

Design project III

EXTERIOR STYLING FOR 2030 BASED ON TECHNOLOGY AND HUMAN FACTORS

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DECLARATION

I declare that this written report represents my own idea in my own words, and where others, ideas or words have been included, I have mentioned the original source. I also declare that I have adhered to all principles of academic honesty and integrity and have not falsified, misinterpreted or fabricated any idea, data, facts or source in my submission.

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APPROVAL SHEET

This Mobility & Vehicle Design project report entitled “Exterior Styling for 2030 based on technology and human factors”, by Ashwin R Krishnan is approved in partial fulfillment of the requirement for Master of Design degree in Mobility and Vehicle Design.

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Ashwin R Krishnan

Date:

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1.INTRODUCTION

Throughout history, technology and culture have driven each other to progress. Technology is created out of direct and indirect human needs, while certain technology creates new needs. The result of this symbiotic relationship is what we generally call as 'trends'. Like how the smartphone and internet technology has driven the whole trend of selfies and image sharing, we can find evidences of trends at any point in history.

Automotive Industry, being highly capital intensive, not to mention the fact that a new vehicle takes at least a few years to go from idea to production, relies a lot on setting and responding to trends. Since designers are always in the business of predicting the future, a thorough study of past trends can help as a tool to anticipate and predict future trends. The research part of this project is to attempt the same: unravelling the complicated relationships between technological and cultural progress and the trends that originated from them. Based on this study, a near future can be anticipated in reasonable accuracy, which serves as a base for the design phase of the project.

Designing the exterior for a car to be launched in 2030 involves certain challenges. The design aims to be reflective of the cutting edge technology as well as the anticipated lifestyle and specific human needs of that era.

RESEARCH PHASE

STUDY OF HISTORY AND TRENDS

2. RESEARCH METHODOLOGY

For the purposes of this project, the time period from 1960 to the present day was taken for study. The aim of this study was to understand how car exteriors have evolved over the period and how the factors of technology, culture, politics etc. influenced this evolution.

Data collected from a number of sources were compiled in chronological order, with the layers of Culture, Events, Science & Technology, Automotive Technology and Advertising laid on a linear timeline from 1960 to 2016. Iconic or popular cars from each year were also overlaid on the timeline. The cars cover a wide spectrum of markets, body types and prices. Cutting edge innovations in general Science and Technology was separated from Automotive Technology, in order to see whether changes in one field immediately reflected in the other.

Cultural forces and historical events were also mapped in the chart linearly. Cultural movements do not occupy discrete blocks of history, but rather fade in and out of existence. Consequently, the chart also maps the cultural trends in a similar fashion. The influence of culture in exterior aesthetics can be studied in this way. It also facilitates the study of how long it takes for a particular cultural trend to influence design and for how long this trend continues.

An added layer of population growth also reflects the growing importance of human needs in shaping the design of cars

3.1 1960s



The 1960's were a period of great social and technological change, especially in the western world. The decade saw the peak of 'Cold War', a relentless show of strength by the two major super powers: The United States and The Soviet Union. The period was marked by the two powers scrambling to establish themselves as the leader in technology and innovation, resulting in the Space Race and culminating in Neil Armstrong being the first human ever to land on the moon in 1969. The world also witnessed several international conflicts, with the infamous Cuban Missile Crisis pushing the nations to the brink of nuclear war.

A strong anti-war mentality rose among the youths in western nations, coupled with the urge to rebel against the social norms set by the government and the previous generations, led to what is now known as the 'Counterculture Movement'. The 1960s were all about breaking the rigid social norms and establishing a new identity.

3.1.1 **1960s** TECHNOLOGY



The Space Race between United States and Soviet Union catalysed the development of a tremendous amount of technology, transforming daily lives globally. Tape Cassettes and Optical Disks were invented which would revolutionize media storage and the music industry in the following years. The first communication satellite was launched in 1962, which led to a whole era of global communication. Technology such as LEDs and Lasers were developed which found their way into a number of electronic devices. Personal computers, though still in their nascent stage, saw developments such as the mouse in this decade. 1969, already memorable for landing the first man on the moon, also saw the first form of today's internet, developed as a network of computers for the United States military.

Reflective of the boost in scientific and technological growth, automotive technology also saw a number of major innovations being developed. The decade saw Computer Aided Design (CAD) being used for the first time in vehicle design. The success of tape cassettes saw the first in-car cassette players being fitted in 1965 by Ford. This eventually led to the first car stereo in 1969. Other features such as halogen headlamps, electronic fuel injection, turbochargers etc were becoming commonplace in this decade. Stricter safety regulations were also influencing design. Interiors were required to have lap belts in 1964 which gave way to full shoulder belts in 1968. Reverse lamps were another regulation which was implemented in 1966.

3.1.2 **1960s** SOCIETY AND CULTURE



The 1960's were notable for the palpable global tensions due to the ongoing Cold War. A significant percentage of American and European youths initiated a strong anti-war sentiment which eventually turned into the Counterculture Movement. Rejection of established social norms was a dominant theme of the decade, as the younger population wanted to break away from the complacent decadence of the 1950's post war boom.

The counterculture movement gave rise to a sharp change in fashion and lifestyle. The conservative fashion of the early 60s gave way to what is known as the 'Hippie Culture'. Strong believers of pacifism and liberation, Hippie culture was iconic for their unique fashion emphasizing bright colours and floral motifs. The term 'flower power' was used to signify the Hippies' peaceful anti-war sentiment that was a polar opposite to the Macho image projected by the previous generation. Newer music styles such as Pop-Rock was a hallmark of this decade, and was epitomised by bands such as The Beatles.

The emergence of the space race also influenced pop culture, and resulted in Sci-Fi space operas such as Star Trek in the latter half of the decade. The technological progress in the developed world and the burgeoning economy was also reflected in the optimistic, utopian setting of the show.

3.1.3 1960s CAR EXTERIOR TRENDS



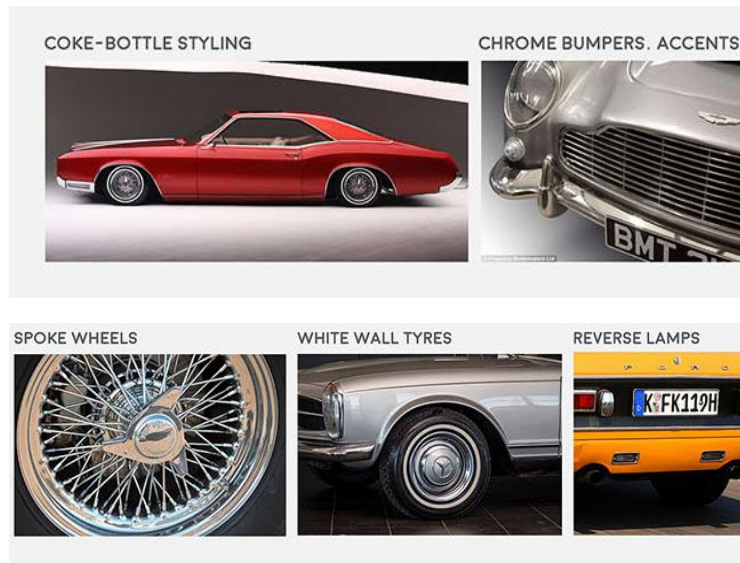
The reflection of social and technological changes is clearly visible in the cars designed and launched in the 1960s. In the United States, the 1950s were notable for large, long cars with a lot of flamboyant details like tail fins, curved windshields and chrome accents, all of which were a result of the influence of commercial aviation as well as the heroism of WWII era fighter aircraft. In the 1960's, however, the influence of counterculture and social liberation saw a whole new breed of cars: muscle cars. Started with the Ford Mustang in 1965, muscle cars epitomized the freedom and rebellious nature of the 60's youth. In terms of styling, a lot of the 50's opulence was toned down in favour of more subtle, powerful designs. The term 'coke bottle styling' was used to denote the characteristic side profile of several 60's cars, with the shoulder line taking the distinctive contour of a Coca Cola bottle.

The muscle car wave was also a result of the unique geography and roads of United States. Having a relatively low population density, with the major cities spread apart by hundreds of miles, roads in the US were wide, straight and traffic free. To cover such huge distances in maximum comfort, the cars were built with large engines, plush rides and long, wide bodies.

The muscle car wave also made ripples in the European market. Europe, in comparison was much more compact and dense compared to the United States, so a full-size muscle car such as the Dodge Charger RT (1968) would not be a very practical

3.1.4. **1960s** CAR EXTERIOR TRENDS

car for the tight European cities and busy highways. To address this need, European designers started styling their compact sportscars to evoke the muscle car look and feel. The highly successful Ford Capri (1969) was such an example.



In Asia, Japan was quickly recovering from the aftermath of the World War, and was building a burgeoning small car market. In order to promote car ownership, the Japanese government introduced huge tax benefits and other incentives to manufacturers who develop small, affordable and reliable city cars. The result was a segment of cars called 'Kei' Segment. Japanese cars of this era were compact and featured design cues inspired from European city cars and light sportscars.

Other design trends of this era was the toning down of chrome accents on the exteriors. Chrome was still used in the bumpers, grilles and headlight surrounds. Spoke wheels and steel rims were common in almost all categories of cars. The large white wall tyres of the 50's receded to minimal strips of white paint on the tyres. The effect of regulations were also seen on the exteriors. The mandatory reversing lamps resulted in designers haphazardly placing them on the cars as an afterthought.

3.2. 1970s

The optimistic boom of the 1960s were given a harsh reality check in the 1970's. The decade was hit by two severe fuel crises, which wreaked havoc across the world. The Space Race had fizzled out following the United States' triumphant moon landing and Soviet Union's subsequent failure to retort. Themes of conservation, sustainability and environmentalism first appeared in this decade, catalysed by the fuel crisis. Another contributing factor was the first images of the earth as seen from a spacecraft. The idea that our planet was a tiny, fragile sphere of life triggered the idea that our resources are finite and need to be conserved. A sluggish economic growth prompted industries in many leading nations to rethink their sky-high strategies. Regardless of this, scientific and technological progress continued in earnest, with a handful of radical innovations being developed in a number of areas.



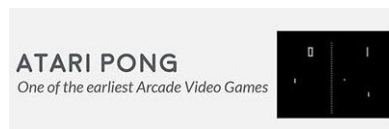
3.2.1. **1970s** TECHNOLOGY



The themes of conservation reflected in technology also, with the Green Revolution peaking in the decades. Green Revolution used genetic technology to develop high yielding seeds and efficient fertilizers so that farmers can increase production. The decade also saw a revolution in electronics in the form of the Microprocessor, which would go on to dominate every single electronic device to the present day. Microprocessors resulted in the miniaturization and affordability of almost every consumer electronic product, from computers to music systems. The earliest mobile phone networks were developed at this time, along with the first space station (Skylab, 1973). Supersonic commercial aviation became a reality as Concorde took its first flight in 1976. Personal computers and supercomputers all started seeing upgrades in performance and reliability.

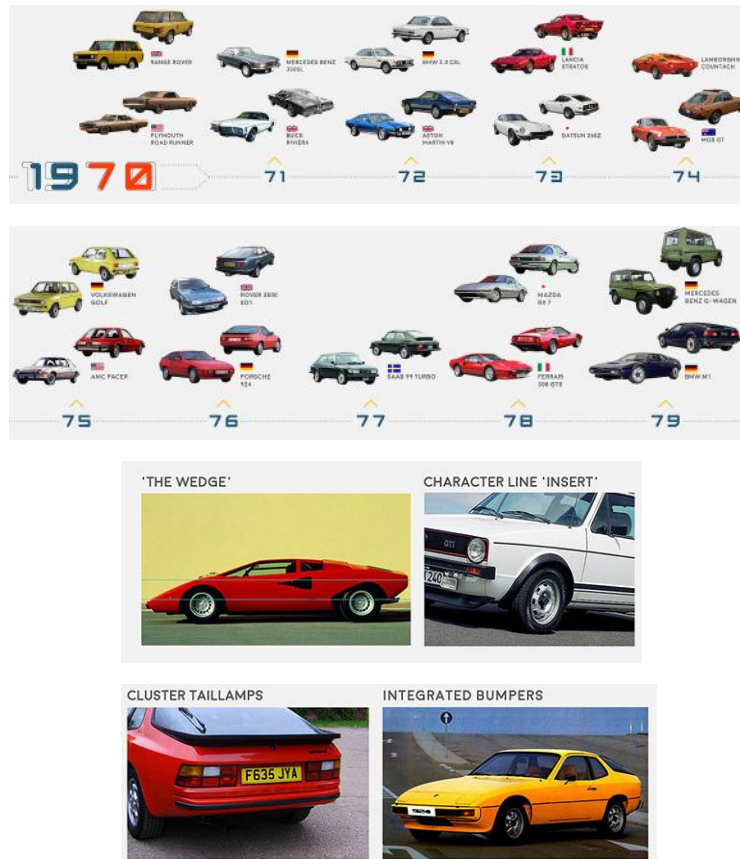
In automotive technology, the decade saw several previous technology being improved upon in terms of reliability, safety and performance. The archaic body on frame construction was discontinued in passenger cars by 1971 in many European countries, in favour of stronger and more capable monocoques. Efficient and environmentally friendly engines with turbochargers and catalytic converters were also a result of customers looking for maximum fuel efficiency in the tough times.

