The World's Most Popular Architecture

the Technology and Interior of the Automobile

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No other architecture is as elaborately conceived, intensively designed and commonly experienced as that of the automobile and its interior. Once we fully appreciate the automobile's sheer density, proliferation and sophistication of technology, as well its incredible millimetre-by-millimetre concentration of design (and for automobiles today 'technology' and 'design' are more or less indistinguishable, the older separate teams of 'engineers' and 'stylists' having now merged into multi-disciplinary product development teams), in addition to the varied mental and physical subtleties involved in the act of car driving, we find that resting at home, being at work or even flying as a passenger in an airplane are all by comparison as if dwelling in a stone-age cave. The car is also an extremely everyday entity, with over 700 million in regular use worldwide, a figure expected to reach 1 billion by 2030. Around the world, car travel – the number of journeys taken and miles driven – is estimated to triple between 1990 and 2050 (Urry, 2002; Brandon: 2002, 385).

In short, the car is not only the most exhaustively-designed space with which we now commonly engage as part of our normal lives, but also, through our interaction with it – through the act of driving – creates a similarly intensive encounter with architecture

as designed space. Furthermore, it also a highly mediated kind of architecture, particularly through its depiction in movies, where the public in their billions see and experience automobile interiors vicariously rather than directly. Here, in movies, present and future drivers alike experience car design and technology in a particularly dynamic and seductive form, encouraging their desire for new forms of automobile consumption. In exploring the world's most popular architecture here, then, I also look at the way this space has been depicted in one of the world's most popular representation, that of film.

Automobile Technology

What kind of technology are we talking about in the history of the car? In very general terms, most car technology from the end of the nineteenth century until the 1960s was predominantly a matter of mechanics and mobility, that is of making the car go and stop as efficiently and as reliably as possible. Thus in the 1900s Rudyard Kipling was able to see that his 'agonies, shames, delays, rages, chills, parboilings, road-walkings, water-drawings, burns and starvations' suffered in the early developments of the automobile at the turn of the century soon gave way to the 'safe and comfortable' car (Filson Young: 1905, 249). Something of this hard-won triumph over tribulation can be seen in a film like *Genevieve* (Henry Cornelius, 1953), where two 1904 automobiles, a Darracq 10/12 hp Type O and Spyker 14/18 hp, for all their constant mechanical eccentricities and temporary failings, manage to convey their

occupants along the 100 mile journey from London to Brighton and back again.

From the mid-1900s onwards, automobile innovation was primarily directed at refinements in this area of mechanical function, performance and reliability. So even in the most radical of inventions, such as the Dymaxion prototype car designed by architect Buckminster Fuller in 1933, we find predominantly mechanical inventions, such as a chrome-molybdenum chassis and a rear-wheel steering machine. The Dymaxion offered air-conditioning and rear-view periscopes, but essentially these were trimmings added on top of what was predominantly an exercise in mechanics and aerodynamics, seeking to reduce unsprung weight, increase carrying capacity and exploit the potential of the ninety hp Ford V8 engine (Brandon: 2002, 266-73; Dron, 2010; Silk: 1984, 248-51).

In some of the most extreme concept cars of the 1950s and early 1960s, there was the occasional interest in advanced technological control systems, such as the fingertip-controlled steering dial and travel programming computer of the six-wheeled Ford Seattle-ite XXI of 1963. Most notable of all here is General Motors' earlier Firebird II concept car of 1956, which - no doubt with one eye on the radio-controlled highway of General Motor's earlier 'Futurama' exhibition (1939) and *To New Horizons* film (Jam Handy Organization/General Motors, 1940) - was intended for the 'Safety Autoway of Tomorrow' where it would be automatically steered, accelerated and braked via signals emitted from electronic control strips set in the road surface and picked up by two antenna mounted in the car's nose (General Motors, 1956). The system also incorporated radio and

television communication with a nearby Control Tower. Presented at General Motors' travelling 'Motorama' exhibition of 1956 and seen by over 2.2 million visitors, a Technicolor documentary *Design for Dreaming* (MPO Productions/General Motors, 1956) promoted the Firebird II to an even wider popular public, depicting a modern city of automated highways, along which a young couple entirely relax under a starry night-time sky as they speed along curving tracks and elevated roadways into an prosperous and care-free technological future.

