

Design Evaluation Report

Inspired by Sound

A Vehicle with two personalities

By Ruben Lansley

P149031

Introduction

My intention within this design evaluation report is to take you my thought process and execution throughout my major project.

Initially I contacted Ian Callum, Design Director at JLR, and asked him if I would be able to do a project using him as a starting point “An Ian Callum Car”, using his design philosophies and design DNA which he has sculpted and refined for many years, to inspire my project and he agreed.

Luckily, he said yes.

I was able to send Ian Callum a list of questions which helped me get into his mindset with regard to design and which would allow me to define more the direction of the project. In particular I wanted to discover his likes and dislikes.

For questions and answers please see **Appendix A**.

Having first-hand information like this, allowed me to define a direction. My aim was to observe and understand his point of view but not necessarily follow it completely. I used his information as a starting point and as design guidelines. I wanted to create something which he would like or find interesting in some way. I used them like a DNA, no different to an automotive company brand DNA.

Question 1 (Q1) (see Appendix A) resonated with me the most. I found it interesting he is inspired by music, in terms of its composition and layers. I found his justification of how music inspires him more of a comparison between the structure of music and design rather than an explanation of how music actually inspires him. I could understand how music and design are both made up by layers and both tell a story in two very different ways. However, it didn't tell me how music could stimulate creativity or ideas.

I went into my design and sketch process taking this quote far too literally. How could I split up a design in to layers like in music? I considered different aspects of music. For example: the rhythm could be the chassis of the vehicle because its constant, it keeps a beat, it's consistent, and it supports the vehicle just like the rhythm supports a song. The Melody is the part of the song which changes the theme of the song; the top of the car could change depending on the theme, the person or the day of the week. I was struggling to use this as an inspiration, it didn't seem like it was a strong justification. I felt people would not be able to see the correlation between my final design and how it was inspired by music.

This is when I stepped away from this thought process. I decided music was a little too vague. To simply be inspired by music is quite a big statement due to there being so many different types of music.

How could I take this further? It is at this point I decided to use sound rather than music as my inspiration.

Ernst Chladni, 18th century German Physicist, shows us how to visualise sound using the Chladni plate. This was going to help dramatically when it came to physically understand how I could be inspired by something non-physical. Taking something that you can't see and representing it within a surface was my first challenge and how I started my experimentation.

A Chladni plate is a square sheet of metal which is mounted on a single central stand attached to a solid sturdy base. Different sounds can be played. The sound is transferred into vibrations on the metal plate. Sand is placed onto the metal plate and when different sound frequencies are played the sand will arrange itself into symmetrical patterns, the patterns will change depending on what frequency is played.

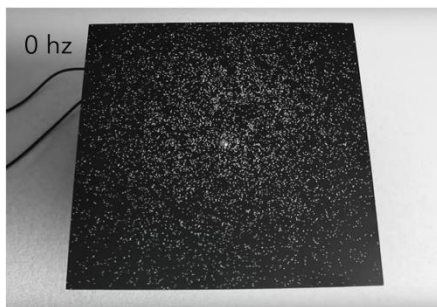
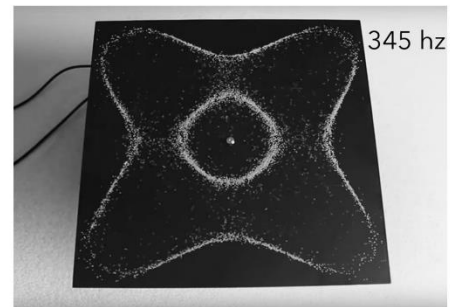


Figure 1 (Chladni Plate, Inspiration)



In Figure 1 and 2 I have shown the way sound can be visualised and how different sound frequencies can cause the sound to arrange itself in different ways. As the frequency goes up so does the complexity of the patterns which are created. Figure 2 is showing how complex sound can be represented by. I found that when the patterns become too complex it is harder for me to imagine how I could be inspired by them, or how that would influence my design. Often it is the simple forms that can be the most inspiring.



