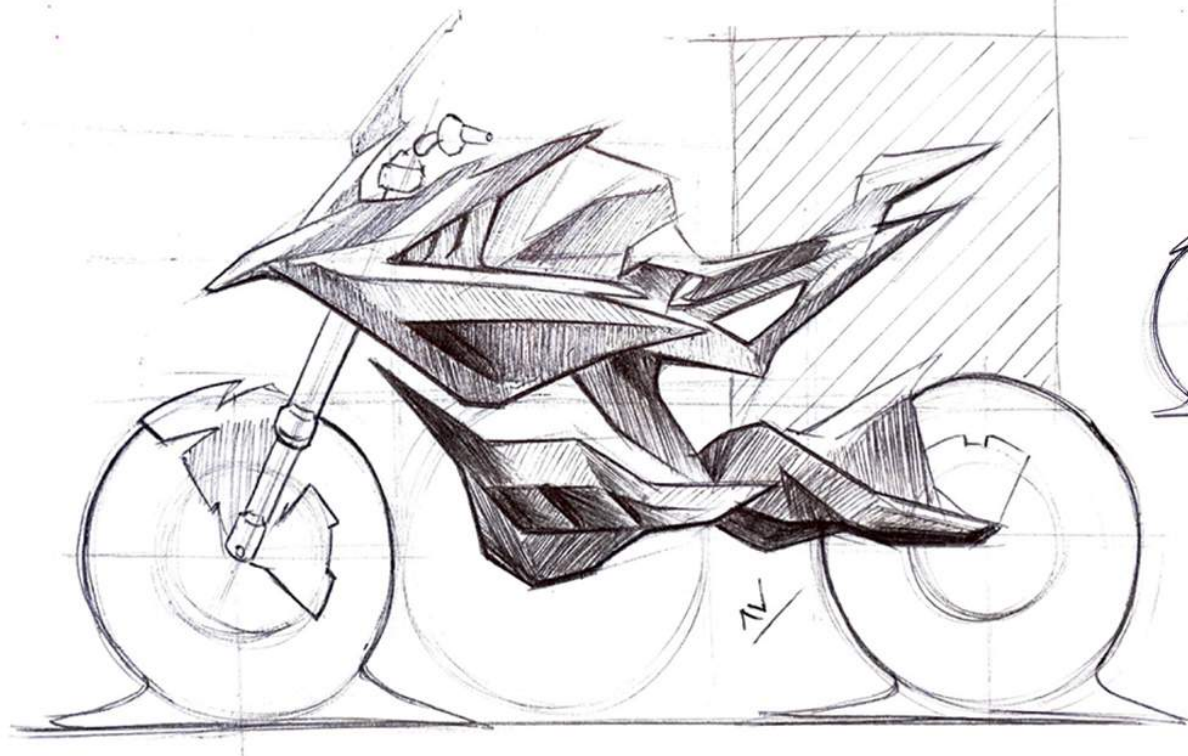
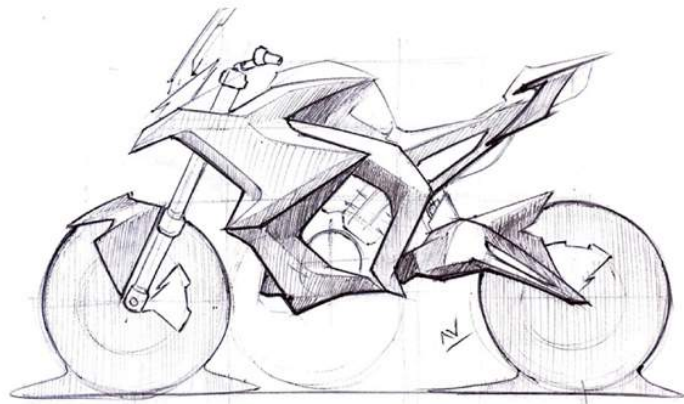
12. IDEATION SKETCHES