Yet despite this kind of occasional sci-fi fascination with automated control and electronic technology, in the wider scheme of post-war car design, technology and manufacture such things were marginal to a much more overt obsession with alternative propulsion systems and surface styling. Thus in the 1950s some prototypes investigated jet engines, such as the gas turbines of the Firebird concepts and other vehicles from manufacturers as diverse as Rover and Boeing, or atomic power, as with the outlandish Ford Nucleon of 1958 (Francis, 1950; Smith, 1946; Marriage and Metcalf, 2010). But most important of all was extreme styling, and especially the highly aestheticized tail-fins, cockpit-like canopies, air scoops, exhaust nozzles and other airplane-related features seen on innumerable American cars of the 1950s, from the General Motors LeSabre and Firebird conceptual prototypes to production vehicles such as the Cadillac Fleetwood 60 Special (1959), all of which symbolized a kind of miraculous speed, superior American military power and consumer affluence in the emerging Cold War era. Together this created what Chrysler called 'the new shape of motion,' giving an overt aesthetic

expression to a confident and overtly technological present-future (Gartman, 1994; Gartman, 2004b; Hine, 1986; Baudrillard, 1996).

It could be argued that this remains the situation today, where style and surfaces often seem to be the pre-eminent features of automobile design and where the driver's interaction with technology plays second fiddle. There are of course some specialist cars like the high-tech Japanese Nissan Skyline GT-R of the 1990s and later GTR series from 2007 onwards which offer all manner of information and controls for such things as turbo boost, four-wheel drive, four-wheel steering, pitch and yaw, G-Force, lap times, engine temperatures, intake and exhaust gas temperatures, brake cooling, customizable displays and so forth, but for most cars today the driving experience is largely devoid of direct interface with engine and other mechanical technology. Thus manufacturers tend to focus on automobiles like the Audi A2, where the oil, water and petrol reservoirs are all accessible from the exterior and where the driver is consequently actively discouraged from engaging with the rest of the car's mechanical functions. But there are other areas of the car where car technology, and in particular the driver's interface with it, which have grown with some degree of complexity. Around 1965, this all begins to emerge in three areas of automobile design and driving experience - safety control, communication and interior interfaces. I briefly explore each of these in turn, while also indicating some of the ways in which such developments have appeared in film.

Controlling Devices

In 1965, Ralph Nader, an activist lawyer and protector of consumer rights, published an automotive bombshell. In *Unsafe At Any Speed*, Nader directly charged the executives and stylists of the American automotive industry with not only willfully ignoring aspects of safety in car design, but with actively developing and selling cars which they knew to be dangerous. For example, Nader argued that the General Motors Chevrolet Corvair had a swing-axle rear suspension system so atrociously designed that it had directly lead to numerous accidents and deaths, despite GM knowing they could have improved the Corvair's handling by fitting a simple fifteen dollar stabilising bar Nader 1965; Gartman 1994). The eventual result of these damning charges was a humiliation for the car industry, forcing it to publicly admit much of what Nader had claimed, and to make immediate changes to its operations. Many US bodies such as the Environmental Protection Agency Occupational Safety and Health Administration (OSHA) and Consumer Product Safety Commission were also either directly set up or greatly influenced by Nader's work, while overseas automobile manufacturers wishing to export their cars to the US had to quickly change their own cars to suit the new regulations.

Much of what see in cars today follows this post-Nader revolution, with entire brands of car now being renowned for their safety, such as Volvo, a company which aims, by 2020, for no one to be killed in one of their cars (Milne, 2013). Nor is Volvo alone in such aspirations, for nearly all automobile manufacturers today incorporate in their models a whole raft of features specifically designed to increase the safety of the driver and other occupants

