

Mitchell Newman

1702455

Creative Computer Games Design

Richard Morgan

Word Count: 5543

A Study of Car Culture in Games and Reality

Declaration by Candidate

I hereby declare that this dissertation is my own work and has been submitted exclusively to the University of Wales Trinity Saint David for the purpose of being marked. All research, studies, quotes and anything else from other people used in this dissertation have been acknowledged as the work of other people and referenced appropriately.

Signature: 

Date: 10/12/2019

Contents

Table of Figures.....	4
Glossary.....	5
Abstract.....	6
Chapter 1 - Show Cars.....	8
Stance Cars.....	9
Tuner cars	11
Chapter 2 - Body kits.....	13
Chapter 3 - Appeal of Identity and Customization in Games	17
Chapter 4 - Vehicle Sports	20
Conclusion.....	24
Further Work.....	25
Bibliography	26
References	27

Table of Figures

Figure 1.....	Page 9
Figure 2.....	Page 11
Figure 3.....	Page 12
Figure 4.....	Page 14
Figure 5.....	Page 16
Figure 6.....	Page 18
Figure 7.....	Page 19
Figure 8.....	Page 21
Figure 9.....	Page 22
Figure 10.....	Page 23

Glossary

Slammed- when a cars suspension is so low that it is as close to the floor as possible.

Stock- when a car has not been modified in any way.

Paddle shifters- a paddle located behind the steering wheel that allow the driver to go through gears easier and quicker.

Camber – where a car has negative camber this tilts the wheels outwards, so the car is driving on the inside of its tyres.

Coil overs – adjustable suspension

Air Suspension – can manually control the cars suspension using controls in the car to raise and lower the vehicle.

Aesthetic- the looks of the object

Abstract

The document will explore the basics of car culture in games and reality and discuss the differences within the different groups of car enthusiasts. The literature review gives a brief overview of how car culture first evolved. The first chapter talks about Show cars that usually have all aesthetic modifications in order to draw attention from passer-by's, Enthusiasts also do it in order to reflect their personality on to the Vehicle. The way they do this is with various modifications which range from body kits, engine modifications and to air suspension. The second chapter discusses what is needed to become a stance car enthusiast, for a car to belong to the 'Stance' group of enthusiasts it must have a certain degree of negative camber and must be very low to the ground. The third chapter is about Tuner car enthusiasts that strive to enhance the overall performance of the vehicle, however there is a fine line between these two cultures where they care about the looks and performance of the vehicle. The third chapter discusses the appeal of identity and customization within car games or games such as grand theft auto is mostly down to individualism, people like to make vehicles reflect their personality. Whether it be removing a spoiler in the game from your starting car just to make it look different compared to when the player received it, or just as simple as changing the colour of the starting car. The fourth and final chapter states how much of an impact vehicle sports have had on car culture, the conclusion states that there are many different groups of car cultures that all have their own unique take on the hobby that has evolved into different sports, customizations and video has a impacted games hugely. For further work we discuss future topics that could be explored which include going more in depth within vehicle sports and investigating how they have had an impact on aesthetic modifications within the car community such as Formula one and Nascar.

Introduction

This document will cover the basics of car culture in games and reality and discuss the differences within the different groups of car enthusiasts. Chapter 1 will be discussing the differences between groups within car culture and what makes each group their own individual subculture, chapter 2 will discuss body kits within the car community and the impact it has had on the community, as well as if they are functional or an aesthetic modification. Chapter 3 is about customization within games and how people want to state their individualism in the game, also the development of technology in order to get more of a realistic experience from racing games and how this has had an impact on the game and car community. In the final chapter this research will cover car sports and how these sports have been integrated into the gaming community and the aesthetic modifications derived from vehicle sports. Modifying cars started just after cars were invented this was mainly to improve them by making them safer and faster, however as the years progressed Americans predominantly started modifying them as moonshine runners and bank robbing cars, for them to withstand the stress of outrunning the police and the harsher terrain of their home made get away tracks. According to Mathew Bedworth car culture is not slowing down and continues to thrive mainly down to the new up and coming modifications being released for all makes and models of cars (Bedworth, 2017) the majority of the modifications are dependent on what group of car enthusiast the car belongs to whether it is Stance, Track, Tuner or a Show Car, these groups all have similarities but there are definitely some major differences between each car culture (A glossary of terms is included as part of this research). These subcultures have now evolved into the car culture we know today.

