

ART ON WHEELS

Hypercars are defined as high-performance sports cars which automakers usually promote as unusual supersports cars. As described by hypercar.info, an hypercar is a “limited-production special version from a small volume luxury automaker”. But, for me hypercars can’t be described as mere tangible objects, they are much more than that. Hypercars are a way of innovating in all senses: technologically, design-wise and many more. This gives automakers the option of investigating the future of movility. Nowadays, a lot of external factors are involved in cars design processes, such as regulations, environment, ethics and costs. To make the design process more efficient, designers also need to be educated to think and work as engineers. By doing this, the design process merges art and science as one, which converts the process in a complex work but more efficient at the same time. Personally, hypercars are a way of expression through art for designers and engineers, so hypercars could also be described as “art on wheels”.

The essence of conventional cars is in danger of disappearing due to global problems we are facing nowadays, such as: climate change, interests and capitalism or costs. In my opinion, this essence is mainly in hypercars and we should focus on saving them because everything starts on them: design, technology, etc. Everything used in hypercars is the future of regular cars, so we need to improve them and make them fit to the problems we are facing, so that we can also keep conventional cars.



Figure 1

Climate change is a global issue that needs to be addressed as soon as possible due to its dangerousness to humanity and earth’s ecosystems. In my opinion, and as Robert Swan said, “the greatest threat to our planet is the belief that someone else will save it”. Unquestionable,

this can be related with designers. While working on a new concept vehicle, there's an obligation of thinking and working plenty of years ahead of the present. This means that if the environment is a problem now, we should have been working on zero emission vehicles at least since the start of the 21st century, but that hasn't happened and now we are dealing with very little time to act with sufficient margin.

Undeniably, this problem directly affects the automotive world and conventional cars because of all the regulations coming into place which take the environment as a priority by addressing problems such as global warming, pollution and waste. As scientists have stated, we only have until 2030 to act before global warming becomes an irreversible issue, and "acting now is crucial to being able to meet that goal" (Shindell, 2018).

As the European Parliament stated, "transport is responsible for nearly 30% of the total CO2 emissions, of which 72% comes from road transportation". This worrying figure is making governments act on the matter by coming up with new regulations. For example, in 2015, the EU stated that in 10 years (2015 – 2025), they'll require automakers to have halved their total CO2 fleet average emissions. Also, several cities across Europe, such as Amsterdam, Paris, Brussels and London are planning on banning petrol and diesel cars by 2030/35.

Investing on electric vehicles is one of the solutions for a more environmentally friendly way of living. And as Bernie Sanders said in his presidential campaign:

we have less than 11 years left to transform our energy system away from fossil fuels to energy efficiency and sustainable energy, if we are going to leave this planet healthy and habitable.

(Sanders, 2019)

This might look like a viable solution but in my opinion, it's only a step past into the future. Self-sustained vehicles with clean energy are the real future.

Another issue to address are the constantly changing interests. Higher intelligence gives the human race the capability of thinking and being conscious of their acts, but this sometimes can be taken for granted and even taken advantage of. This means that our thoughts and actions can be highly influenced by external stimulus, such as commercials.

Our surroundings are in constant change, and therefore our ethics and morals are constantly evolving to fit those changes. Technology, for example, has a very important role in this evolution, because as it improves, changes around us will happen faster and more often. These changes will directly affect the way people think about things such as: races, mobility and autonomous vehicles. For example, a lot of new ways of improving safety are appearing which can be implemented in a lot of different fields, but focusing on transportation, we can say that how vehicles are being built and how the future market is shaping itself is changing drastically.

Obviously, there'll always be a minimum chance of suffering an accident due to external factors, but intelligent vehicles will be made to reduce that chance. But, as security might become a priority, the essence and enjoyment of driving conventional cars will be taken away. This strong connection with emotions is making auto lovers worry about the danger cars are in due to autonomous vehicles and the constantly changing rushed lifestyles.

Lastly, capitalism is a huge problem related with the ones previously mentioned. This problem involves the capacity of molding human's brains to a desired way of behaving, which can easily be done with commercials or anything involving marketing.

Hypercars are part of a very small market target due to the general costs, but that could be changed by reducing to the minimum or even eradicating the maintenance costs. This would move away the stigma created around hypercars only being a real possibility for a very low percentage of the wealthiest people around the globe.

What are the solutions for these issues? Why not take advantage of our surroundings and power our vehicles with renewable energy which we can get on a daily basis? So, in other words, why don't we make self-sustained cars? And also, why not reducing to the minimum maintenance costs by lowering the possibilities of suffering damages by using high-end technology which could even repair itself and by eradicating running costs with self-generated power?