(Conley and McLaren: 2009, 95-110). Such safety technologies include those which intervene through prevention, such as traction control, active body control, active suspension (which helps restrict skidding) and ESP (Electronic Stability Programme, which keeps cars stable under load, and also warns of tyre air pressure loss). Active speed and cruise controls prevent the driver from hitting the car in front, such as Jaguar's microwave radar-based Adaptive Cruise Control system, while ALS (active light systems) deploy headlights which turn in relation to steering movements, thus helping the driver to see around corners. Other technologies are interactive, including head-up-displays of dashboard information projected onto the windscreen (currently available on BMW, Citroën and Chevrolet models, among many others), adaptive brake lights and reversing cameras. More futuristically, in the case of Mercedes, an infra-red camera system called 'Night View Assist' helps drivers to see in night-time conditions. Additionally, there are control technologies which are reactive, such as seat belts, four-channel ABS (automated braking systems), airbags and window curtains, as well as technologies like Jaguar's Pedestrian Contact Sensing and Citroën's Active Bonnet systems which, when detecting a collision with a pedestrian, deploy a pyrotechnic actuator to instantaneously raise the car bonnet a few millimetres, so preventing that pedestrian from striking hard points such as the top of the engine. Many of these reactive technologies are largely hidden from the driver, such as the 'pre-safe' systems which anticipate or measure the first stages of an accident (through proximity and impact sensors) and which instigate the initial stages of safety equipment, such as tightening seat belts and beginning air-

bag deployment sequences. Manufacturers like BMW are also beginning to incorporate technologies such as all-round laser sensors and nose-mounted cameras to provide collision avoidance during sideways lane changes, an AMULETT system to detect any nearby children wearing a special transponder, as well as an 'autopark' feature where the driver can place their car into a tight parking space by standing outside and operating it remotely (Holloway, 2010).

Although not all of these technologies make for exciting car sales features, still less movie stories, the underlying notion of a car being modified by the addition of a particular piece of control equipment or device has been one of the most prevalent features of car-focused films, particularly from the 1960s onwards when such technology first made its presence felt in the post-war consumerist car market. In *Only Two Can Play* (Sidney Gillat, 1962), for example, Liz and John try to make love in her large Oldsmobile convertible, but are quickly thwarted when their panic-pushing of buttons sets off the electric seats, radio, lights, horn and windscreen washers. In a even more comic commentary, *Trafic* (Jacques Tati, 1971) makes perhaps the greatest parody of car gadgetry with its portrayal of the Altra camping car, complete with ridiculous devices such as a table and chairs that fold out from the car rear, a shower and shower curtain, a front grille which turns into a barbecue, shaver mounted in the steering wheel and a television on an electric stand, as well as an extendable body and pop-up roof.

But the most celebrated depictions of automobile devices are undoubtedly those of the James Bond 007 films, most notably of all in the Aston Martin DB5 deployed in *Goldfinger* (Guy Hamilton, 1964) and

Thunderball (Terence Young, 1965). The Aston's functionality includes the ability to create smokescreens, oil slicks and a carpet of tyre-puncturing tacks, as well as Browning machine guns, water cannons, bullet-proof glass, audio-visual tracker for a homing device and a secret control panel. Most famously of all, the silver birch DB5 equips Bond (Sean Connery) with an ejector seat, rear bullet-proof screen, extendable wheel spinner to slash other cars' tyres and rotating British, Swiss and French number plates. Also fitted, but not explicitly shown in the movie, are a radar scanner hidden in the wing mirror housing, telephone in the driver's door, under-seat tray for weaponry and golden jewelry, and extending overriders on the bumpers for ramming. So popular were these devices with the public that the DB5 was shown at innumerable premieres and promotional events during a two-year world tour, as well as being used in advertisements from Burton slacks to Simoniz 'Vista' car wax, and appearing as the pace car at the US Laguna Seco race track. Children could also join in, with scale models on offer from Corgi to Scalextric, often including working versions of the ejector seat and other componentry. All of this has made the James Bond DB5 what is often referred to as the most famous car in the world, and in 2010 the sole remaining example of the two originally produced for filming was sold for £2.6 million (Anon, 2006; Adams, 2008). It was also instantly recognised when it made a re-appearance in the most recent Bond film, *Skyfall* (Sam Mendes, 2012).