Chapter 1 - Show Cars

Show cars usually have all aesthetic modifications in order to draw attention from passer-by's, Enthusiasts also do it in order to reflect their personality on to the Vehicle. The way they do this is with various modifications which range from body kits, engine modifications and to air suspension. The reason behind why people would want to stand out amongst the crowd is due to establishing individualism, you will find that people who are interested in cars usually modify their vehicles for how they want and not for other people. "It has changed over the years from Race cars to lowriders, there is now 1000's of different genres of modifying and it has just got bigger and bigger with no sight of it ever slowing down." (Bedworth, 2017) This may make the vehicle more impractical, such as 'slamming' the car to the ground in order to make their car look more aesthetically pleasing or to achieve better wheel fitment so that the barrel of the wheel is sitting on the quarter panel as the car is driving. Car enthusiasts will also add body kits to their vehicle to make it look lower, or to give the car a more aggressive look, wide body kits is one of the biggest modification that enthusiasts are repeatedly doing right now, "One of the major modified trends for 2018 is body kits" (Clarke, 2018) this modification is putting over fenders on the original arches in order to fit a wider wheel to change the look of the car quite drastically, this requires the owner to cut huge sections out of the body of the car in order for the new wheel not to rub on the original quarter panels or wheel well when driving.

Show car enthusiasts will go to huge lengths in order to stand out from the other enthusiasts this would include fitting as wide as possible wheel to your vehicle, if you do not like the look of a wide body kit, and still want to fit an wide wheel to your car, what some people do is adjust the negative camber of their vehicle which would tilt the wheel inwards in order to get the top portion of the wheel

in the wheel arch as seen in figure 2, there is a large following for this style which is called 'Stance' and is a tetchy subject within the car community due to enthusiast either loving the style or hating it.

Show car enthusiasts will also modify the mechanical side of their vehicles as well as aesthetically, however what sets them apart from Tuner car enthusiasts is that they will strip their engine bay down until nothing is left except the engine this might not seem like a lot of work however this requires the individual to re position the battery and fuse box somewhere else in the vehicle, get rid of their air conditioning, and tuck all of their wires so they cannot be seen by anyone. This is all to show how clean your engine bay is at car shows and is basically a party piece, people will also go to the lengths of removing their engine to paint their engine bay a different colour to the rest of the car to show at car events and shows.



Figure 1: Asian Car Show, 2019

Stance Cars

For a car to belong to the 'Stance' group of enthusiasts it must have a certain degree of 'negative camber' and must be very low to the ground (slammed) as shown in Figure 2, this look for a car usually means the car will have their tyres stretched over their wheel in order for the wheel to tuck into the wheel arch as much as possible to achieve the max amount of negative camber or have the tightest

fitment between the wheel and the inner of the wheel arch sometimes they are even touching whilst driving. This look is also becoming more common amongst the exotic car scene “Slamming aficionados are taking the culture to ever-new heights; stanced Ferraris are not unheard of ” (Clarke, 2018) according to Jordan Clarke stance cars originated in Japan from an underground street gang that used to deliberately annoy the police in Japan with their low cars, huge exhausts that came vertically up past the roof of the car and their negative camber, the style was called ‘Bosozoku’ which dates back to Post-World War 2 around the 1950’s. There are certain types of Stance enthusiasts’ ones that will use traditional coil overs and max them out to the lowest setting and drive like that, the other type use air suspension in order to get as low to the floor as possible but also having the option to raise the car to clear speed bumps and other hurdles in the road, according to Jordan Clarke air suspension is more commonly found on European cars compared to Japanese cars “Then there’s the whole Euro side of things, where it’s all about very smooth engine bays, smooth bodywork, really tight fitment on wheels, crazy offsets, low profile tyres, air ride suspension.” Air suspension is different from hydraulic suspension, hydraulic suspension uses hydraulic fluid, which allows the user to move the suspension a lot quicker than then causes the car to bounce which is what you see on low riders that make the car dance.