3.2.2. 1970s SOCIETY AND CULTURE



The electronic revolution ushered in the age of Colour Television in households. In a decade that was marred by pessimism caused by the Fuel crises, the music styles also sharply diverged. Two popular streams of music Disco and Hard/Punk rock were polar opposites, the former being celebratory and laid back while the latter being rebellious and agitated. A new kind of entertainment emerged in the form of gaming, with the first videogames appearing in the mid 70s. Recreational drug use gained a tremendous amount of exposure among youth and even popular culture. Fashion focused highly on individuality, with brands opting for tailored fits and pastel colours. The famous 'bell bottom' trousers were a hallmark of the 70s. Western audiences also embraced Asian movies, especially the martial arts action movies which propelled Bruce Lee to international stardom. The world was going through a lot of political shifts at this point, one of the notable being the Iranian revolution of 1979.

3.2.3. 1970s EXTERIOR TRENDS



Caught in the distressing fuel crisis and economic downturn of the decade, many manufacturers were forced to make their cars more affordable, efficient and reliable. This resulted in many models just going through simple cosmetic refreshes to differentiate from their older guises. Some of these cosmetic jobs were forced by stricter safety regulations. The importance of pedestrian safety saw the end of sharp chrome bumpers, and designers were challenged to integrate softer bumpers without having to redesign the entire car. The result can be seen in cars like the 1974 MG GT, which had a black rubber bumper that was criticized upon release. By the end of the decade, manufacturers like Porsche and Ferrari had come up with more elegant solutions, and body-colour plastic bumpers were seen in a number of high end models. The ungainly reverse lamp add-ons from the 60's were also more cleanly integrated as tail lamp clusters in this decade. Many European designs opted for the use of rubber or metal strips to denote character lines on flat sheet metal instead of formed surfaces. The era was not devoid of high end dream machines, though. Fueled by the radical thinking of Italian design houses like Pininfarina and Bertone, and spearheaded by legendary designers such as Giorgio Giugiaro, the decade saw the rise of a distinct 'wedge' aesthetic, with a number of mid engined sportscars like the Lamborghini Countach (1974), having a very sharp, angular profile that looked unlike anything seen before.

3.3. 1980s

The 1980's saw a new surge in optimism, this time fueled by the electronics revolution. The technological and scientific innovation seen in the 1970s resulted in a slew of affordable, portable and stylish consumer electronic items that changed the daily life and popular culture for ever. The decades long Cold War was on the decline, with Soviet power waning over the decade, leaving the United States to dominate the global market and even popular culture. The never before seen gadgets and electronics led to the whole theme of '80's futurism', with industry and culture having a very positive outlook towards futuristic technology.

1980
WAR ON
DRUGS IN U.S.



1989
TIANENMEN
PROTESTS-CHINA



1989
FALL OF
BERLIN WALL



3.3.1. 1980s TECHNOLOGY



The 70's set the foundation for the consumer electronic revolution with the invention of microprocessors, the 80's capitalized on it. Computers became more powerful and portable than ever, with innovative display and graphics leading to intuitive user interfaces such as the GUI in 1984's Apple Macintosh. Portable music players such as Sony's iconic Walkman and later the CD playing Discman utterly captivated the tech savvy young generation. The earliest commercial mobile phones were launched by Motorola in 1984. Innovative manufacturing technology allowed the devices to be stylish and affordable at the same time.

The electronics revolution was visibly affecting automotive technology as well. The early 80's saw electronic compass and navigation computers installed in Toyota models. Engine Control Unit (ECU) microchips were also becoming popular by managing engine performance and efficiency in a much better way. The rise of Compact Disks as a new medium created a need for people to listen to their music CDs while travelling. It was Pioneer, a third-party manufacturer who first developed car CD players in 1984, with OEMs soon following suit. Safety features such as Anti Lock Braking System was introduced in the decade. Even the first touch screen, a feature ubiquitous in today's cars, was first seen in a 1986 Buick Riviera.

3.3.2. 1980S SOCIETY AND CULTURE



MICHAEL JACKSON

Known as The King of Pop, Jackson revolutionized pop music, stage performances and music videos



FASHION: ICONIC 80'S

Vivid colours, synthetic materials, curled hair all make the iconic 80's look which peaked in the later half of the decade

BACK TO THE FUTURE - 1985

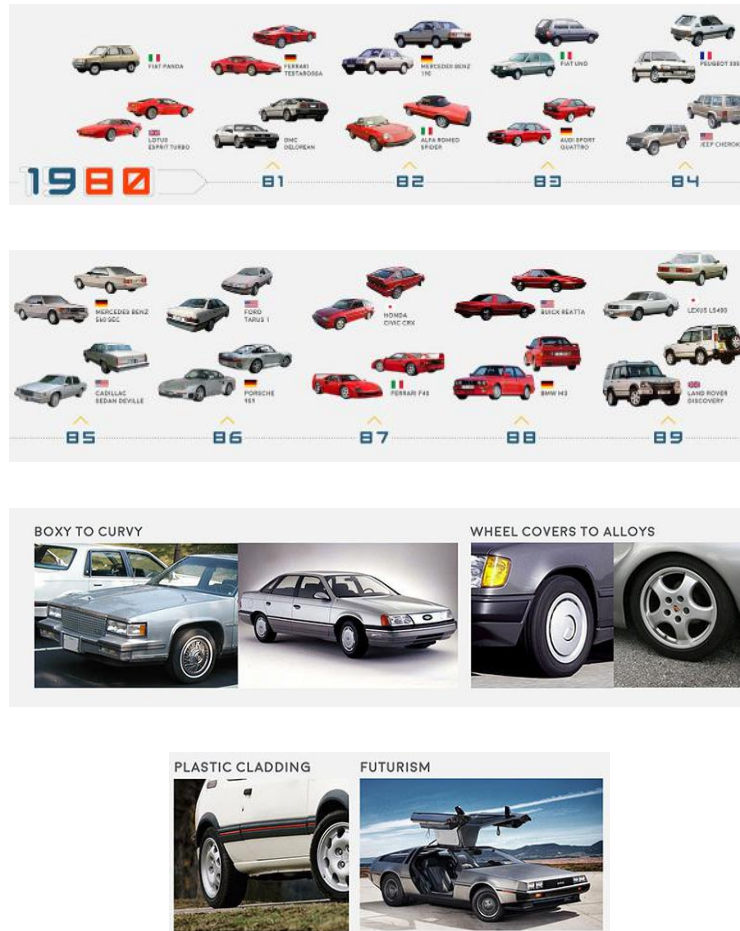
The futuristic time travel premise and sci-fi tech set the template for 80's futurism



The weakening of Soviet Union prompted United States to focus more on its internal conflicts. One of the major early 80's movement was the 'War on Drugs', a series of government moves and publicity campaigns to curb the rampant drug trade and addiction issues among youth. Vibrant youth movements were gaining traction even in strict regimes like communist China, with the Tianenmen Square massacre of 1989 becoming one of the historic student protests in the eastern world. The decline of USSR was further cemented by the fall of the Berlin wall in 1989, which was seen as a triumph of freedom and unity in the western world.

The sudden boom of electronic devices also completely changed pop culture, music and fashion. Electronic instruments started replacing conventional musical instruments, and gave rise to the wave of Synthpop and Techno Dance music genres. The 80's were also known as the MTV era, with the globally popular music channel promoting the trend of artists releasing Music videos along with their tracks. Michael Jackson was one of the unmistakable stars of this era, with his popularity reaching far and wide across the world. Hollywood also cashed in on the trend of Futurism, with 1985's 'Back to the Future' being a perfect example. The 1980's fashion was also iconic in this regard, with youths opting for a very flashy and vivid neon color palette, striking patterns highly unconventional hairstyles to celebrate the future that had arrived.

3.3.3. 1980s EXTERIOR TRENDS



The decade saw a number of iconic cars featuring cutting edge technology and captivating looks. Cars like the DeLorean DMC 12 (1981), Porsche 959 (1986) and Ferrari F40 (1987) had a plethora of technical and design innovations that made them instant classics. Manufacturers and designers of high end cars were increasingly willing to take bold calls in styling and technology. This eventually filtered down to even pocket friendly cars trying to emulate the cutting edge technology of the era in some ways. The dual tone plastic cladding of the affordable Fiat Panda is reminiscent of the plastic body of many of that time's electronic gadgets. The rise in fuel prices in US throughout the previous decade had finally prompted American manufacturers to design their cars to be more aerodynamically efficient. As a result, many cars such as the 1986 Ford Taurus shifted from a boxy to curvy styling aesthetic. This trend was set earlier by the European car makers, who had been using aerodynamic styling to improve fuel efficiency during the previous decade itself. The improved technology and manufacturing has also led many manufacturers to switch from wheel covers to proper alloy wheels, although in the 1980's they were still mostly limited to sportscars.

3.4. 1990s

The 1990's was a relatively peaceful period that saw one of the largest technological booms in history. The internet technology that has been brewing since the late 1960's finally exploded into the mainstream, and changed nearly every facet of life. The end of Soviet Union and the Formation of European Union effectively shifted the world away from the bipolar dynamic of the previous decades and settled into a relative state of economic and political balance. Environmentalism gained greater traction, exemplified by the 1992 United Nations Earth Summit, which set a number of landmark measures to protect and sustain the environment. Scientific breakthroughs such as the Hubble telescope and cloning led to a whole new understanding of how life and the universe work. Digital technology was beginning to captivate daily lives, with computers, internet and mobile phones establishing dominance in urban lives. Greater exposure and availability of technology meant that developing nations were also enjoying these benefits to a greater degree



3.4.1. 1990s TECHNOLOGY



Digital technology saw continuous breakthroughs in the decade, owing to rapidly advancing microprocessor technology. Home computers became more powerful and lighter than ever before, quickly followed by mobile devices. The 2nd generation (2G) mobile networks were getting established in this decade. The first laptops were introduced in 1991. The World Wide Web opened to public access in 1991, and would go on to become a vast collection of websites by the next decade. The ubiquitous search engine Google began its service in 1996, in the same year as e-commerce giants Amazon and eBay. Moving on from Compact Disks, Flash Drive storage first appeared in 1994. Wireless internet and bluetooth technology came about in 1999. Digital mp3 music players also came out in the same year.

The technological boom also reflected in automotive technology. GPS navigation appeared in the 1990 Mazda Eunos. Digital imaging technology led to reversing cameras in 1991. McLaren F1 became the first road car to use the super-lightweight and strong material of Carbon Fiber in 1992. Carbon Fiber technology was under development from the 1950s and was used in racing cars during the 1980s. This gap in technology adoption has become increasingly shorter as we progress. Other cutting edge technology such as Lidar Based Cruise Control, Parking Assistance, Dynamic Stability Control, Rain Sensors and In-Car Internet became available during the decade.

3.4.2. 1990s SOCIETY AND CULTURE



HIP HOP

The African-American subculture grew highly popular and influenced mainstream culture in terms of music, fashion and lifestyle



FASHION: BACK TO BASICS

By mid 90's fashion styles turned to stylish, but minimalistic. Unkempt casual looks and tattoos were popular in this era. Fashion styles were increasingly getting globalized as well.

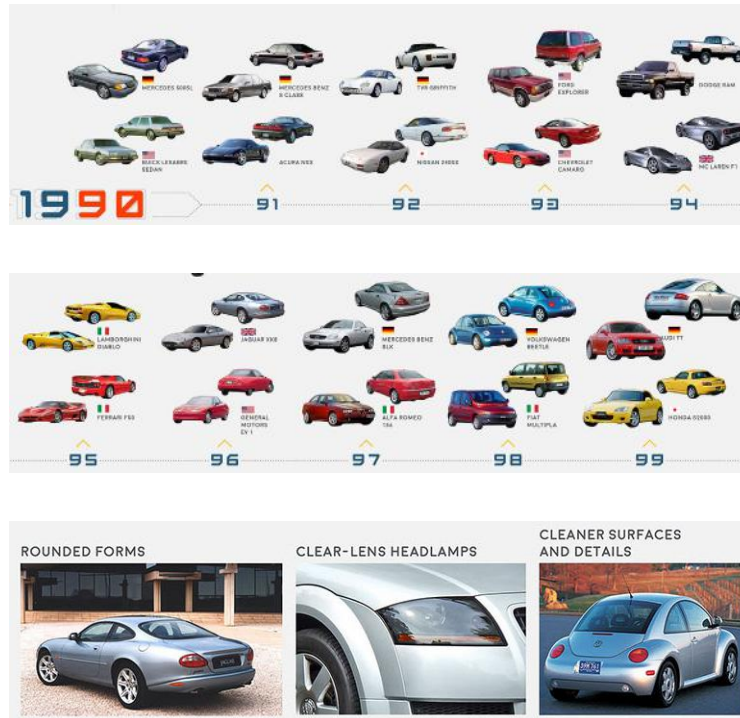
TERMINATOR 2 - 1991

Set the template for use of computer generated special effects in movies



The vivid colours and futurism of the 1980s were mellowed down for a more restrained, yet still progressive approach to progress. The internet was beginning to make the dissimulation and availability of information much easier on a global scale. Communication became easier than ever before, and society was starting to develop a dependence on gadgets and technology along this decade. In the western world, cultural forces of minorities such as African Americans were also making a larger impact, and led to the rise of Hip Hop culture in the United States. Fashion trends also followed the whole theme of 'back to the basics', with simple elements and calmer colour palettes becoming popular. The dissemination of western pop culture on a global level has influenced the globalization of trends as well. For instance, the fashion trends of Indian youths in the 1990's were almost identical to those of American or European youths of the same era. The reflection of advanced technology was seen in the movies as well. Computer generated graphics and animation was gaining popularity in Hollywood. Movies such as Terminator 2 and Jurassic Park put computer generated special effects to great use while Toy Story (1995) became the first ever fully computer animated feature film.