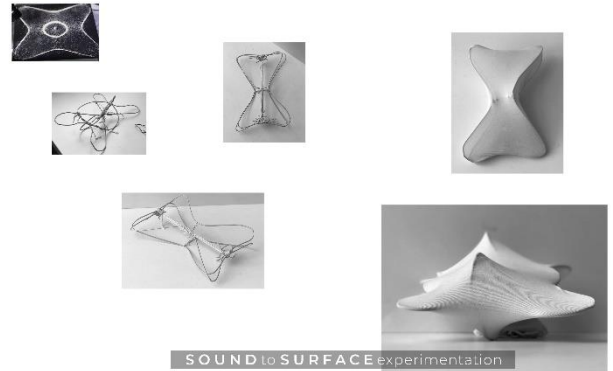
Figure 2

How has sound inspired me so far?

Seeing how different sounds can cause the patterns on the Chladni plate inspired me to want to create a vehicle that changes, something that is inspired by not just one thing but two. If a pattern can just completely rearrange itself into something completely different, why can a vehicle not do something similar? I want my vehicle to do two things not at the same time, but one or the other, could this be a physical change? One vehicle, two modes? Two shapes? Two patterns?

Can the vehicle be inspired by silence and then on the flip side, be inspired by loudness?

I decided to go with the graphic produced by 345 Hz because this is the simplest representation of loud. How could transfer a 2D graphic into a 3D volume? I had the idea to bend wire into similar shapes to the graphic and stretchy material around the structure to see what kind of surfaces could be produced. This could then lead on to influencing the surfaces of my vehicle.



Which is illustrated in the Sound to Surface experimentation (Figure 3) images on the right.

Figure 3

The Scenario

It was at this point where I had enough information to start formulating ideas and sketching. It is equally important to justify a reason why my vehicle would change from one mode to another. There were two routes I could go down at this point, looking into predictions for the future, where will we be in 30 years' time or I could create my own Ideal future specifically for this project, creating my own reality where I decide what happens.

Both have their benefits and drawbacks however, I decided to go with my own reality with aspects of future technologies which are in early development now whilst also creating an environment that will benefit my design.

Having visited the Paris Motorshow 2018 as part of my research the car industry is swaying towards autonomous and controlled travel for the future. Creating a huge network of seamless travel, car sharing, integration and doing this in the safest way possible. We also need to consider the safety of the planet, as currently if we do not do anything about the world's CO2 emissions, we have about 12.5 (Earth, 2019) years until climate change is irreversible. The transportation industry takes up

23% of the world's CO₂ emissions (World Health Organisation, 2019) so switching to clean energy to power transportation is crucial to stop this from happening. Clearly by 2050 we will have to have made the complete switch so I am envisaging that my vehicle will be powered by electricity, as this technology is rapidly developing. Battery technology is a focus, electric vehicles (EVs) currently have issues with range, this range can fluctuate with external factors such as it being too hot outside or too cold. I've learnt from EV drivers that this is a big problem and the notice their overall distance being halved because of this. This technology needs to be developed further. It is envisaged that the technology will develop to a point where the battery or fuel cell for the vehicles could be the size of a mobile phone and power a whole vehicle (Mobilegeeks.de, 2019)...

With autonomy and control in mind we are currently beginning to see infrastructure such as smart motorways (highwaysengland, n.d.) and average speed limits becoming much more common. People are controlled to the speed limits or they will receive a fine. This control is being put into place for safety firstly, as control means there will be less accidents due to people driving recklessly or speeding. This infrastructure will also help when implementing self-driving vehicles. There is a vision currently for vehicles to become more integrated into our lives. They will become an extension of our homes or work place, allowing us to continue our lives within them whilst being transported from A to B. The safest way to integrate this sort of system would mean going completely autonomous, every vehicle is completely controlled. However, what about the people who enjoy driving, enjoy that control of the vehicle and the freedom. Although some may find this uneasy for autonomy to work seamlessly manual driving vehicles would have to be phased out completely allowing autonomous vehicles to run like clockwork.

This isn't something that is being implemented yet as complete autonomy is yet to hit the roads, it is definitely being tested off road. This can be seen in the Mercedes f-015 luxury in motion (mercedes-benz, 2019)

I personally enjoy driving. I enjoy the speed and freedom of it. It allows me to be independent of public transport. There are times though where I wish I could flick a switch and let the car take over and drive me home; I could use my time more efficiently by working or resting.