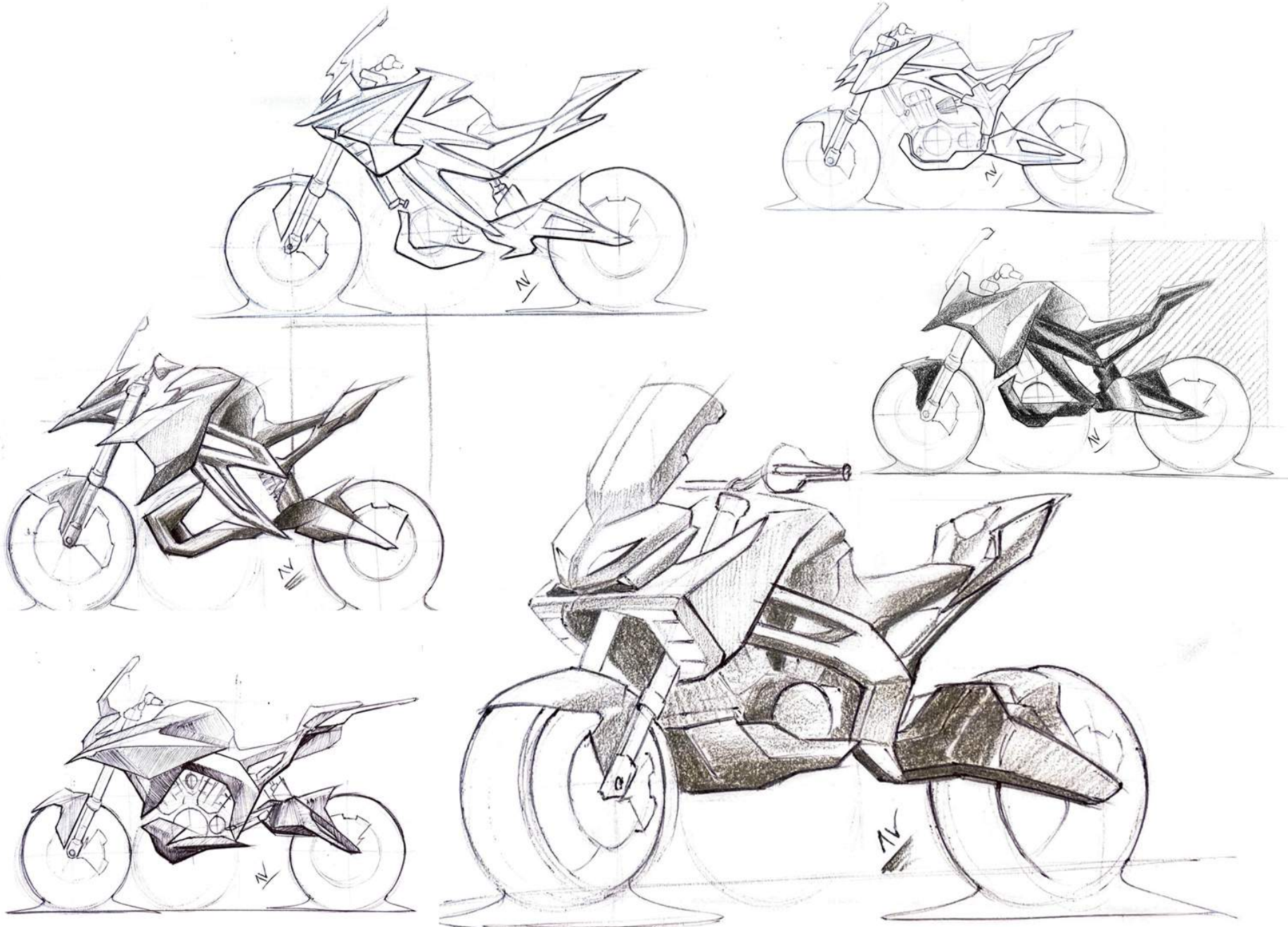
12.1 Form development

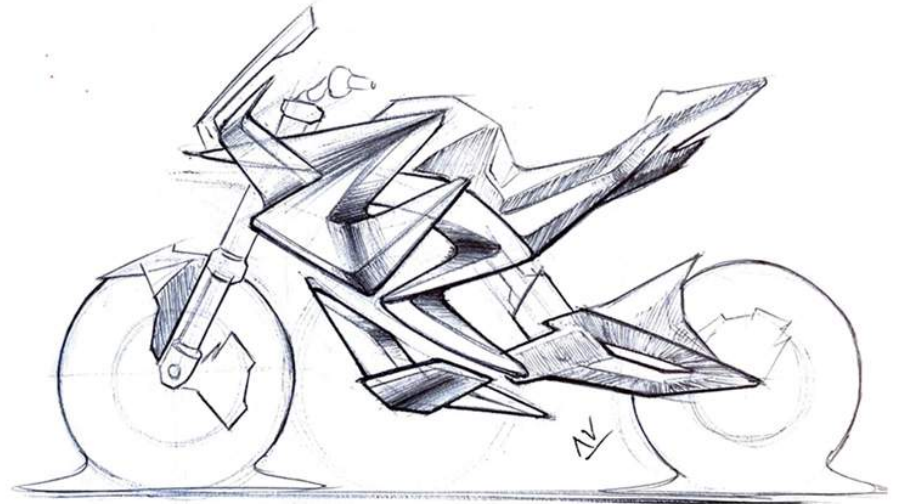
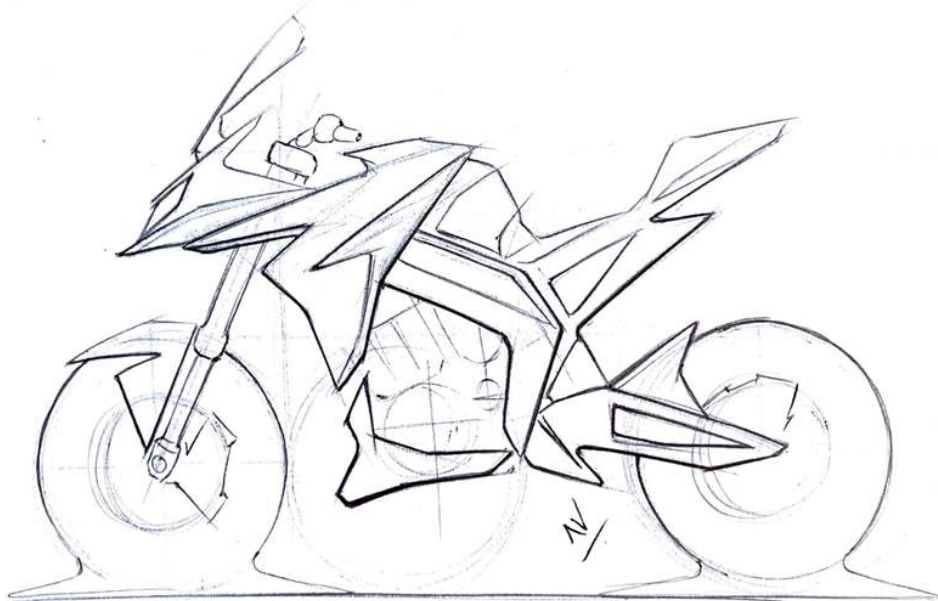
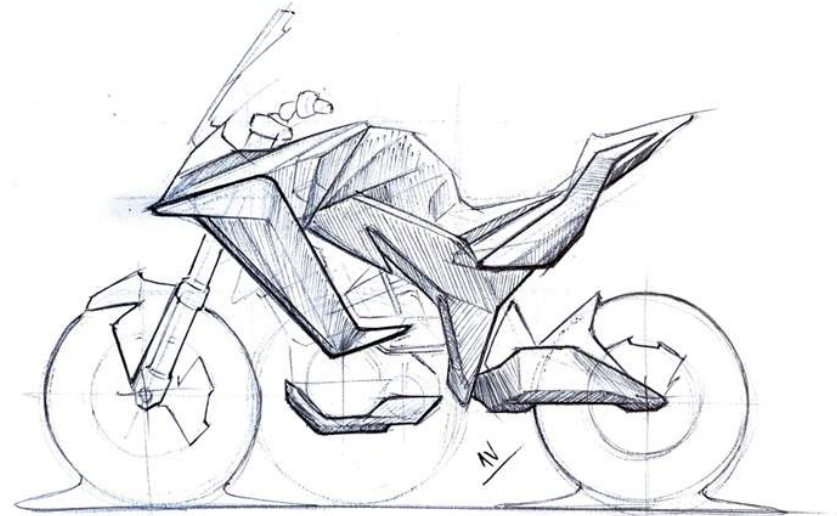
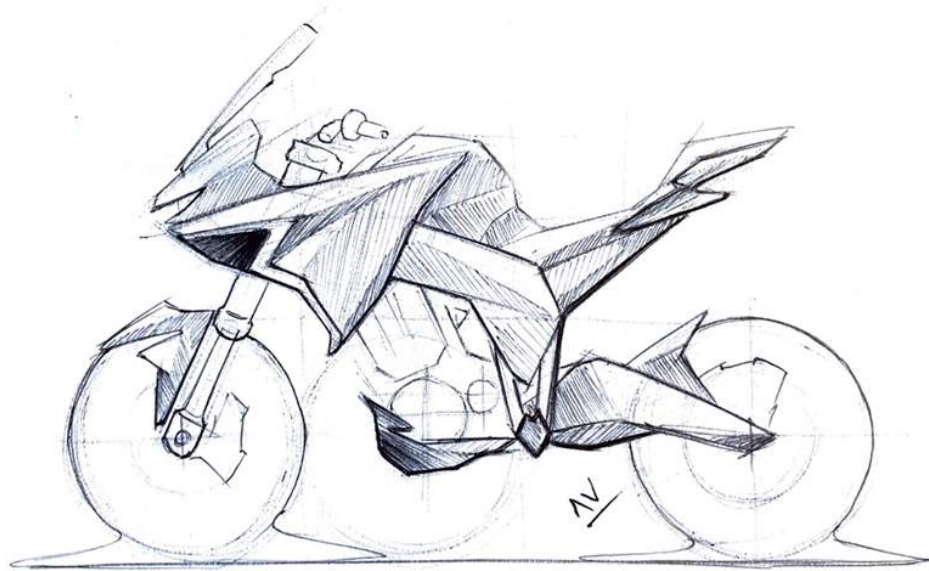