Within the stance community all enthusiasts are trying to outdo each other, by buying bigger better and more expensive wheels, and trying out different things to try and all be as unique and as individual as possible, this motivation is what is fuelling the car community to be better than one another “Everyone’s trying to out-do each other all the time with better wheels, wider wheels, lower cars, bigger engines, smaller cars. But it’s healthy, everyone enjoys themselves, everyone’s trying to do different things. Sometimes someone does something different and everyone hates it, but it still gets attention.” (Clarke, 2018) with everyone trying to out compete each other many spend thousands on their car to make it stand out from the rest, a huge chunk of this money goes on wheels. Depending on what cast of wheel the enthusiasts would purchase, there is different casts you can get ranging from forged wheels to three piece wheels being the most expensive this is down to the wheel being

made up of three different pieces the face of the wheel and then the two barrel pieces. Because the wheel is made from three pieces it allows for people to design custom wheels mixing up two different sets of wheels to create their own one of a kind wheel, three piece wheels also come in the widest variations due to the barrel of the wheel being two separate pieces, this is the go to wheel for enthusiasts in the stance community as having the widest and most custom wheels is the most sort after thing and draws more attention to the individual.



Figure 2: 2013 Scion FRS Rocket Bunny Show Build, Dead Clutch

Tuner cars

Unlike show cars 'Tuner' car enthusiasts strive to enhance the overall performance of the vehicle, however there is a fine line between these two cultures where they care about the looks and performance of the vehicle. Tuner enthusiasts tend to go for a more Track oriented look for their vehicle, where they would have aftermarket suspension in order to get a stiffer ride, which then means it would corner better without as much body roll from the vehicle "When the vehicle sits closer to the ground it decreases the amount of air that goes underneath the vehicle, which then reduces the amount of drag on the car. It also helps out with the cars handling and traction. With the car being

closer to the ground it can actually improve the tires grip on the road which allows for better handling.” (Ouellette, 2017) They would not slam their car to the floor, they would make the wheel and tyre fit nicely and flush in the wheel well in order to get better aerodynamics by making their car closer to the floor to reduce drag, whilst still maintaining a functional ride height. However, Tuner cars will still invest in aesthetic modifications, this is usually due to the benefits these modifications give, which for example would be down force provided by a huge spoiler fitted to the back of the vehicle to keep the rear wheels planted on the ground. Another example of this would be wide body kits, this makes the vehicle wider which then gives the car more surface area which leads to more grip on the road. Tuner car enthusiasts will invest thousands of pounds into the engine of their car whether this is installing a turbo or supercharger onto their current engine in order to achieve high horse power and torque or an engine swap to another engine with more tuning potential and capable of holding more horse power without doing too much modification to the internals of the engine, such as reinforcing the pistons and rods so they do not break under so much power. It is not uncommon for engines to blow up in Tuner cars due to the engine not being able to hold the power that the enthusiast has set for the engine this is usually due to the owner not upgrading the internals in engine to a stronger material to hold all that power. It is also not uncommon for tuner cars to shoot flames out of their exhausts, this is due to the car being mapped to unload a certain amount of fuel into the exhaust to ignite and cause the flame, this can be down to the car having so much power or purely just for show purposes.



Figure 3: Stance is everything, Dave T, 2013

Chapter 2 - Body kits

Body kits are usually for aesthetic purposes, in recent years wide bodying a car has become increasingly popular, due to it making the vehicle look more unique and aggressive, this includes super cars as well “This year, the big things have been big spoilers and wide body kits. So everyone’s been buying every type of car you can think of, putting on a huge spoiler that you would normally see on a race car and bolt-on wide arches, and then painting it or wrapping it.” (Clarke, 2018) Companies such as Liberty Walk, Rocket Bunny and RWB, supply various unique and inspirational kits for the super cars and have inspired people to create their own kits based of the designs of these big companies and have also inspired smaller companies to start mass producing their own kits for less to compete with larger companies and for more obtainable cars. These kits occasionally include a new front bumper, wide arches a new spoiler and side skirts which can drastically change the appearance of the car being modified and can make it look like a brand-new car even if the car was made twenty years ago. Installing a wide body kit to a car involves cutting a huge section of the cars arches in order to fit bigger wheels. People are willing to cut up million-pound sports cars because it changes the appearance of the car so much, in order to be different from the other super cars, this usually decreases the value of

the vehicle. Liberty walk Japan had a huge impact on the wide body trend, exotic cars started receiving this wide body treatment in the Liberty Walk Japan headquarters “In 2012 Liberty Walk tried again, this time with the first wide Murcielago. This car introduced the world to the “LB Works” style we now associate with Liberty Walk. Cutting up an exotic supercar and sticking over fenders on it got everyone’s attention.” (Saito, 2017) Ever since liberty walk and other companies have started producing kits for high end vehicles such as McLaren, Lamborghini and Ferrari.