A vehicle which can do two things would link perfectly with my inspiration and will give people the option to drive the vehicle or set it to autonomous for the commute to work.

A technology that is being worked on currently called B2V (Brain to vehicle). This is being developed by Nissan, with the idea that we can control the vehicle with our mind or allow the vehicle to pick up signals from our brains before we have even had chance to make that response ourselves. For

example their plan is to integrate this technology in to autonomous vehicles, so that the vehicle can recognise a few hundred milli seconds before the human makes the active decision to grab the steering wheel and take back control, so that it can make the correct adjustments and allow for this to happen safely (Natashah Hitti, 2018). With this technology being developed now, it makes me wonder where it could go in the future, will we be able to control vehicles completely with our minds? This is something I would like to integrate into my vehicle, the ability to drive manually with your mind and still get that same experience that you would do with a steering wheel, gear stick and pedals. Would this give you a whole new immersive experience? This could also have added benefits for safety, the vehicle could recognise if the driver was intoxicated and therefore not let them drive the vehicle in manual mode. However, there are some ethical issues with this technology, allowing something into our minds to drive may seem like a cool idea, but does this open the options for people to get inside of your head, are we then giving to much of ourselves up?

Design realisation

Taking my design from sketch to reality was an eye-opening process. From the start it was my plan to have quite a conceptual design, focusing on creating an artistic representation of an idea. Creating something that looked different, due to it being proposed for the year 2050. If it looked like a vehicle, we have on the roads now there would be no point in this exercise. It also allows me to show off the concept in an exaggerated way. Keeping in mind a level of feasibility to the vehicle, ensuring that it was packaged and designed around the people sitting within.

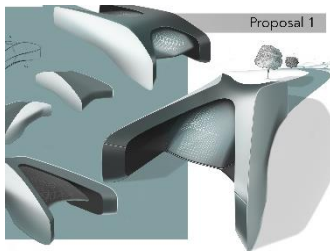


Figure 6

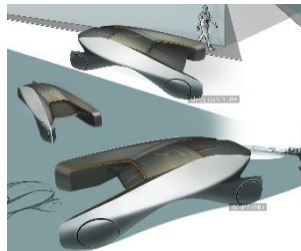


Figure 4

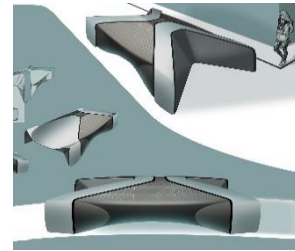


Figure 5

From the initial ideas stage moving into deveopment, I wanted to take forwards the 2nd proposal (figure 5) and balance this out with the proportions of proposal 3 (figure 6). During the sketching stage of proposal 2 I mainly experimented with the form and drew most of my sketches from a top $\frac{3}{4}$ view, however not necessarily resolving the front and rear. When it came to developing this I did not get to keep some of the things I had envisioned. I would not be able to have this slim sleek pod hanging in the middle to carry the passengers, as this simply wouldn't fit in any in a feasible

ergonomic position. Simply resolving this as I thought did not give the same effect I though It would have from the start.