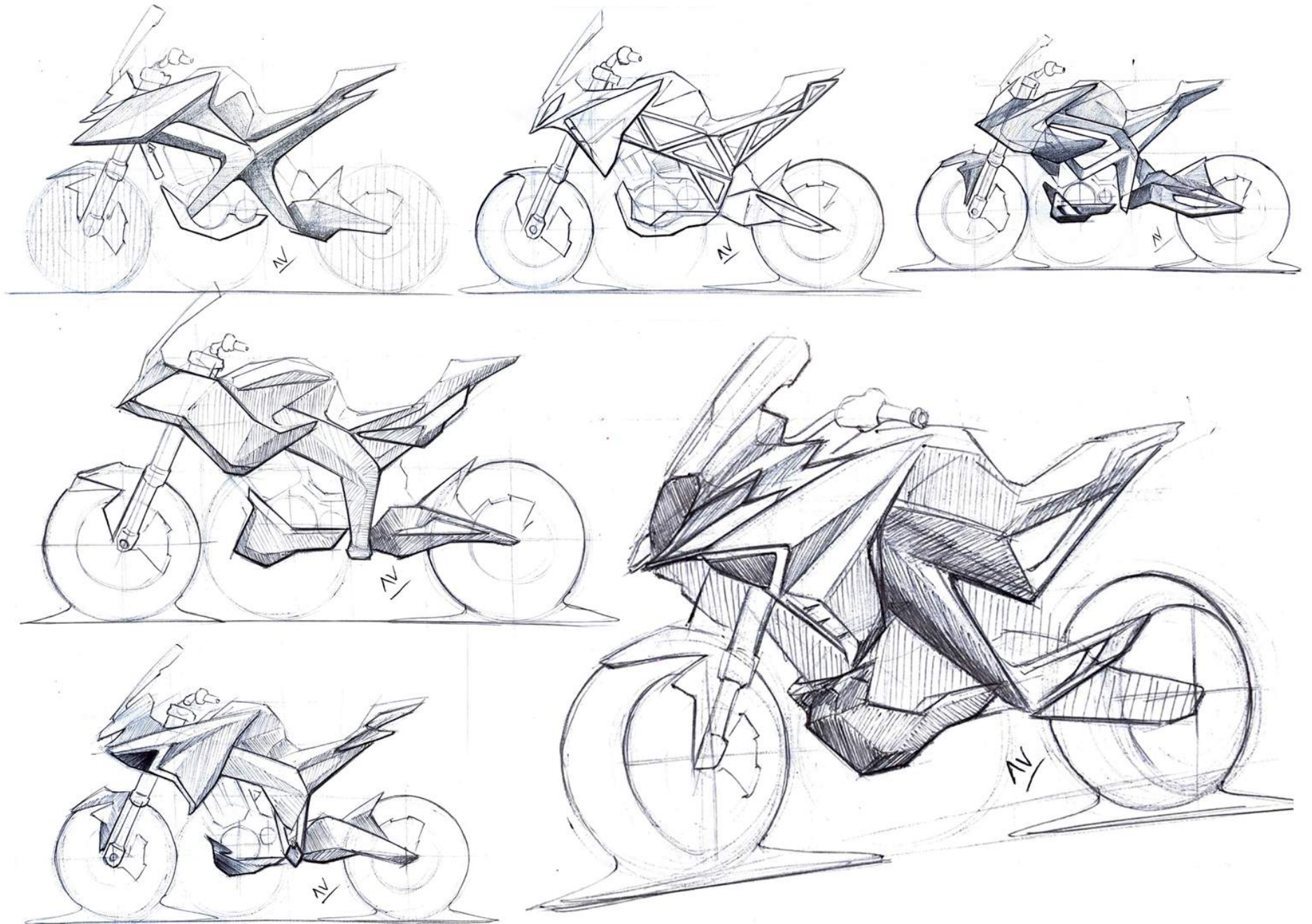
12.2 Conceptual sketches











13.1 Concept 01



13.2 Concept 02



13.3 Concept 03



13.4 Concept 04



13.5 Concept 05



13.6 Concept 06



13.7 Concept 07



13.8 Concept 08



13.9 Concept 09



14. FINAL DESIGN CONCEPTUALISATION

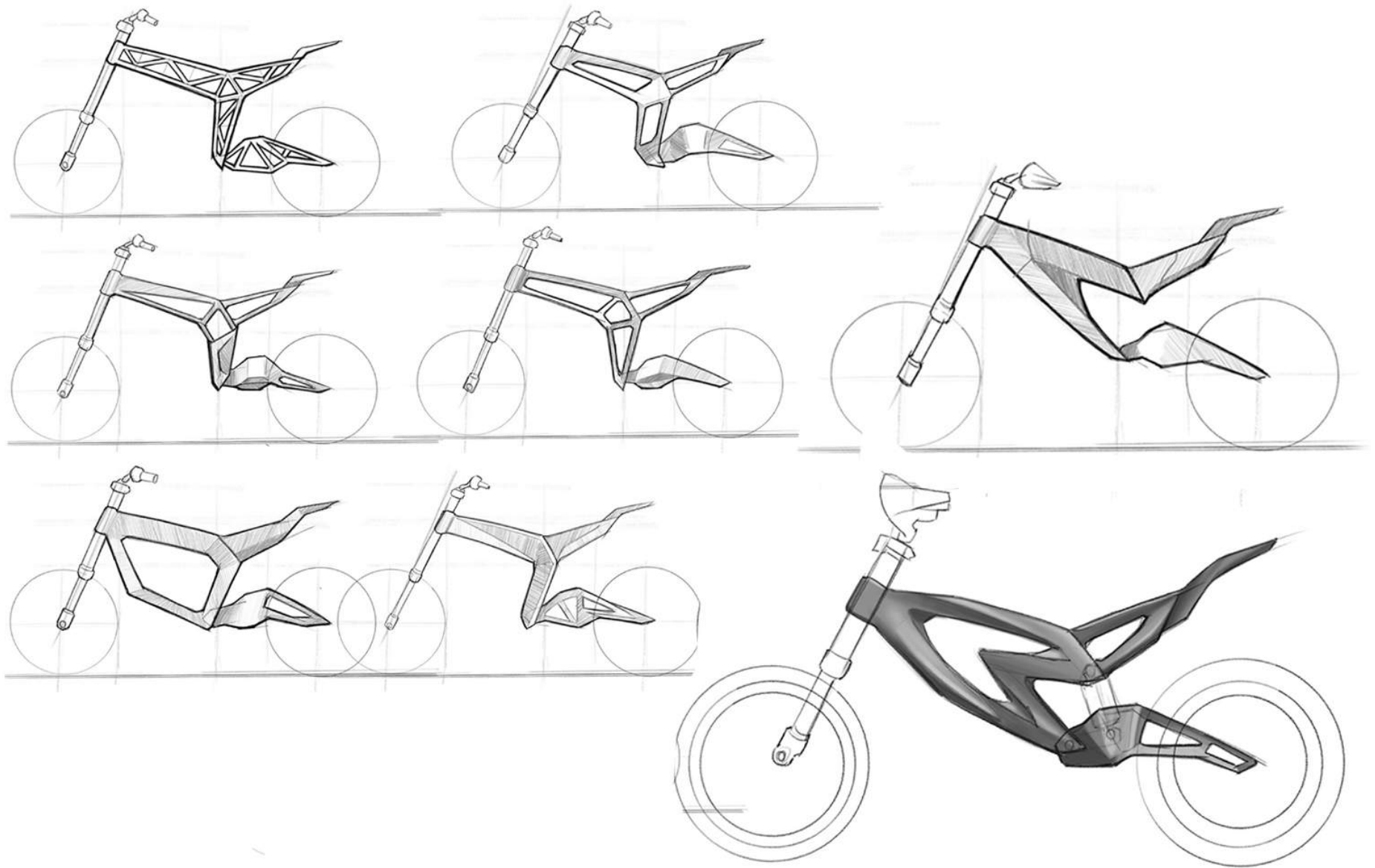
The selected concept (the concept in the middle as shown in the image below) is further developed. The rationale for the selection comes from the user persona created earlier in the design process and the mood board and the theme board. The design language of the selected concept goes well with the theme of the design and satisfies the needs and aspirations of the user persona as well.

As the design of the crossover adventure sports motorcycle has been done from scratch, it was necessary to come up with a fresh design evolution and thus the frame of the motorcycle is designed to be the dominant element of the motorcycle. Generally, the dominant element of a motorcycle is its fairing or gas tank and thus a fresh approach was selected to create a frame which goes with the overall design of the motorcycle maintaining harmony with all the other elements and provides a fresh and functional aesthetic as per the user persona.