3.4.3. 1990s EXTERIOR TRENDS



The 1990's saw many manufacturers trying to appeal to a broader audience. Highly region specific trends were eschewed in favour of modern designs that can capture a wide range of markets. The hard edges of 80's designs gave way to softer, rounder forms overall. Advanced manufacturing techniques allowed manufacturers to form sheet metal into cleaner surfaces without ungainly shutlines. Details like plastic cladding were also avoided in the designs to reflect this new cleanliness. Family friendly market segments such as MPVs and urban SUVs were popularized in this decade, with designers deliberately moving away from the rugged utilitarian looks of their predecessors in favor of more sophistication. Very few cars tried to break the mould of existing convention in terms of exterior design in this era, with a few notable exceptions such as General Motors' ill-fated electric EV1 (1996), Fiat Multipla (1998) and Audi TT (1999). Volkswagen's 1999 New Beetle kicked off another trend of retro-revival which would become popular in the coming decade.

3.5. 2000s

2001
WORLD TRADE
CENTER ATTACKS



2003
WAR ON TERROR



2008
GLOBAL
FINANCIAL CRISIS



The 2000's were a tumultuous time in many regards: the 9/11 attacks and the War on Terror that followed, the Global Financial Crisis of 2008 have all had a tremendous effect on the political, social and cultural fabric of the world. Globalization is another buzzword of the decade, with American and European corporations shifting their focus to other nations to develop their workforce and infrastructure. In addition to this, the decade also played out one of the biggest technological and cultural forces we have ever witnessed: the internet. The 1990s had set the stage for the Internet era, which bloomed in the 2000s, making the world an increasingly smaller place. The birth of smartphones in the latter half of the decade propelled this pace of growth to a whole different level. The internet era may very well be the ultimate example of the complex symbiotic relationship between technology and human needs, and how they feed into each other.

3.5.1. 2000s TECHNOLOGY

2000
FIRST CAMERA
PHONE
SHARP J-SH04



2003
VIDEO CALLING
SKYPE



2009
FASTER 4G
MOBILE
NETWORK



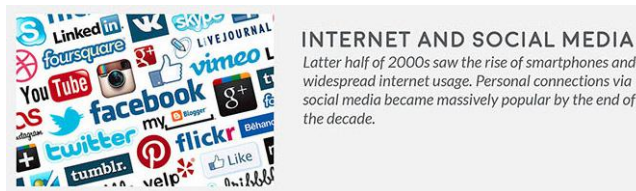
2006
MULTI MATERIAL
3D PRINT



Internet and Mobile technology were the greatest technological forces of this decade. Mobile phones went from the first camera phone sporting a 2G network (Sharp J-SH04 in 2000) to powerful smart devices featuring 4G networks by 2009. The smartphone revolution was more or less catalysed by Apple's iPhone in 2007, which resulted in a hailstorm of touchscreen devices that changed the way we interacted with gadgets. The backbone of all this was the internet technology which reached new heights in the decade. Social media websites like Facebook and Myspace quietly began in the early 2000s before rapidly conquering the world along with smartphones by the end of the decade. In addition to this, newer manufacturing technology such as 3d printing, storage media such as Solid State Drive (SSD) and Blu Ray were also introduced in this decade.

In terms of Automotive Technology, a large number of electronic driving aids were developed during this time. Brake Control systems, Night Vision, Pre-Collision Safety, Lane Monitoring, Automatic Parking etc were just a few of the innovations developed in the 2000s. Smartphones and touchscreen interaction made their way into vehicles as well, with advanced infotainment systems becoming a part of most modern cars. Lighting technology also saw a major innovation in the form of LED lighting being used by Audi in 2007.

3.5.2. 2000s SOCIETY AND CULTURE



SUPERHEROES

The decade saw comic book superheroes rise to great popularity. This rise is attributed to both advancements in computer graphics and (disputedly), to the rising threat of global terrorism.



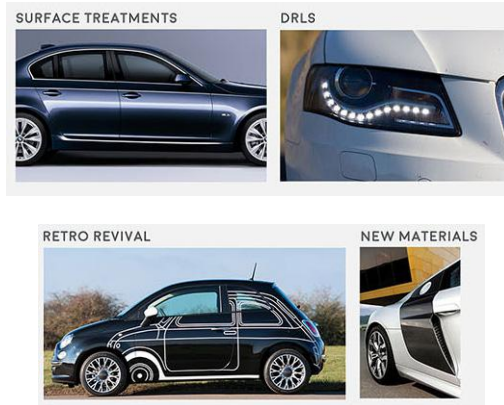
GLOBALIZATION

'Outsourcing' was one of the buzzwords of the decade, with American and European industries exporting their workload to emerging economies, providing employment and enabling a global spread of technology and services.

The internet and social media has had a tremendous effect on the social outlook of 2000s. The culture of sharing experiences online became a phenomenon as websites like Facebook, Twitter and Youtube became globally popular. Information from anywhere on the globe is instantly available, and friends or relatives thousands of miles away are accessible with just a few clicks. Personal connections and friendships formed across social media have become increasingly common along the decade. The phenomenon of globalization also have had a profound effect on the working population in developing countries. The term 'outsourcing' has incited a great deal of discussion in the decade.

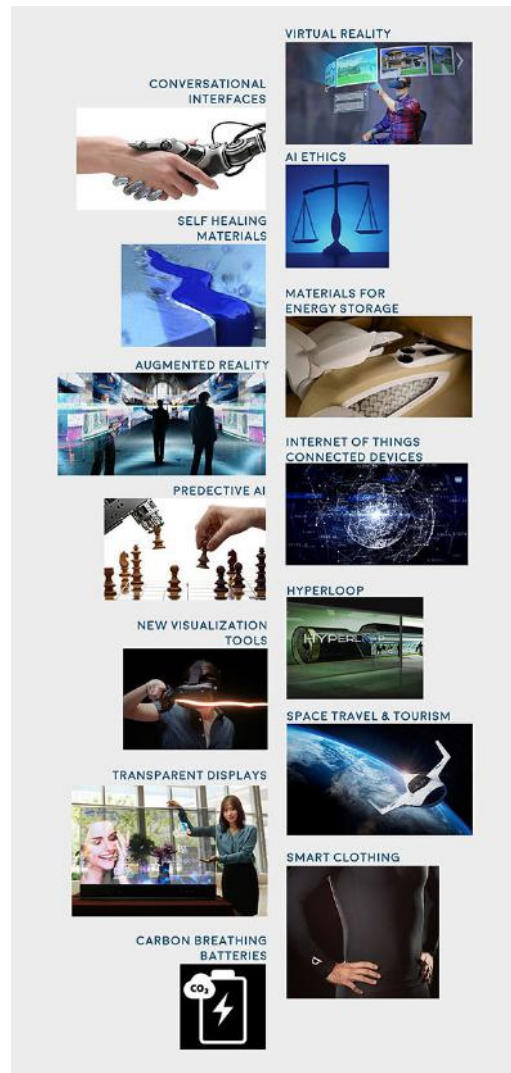
The ever improving technology has had an effect on popular culture as well. Computer generated graphics are commonplace in Hollywood movies, and the decade is notable for the rise of superhero blockbusters. 3D movies, which had seen a brief rise in the late 80's, also became popular in the latter half of 2000s, thanks to advancements in technology. Similiar to the 1980's Synthwave, Electronic Dance Music is a trend that is a reflection of technological progress on music genres.

3.5.3. 2000s EXTERIOR TRENDS



The early years of 2000's were a continuation of the late 1990's trends, with retro revival gaining traction. Cars like the Mini Cooper, Ford Mustang and Fiat 500 were designed as modern interpretations of the classic designs, making use of the manufacturers' rich heritage as well as customers' nostalgia for the products. Increased awareness about climate change and environmental conservation led to the trend of Hybrid cars, with Toyota leading the way with the 2004 Prius' distinctive design. The unique shape set it apart from conventional fuel vehicles, thus encouraging eco-minded customers to use the car itself as a statement. Another salient trend of the decade was an increasing focus on surface treatments. Designers were giving a large amount of focus on manipulating surfaces to get specific emotive qualities from the exterior. It is also notable that surface detailing and lines have become sharper over the years, which is in turn made possible by the newer, advanced manufacturing techniques. Another trend is the use of LED Daytime Running Lights (DRLs) as a styling feature, first done by Audi in 2004. DRLs were a mandatory safety feature in Scandinavian countries for decades, but Audi was the first to use them as a styling element. High end performance cars were also featuring unpainted carbon fiber as a styling as well as functional element, which alludes to the car's use of cutting edge technology and materials. Following this trend, even lower levels cars have started featuring panels with a fake carbon fiber texture to emulate the same sporting credentials.

3.6. PRESENT DAY AND FUTURE



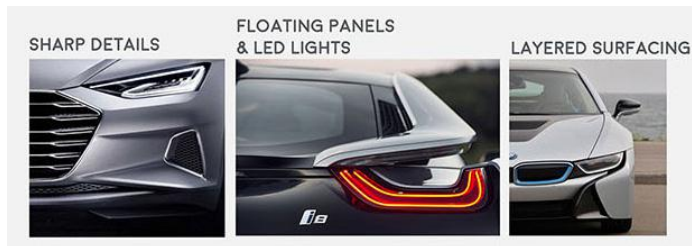
The takeaway from the study of previous decades is that, technology and human needs have always been intertwined and have directly and indirectly influenced automotive styling in myriad ways. Technological progress have been exponential in the last couple of decades, and is only expected to continue to be so. In such a situation, it is only reasonable to expect human needs and consequently exterior design to have profound changes in the near future.

3.6.1. Present and Future of Technology

Since the beginning of the current decade, technology has been driven towards developing smarter devices and gadgets that are constantly connected to a larger ecosystem. Virtual Reality and Augmented Reality are already commercially available, and promise whole new vistas of immersion, entertainment and interaction. We are witnessing the first steps towards creating a fully functional artificial intelligence, in the form of smartphone assistants such as Siri and Cortana. We are looking at interacting with our devices in the form of touch, gestures, voices and even thoughts. Displays are becoming brighter, more vivid and even flexible. Newer materials and manufacturing like 3d printing, smart materials and self healing materials all influence the way things look and function. We have witnessed reusable rocket launchers and the plans to send tourists to space is already being made. Remote controlled drones are already dominating battlefields and delivering packages to homes.

PRESENT DAY AND FUTURE

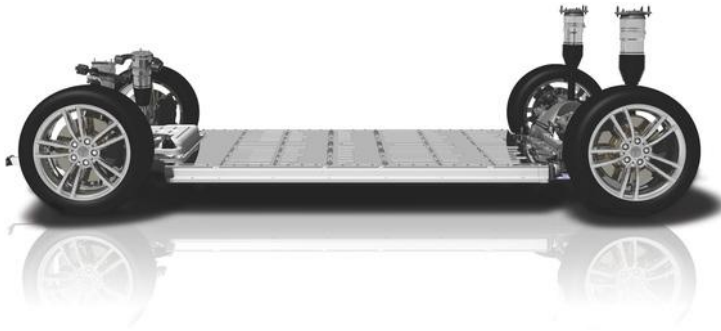
3.6.2. Present Exterior Trends



During the six years that have passed in the current decade, automotive exteriors seem to be going through another set of trends, enabled, again due to the advancements in technology. The hybrid technology of 2000s have matured into highly sophisticated, even performance oriented powertrains in the present day. Manufacturers such as Tesla are moving towards fully electric vehicles. This paradigm shift in automotive technology is facilitating a shift in styling as well. Latest manufacturing techniques have allowed designers to have a greater degree of freedom on surface quality and detailing than ever before. Cars can have very sharp, crisp detailing on surfaces. Another trend is the floating panel design, in which certain body panels appear to be 'floating' unsupported by the rest of the car. The trend was started by BMW's i3 and i8 hybrid vehicles which came out in 2013. Even affordable cars such as the Suzuki Vitara Brezza (2015) were quick to adapt to the trend by envisioning a watered down version of the floating panel concept. Complex surface treatments such as layered surfaces is also becoming popular, with designers boldly trying surface layers with contrasting colors.

Since cars are at the brink of shifting towards new powertrains and technology, with a target user base of urban, tech-savvy and sophisticated customers, designers can afford a lot of experimentation and risks in terms of styling. If electric power

PRESENT DAY AND FUTURE



is the way forward, manufacturers like Tesla have already demonstrated that the mechanical components such as the motors and the batteries form nothing more than a flat platform; a blank canvas on which designers can exercise their maximum creativity. The rapid advancements in technology is rapidly allowing designers to bring their most unconventional ideas to life. As we progress into the future, the newer human needs will create more advanced technology and vice versa. The trends that we observe in design is merely a reflection of this relationship.

DESIGN PHASE

4. THE SETTING: 2030

Keeping the setting at 2030 keeps the time frame close enough so that the trend study could be projected and predictions about the technology and needs could be made. The aim of the study was to anticipate which technology would people be talking about in 2030, and which technology could elevate styling to new levels.

Having the technological advancement as a backdrop, a story was to be constructed that captures the emotional aspects of the intended design. Keywords derived from the story were to be used for constructing the design brief.