Fig 1

Many later Bond films include similarly device-laden cars, notably the white 1976 Lotus Esprit in *The Spy Who Loved Me* (Lewis Gilbert, 1977), which not only boasts missiles, oil slick emission and electronic controls but also the ability to transform into a submarine, and the Aston Martin V8 Vantage Volante in *The Living Daylights* (John Glen, 1987), equipped with side outriggers, spiked tyres, missiles and lasers, rocket propulsion, signal-intercepting radio, head-up display and self-destruction facility. Even more elaborate than the DB5, the Aston Martin Vanquish in *Die Another Day* (Lee Tamahori, 2002), which boffin Q describes as 'the ultimate in British engineering,' offers 'all the usual refinements' such as ejector seat, spiked tyres, remote control and thermal imaging system, as well as weaponry incorporating torpedoes, missiles, lasers, grenades and target-seeking machine guns. Most dramatically of all, this particular Aston can even become invisible via an 'adaptive camouflage' cloaking control system.

The popularity of the automobile gadgetry of the Bond cars is particularly evident from the way it has been overtly parodied in several other films, such as the spoof Bond *Casino Royale* (John Huston, 1967) where 007 is tracked by SMERSH using a remote controlled milk float, and *Cannonball Run* (Hal Needham, 1981) where Bond actor Roger Moore plays Seymour Goldfarb whose silver Aston Martin DB5 boasts Bond-style gadgets like oil slicks, smokescreens and changeable number plates. In *Cannonball Run 2* (Hal Needham, 1984), a black Mitsubishi Starion (driven by actor Richard Kiel, who also plays the famous assassin 'Jaws' in *The Spy Who Loved Me*) directly mimics 007's Lotus Esprit when it turns into a submarine.

Most explicitly of all, *Austin Powers in Goldmember* (Jay Roach, 2002) includes a Union Jack-draped Jaguar XK8, referred to by Powers (Mike Myers) as the 'Shaguar,' equipped with a DB5-style Perspex bullet-proof rear screen and ejector seat.

The fantastic transformational capacity of 007's cars is particularly reflected in *Speed Racer* (Larry and Andy Wachowski, 2008), where the race cars come equipped with everything from hydraulic vaulting pistons, crash-triggered safety bubbles, remote control flying cameras and turbine drives to bullet proof cockpits, tyre shredders, spear hooks, spinning blades and even a wasp nest. This kind of technological variant, where the whole car becomes in effect one giant gadget, reaches its zenithal form in the disassembling and spinning low-rider truck of Rubén Ortiz Torres' art installation/film projection *Alien Toy* (1997), as re-used in Fatboy Slim's 'Rockafeller Skank' music video (1998) and reworked by Citroën for a 2004 car advertisement where a seemingly conventional C4 coupé becomes 'alive with technology' and transforms into a dancing robot (Ondine Chavoya 2004). In mainstream movies, the mutating jet-powered Tumbler of Christopher Nolan's *Batman Begins* (2005) and *The Dark Knight* (2008), is a vehicle which can be operated by remote control, jump over other cars, eject a Batpod motorcycle, assume a stealth mode and even self-destruct when required.

Communication Networks

Besides the weaponry, defence systems and more fantastic control equipment fitted to many of the Bond, Batman and other cars noted above, there is also another type of technology which has been

increasingly visible in automobiles and in films: radios, telephones and other devices for information-exchange. As this suggests, the second area of car technology of note concerns communication, where the car is part of a networked environment in which all manner of data (audio, visual, directional, informational, digital) can be transferred. Thus while many films - from *The Physician of the Castle* (Pathé Frères, 1908) and *La Glace à Trois Faces* (Jean Epstein, 1927) right through the 1960s with *Harper* (Jack Smight, 1966) to the early 1990s with films like *Thelma & Louise* (Ridley Scott, 1991) and *The Living End* - frequently show drivers stopping in order to send telegrams and make calls from pay phones, as soon as possible movies went out of their way to show cars equipped with the latest communication devices, and so plugged into the most modern of technological networks.