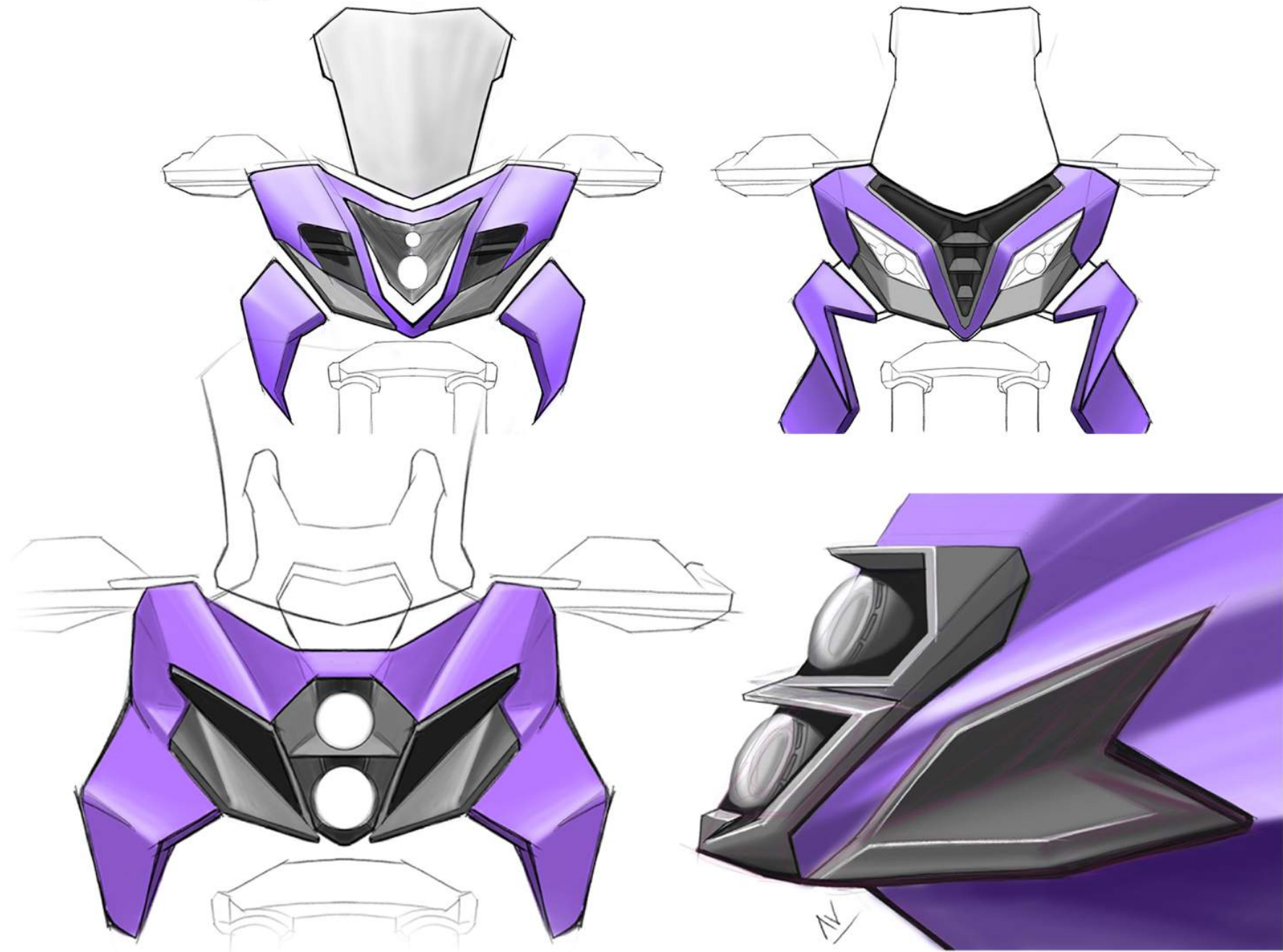
14.1 Frame design



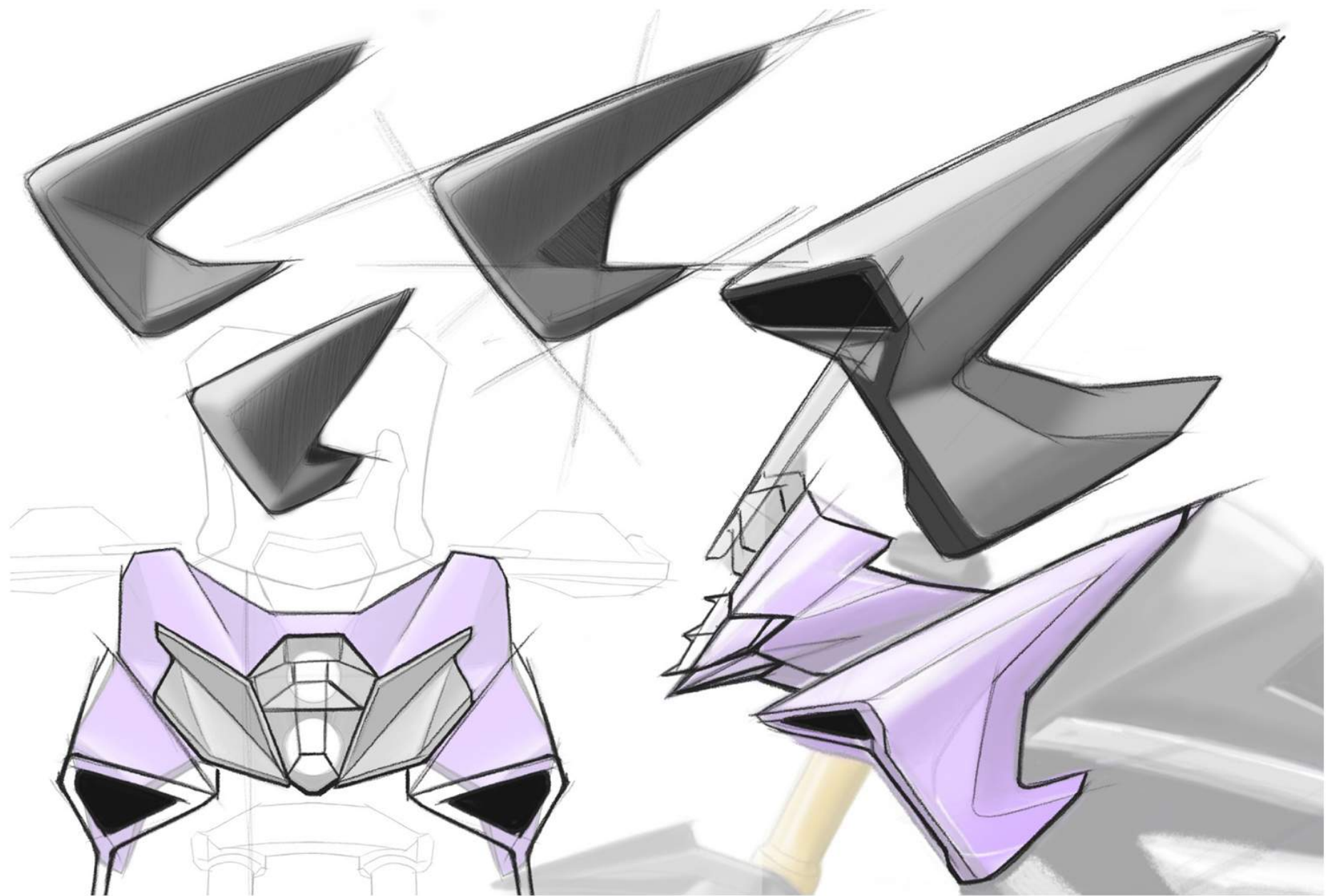
14.2 Fairing



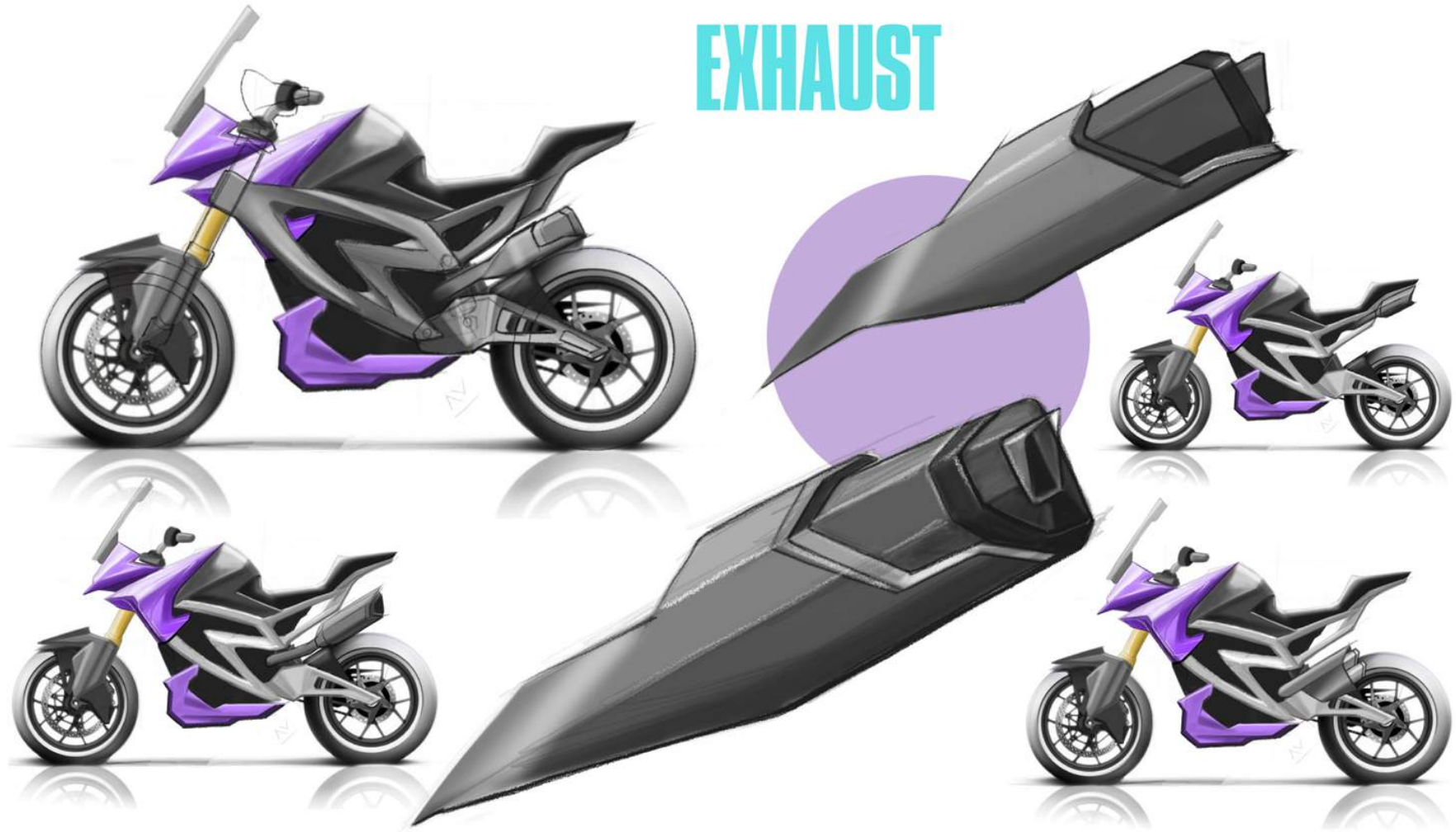
14.3 Front headlight detail



14.4 Fairing detail

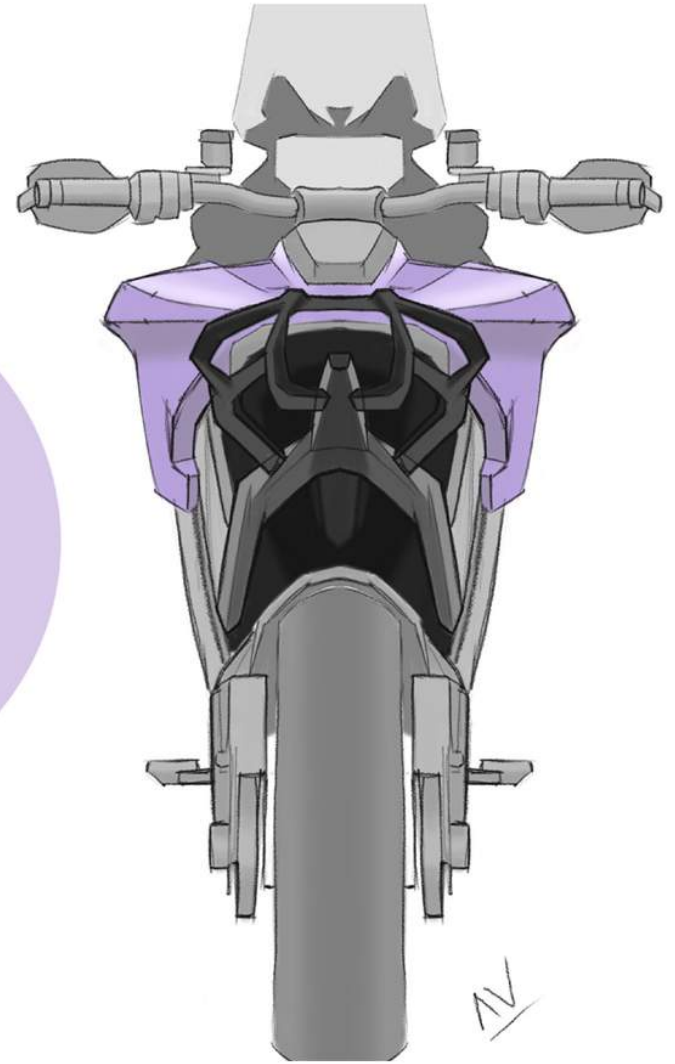


14.5 Exhaust



14.6 Luggage tail rack detail

LUGGAGE TAIL RACK DETAIL



15. VIEWS/ RENDERS