Nature offers us the opportunity to take advantage of it in a positive way, but it seems like we have nearly never put enough interest in coming up with ways of efficiently generating energy from natural resources, as for example, from the sun and fluids such as wind.

Technology will improve enormously in a few years and even more if climate change is taken into account, because there's a rush to make our lifestyles more environmentally friendly. The need to eradicate conventional cars is in an urge and self-sustained cars are the solution. But, before technology gets to that level, vehicles will be powered by electricity in the meantime. Even though it seems like a great solution to the climate issue, to make electric vehicles, automakers require of a couple of environmentally harming materials and resources, such as lithium and power plants, which generate CO₂ emissions and other prejudicial gasses. After all, electric cars are still not 100% environmentally friendly.



Figure 2

So, how could a vehicle use wind to power itself? The answer is: a bladeless centripetal flow turbine patented by Nikola Tesla in 1913. This Tesla turbine consists of a set of smooth disks rotating in a chamber to generate movement thanks to the exchange of momentum between a fluid and the disks. In contrast with other turbines used nowadays, Tesla turbine generates movement through smooth and parallel disks, whereas the others use curved blades like those on a windmill.

The problem that Tesla encountered while creating the turbine was that after a lot of years of development, he couldn't get more than 40% efficiency out of it. But, with the high-end technology and materials available nowadays, we could create a much more efficient Tesla's wind turbine. This 23cm diameter turbine would consist of 30 kevlar disks which would produce around 250 horsepower while weighting not more than 9kg. So, by having two up to date and high-efficiency Tesla wind turbines, the car would offer 500hp just from wind energy.

But, how would the air be captured in order to get the turbines to work? The car will be designed in a way in which the airflow is directed to specifically made air vents with the purpose of capturing as much air as possible into air compressors, which will afterwards send it to the turbines for them to generate the energy to power the vehicle.

Another way of generating sustainable energy is from the sun. To produce power from solar energy, the car will be covered with nano solar cells. This intelligent nano technology, which will be incorporated in the body, won't be possible to detect at a normal sight due to its' size. Just as for the wind energy, the design will be made thinking about getting as much solar power as possible. This will be done by having most of the surface looking upwards to catch as much light as possible, but at the same time have as little surface as possible horizontally to the ground in order to improve the aerodynamics and therefor improve efficiency and performance.

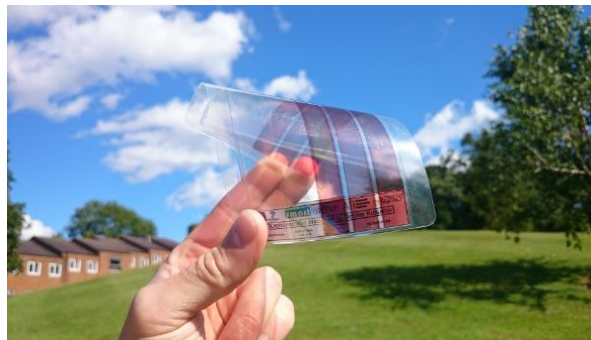


Figure 3

Currently, solar cars produce energy to power themselves for 8 miles an hour with a maximum efficiency of just 45%, but if further investigation is made, it should be able to produce at least five times the current capacity, so this will give the car 40 miles in just one hour powering itself with solar energy with at least 95% efficiency from the solar cells. This means that in just 8 hours of a sunny day, the car would have 320 miles of range just from solar energy.

Ideally, the car would integrate around 300hp from solar energy, which could be stored in the body due to the incredible properties of graphene.

Even though this car should be able to run by it's self-generated power, the world should adapt by building solar powered charging stations for better access to sustainable energy. This obviously is directly related with the economy because most things will have to change to make it possible. But the future of the environment needs to be taken as a priority and, as Colorado's

State University professor, Scott Denning, said, “in order to avoid really bad outcomes, we have to be on a realistic glide path toward a carbon-free global economy by 2030”.

As Bugatti’s deputy design director Frank Heyl said, “design is where art meets engineering”. Designers not only need to focus on aesthetics and making cars look desirable for people to buy it, but also need to work efficiently by constantly thinking about engineering aspects, such as aerodynamics, throughout the whole designing process of a concept vehicle.

There are some key words that came up to my mind when I started thinking about what I wanted my car to become, which perfectly link up with the technological mission and the aesthetical vision of my ideal concept car: nature, fluidity, simplicity, velocity, aggressiveness, power, performance, innovation, elegant. Those words can be seen in my compacted mood board, which combines the inspiration for the technology and resources that will be used to power the vehicle: marine, air and land life.