4.1 2030: ANTICIPATING TECHNOLOGY

2030



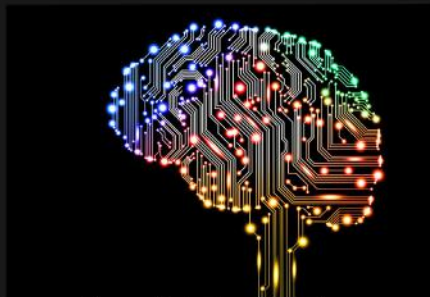
Rise in Urban Population
Higher Education levels and more exposure to tech



Multiculturalism
More Homogenous Cultural Phenomena



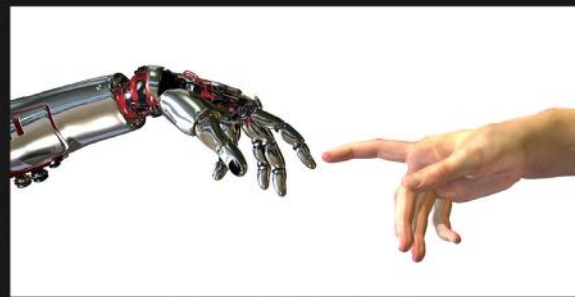
Conservation and Sustainability
Increased awareness about eco-mindedness



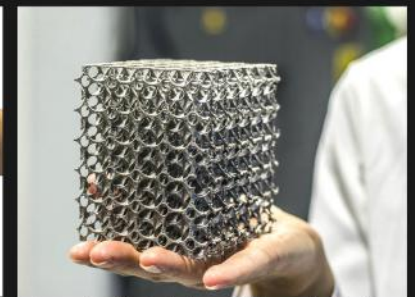
Human Brain Augmentation
Overcoming disabilities, enhancing senses, natural communication with AI



IoT and Home Automation
Home to be a connected network of communicating gadgets



Complementary Use of AI and HI
AI to automate most of repetitive, labor intensive jobs



Smarter Materials and Manufacturing
Aided by advances in Nanotechnology and Bio-engineering



Inter-Vehicle Communication
Vehicles form a part of a larger urban system to effectively manage traffic



15-20% cars with level 5 autonomy
Many manufacturers planning to launch self driving vehicles by mid 2020s



Improved Electric Power and Charging Tech
Reduced charging times and increased range per charge



Mixed Reality
AR and VR to manifest in the form of headsets, implants and contact lenses

4.2 TECHNOLOGY AND LIFESTYLE

The status of technology and life in 2030 can be projected from the topics that are being discussed in excitement right now. The rise of artificial intelligence is a surefire innovation that is expected to happen by the time. Interactions with such 'smart' entities will also be different. Preset instructions and codes will be replaced with a more natural 'language', meaning we will be able to hold conversations with our gadgets and virtual assistants. The confluence of Human Intelligence (HI) and Artificial Intelligence (AI) is going to be a focal point of this development. New areas of research and work will emerge where the effective combination of HI and AI is required. In an optimistic outlook, AI is not going to overpower HI, but rather complement it.

The extension of AI development is a whole slew of connected and 'smart' solutions which will manifest in almost every aspect of life. From transportation systems to home automation and security, devices and machines will have a higher degree of communication skills and autonomy. An ecosystem of connected devices which do not need constant human attention will greatly reduce the stress involved in a number of activities, in addition to streamlining them.

The question of sustainability will be as prevalent as it has been for the past couple of decades. There has been an increasing awareness towards the need to conserve our limited resources and making this planet a better place to live. In the near future

this trend is only expected to continue strong. There is a gradual but definite shift towards using renewable sources of energy, and fossil fuels are going on the decline. Efficient, effective generation and utilization of electric power will drive the forthcoming developments. Cities will have smarter power grids, electric cars will become more popular and devices will work more efficiently than ever.

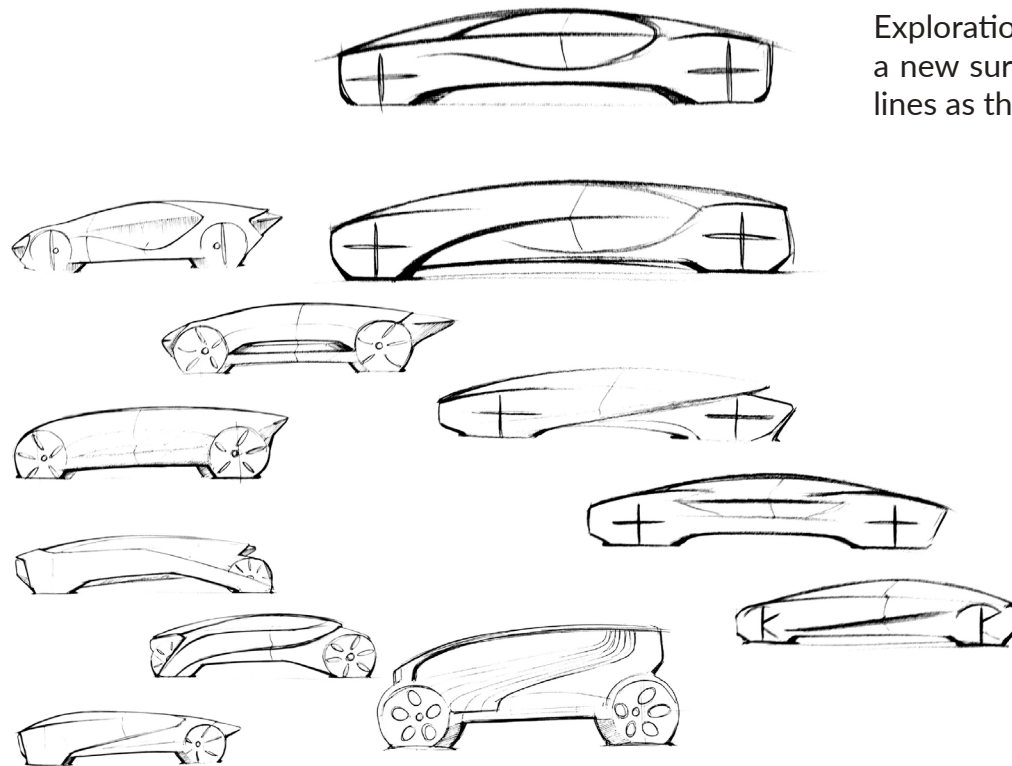
Technology can also change the way we perceive the world. Virtual Reality and Augmented Reality is already making ripples. In the future, these devices can become more seamlessly integrated with our 'natural' perception. This would mean everything we see and experience as 'real' can be supplemented or enhanced by an added layer of virtual elements.

The question of life and culture is a little more subjective to predict, since there is no real way to say for sure which cultural phenomenon will survive and which will perish. However, it can be safely said that our cities will become more multicultural and inclusive due to the increasing effect of social justice movements and higher focus on education and literacy. Urban areas will become more populated than ever, and urbanization itself will increase. The increasing influence of social media and internet globally may result in the decline of region-specific cultural movements.

5. SKETCH EXPLORATION

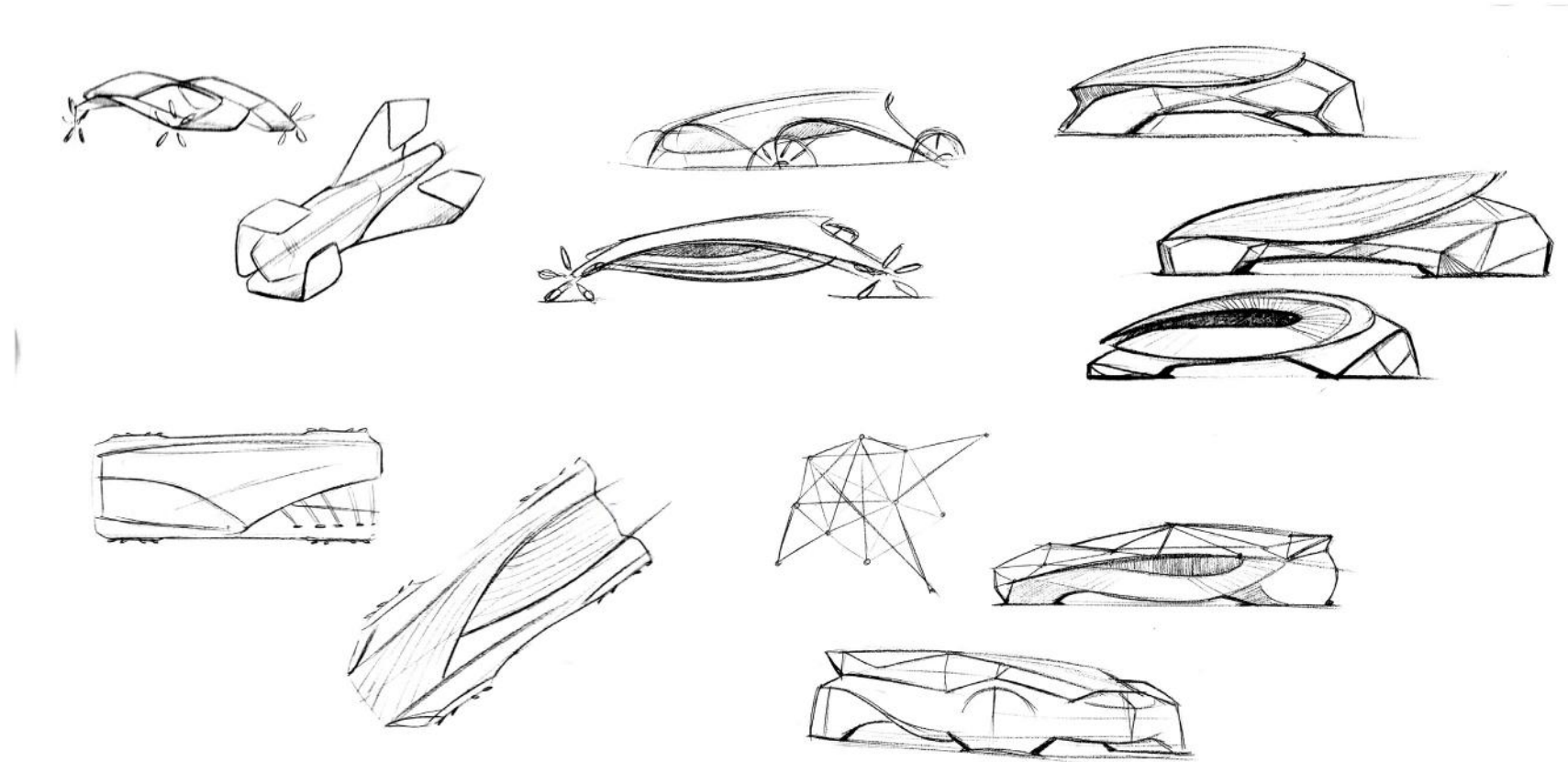
The initial phase of sketching consisted of free exploration of ideas to come up with as many different ideas as possible. Sketching without constraints was helpful in developing several interesting directions for deciding proportions, stance, surfaces and so on. After that, the focus was on developing concepts by following the themes as well as taking cues from the ideas developed during the initial sketching phase.

SKETCH EXPLORATION



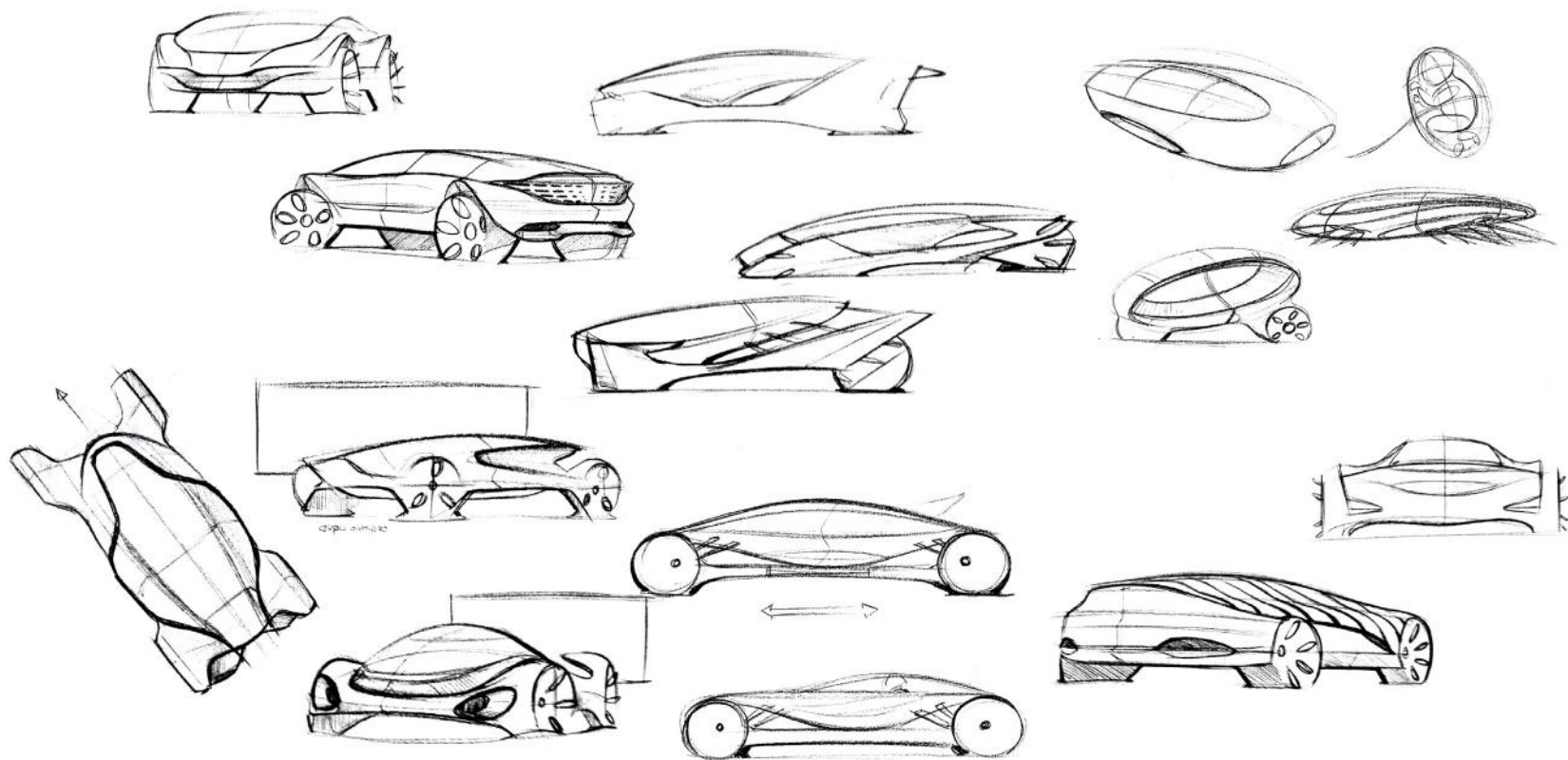
Exploration of fast, sweeping forms. The aim was to see how a new surface treatment can be developed by using strong lines as though stretching from within the body.