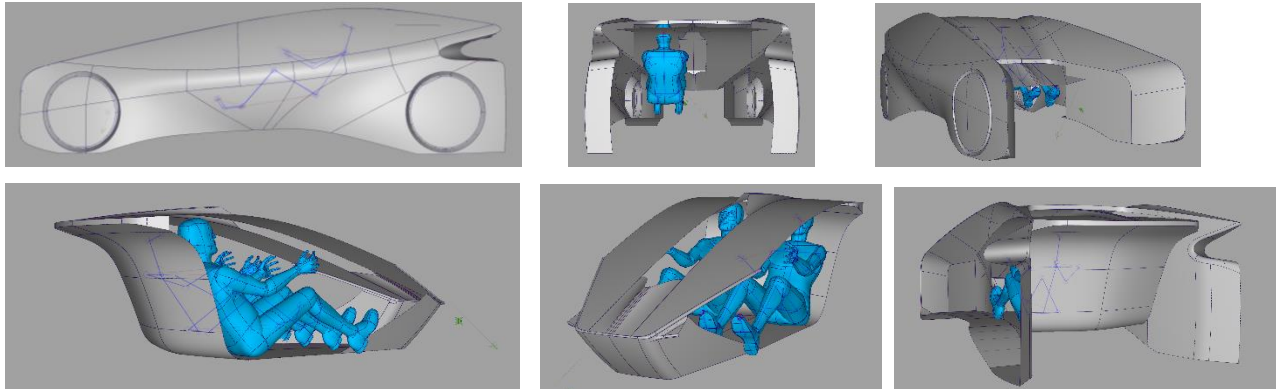


Figure 7

Firstly I started of by blocking in the rear whilst trying to imagine my conseptual idea as well as packaging people within, it came to quite a steep roaling back down to the floor, intersecting with the sides at almost a knife edge as illustrated in Figure 7.

Once I had done this I was thinking that this area was just going to disapear into the dark and look quite empty, it also reminded me of the rear of a sledge which was not my intention so something had to change. At first I really struggled with this area, resolving this was not easy, I was trying to stay aligned with Ian's Pillars of design (see apendix A). The proportion at this point wasn't working in my opinion, it was very tail heavy (Figure 8), all the weight was towards the rear and the form was looking quite wooden. It was important that I was able to really harness what I had gained from my form study and inspiration.

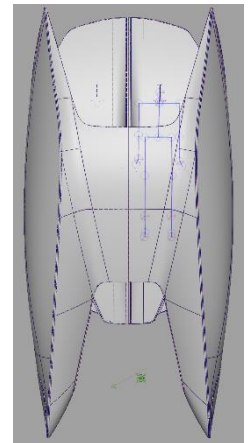


Figure 8

At this point I had to consider how could I take the rear, make it more loose and allow the surfaces to flow. Thinking about how the exterior may link with the interior, making sure that it is honest to the function. With this in mind I wanted to see if I could create a double bubble surface on the rear, to give the effect that there are two people sat within, each part of the bubbling surface is sculpted around the person within. Doing this whilst also adding more speed to the surface, making it look more aerodynamic and light.

Building this surface in and trying to realise this also made me think that I had to reconsider this whole area. I was still getting the same unbalanced proportion, a light diminishing area that just wouldn't be attractive on a model, just a meaningless empty space. Also the double bubble shape does not work for this area and I can almost see why it hasn't been done before as people could interpret it in relation to a certain body part...(figure 9)

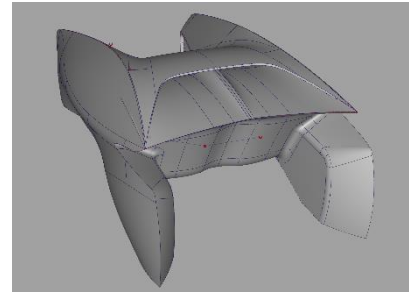


Figure 9

The direction of flow does not link with anything else, there is no correspondence with anything on the design. It is important that things link on to other parts, whether that means it's a similar shape, follows a similar line as something else.

I went back to the drawing board to design a new rear and tried to come up with something that looked better but keeping the theme that I started with.