Figure 4

Going further into the key words, I can describe my project as being nature-inspired. As Frank Stephenson said at a TEDx talk event:

Nature is timeless and it lasts forever... So by incorporating biomimicry, which is the science of biology, and applying it to the design language of cars, we can shrink wrap and minimize their design while having the best performance possible.

(Stephenson, 2017)

Stephenson's wisdom about design summarizes perfectly the intention of this project, as I want to find the breakeven point between engineering and design. Nature is created to offer the best performance possible, and that's why the way it's designed never dies off. By taking inspiration from nature and integrating this philosophy to the concept making process, the project will achieve a high-performance design with top efficiency. For example, one of the main things that will be done is keeping the design as simple as possible in order to reduce the weight for an improved performance.

In this next images we can see the ideation and prototype-making process for the project:

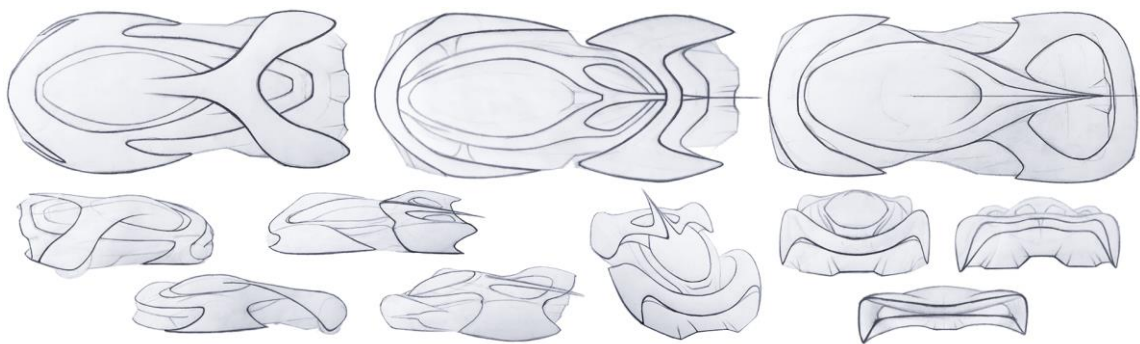


Figure 5

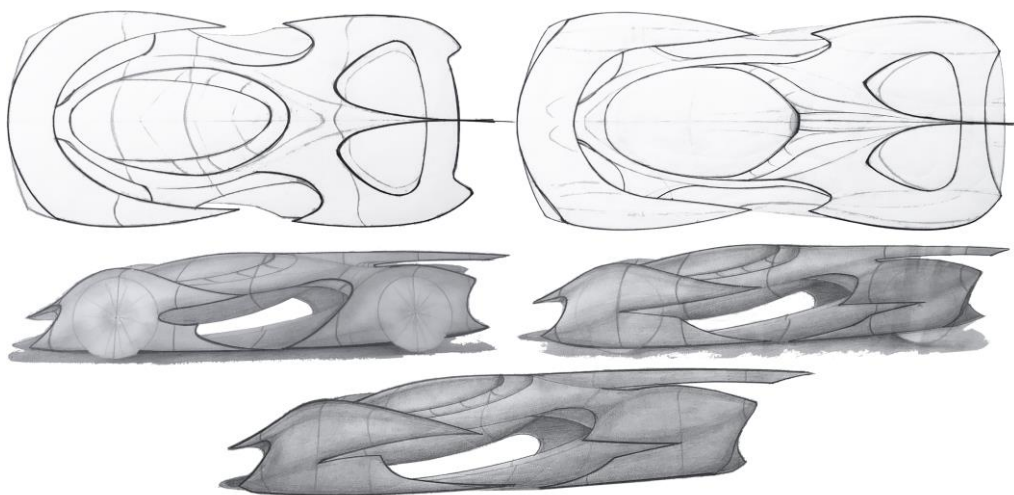


Figure 6

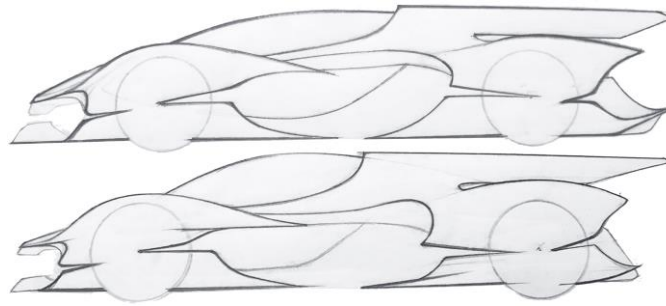


Figure 7

As seen, the prototypes clearly take inspiration from nature, specially from marine life, and as explained before, it combines design and engineering. This is possible because in the designing process, I'm constantly thinking about aerodynamics and high performance, at the same time as in aesthetics. Obviously, there is still a long way to go and a lot of refinement to do, but the idea is there and it can perfectly be seen.