SKETCH EXPLORATION



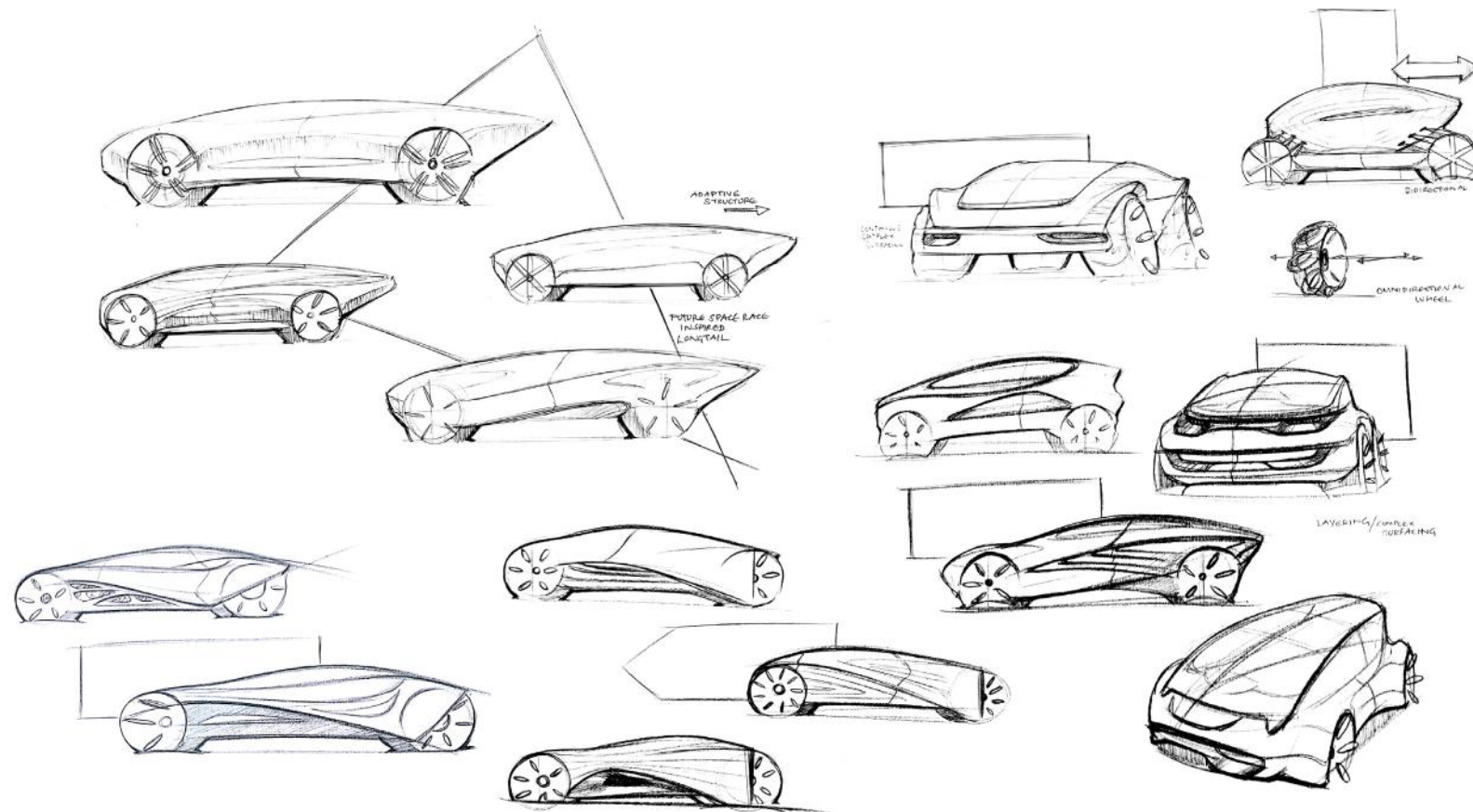
Exploration of asymmetric, planar and geometric forms. The substitution of a traditional DLO with light-conductive smart material allows for more unconventional exterior forms. Multiple layers of planar surfaces provide dynamism to the form. Planar surfaces can also fold over in a complex manner allowing for interesting form expressions.

SKETCH EXPLORATION



Exploration of treating the cabin space as a separate, insulated component. Inspired by a womb, explorations were made to see a cabin that is suspended or floating, giving a feel of lightness and security. Softer, elliptical forms were used to convey the feeling of warmth and security while offset by the other organic shapes to convey speed and direction in some of the explorations.

SKETCH EXPLORATION



Directional forms that convey a strong sense of momentum and speed, while combining the aspects of elliptical forms and layered surfaces. The traditional notions of character lines are eschewed in favour of 'character surfaces'. Forms based on a flexible skeleton are also explored.

SKETCH EXPLORATION

Keeping in mind the possibilities of technology in future, the sketch exploration was to identify the various emotional and technological aspects that can be captured in the exterior form of the car. There was no constraint set on the type of vehicle or target customer initially so that maximum freedom could be ensured to come up with different concepts.

The trend study had helped in identifying the evolution of proportions, surface treatments, detailing and materials in cars over the years. The aim of this exploration was to relate the possible advancements in technology with these factors. The use of unconventional materials and manufacturing could also result in unconventional forms and surfaces. The experiential aspects of a car was also explored in this regard. In the future, a car could be envisioned as something more than just a machine to travel from A to B. Similar to how mobile phones have evolved from simple devices to call others to full-fledged smartphones, cars can also be seen to fulfill larger roles in the future. This is also the perfect time to consider such possibilities because there is a paradigm shift about to happen in the automotive industry. With electric cars on the rise, along with new methods of manufacturing and even new models of car ownership, we are beginning to redefine what a car is and what it can do.

This paradigm shift was crucial in the exploration phase of the design, because it gave a broader playing field to think within and generate ideas. The aim was to not think of an exterior

form in terms of functional exterior elements such as DLOs and lights and other such detailing, because the technological advancements can give a greater leeway in playing with these elements from a styling point of view. This has further enabled the exploration process to be more free to develop more unconventional surface treatments and detailing.

The dynamism of the form can also be more seamlessly integrated into the functionality of the vehicle. Explorations included forms and surfaces that can move and realign based on conditions. Even the idea of a 'surface' was eschewed in favour of a fibrous form that wraps around the driver for a more natural and focused experience. New manufacturing techniques also allow for non-traditional surface treatments, therefore graphical treatments, textures and patterns could possibly be built into the surface itself. Organic and geometric designs were also explored.

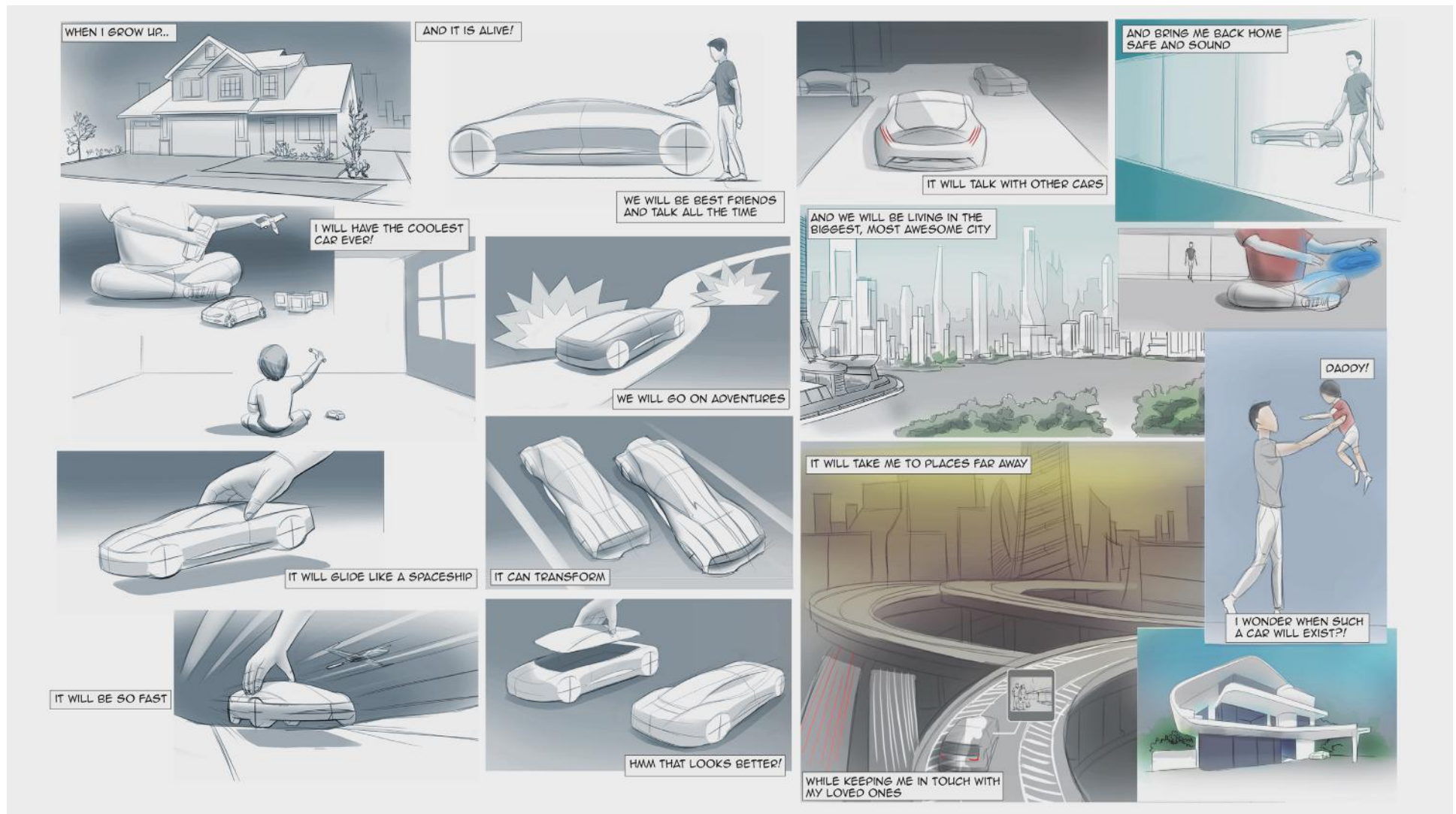
The takeaway from the free exploration phase was that there is a much broader spectrum of new experiences a car from 2030 can provide to its users. The challenge lies in translating these experiential aspects into a form.

6.STORYBOARD

The effective starting point in form development for this future car was to lay down a story to set a direction and keywords for the design brief. The storyboard attempts to capture the emotion and experience the design has to capture in the final deliverable of the project.

The focus on this project was brought to the context of a family living in an urban metropolis setting of 2030. The storyboard sets the car to be a companion for the family rather than a machine of convenience. The car becomes a part of an Artificial Intelligence ecosystem within the home, and it knows and adapts to the needs of its family members. The diverse needs of the context also calls for versatility. The storyboard captures the essence of the context around which the design has to be built.

STORYBOARD



7. KEYWORDS AND DESIGN BRIEF

The keywords generated from the story are shown (left). Based on these keywords and the initial intent of the project, the design brief was constructed as follows:

“To design the exterior for an electric powered four wheeled autonomous passenger vehicle for the year 2030. The design should be reflective of the cutting edge technology and human thinking of the time while embodying the keywords mentioned”.