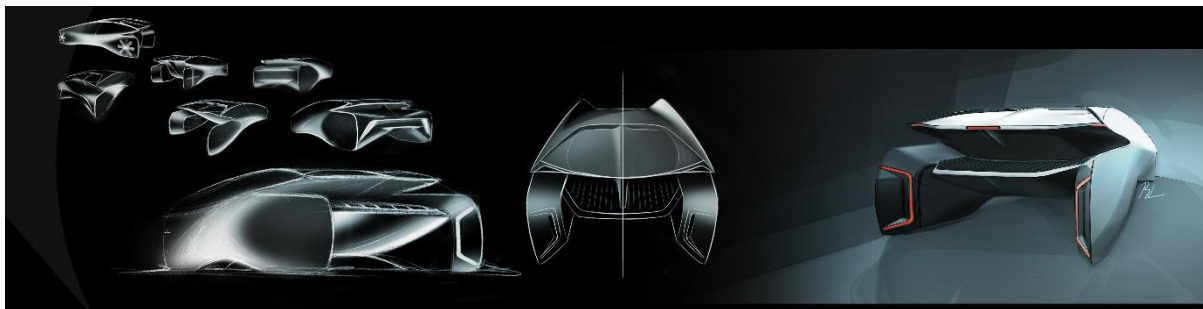


Figure 10

Going from the double bubble rear I tried to come up with something that would split up the mass from the top to the bottom, this was either linking up the rear completely, or introducing a new area/ surface that would break up the proportion, In doing this it would add more speed, allowing for an area to assign a function to and also loose this dark hole that was dominating the rear. My final conclusion of the rear was to add a shelf (Figure 10).

The side surface of my model was really about trying to communicate the surface structure that I got within my earlier sound to surface experimentation. Doing this I created smooth rolling surfaces that often went from a pinch to a large expanse across the body of the form.



Figure 11

The development of my side was about pushing the fluidity of the surface making sure the proportion was well balanced as well as this.

At the start of development my design in general was very tail heavy, this was in every view, especially in the side, the top curve of the silhouette was very wooden and harsh, with little speed. Peaking too far to the rear. This can be seen in the first side view on Figure 11. In order to balance out the proportion, I needed to exaggerate some of the proportions. Creating one curve from front to rear that had speed, which flowed and had curvature throughout. It was also linking this curve to the rear curved vertical on the rear of the vehicle. Doing this emphasising the rear wheel area, giving the vehicle much more stance and drama. Throughout the side profiles the vehical becomes much more dramatic and emphasised. With regards to the reflections, and the form of the side profile, I felt the



Figure 12

need to constantly refine. I wanted there to be a clear link to my surface experimentation, communicating tension, a tension derived from sound (Figure 12).

Throughout my top view development I was trying to encapsulate some of the form and be inspired by the shape made on the chladni plate, similar to a figure of eight.

The development was again about balancing proportion but also reducing. Sometimes it's easy to cover design in complexities, going in to smaller things and adding details, when actually the other parts are not right or balanced well. When going into Ian's philosophies and what he believes in, it is about purity of the form and making sure it is beautiful before anything else. In this case less is more. My initial concept was to have a mechanical pod that extends, having this as a focus point. This is seen on the first sketch on figure 13. However all the tension is going to the rear and becomes quite cramped and condensed. Further the protruding pod coming from the centre isn't very

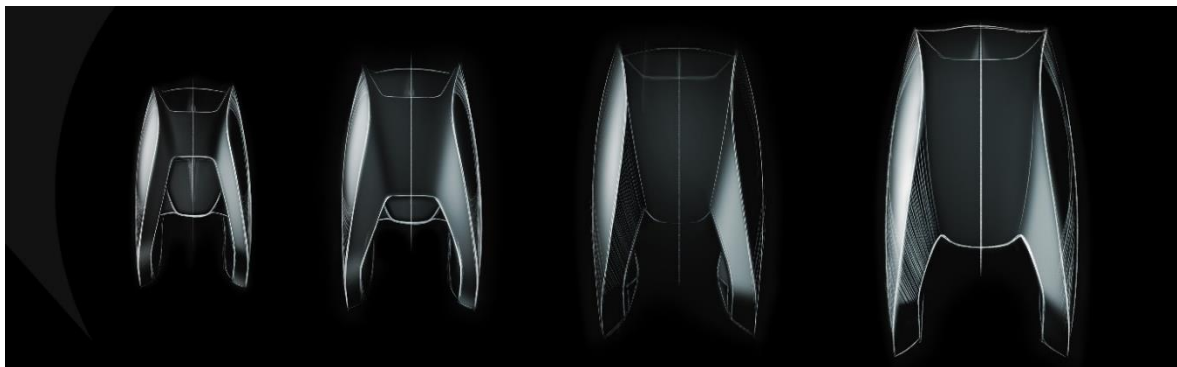


Figure 13

appealing, it almost reminds me of something sticking its tongue out... This is the same for the second drawing, Each stage of the development I found myself reducing and pulling the mass forwards in order to balance out the rear.