The first offerings in this field were mostly aimed at information reception, most notably through car radios, which by 1941 were already fitted to over thirty per cent of US cars (Bull: 2004, 245). In films we see this increasingly from the late 1940s onwards, as in film noirs like *They Live By Night* (1948), *Gun Crazy* (Joseph H. Lewis, 1949) and *The Hitch-Hiker* (Ida Lupino, 1953) where updates on police activities are heard via radio broadcasts while on the move. Later, many cars became equipped with compact cassette and 8-track systems, with Ford being one of the first, in 1965, to offer 8-track players as an option in its Mustang, Thunderbird and Lincoln cars. Along with the subsequent CD-players of the 1980s and 1990s and the most recent iPod systems for music, we also now have DVD systems for

television and video, many of which are fitted to cars either as factory-installed or after-market devices.

Unlike radios, which usually can only receive information, other communications devices can both import and export information, such as in-car telephones. These began with radio-based systems, then VHF- and UHF-based networks like the MTS (Mobile Telephone Service) and IMTS (Improved Mobile Telephone Service) systems in the USA, culminating with mobile fax systems and integrated Bluetooth-enabled mobiles, as well as computer-like telephone, text and email devices like the smartphone Blackberry and iPhone. Like radios, these automobile-mounted telephones make an early appearance in movies, and, for example, are fitted to James Bond's 1935 Bentley 3½ Litre in *From Russia With Love* (Terence Young, 1963) and the Rolls-Royces of Thomas in *Blow-Up* (Michelangelo Antonioni, 1966) and Charlie in *Charlie Bubbles* (Albert Finney, 1968). However, from the late 1980s onwards, early technology adopters like yuppie Charlie in *Rain Main* (Barry Levinson, 1988) and gangsters Eddie in *Reservoir Dogs* (Quentin Tarantino, 1992) and Vincent in *Pulp Fiction* (Quentin Tarantino, 1994) are shown using mobile phones while driving, and from the early 1990s onwards we tend to see drivers using these devices rather than car-related communications equipment. Indeed, in *Casino Royale* (Martin Craig, 2006), even Bond uses a Sony-Erickson mobile phone rather than Q-provided car-mounted technology to navigate his Ford Mondeo.

More recently, many cars today also offer integrated technology providing direct network connection to email servers, with messages displayed on a screen, while voice synthesis and control allow the

messages to be read out and responded to. For example, the 2010 Mini Countryman was one of the first to use an iPhone-based application to connect the driver to internet services like Facebook, Twitter and Spotify, while BMW's 'Online' facility and new app-based integrative software allows drivers to connect to wi-fi hotspots, share locations in real time, view weather information, find a parking space or doctor, peruse news items and stock market updates, and access mobile office features such as the driver's own address book and e-mail account (Steel, 2013). Porsche's own app for the E-Hybrid version of their Panamera model also lets drivers interface with their car by remote, such as to set the timing of the electric charging systems or to pre-cool or pre-heat the cabin environment.

Most commonplace of all, sat-nav systems provide networked map location and guidance. In the mid 1990s solely the preserve of up-market BMWs and the like, by 2006 these sat-nav products from manufacturers such as Tom Tom and Garmin had become readily affordable as aftermarket accessories, and now offer such facilities such as digital data streams with crowd-sourced traffic updates and warnings, 3-D and photo-realistic views, alternative routes and the proximity of innumerable local services, from hotels to sites of historic interest. Associated systems alert the police when a car has been stolen, such as the GPS-based 'Tracker' system in the UK or the 'IntelliTrac' in Australia), while other GPS-based systems warn drivers about radar traps and speed cameras. Specialist systems such as the data loggers by Race Technology and Racelogic give even more detailed information about distance-timing, acceleration, drift angles, positioning on race tracks and so forth. Other recent

technologies include systems such as BMW's 'Micropause Apps,' which communicates with traffic lights to let the driver how long the car will be stationary and provide new flashes on a screen, as well as ILENA intelligent sat-nav, which calculates different routes according to preferences for economy and speed and the driver's known driving style.