Also, there's the need to mention that for me, the McLaren P1 is the most iconic hypercar because it revolutionized the automotive industry. Because of that, McLaren will be the chosen brand to develop this project, which might be a tribute to the McLaren P1, with some resemblance lines from it's design.

What about ergonomics? Looking at a package drawing made for one of the first prototypes, we can see the disposal of the main elements, including the two-seater cabin. As mentioned before, all the body will be covered with solar cells and it'll also be able to act like a battery and store energy. Obviously this is not the final design, and therefor the ergonomics might change, but the disposal will be very similar.

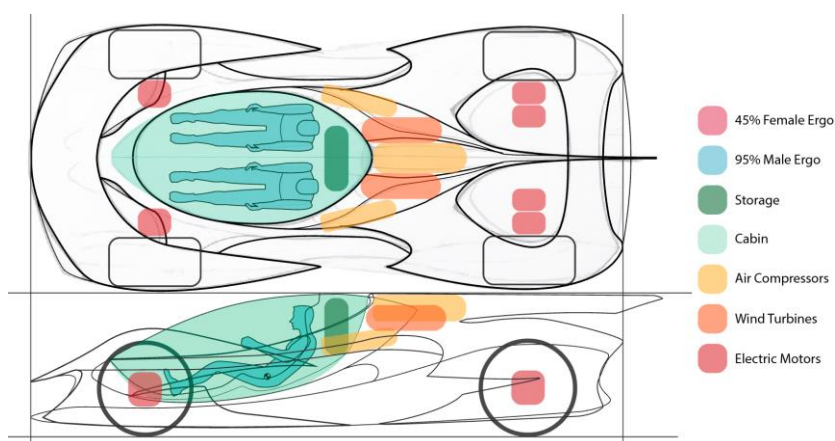


Figure 8

All in all, the main purpose of this project is to create a self-sustained hypercar which will allow the automotive industry to maintain the essence of road transportation without harming the environment and pleasing the constantly changing interests while avoiding maintenance costs. This will be possible by investing in further investigation and improvement of high-end technology, which will allow us to have intelligent materials and that will give us the opportunity of only using renewable energy sources such as sunlight and wind to power future vehicles. By achieving this, the main problems the world is facing nowadays will be successfully addressed and the essence of road transportation, hypercars, will be kept.

Design parameter	Description
Target Customer	Mission: extend the target market of hypercars by reducing to the minimum the usual costs that encompass their maintenance.
Aesthetics	Nature-inspired with the main goal of finding the breakeven point between engineering and design in order to achieve the best performance and efficiency possible.
Ergonomics	Two seater cabin with a small storing space.
Size	Around 4850cm x 200cm x 111cm
Performance	Around 800 hp on self-sustained energy and maybe an option of extra 800 hp on plug-in solar energy.
Environment	Self-sustained environmentally friendly hypercar which will lead the future of totally clean road transportation.
Production Quantity	Start off with a very limited number (23) for the first year in order to gain popularity and make sure the world prepares for this change on movility, and after that produce 500. We want to change the automotive industry and prove that self-sustained vehicles are the future. Open up new roads to the future of movility.
Materials Properties	High-end technology. Use of very light and intelligent materials such as graphene and kevlar. Solar nano cells and batteries incorporated in the body thanks to graphene.
Target Product Cost	Around 2M first 23, next 500 around 1M.
Launch Date	2030
Sustainability	Fully powered by natural resources: wind and sunlight.

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Figure 1: Deesse, B. (2013). *McLaren P1*. Available at: https://www.wallpaperup.com/76565/McLaren_P1_Race_Track_Motion_Blur_Backfire_Flame.html (Accessed: 15 October 2020)

Figure 2: Frayer, K. (2016). *Illegal Steel Factories Dodge China Emissions Laws*. Available at: <https://www.gettyimages.co.uk/detail/news-photo/smoke-billows-from-a-large-steel-plant-as-a-chinese-news-photo/625667906?adppopup=true> (Accessed: 16 October 2020)

Figure 3: Cuthbertson, A. (2016). *Indoor solar cells*. Available at: <https://www.newsweek.com/indoor-solar-cells-made-possible-moth-eye-graphene-breakthrough-430827> (Accessed: 16 October 2020)

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Figure 5: Ordoñez, L. (2020). Prototype sketches. Own image.

Figure 6: Ordoñez, L. (2020). Prototype sketches. Own image.

Figure 7: Ordoñez, L. (2020). Prototype sketches. Own image.

Figure 8: Ordoñez, L. (2020). Prototype package drawing. Own image.