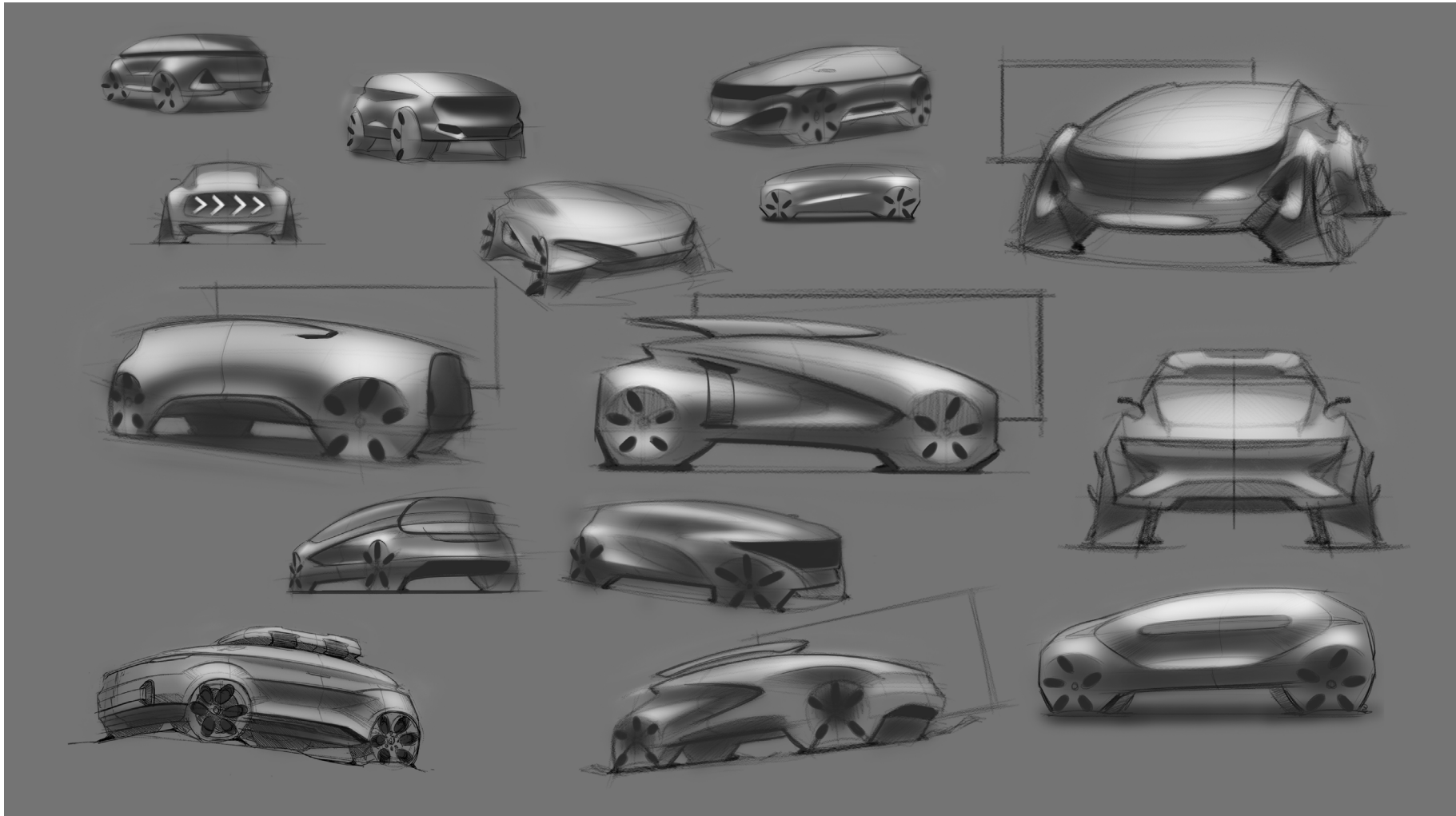
PLAYFUL

WARM

ADVENTUROUS

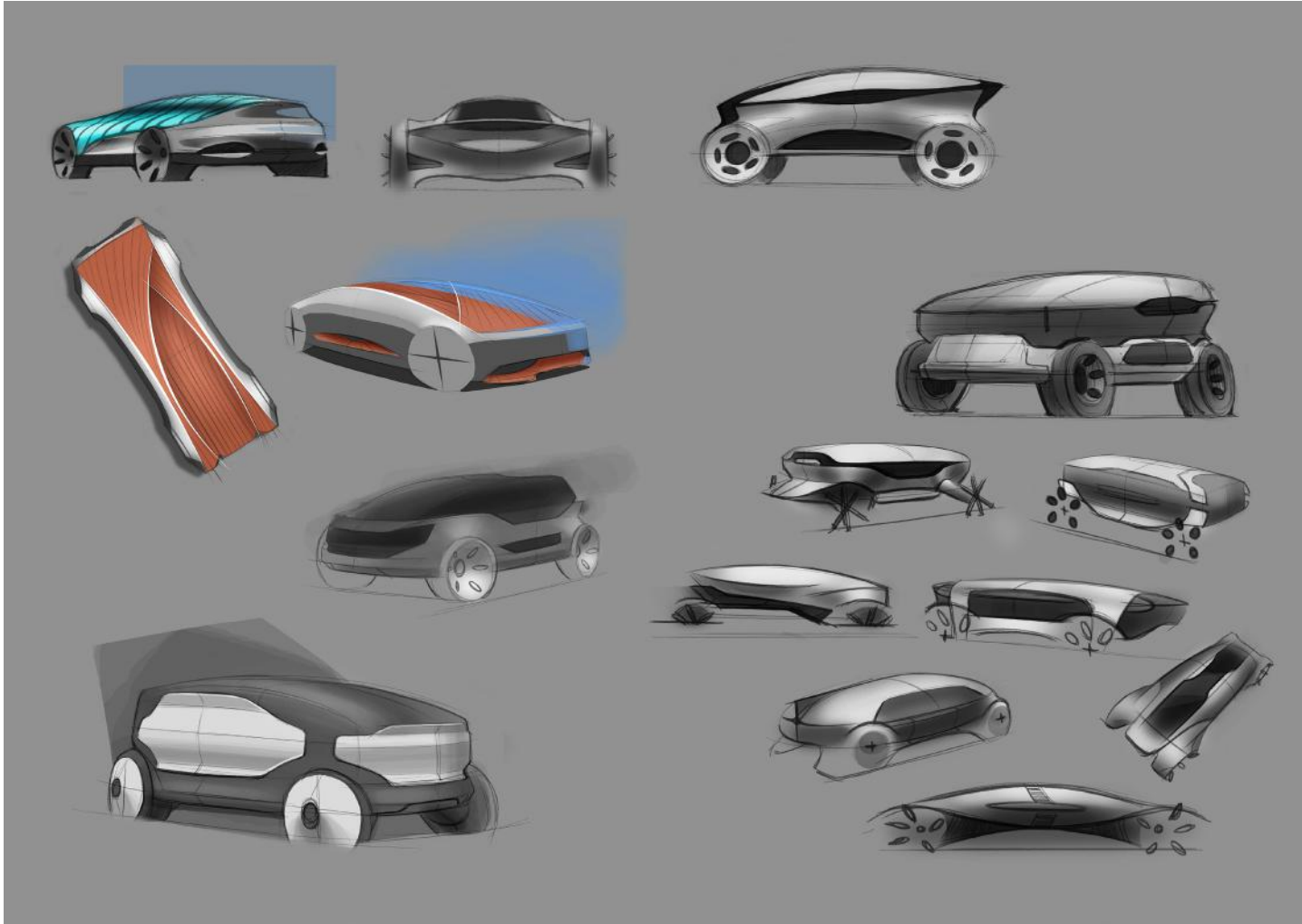
COMPANION

8. CONCEPT GENERATION



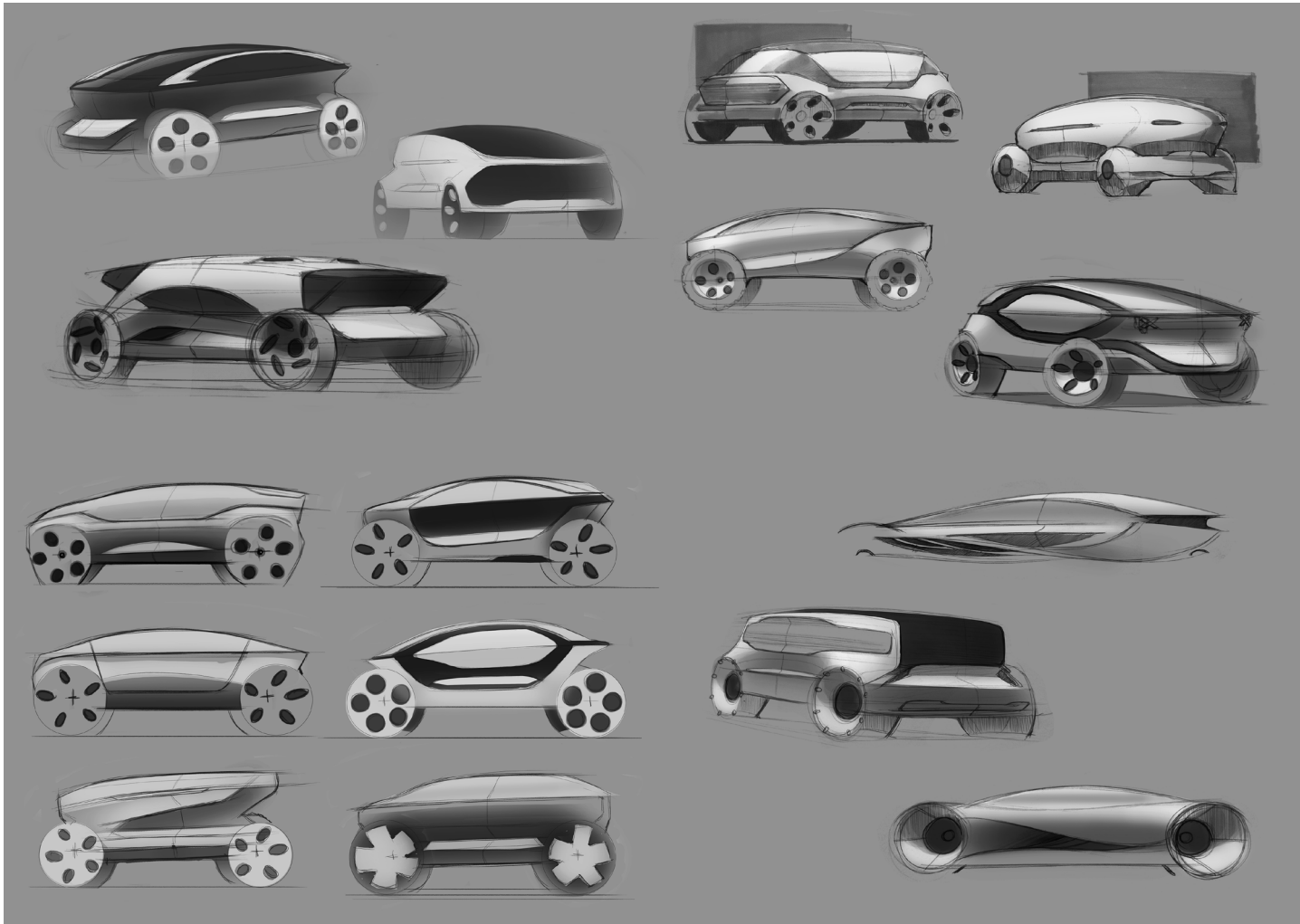
Exploration of 'adventurous', carrying forward the traditional SUV styling cues and exploring how the future advancements in manufacturing, packaging and technology can allow for a more dynamic, active form. Layout of an electric vehicle allows for more forward-leaning, directional forms that can convey the athleticism, while other explorations tried to emphasise on the strength and stability of a go-anywhere vehicle.

CONCEPT GENERATION



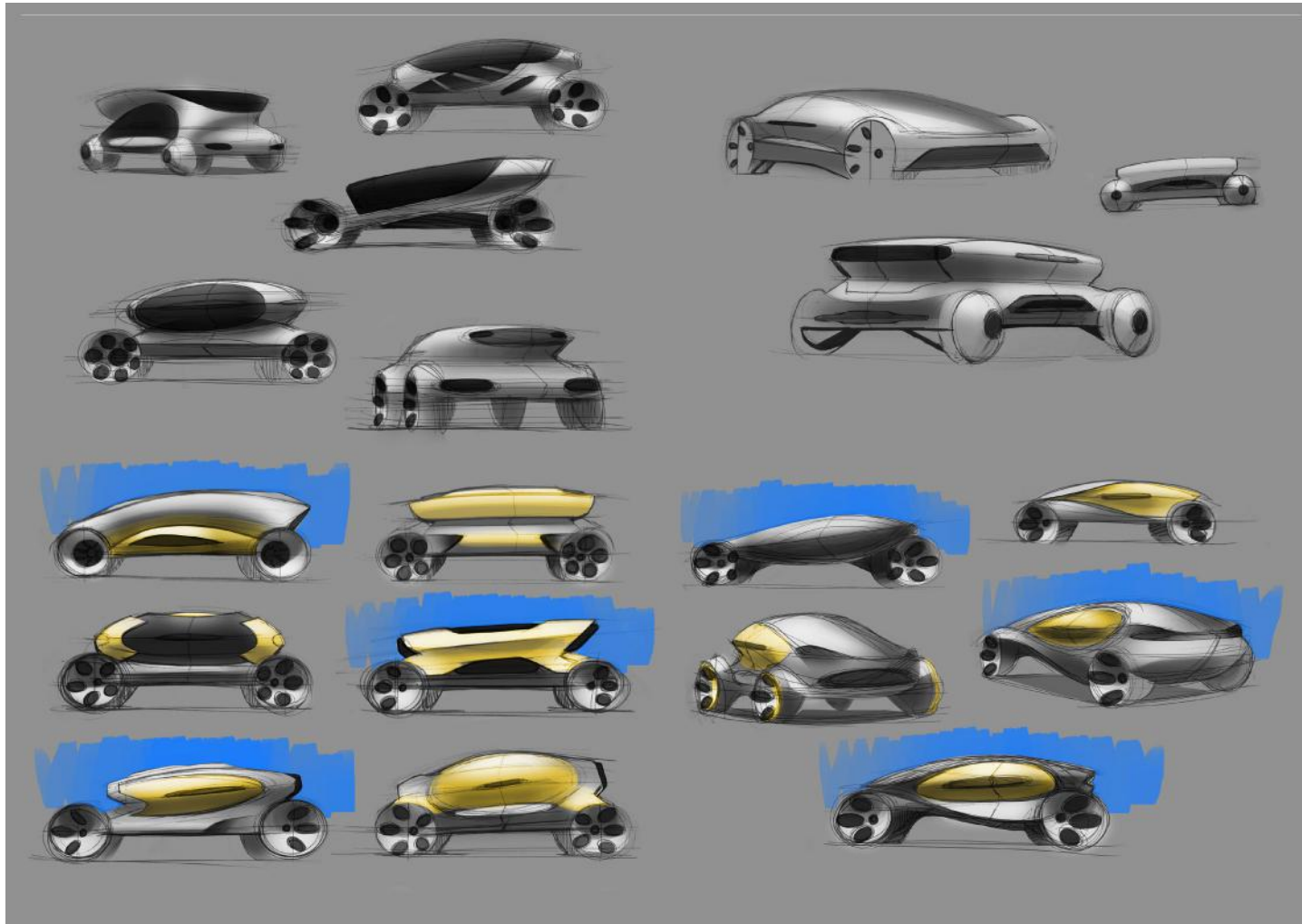
Exploitation of layered surfaces instead of traditional lines. The contrast of inner and outer surfaces add an element of surprise to the car.