Body kits are mainly made out of fibre glass; however, some people go as far as to make their kits out of carbon fibre this is usually found on more high-end cars due to carbon fibre being stronger and more expensive. A YouTube creator by the name of Tj Hunt (Hunt, 2019), has recently produced the first wide body kit to be 3D printed using huge 3D printing machines, these prints take hours to produce however instead of making fibre glass moulds for the kits, you would just simply have to press a button to produce a whole kit as technology progresses 3D printers are becoming cheaper to buy and some believe that 3D printing body parts is going to be the go to way to produce body kits and other accessories for cars. 3D printing is already common in car culture due to people printing brackets, interior trim pieces and even wheels.



Figure 4: Need for Speed: Heat, 8 November 2019

Body kits are not just for aesthetic purposes only they can provide extra vents on the arches which leads to better cooling for the brakes and better air flow. Kits are usually designed with this in mind, so that they serve a function “Body kits aren’t just for looks, in fact, they were never for looks. Sure looking cool is a by-product of such modifications, but aero-styling was designed to cut the drag to a minimum and allow cars to slice through the wall of air with less resistance.” (Piscopo, 2018) this helps cut down on lap times and provides more grip due to the car having more of a surface area, it also allows for some cars to stay with the rules and regulations of vehicle sports due to wheels not being allowed to stick out further than the body of the car, hence why people use wide body kits because it widens the body of the car as well as the wheel arches. Within several different vehicle sports wide body kits are present due to the added traction on the road, in the Hillclimb sport widebody kits and huge spoilers help the car corner better due to the down force added by the spoiler and from the added traction from the sticky tyres, and wide wheels. Hillclimb is where “Cars tackle an uphill course one-by-one, with the quickest time dictating the winner.” (uk, 2019) These cars usually have huge amounts of horsepower due to the whole track being up hill.

A car body kit was made specifically for a Polestar 1 which is included in the game *Need for Speed: Heat* “*Need for Speed Heat*, the latest game in the long-running franchise, arrives on November 8 and features a highly modified Polestar 1 as its halo car.” (Bruce, 2019) The kit was designed by Kyza Saleem and served as a huge advertisement for the game, this link between games and reality bridges the gap for enthusiasts who are customizing cars in games as well as the cars they own in real life. Kyza Saleem has designed many different car concepts ranging from super cars to old BMW’s that have been featured in SEMA which takes place in Las Vegas and is one of the largest cars shows in the world. The show features high end brands such as Toyo Tyres, Cosmis Wheels and Liberty Walk. SEMA is where car enthusiasts come together to show off their high-quality vehicle builds; the show is usually the place where large companies release their new products this goes for body kits as well. With the new 2020 Supra being released which is a modern take on the 1993 supra (Wong, 2019) body kit companies jumped at the opportunity to make and show off their own iterations of a kit for the car,

there were 43 Supra's at the SEMA car show in 2019 with the vast majority of them being wide bodied. (Blackstock, 2019) Wide body kits can decrease the practicality of the car due to the car needing wider wheels and the cars suspension needing to go lower in order to fill in the wheel arches more, this will then lead to the wheels rubbing the inside of the wheel well at full lock or even when going over speed bumps unless whoever installs the kit modifies the wheel well extensively "you can safely drive around at this height with only the faintest of rubbing at full lock." (Carbonare, 2016) as you can see according to Carbonare, he says that there is slight wheel rubbing in the lowest setting on his air suspension, however he also states that "In its highest position, the Hashimoto R35 had no issues tackling steep ramps in underground parking areas and just general manoeuvring around" (Carbonare, 2016) this shows that modifying a car by widening it as long as you do it properly can still be usable and practical. Carbonare is using a type of air suspension called a lift kit, this allow him to raise the cars height in the back and the front in order for his car to get over speed bumps or ramps in a multi-story car park as he mentions, however this is one of the most expensive types of suspension a car enthusiast could buy they are usually priced around the £3500 area.



Figure 5: Photos taken by Author

Chapter 3 - Appeal of Identity and Customization in Games

The appeal of identity and customization within car games or games such as grand theft auto is mostly down to individualism, people like to make vehicles reflect their personality, whether it be removing a spoiler in the game from your starting car just to make it look different compared to when the player received it, or just as simple as changing the colour of the starting car. This will then progress to adding huge chassis mounted spoilers, a body kit, a crazy vinyl design going across the side of the car and a change in wheels all of these modifications I listed do not change the performance of the vehicle, which is the main goal of the majority of racing games to race a fast lap around the track and beat the other cars so why add these aesthetic modifications to the car “Customising your car is one of the most enjoyable elements of any motoring related video game with car customisation being many gamers favourite parts.” (Taylor, 2019)