Front 3/4 view

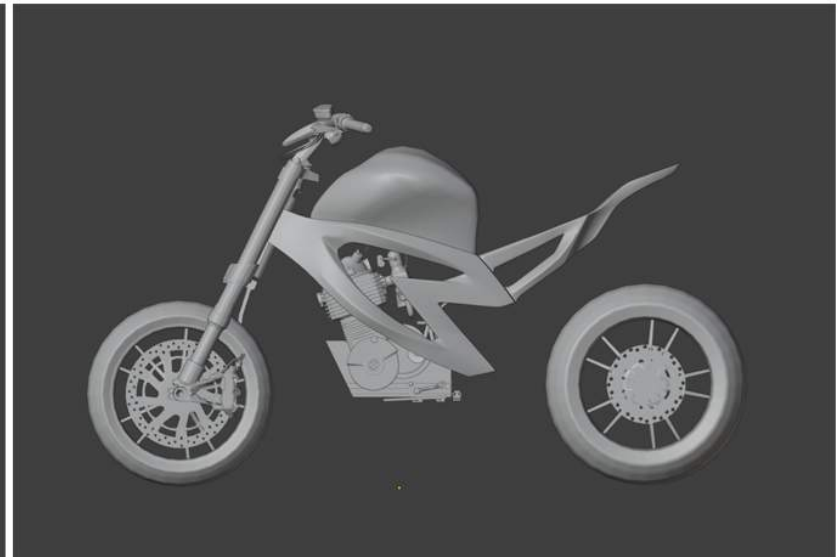
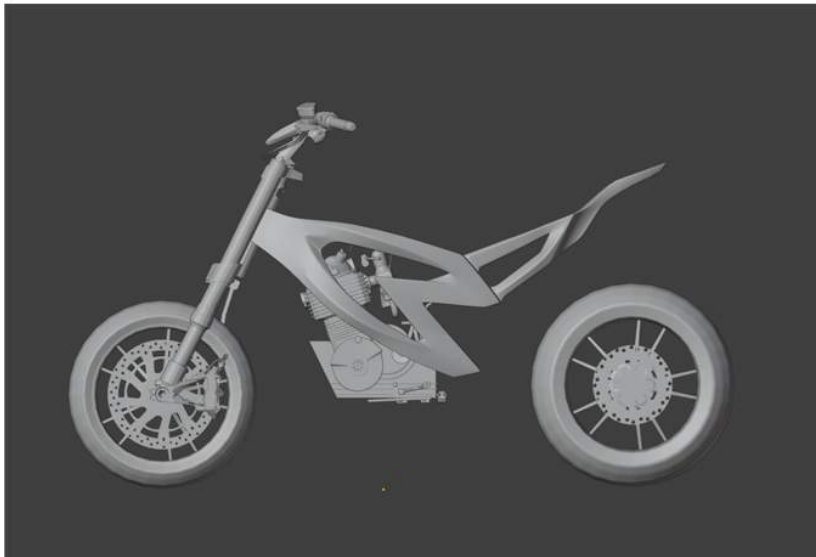
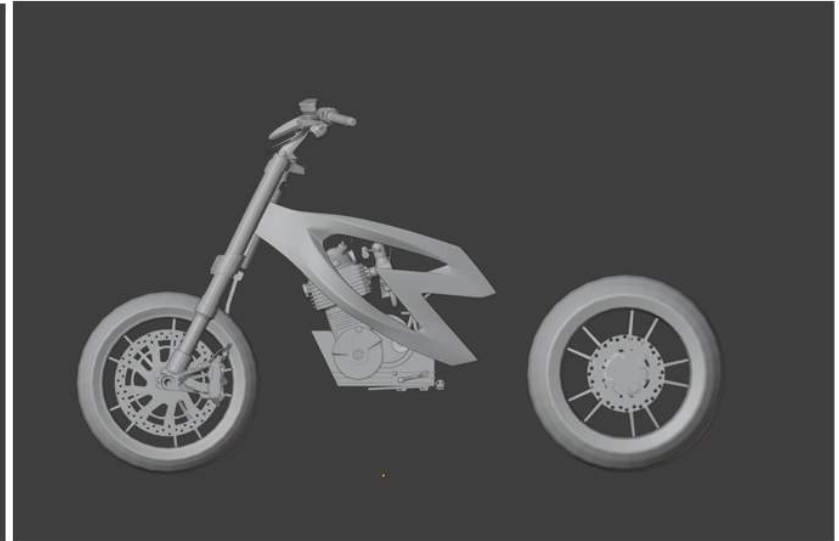
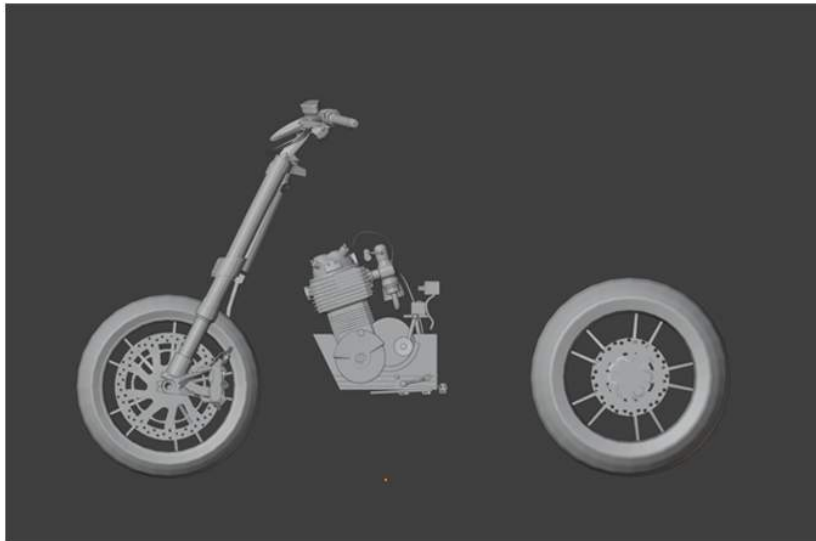


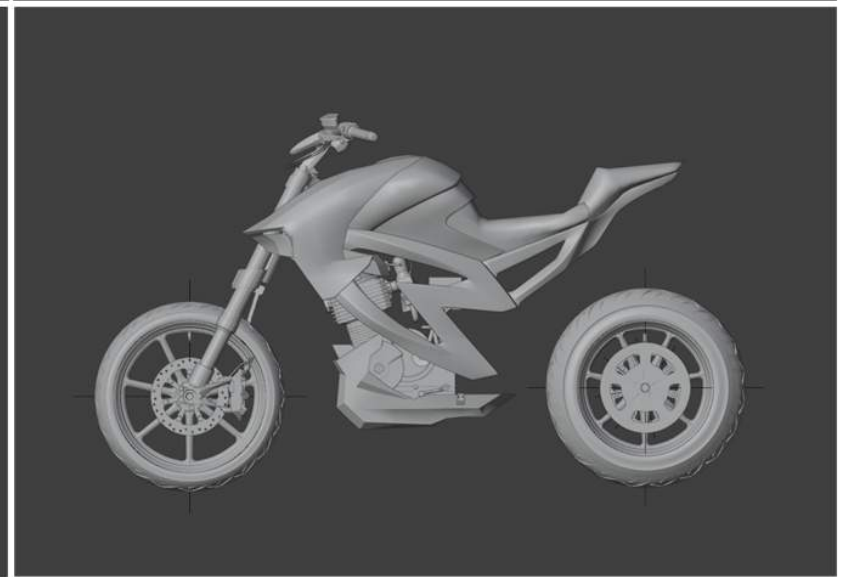
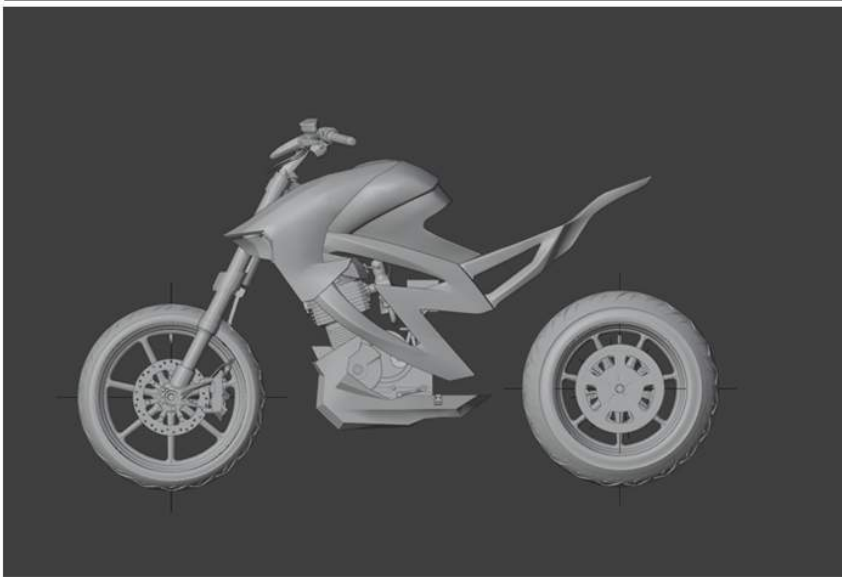
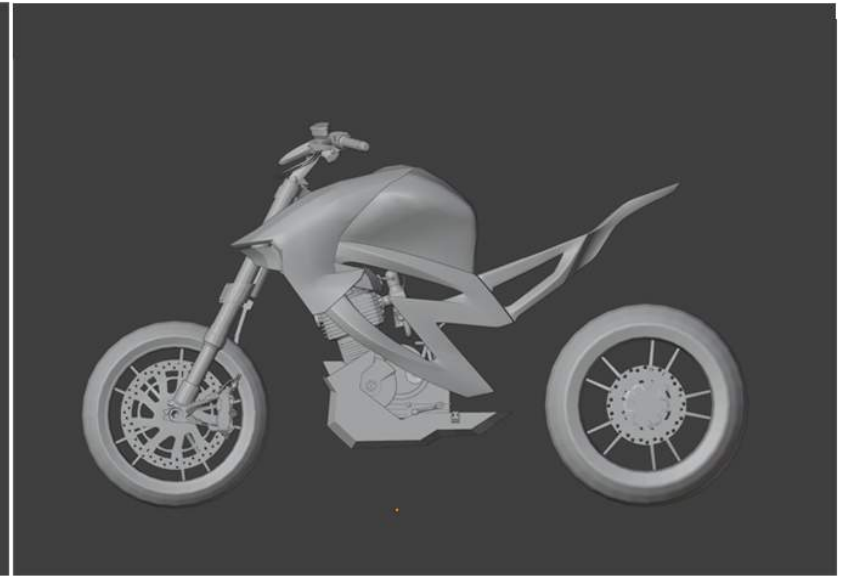
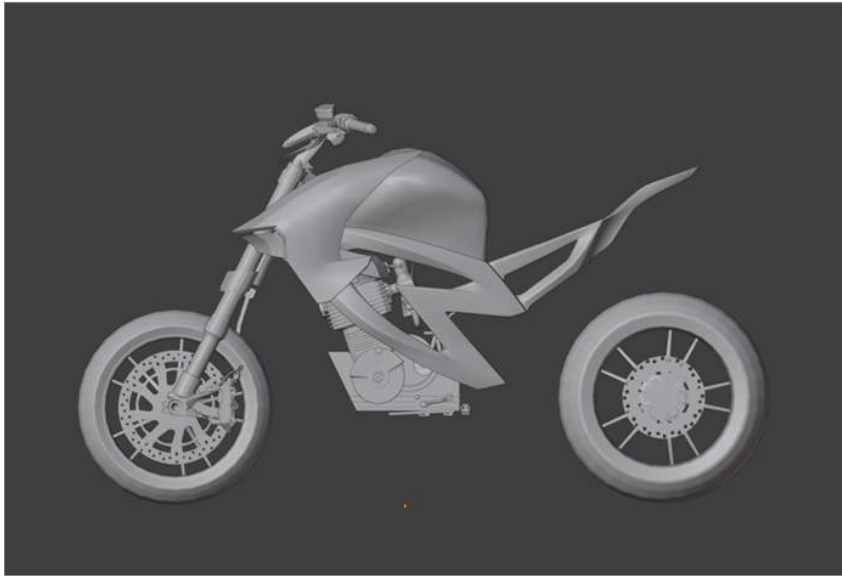
Rear 3/4 view