I decided that I would have a physical change of the exterior with a shape changing material. There is currently lots of research into shape shifting materials, at the University of Colorado (University of Colorado at Boulder, 2018) they have been developing a material that can change for a stimulus such as light, temperature or electrical input. With this being said, if this technology is being made use of in this day and age, by the time we are in 2050 the technology will have advanced significantly. Figure 14 shows the vehicle change between autonomous and manual using a shape shifting material.



Figure 14

Due to the overall proportion of the vehicle there may end up being blind spots. I have integrated camera modules in the front of the vehicle in order to allow the passenger to see these areas (Figure 15). Further other areas of the vehicle use semi-transparent material in order for the passenger to see out of the vehicle this is shown in my package.

With regards to meeting my initial Product design specification, I have kept inline with the majority of the points, if anything has changed or been developed this is due to further research into future technologies and my own idea development of the project.



Figure 15



MAJOR PROJECT: PRODUCT DESIGN SPECIFICATION

BA/MDes Automotive & Transport Design

Module:	M6X02237 – Major Project: Design Research & Manifesto
Project Title:	Inspired by Sound
Student Name:	Ruben Lansley

Design Parameter:	Description:
Target Customer	Petrol Head an electric AI world
Aesthetics	Inspired by sound... Following Ian Callum's Design principles, British design
Ergonomics	Cockpit styled interior.
Size	2-seater: shape changing to provide more room when in autonomous mode
Performance	Electric performance car on the weekend, autonomous commuter in the week
Environment	Country roads and city's
Drive train	Electric, 4 independent Integrated wheel motors, 4 batteries units.
Technology	360 cameras, 1-way transparency material, shape changing material, Interior displays, Simi Autonomous, independent wheel motors.
Materials Properties	Shape changing Specific materials undetermined due to launch date. One-way transparency glass Lightweight High Quality
Target Product Cost	Subscription based, affordable to white collar workers.
Launch Date	2050
Sustainability	Due to the increased population and a lack of natural resources, the vehicle will have to be produced from sustainable and recycled materials.

Figure 16

Conclusion / Executive Summary

Inspired by sound and sculpted by Ian Callum's design philosophies. An experimentation taking the non physical into the surfacing of a transportation concept for the year 2050 at a time where we are controlled by artificial intelligence and autonomy. People dream of the days when they had driving freedom. Creating a vehicle with two personalities: one personality inspired by silence, fully autonomous for the daily commute. The other personality inspired by loud, a two seater sports car for pleasure driving. Shapeshifting materials facilitate the exterior change from silence to loud distinguishing between the two modes.

Appendix A

Q1

I am interested in what inspires you?

"Music really inspires me... It's the collection of structures in composing music and lyrics. Music is 3D (as it's a collection of layers) and it tells a story. I want my designs to tell a story in a 3D form"

Q2

Do you think manually driven cars have a place in the future? Or is autonomy the future?

"No they will survive long after Ruben is gone (ha ha) human machine interface will survive as it's mankind's creation and autonomy has its place but so does interaction with the machine"

Q3

3 pillars which you think must be respected for good design in your opinion?

"Draftmanship / Proportions

Line and form creation that requires no explanation

Extremity (if not it will just look boring)"

Q4

Are there aspects to a cars proportion that shouldn't change?

"No"

Q5

Where is your favourite place to drive? The car you enjoy driving the most? And why?

"SWB 250 Ferrari,

It triggered my childhood memories"

Q6

Your favourite and least favourite design trends?

"Favourite: 60's American

Least: Noughties (Why: Fussy)"

Q7

SUVs have been a large focus for many companies recently due to their versatility and practicality, do you see a future for single purpose specialist vehicles like supercars?

"Yes, humans will always seek the extreme of things it's what makes us different to machines"

Q8

What is it about Hot rods that you like?

"Rebellious – Proportions – Power – Simple"

Q9

What is it about the Mini that you like?

"Cleaver package"

Q10

Who's on your playlist?

"David Bowie, Rolling Stones, Bruce Springsteen, Biffy Clyro, Ed Sheeran, Stereophonics, Jackson Brown, Adele ,Van Morrison"

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