Forza Horizon games have a huge community dedicated to the customization of cars in the games, the community will upload their own unique vehicle designs for other people to download and use on their own cars, these designs range from a design that just looks cool or to famous vehicle designs such as the vinyl wrap designs from the *fast and furious* films or like a hot wheels car the player may own. “The Hot Wheels Car Pack for *Forza Motorsport 6* features seven cars for you to collect, race, and customise” (Forza, 2016) *Forza* would not keep releasing packs such as this one if people wasn’t interested in aesthetically modifying their vehicle. Car racing games such as *Forza* would not include slow cars such as the 1963 Volkswagen beetle if individuals did not enjoy modifying them aesthetically. The reason *Forza* would include these cars is because some people do not want to blitz around the race track in a Lamborghini, they would prefer to take a ‘stock’ 1963 Volkswagen beetle and lower it, do an engine swap to make it ridiculously fast in order to beat or come close to beating the Lamborghini because that’s how most enthusiasts would want to play the game. The fact that *Forza* allows its players to do engine swaps in game shows that *Forza* as a brand listens to their community “Engine Swap is a conversion upgrade option in *Forza Horizon 4* that swaps the engine of a car with a

different variant. An engine swap can significantly increase the Performance Index of a car but may also have a notable effect on weight distribution and handling. Upgrades from a stock engine or another engine swap do not carry over to a new engine swap.” (Community, 2018)



Figure 6: Photos taken by Author, 2019

Cars have been in games since 1977 which is when the Atari 2600 was released. “Back in the good old Atari 2600 days, replicating a car in a computer game was a simple matter.” At this time, cars in games were more like a “vaguely vehicle-shaped blob formed of a few dozen blocky pixels, and a buzzy ‘engine note’ soundtrack that rose and fell with no relation to your speed” (Horncastle, 2013) fast forward forty two years and we now have gaming systems that allow the player to use a steering wheel, pedals and a gearbox to drive their favourite car whilst sitting in their house (refer to Figure 6). This allows the player to experience more when playing their driving games, it allows the player to feel more connected to the game and allows the player to drive their dream car being able to even use ‘paddle shifters’ which are usually located in semi-automatic sports cars as it allows the driver to change through gears faster. These machines are fairly expensive for a high-end quality set up “The

base is \$599.95 while the wheel rim costs \$249.95. If you're seriously considering this setup, then the Club sport V3 pedals are a must at \$299.95. Overall, that is over \$1000" (Williamson, 2015) these systems would not be made if there was not a demand for the systems, if people are willing to pay upwards of a \$1000 for these systems it shows how relevant car culture is in the virtual world, especially when you can play the game in the same way using a controller it just isn't as immersive as having the bucket seat and changing gears using your foot on the clutch pedal. People even take it another step further and get custom carbon fibre steering wheels for their set up which increases the value again, this links back to individualism and people wanting to stand out from other gamers with the same set up.



Figure 7: Photos taken by Author, 2019

These machines are even used to train and improve F1 drivers using full motion racing simulators to provide a realistic driving experience with no repercussions of crashing "All of these ideas violate one of the fundamental elements of play: It's safe. The whole idea of play is to give the player an experience without the danger that might normally accompany that experience." (Crawford, 2006) these driving cages are made to resemble an actual race car, using a curved screen to allow for a more organic feeling whilst playing "The driver's cage is designed using authentic race car methods, a low bend radius tubular lightweight steel space frame encloses the driver to create a real 'inside vehicle' feel" (Systems, 2019) the chair will vibrate and move in unisons' with the vehicle the driver is controlling to get a truly immersive experience.