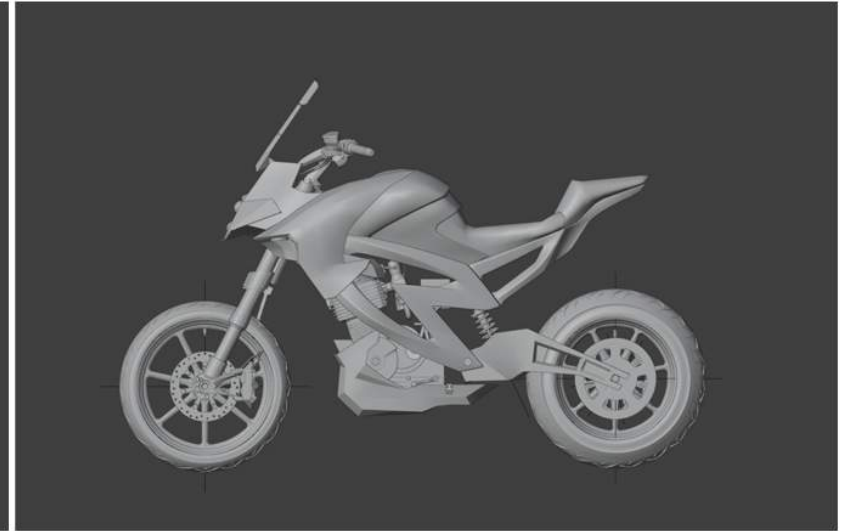
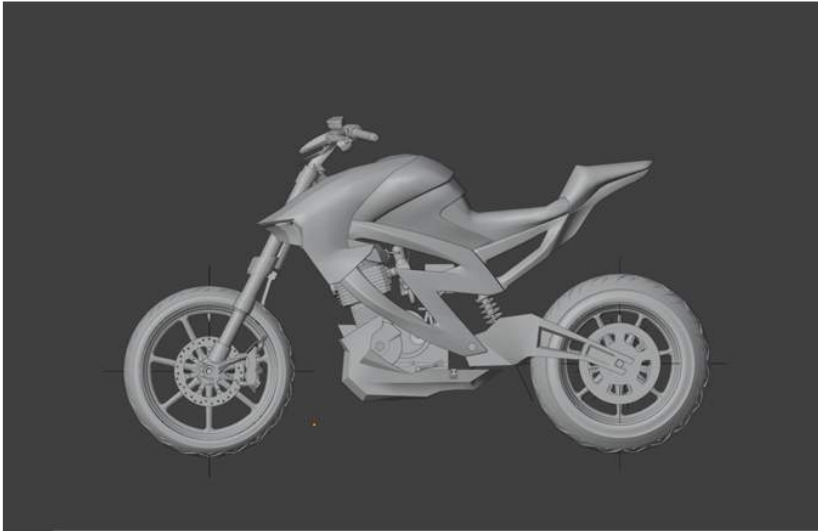