CONCEPT GENERATION



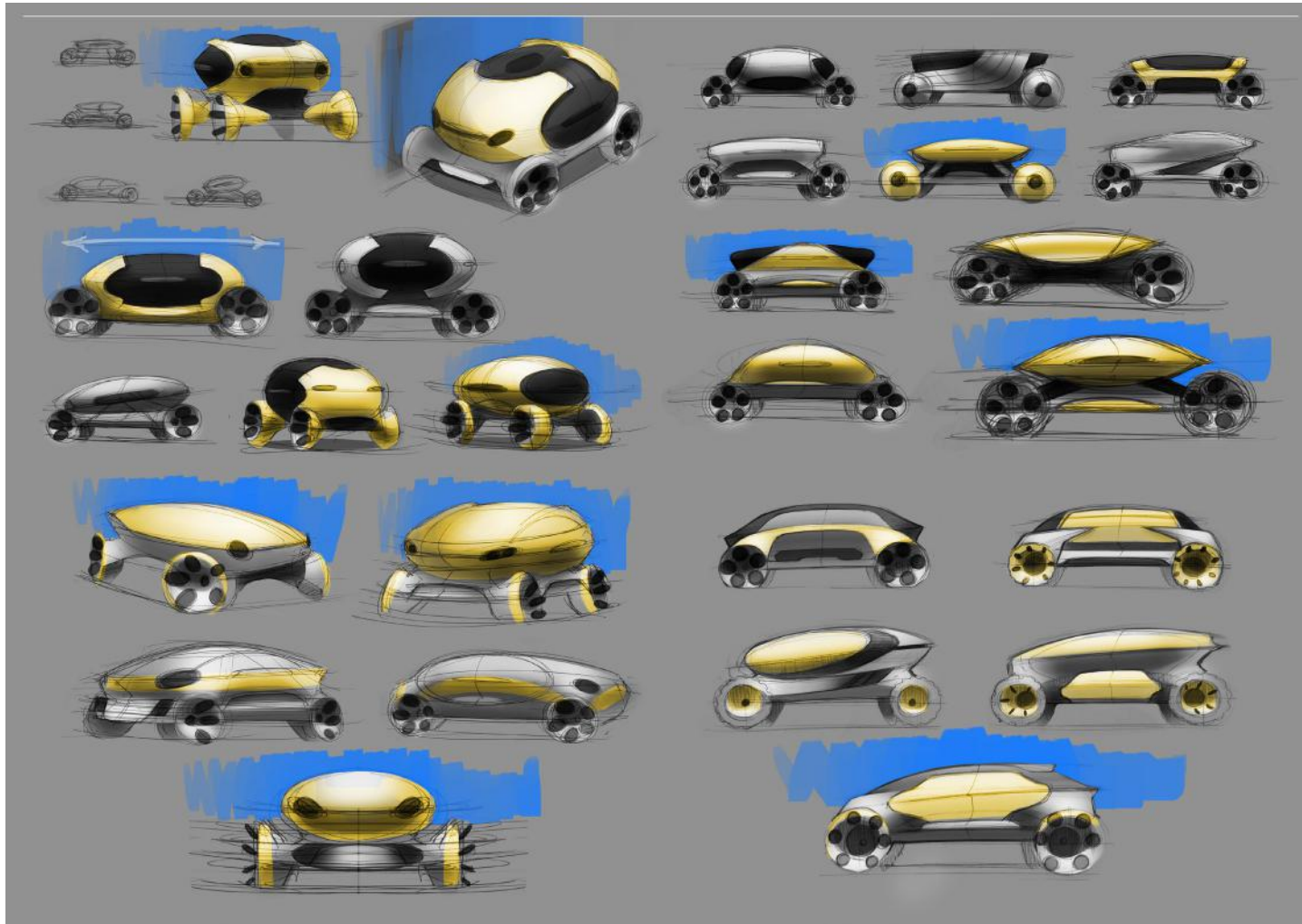
Positioning of prominent wheels at the extremities of the car leads to emphasise the adventurous nature. The planted stance is offset with dynamic volumes conveying a purposeful and active nature.

CONCEPT GENERATION



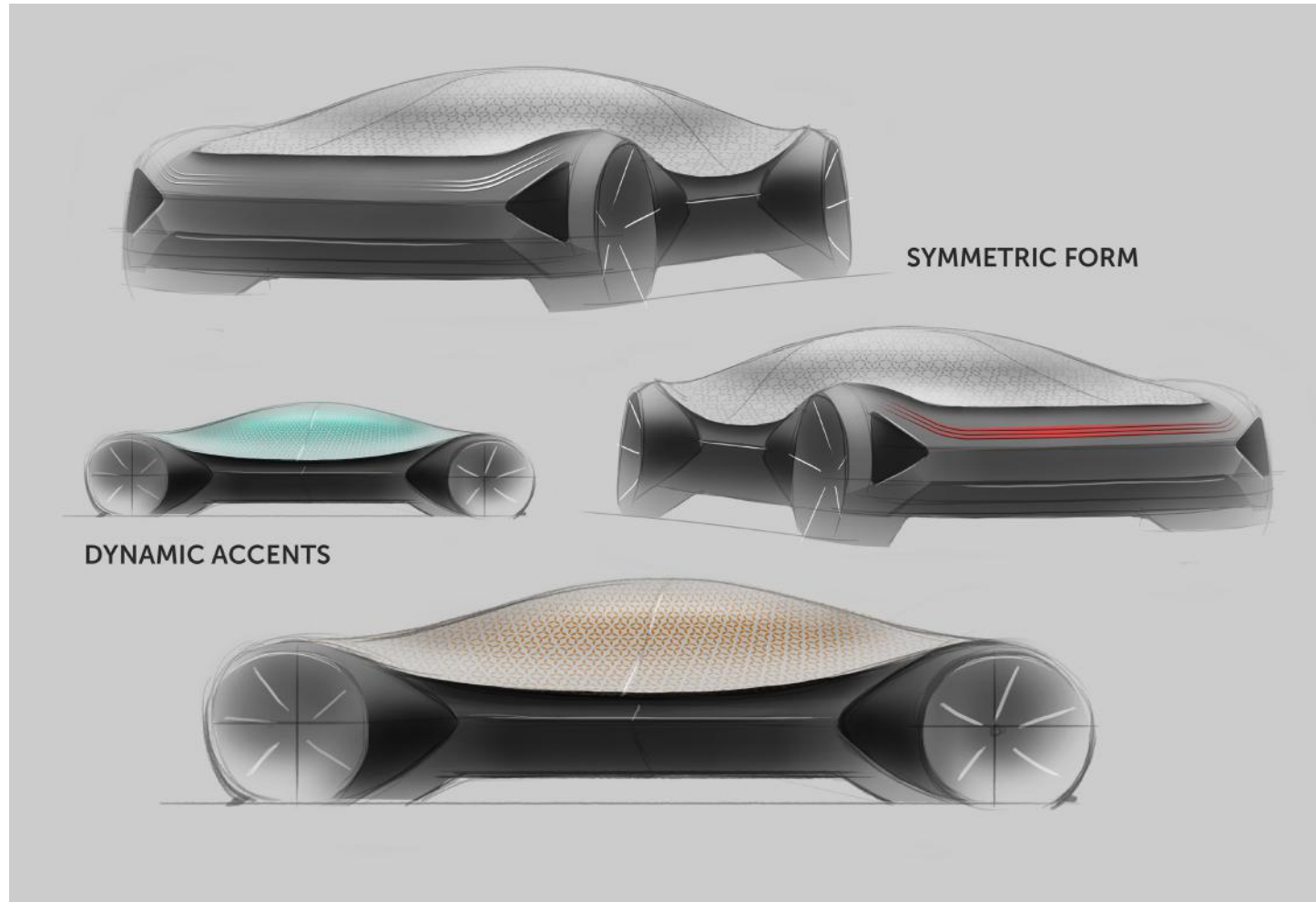
Combining organic forms and layering on the wheel-out stance to emphasise the fun, enthusiastic nature of the car. Elements of contrast on the forms were attempts to break the continuity of the larger surfaces in an interesting manner.

CONCEPT GENERATION

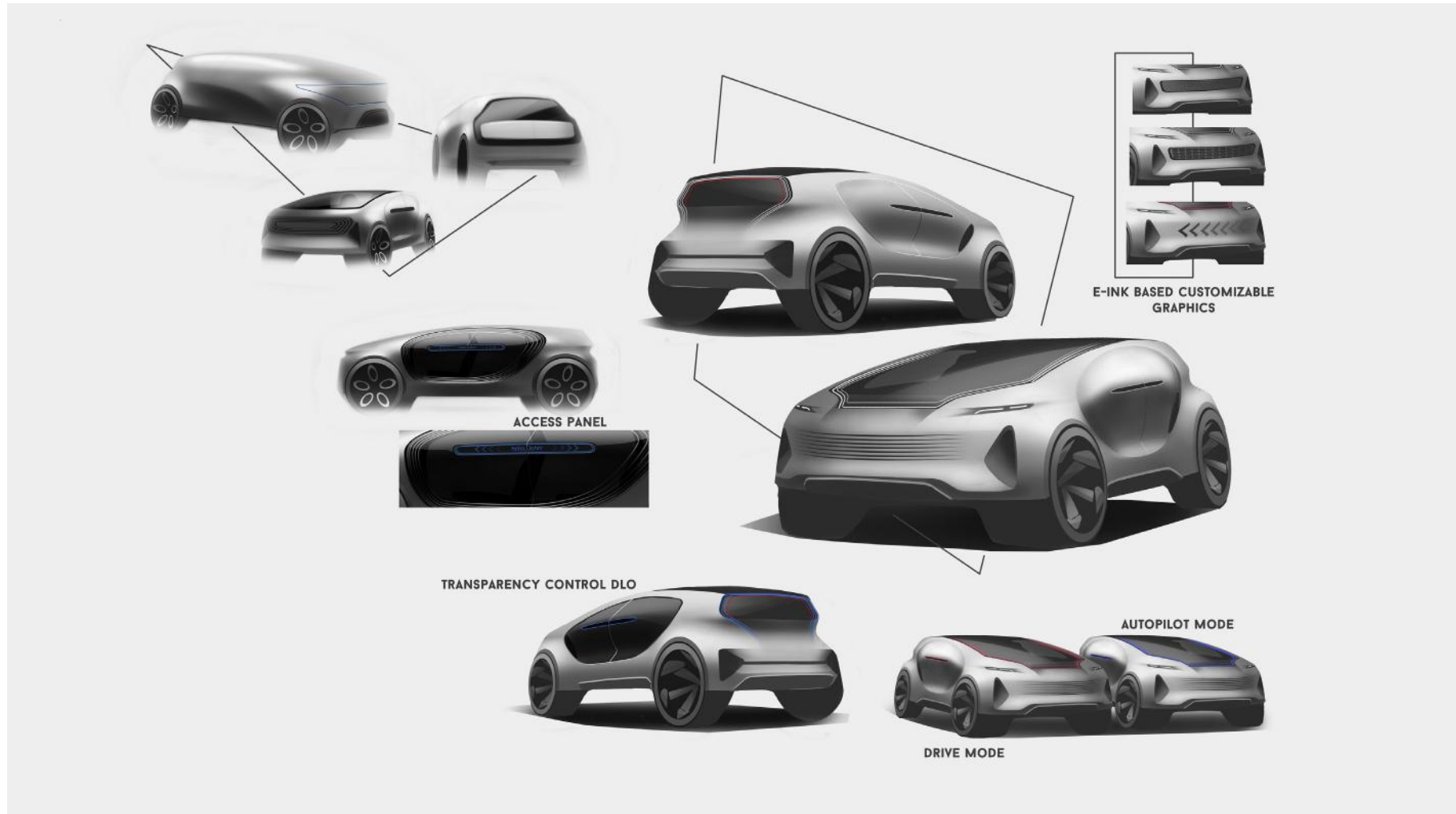


Further explorations combining the adventurous, fun and enthusiastic nature of the car.