Chapter 4 - Vehicle Sports

Drifting has become more relevant in recent years and is continuing to increase in popularity, whether this is down to the thrill of the sport or down to the aesthetic cue's car enthusiasts are taking from the drift scene. Drifting started out in Japan with car enthusiasts racing in the mountain roads illegally "practice of sliding a rear-wheel-drive car around a set course has gone from illegal night-time pursuit in the mountains of Japan to a globally-recognised professional sport." (Butters, 2017) drifting has inspired many enthusiasts aesthetically, such as installing bucket seats in their car with a harness as a substituted to a seat belt, a colourful roll cage to attach the harnesses too and an eye catching livery over the car usually advertising the brand of their modifications on the car "S-chassis machines are still very popular in Japanese grassroots drifting, but it's obvious that more owners are experimenting with different styles." (Carbonare, 2015) (refer to Figure 5) drifting has also affected the game world as well with these aesthetic modifications carrying over to racing games as well as the sport, *Forza Horizon 4* has game modes set up specifically for drifting where the player has to slide the chosen vehicle around the track accumulating as many points as possible, in order for the player to gain points the player must hold the drifts for as long as possible and link drifts which means going from one drift in to another one seamlessly, this is a similar scoring system the sport in reality. This is where the driving peripherals are most useful, because the player can be sitting in the bucket seat with the pedals laid out in order to achieve precise movements to link these drifts, also having a sturdy steering wheel that will take a lot of abuse from frantic actions to get the car being drifted to kick its back wheels out in order to initiate the drift.



Figure 8: Speed Hunters. Grassroots Drifting: Japanese Style, 2015

Drag racing is a “form of motor racing that originated in the United States and in which two contestants’ race from a standing start side by side on a drag strip—a flat, straight course, most commonly 1/4 mile (0.4 km) long. Both elapsed time (in seconds) and final speed (in miles per hour; mph) are recorded, although for most events the winner is simply the first to cross the finish line.” (Augustyn, 2019) this sport doesn’t have a specific group of cars dedicated to the sport like others it usually has a mixture of different cars with huge modifications ranging from engine swaps to wider wheels on the front or the back of the car depending on whether the car is front wheel drive or rear wheel drive and then having skinnier wheels on the opposite (see figure 9), this is in order to transfer the power of the car to ground quicker so that the car can reduce the amount of wheel spin when the car launches of the starting point. It is not uncommon to see these cars to perform a burnout just before they start the race in order to heat up the tyres on the vehicle in order to get better traction. These vehicles reach such high speeds completing the quarter mile in just 9 seconds, that towards the end of the track they require more than just breaks to stop “A special airfoil “wing” located at the rear produces a large downward force (between 4,000 and 8,000 pounds) that helps to maintain traction and stability. Top Fuel and Funny Car dragsters generally deploy one or two special parachutes to decelerate past the finish line.” (Augustyn, 2019)



Figure 9: Car Tech, Drag Racing: Tire Guide, 2015

Sports such as time attack has had an impact of the aesthetic car community due to enthusiasts making their car look more aggressive by adding aerodynamic pieces to their car such as huge splitters to the front of the car that require rods that attach from the bumper to the splitter in order to stop the splitter touching the floor when driving due to all the down force provided by the splitter. As you can see in Figure 10 the car has a huge amount of aerodynamic properties such as the splitter, a huge spoiler and the canards that are located on the front bumper this is to cut through the air and provide the vehicle with more down force. This allows the driver to corner better and has more traction which is why the car has the added support from the wide body kit in order to fit bigger wheels to gain even more traction and grip, as the goal of time attack is to get the fastest lap going around the track “Time Attack in its simplest form, it’s a bunch of purpose-built cars lapping the same track against the clock to see who’s the fastest.” (Horncastle, 2019) the reason why this sport is getting more attention recently is because the sport is increasing in popularity due to the cars being attainable, because they are not formula one cars that cost millions “drivers at Time Attack race cars that actually look like cars. And not glitzy high-end exotica, but everyday road cars that you will see down the shops and can pick up on the second-hand market easily. From little Civics to serious Skylines (and a load of oddities in between), they’re very much affordable foundations but modified with extraordinary engines and power figures to match.” (Horncastle, 2019) Almost everything within the car is replaced with lighter materials such as the glass being placed with plexi glass, and body panels being cratered out of carbon

fibre, the panel gaps are also made to be tighter to reduce drag on the car to achieve maximum aerodynamic efficacy.



Figure 10: Alex Brevenkin, Car Throttle, 2017

Conclusion

There are many different groups of car cultures that all have their own unique take on the hobby that has evolved into different sports, customizations and has impacted games hugely video games. Mathew Bedworth states that car culture is not slowing down and continues to thrive mainly down to the new up and coming modifications being released for all makes and models of cars, new and unique modifications are constantly being created and shown off at car shows all across the world such as SEMA, which is then leading to cheaper and more sustainable ways to create these modifications such as 3D printing wide body kits for cars that will take weeks rather than months to produce compared with traditional fibre glass body kits. This culture has also had an impact on the gaming scene, due to racing games continuing to thrive amongst every other genre of game, and for the development of its peripherals to make racing games more realistic and engaging, with the advancement of technology fuelling its success. Car sports has also had a huge part within the car community providing different customization options and re-inventing the way they are produced to make them cheaper and more efficient, these sports are developing better modifications to reduce the times of their laps or improve the vehicles speed which is then being transferred and evolving the trends of car cultures.