16. 3D MODEL

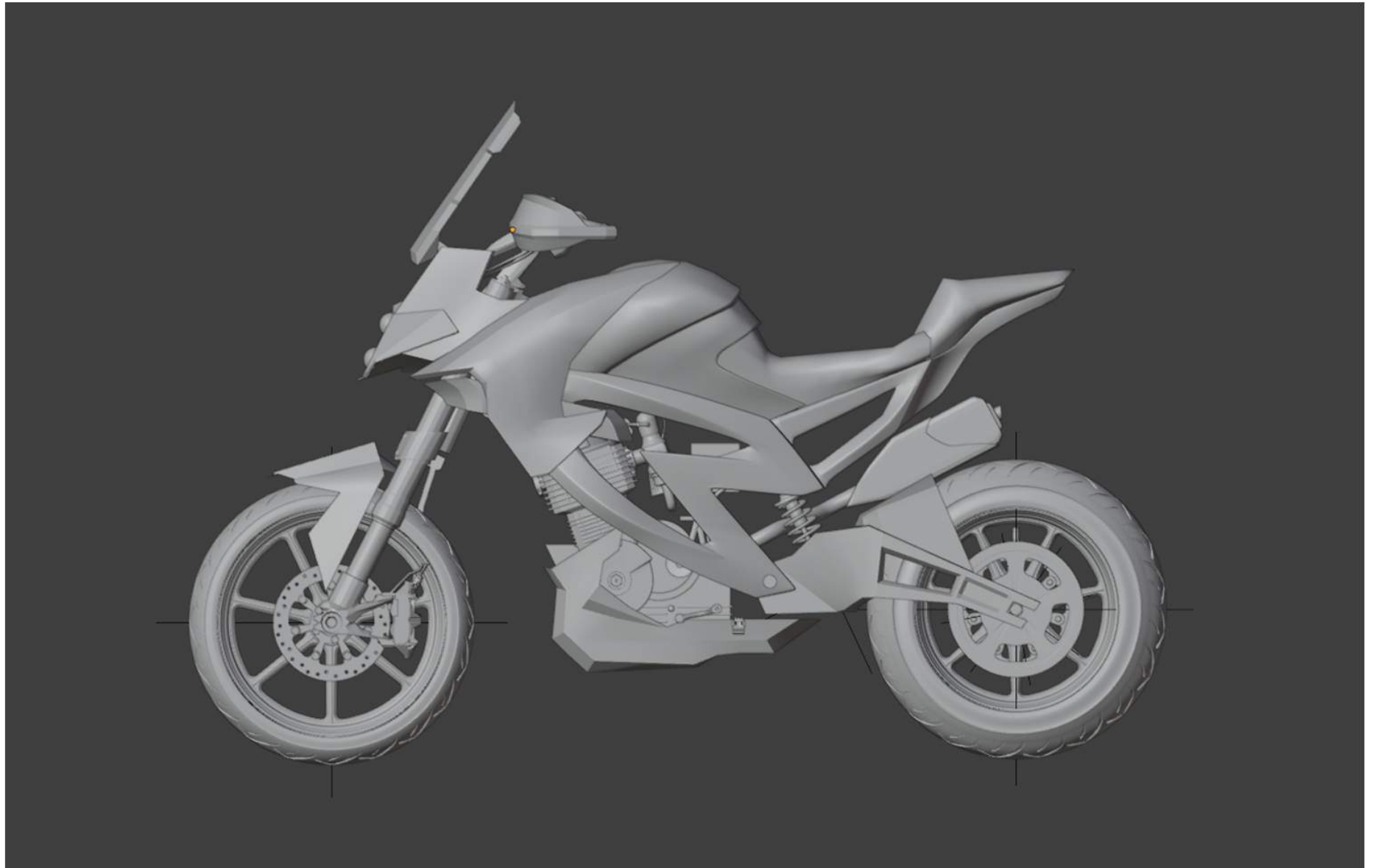
16.1 Stage 1 model

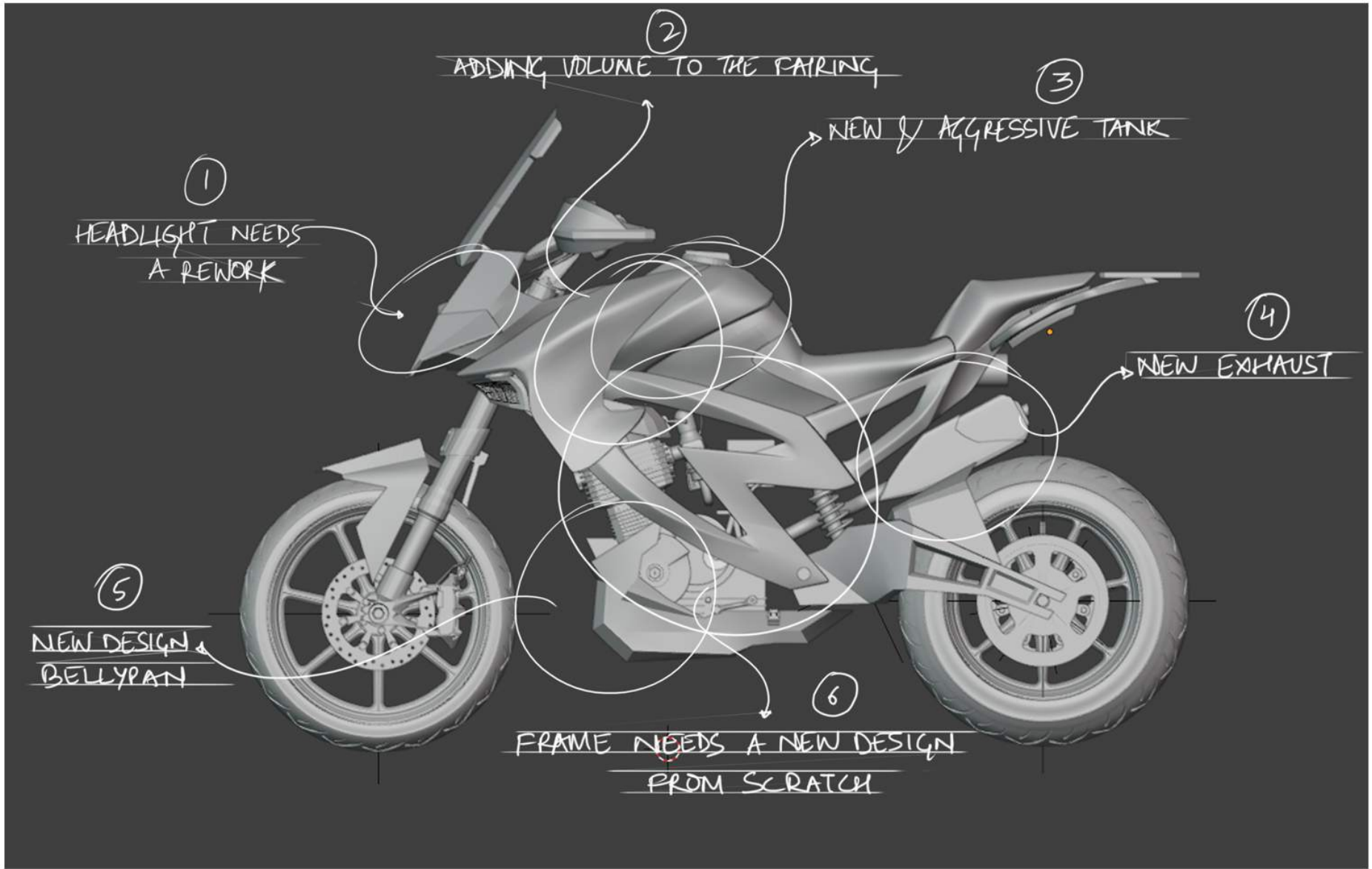




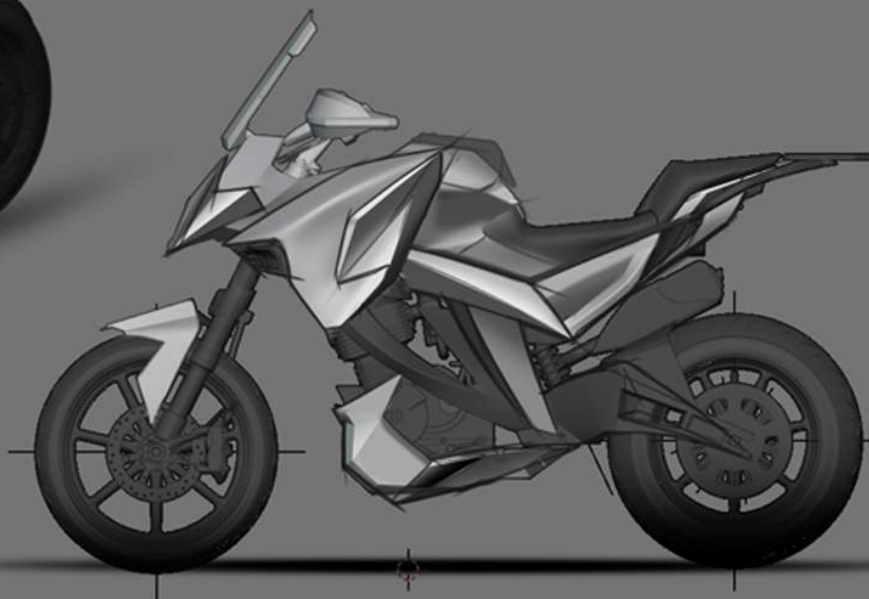


16.2 Stage 2 model

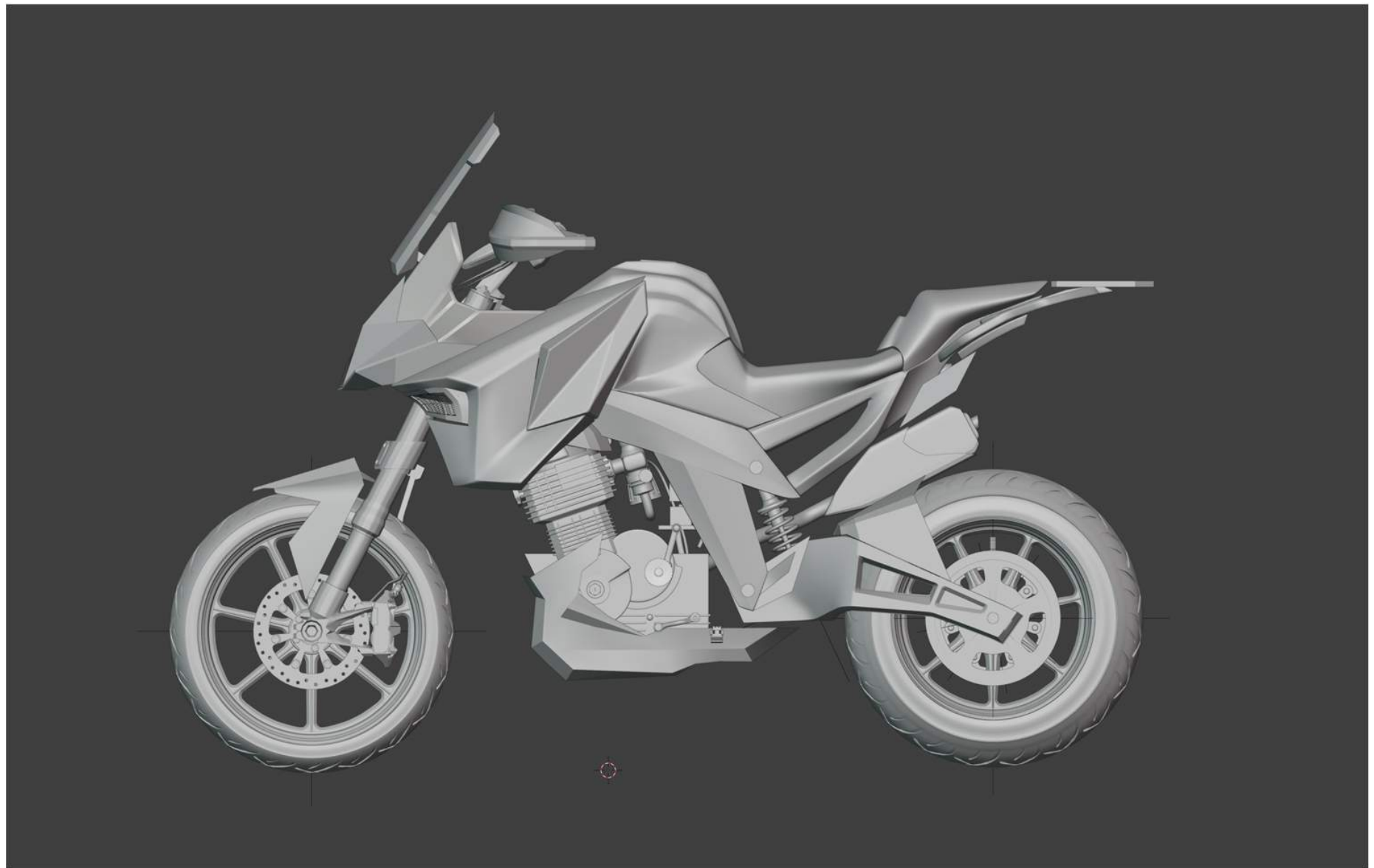


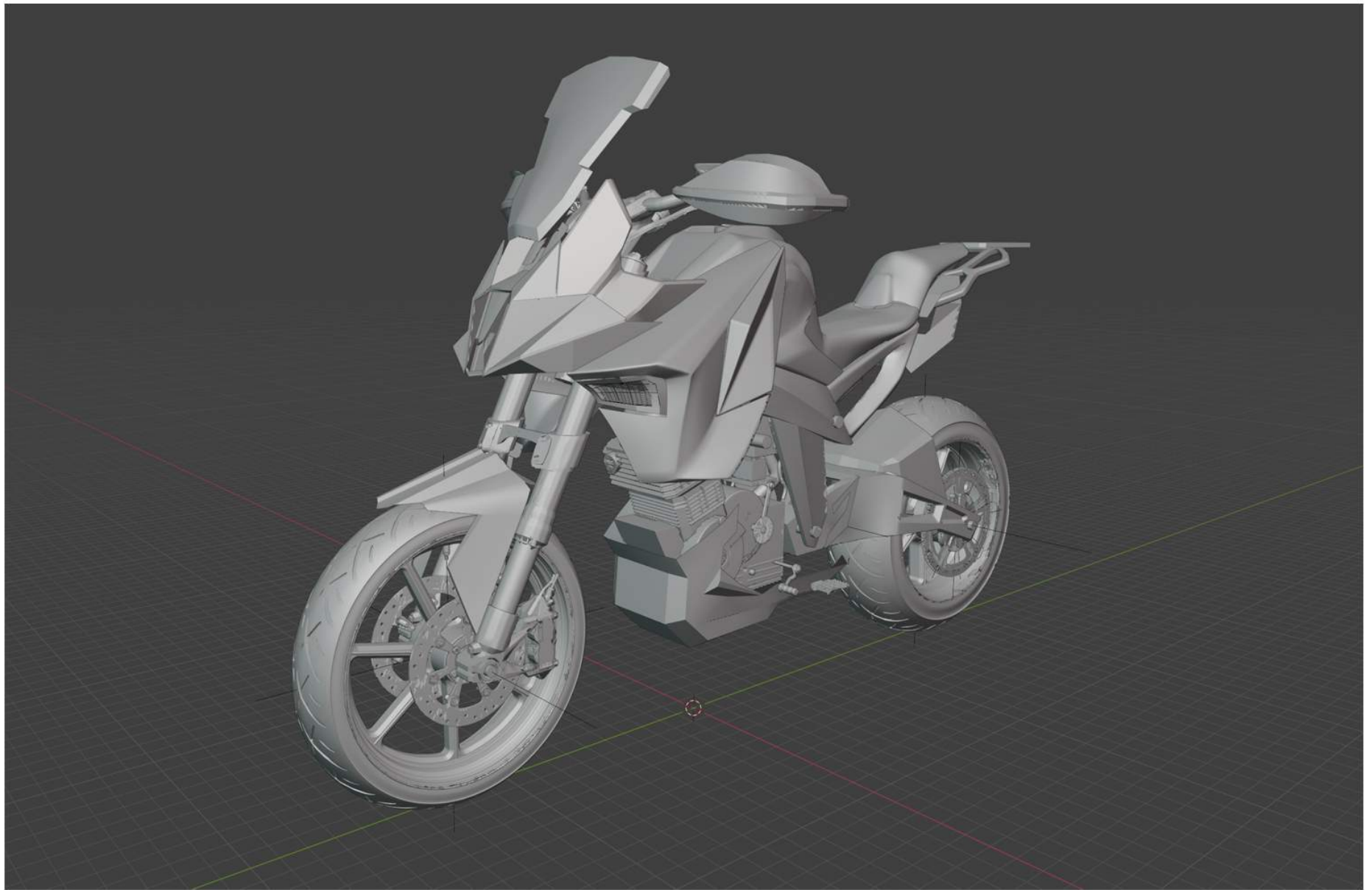


Addition of details



16.3 Stage 3 model







17. FINAL CONCEPT RENDERS

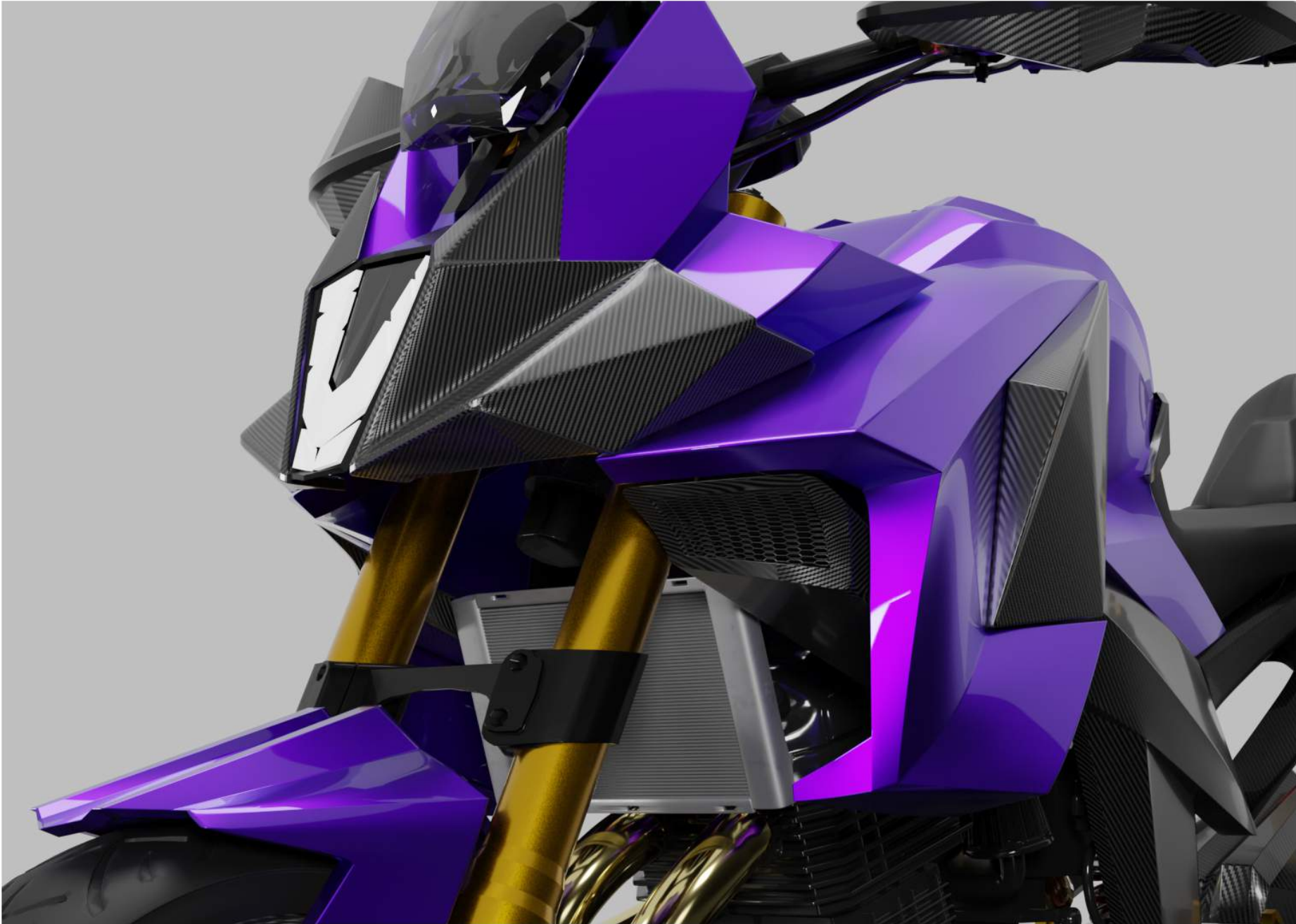


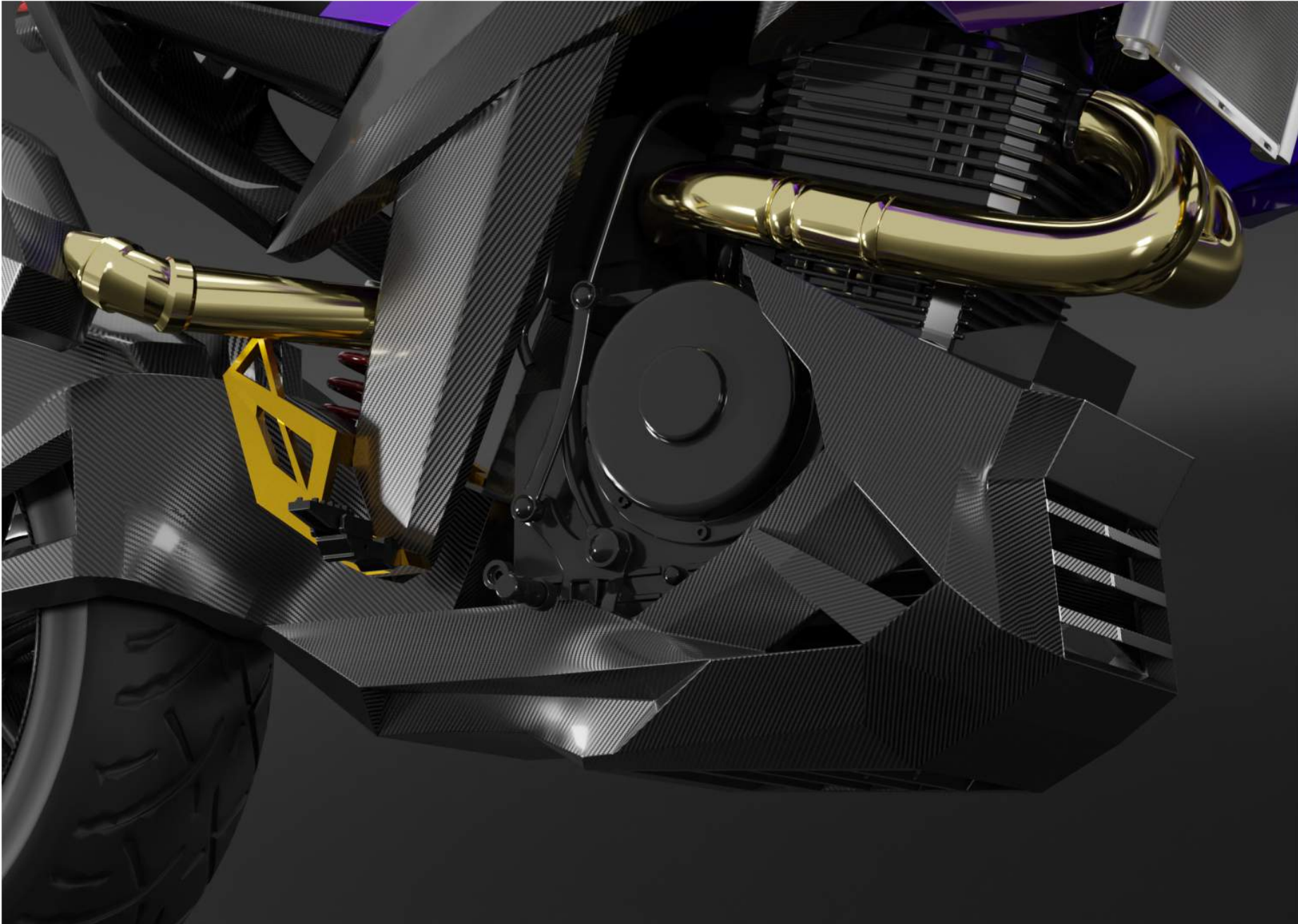


















18. 1/5 SCALE PHYSICAL MODEL







19. REFERENCES

1. <https://www.financialexpress.com/business/express-mobility-indias-mid-size-motorcycle-market-to-continue-to-attract-new-players-and-models-3176830/>
2. <https://www.autocarpro.in/analysis-report/boom-midsized-motorcycles-india-28493>
3. <https://www.bmwmotorcycles.com/en/experience/stories/urban-mobility/concept-ce02.html>
4. <https://www.formtrends.com/honda-cb4x-concept-blends-attributes-of-3-bikes-into-1/>
5. <https://www.youtube.com/c/GenZBiker?app=desktop>
6. <https://thenounproject.com/>
7. <https://www.kawasaki.com/en-us/motorcycle/ninja/sport/ninja-7-hybrid>
8. <https://www.bmw-motorrad.in/en/models/sport/s1000xr.html#/section-faq>