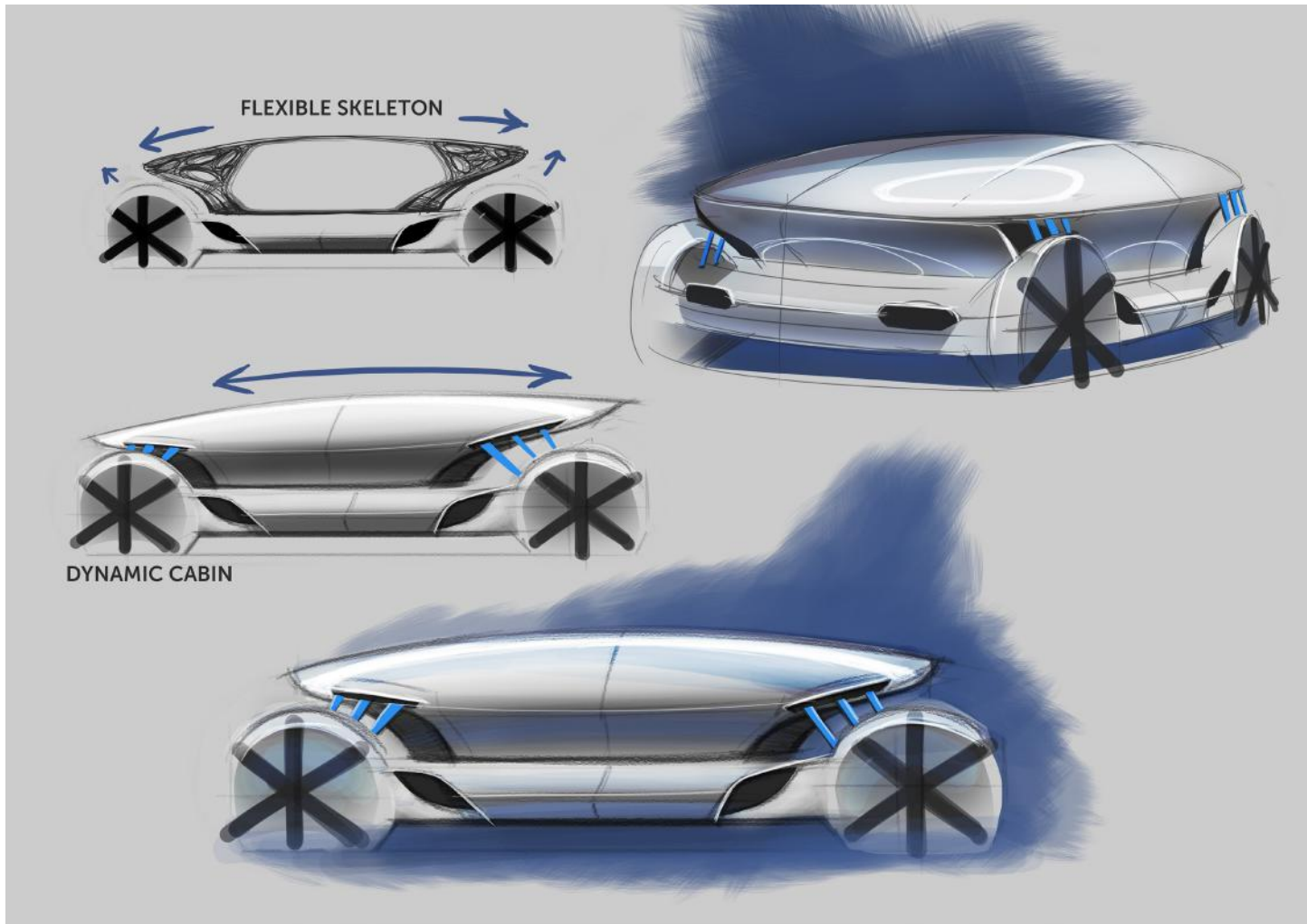
CONCEPT GENERATION



CONCEPT GENERATION

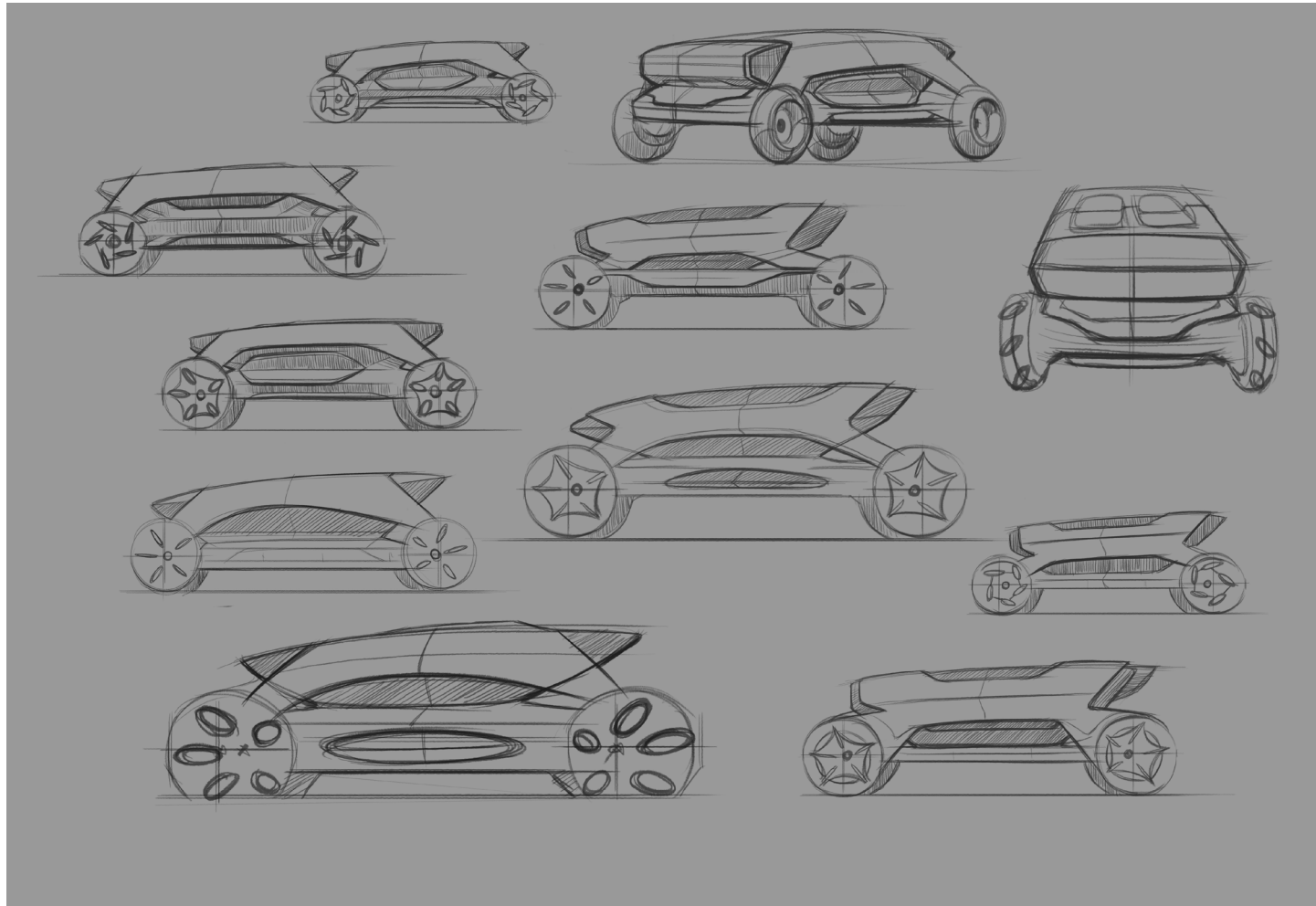


CONCEPT GENERATION



9.FINAL CONCEPT

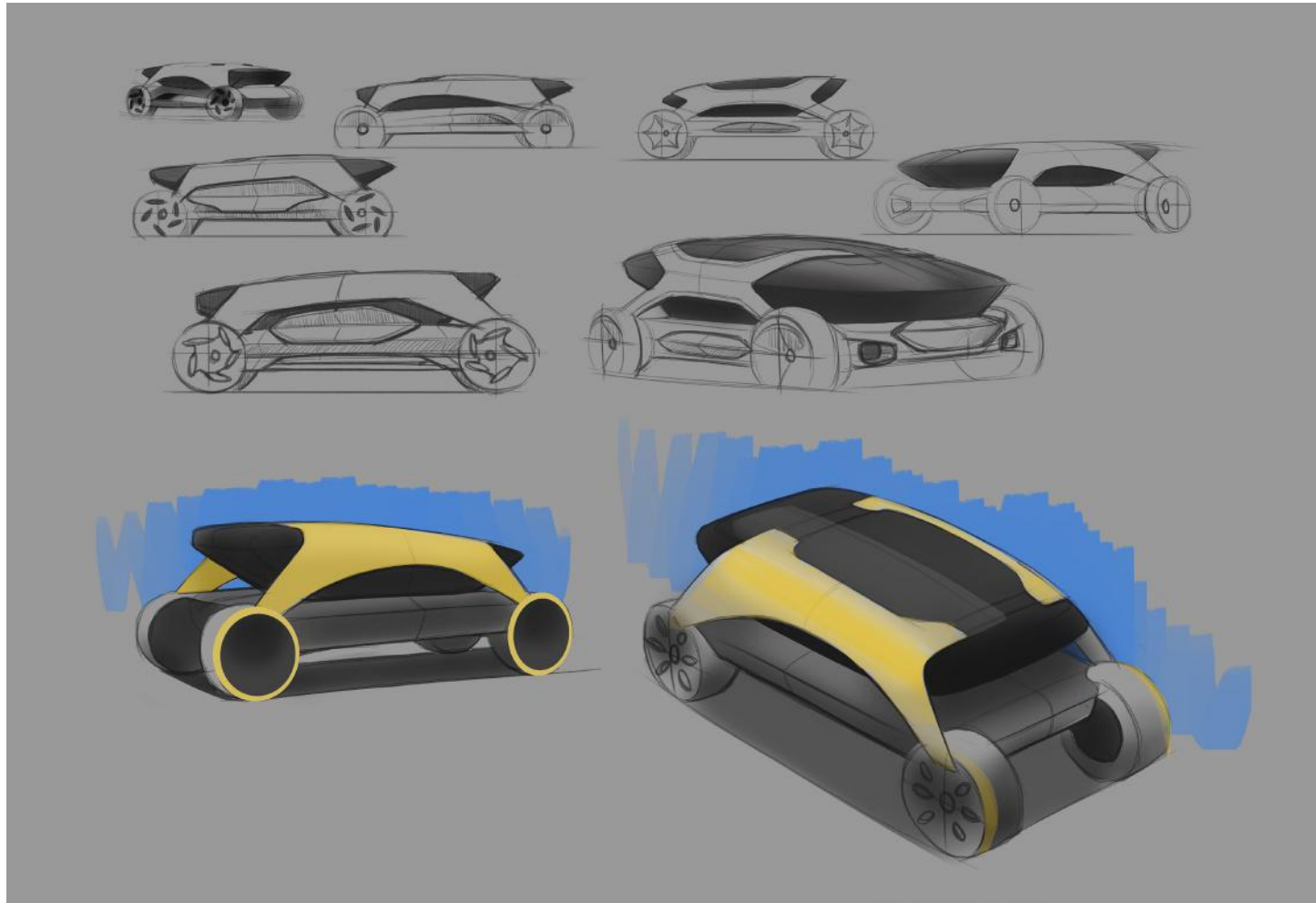
KEY SKETCH DEVELOPMENT



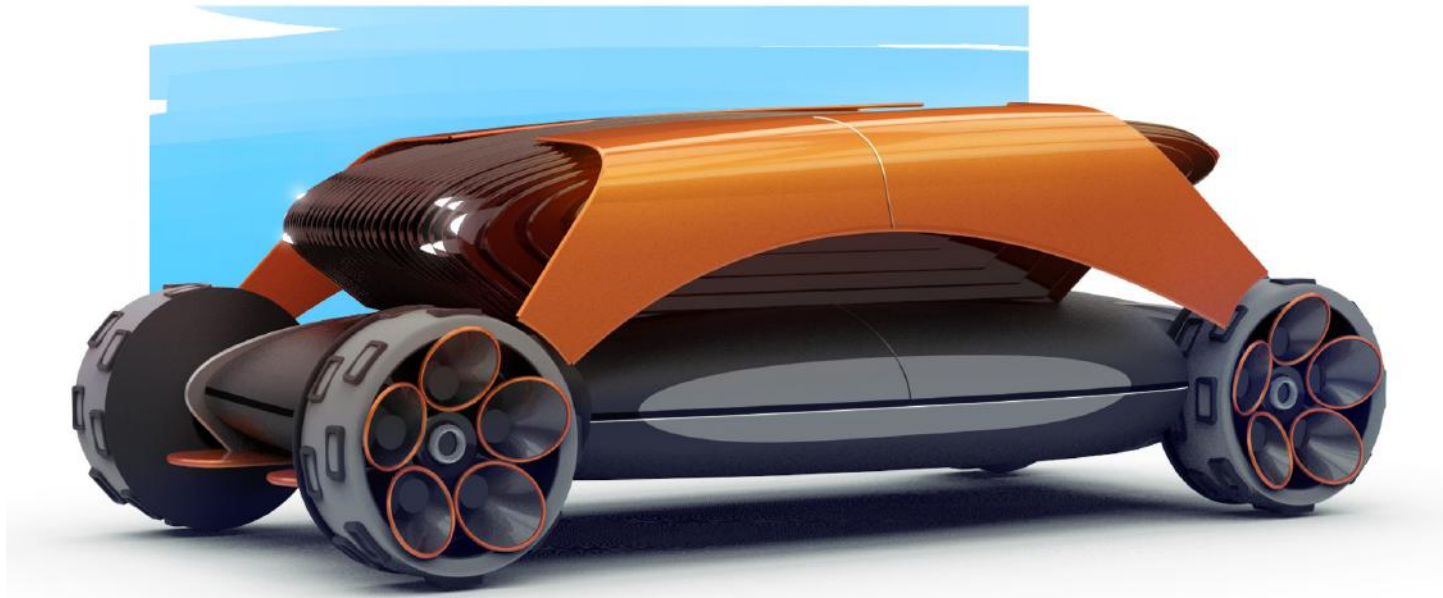
The key sketch carries the experiential aspects of the design brief. The cabin area is enveloped by a layered surface which anchors the form to the wheel, balancing the cabin which appears to be floating and moving forwards. The stance is purposeful and curious, as the car itself is adventurous. For a family vehicle, the side profile combines the playfulness and elegance needed for the vehicle.

FINAL CONCEPT

KEY SKETCH DEVELOPMENT



FINAL CONCEPT



FINAL CONCEPT



FINAL CONCEPT



FINAL CONCEPT



FINAL CONCEPT



FINAL CONCEPT



10. MOCKUP MODEL

WORK IN PROGRESS...

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