Further Work

If my researched continued into car culture in games and reality, more research could be conducted related to vehicle sports, and investigate how they have had an impact on aesthetic modifications within the car community such as Formula one and Nascar. Also dig deeper into the wheel industry and the different types of wheels and what they are used for such as three piece wheels for show cars and flow formed wheels that are mainly used for racing due to the wheel being stronger and lighter than most wheels. Advancing tech could offer more scope for peripherals (and VR) or customization and representation virtually, exploring the potential of technology progressing allowing people to save car builds that they have created within racing games and have them permanently on their account and can access the build as long as they have internet connection. Compared to years ago where an individual would have too chose the colour of the car and that would be the max customization available, the same as in an arcade racing simulator.

Bibliography

Cooper, R., 2019. *Need for speed: Heat*. s.l.:Electronic Arts.

Deadclutch, 2019. <https://www.deadclutch.com/2018/07/02/2013-scion-frs-rocket-bunny-show-build/>. [Online]

Available at: <https://www.deadclutch.com/2018/07/02/2013-scion-frs-rocket-bunny-show-build/>
[Accessed 22 November 2019].

Fast and Furious. 2001. [Film] Directed by Rob Cohen. United States Of America: Universal Pictures.

Hunt, T., 2019. *Youtube*. [Online]

Available at: <https://www.youtube.com/user/ironmenfan1>
[Accessed 29 November 2019].

Kyza Saleem, 2019, widebody polestar 1

Studios, M., 2018. *Forza Horizon 4*. [Online]

[Accessed 03 December 2019]. (Cooper, 2019)

References

Adams, E., 2006. *Fundamentals of Game Design*. Third Edition ed. s.l.:New Riders.

Augustyn, A., 2019. *Drag racing / motor sport*. [Online]

Available at: <https://www.britannica.com/sports/drag-racing>

[Accessed 04 December 2019].

Bedworth, M., 2017. *DriveTribe*. [Online]

Available at: [https://drivetribes.com/p/modifying-cars-why-do-you-do-it-](https://drivetribes.com/p/modifying-cars-why-do-you-do-it-UXUMVOg7SuCzVWJqzn_qHw?iid=N76uG3-dQ762cqRBx_jqJw)

[UXUMVOg7SuCzVWJqzn_qHw?iid=N76uG3-dQ762cqRBx_jqJw](https://drivetribes.com/p/modifying-cars-why-do-you-do-it-UXUMVOg7SuCzVWJqzn_qHw?iid=N76uG3-dQ762cqRBx_jqJw)

[Accessed 20 November 2019].

Blackstock, E., 2019. *Jalpnik*. [Online]

Available at: [https://jalopnik.com/there-are-an-obscene-number-of-toyota-supras-at-sema-th-](https://jalopnik.com/there-are-an-obscene-number-of-toyota-supras-at-sema-th-1839690781)

[1839690781](https://jalopnik.com/there-are-an-obscene-number-of-toyota-supras-at-sema-th-1839690781)

[Accessed 01 December 2019].

Brevenkin, A., 2017. *CarThrottle*. [Online]

Available at: <https://www.carthrottle.com/post/obpx9yd/>

[Accessed 06 December 2019].

Bruce, C., 2019. *Motor1.com*. [Online]

Available at: <https://www.motor1.com/news/375963/polestar-1-nfs-real-life/>

[Accessed 26 November 2019].

Butters, J., 2017. *IT STARTED IN JAPAN: THE HISTORY OF DRIFTING*. [Online]

Available at: [https://drivetribes.com/p/it-started-in-japan-the-history-Z7UMkajoS-uajc3HNU-](https://drivetribes.com/p/it-started-in-japan-the-history-Z7UMkajoS-uajc3HNU-NyQ?iid=MEAjenteR1GGMwtBOHDkbw)

[NyQ?iid=MEAjenteR1GGMwtBOHDkbw](https://drivetribes.com/p/it-started-in-japan-the-history-Z7UMkajoS-uajc3HNU-NyQ?iid=MEAjenteR1GGMwtBOHDkbw)

[Accessed 21 November 2019].

Carbonare, D. D., 2015. *Grassroots Drifting: Japanese Style*. [Online]

Available at: <http://www.speedhunters.com/2015/09/grassroots-drifting-japanese-style/>

[Accessed 21 November 2019].

Carbonare, D. D., 2016. *Speed Hunters*. [Online]

Available at: <http://www.speedhunters.com/2016/03/living-with-a-widebody-gt-r/>

[Accessed 28 November 2019].

Clarke, J., 2018. *Red Bull*. [Online]

Available at: <https://www.redbull.com/gb-en/buying-body-kits-for-your-car>

[Accessed 20 November 2019].

Community, F., 2018. *Forza Horizon 4/Engine Swap*. [Online]

Available at: https://forza.fandom.com/wiki/Forza_Horizon_4/Engine_Swap

[Accessed 20 November 2019].

Cooper, R., 2019. *Need for Speed: Heat*. s.l.:Ghost Games.

Crawford, C., 2006. *Chris Crawford On Game Design*. s.l.:s.n.

Deadclutch, 2019. <https://www.deadclutch.com/2018/07/02/2013-scion-frs-rocket-bunny-show-build/>. [Online]

Available at: <https://www.deadclutch.com/2018/07/02/2013-scion-frs-rocket-bunny-show-build/>

[Accessed 22 November 2019].

Fast and Furious. 2001. [Film] Directed by Rob Cohen. United States Of America: Universal Pictures.

Forza, 2016. *Buy Hot Wheels Car Pack - Microsoft Store en-GB*. [Online]

Available at: <https://www.microsoft.com/en-gb/p/hot-wheels-car-pack/bvks2c8rkt2v?rtc=1&activetab=pivot:overviewtab>

[Accessed 20 November 2019].

Gilkey, T., 2019. *Asian Car Show*. [Online]

Available at: <https://www.pvvp.org/car-shows/schenley/asian-car-show/>

[Accessed 29 November 2019].

Horncastle, R., 2013. *How do cars end up in games? Top Gear*. [Online]

Available at: <https://www.topgear.com/car-news/gaming/how-do-cars-end-games>

[Accessed 20 November 2019].

Horncastle, R., 2019. *Top Gear*. [Online]

Available at: <https://www.topgear.com/car-news/motorsport/ten-reasons-time-attack-needs-your-attention#1>

[Accessed 06 December 2019].

Ouellette, A., 2017. *That Challenger girl*. [Online]

Available at: <http://thatchallengergirl.com/uncategorized/why-do-people-slam-their-cars-down-low/>

[Accessed 01 December 2019].

Piscopo, N., 2018. *19 Body Kits That Turn Even The Deepest Sleepers Into Speed Demons*. [Online]

Available at: <https://www.hotcars.com/20-body-kits-that-turn-even-the-deepest-sleepers-into-speed-demons/>

Rodriguez, T., 2019. *LMR*. [Online]

Available at: <https://lmr.com/products/what-are-flow-formed-wheels>

[Accessed 06 December 2019].

Saito, K., 2017. *Liberty Walk's Japanese Headquarters Is Just As Crazy As Their Tuned Cars*. [Online]

Available at: <https://jalopnik.com/liberty-walks-japanese-headquarters-is-just-as-crazy-as-1818868589>

Studios, M., 2018. *Forza Horizon 4*. [Online]

[Accessed 03 December 2019].

Systems, 3., 2019. *RAID Full Motion Racing Simulator*. [Online]

Available at: <https://www.scan.co.uk/3xs/info/racing-simulator-pc>

[Accessed 20 November 2019].

Taylor, C., 2019. *Best Games To Customize your Car*. [Online]

Available at: <https://www.allcarleasing.co.uk/blog/best-car-customization-games/>

[Accessed 20 November 2019].

T, D., 2013. *Stance is everything*. [Online]

Available at: <https://www.stanceiseverything.com/2013/03/theme-tuesdays-engine-bays/>

[Accessed 22 November 2019].

uk, M., 2019. *Motorsport uk*. [Online]

Available at: <https://www.motorsportuk.org/the-sport/types-of-motor-sport/hill-climb/>

[Accessed 04 December 2019].

Williamson, J., 2015. *Top 5 Racing Peripherals for PC*. [Online]

Available at: <https://www.eteknix.com/top-5-racing-peripherals-pc/>

[Accessed 20 November 2019].

Wong, J., 2019. *History of the Toyota Supra, a Japanese sports car legend*. [Online]

Available at: <https://www.cnet.com/roadshow/news/toyota-supra-history-sports-car-celica/>

[Accessed 01 December 2019].