Where fitted directly into the car by the manufacturer, all of this network-related technology is now commonly gathered within a system like Mercedes' COMAND (Cockpit Management and Data System) environment, so that radio, CD-player, DVD, memory cards and sat-nav are harmonized behind a single unified interface. Much of this technology is thus not mono-functional but aimed at integrating information with other aspects of the car's operations, and particularly with its environmental impact. Indeed, new developments in hybrid, electric, turbine and fuel-cell propulsion systems, which in the 2010s have appeared in most manufacturers' ranges of mass-produced cars, are especially open to this kind of technology integration. For example, BMW is planning to use pre-selected sat-nav routes and information about traffic and weather in order to enhance the performance of its hybrid propulsion cars, such as setting the optimum battery charge or pre-warming the engine (Holloway, 2010). In a similar way, interactive connectivity can also be used for such things as automatically informing dealers when cars needs servicing, or providing drivers with live information on weather, restaurants, petrol stations and so forth, and here, with these kinds of interactive technology, we begin to approach the kinds of advanced automobile connectivity and automation which we see in films like

Tron, *Demolition Man, Minority Report* and *I, Robot* described below (McIlroy, 2010).

Distributed Interiors

The third technology which changes the interface of the car has developed around the automobile's body type, interior space and cabin equipment. The kind of fascination which this aspect of car technology can generate is seen in films like the *Lift to the Scaffold* (Louis Malle, 1957) when, after seeing the motorized roof retract on an American Chevrolet convertible, Véronique declares excitedly 'Look, push of a button and its done! That's the kind of life I want.' Yet this is just the merest glimpse of the advances in automobile configurability that begin to emerge a few years later. Thus from the 1960s onwards, and particularly in the 1990s and 2000s, an ever-increasing proliferation of new car types have emerged in the form of various hatchbacks, coupes, city cars, retro cars, sports-utility vehicles, 4x4s, MPVs and hybrid propulsion cars etc, as well as innumerable crossover variations, each of which has been intended to appeal to a particular market segment and a particular set of cultural identities which coalesce around such social aspects as sports and leisure preferences, social life, sexual orientation, gender, business and commerce status, arts and creative outlook, safety and risk and so forth. This market is not hierarchical or rigid but fractured and tolerant, with each brand and model signalling a specific lifestyle niche, around which owners can switch at will. Thus automobile identities are no longer stratified and ordered on a mass-scale across society, as they were until around

1960, but are now increasingly diverse, fragmented, local and ephemeral (Gartman, 2004a).

Today, therefore, just as we have seen enormous increases in the technology of safety and communication, we now find an incredibly intense focus upon how the car body shape and interior are designed, constructed, specified, adjusted and modified. This is readily evident, for example, from the current BMW range of cars which incorporates everything from a small two seater (Z4) to a family saloon (1 and 3 Series) to a large estate (5 Series Touring) or a 4x4 SUV (X1, X3 and X5), as well as crossover body styles such as the 'Sports Activity Coupe' 4x4 (X6) and the 'Progressive Activity Series' amalgam of a saloon, 4x4 SUV and gran turismo (5 Series GT). Within this overall range of space- and body-types, interiors can not only be specified according to just about every conceivable color, material or texture, but can be adjusted for precise variations in seating, dashboard layout and instrumentation, four-zone climate control of temperature, air refresh rates and humidity, visibility (through electrically operated and memory-setting retractable mirrors), panoramic roofs, sunblinds, ambient lighting, active headrests and keyless entry systems as well as the extensive range of communications and hi-fi equipment described above - all of which can be altered through a highly complex set of controls, computers and motors, including BMW's iDrive interface (a rotary push-pull-and-twist dial giving access to an Apple-style menu-driven hierarchy of driver options).

Nor is this intensity by any means confined to BMW, and most other manufacturers now pursue similar strategies of exhaustive

internal design and obsessive technological refinement. For example, the Citroën C6 saloon first launched in 2006 boasts, in addition to many of the BMW features described above, such technologies as a self-cleaning concave rear window, speed-sensitive aerodynamic devices, individually-heated lounge-style seats, voice-recognition control for its 'NaviDrive' mapping and information system, a driver-configurable head-up display and automatic and driver-adjustable Hydractive suspension and ride settings, as well as a LDWS (Lane Departure Warning System) device that uses infra-red sensors to detect if the car has drifted out a freeway lane and then alerts the driver via vibrating seat emitters. In short, the overall effect of this massively concentrated application of design and technology is the production of a relatively small space, barely large enough to hold 5 adults in very close proximity, in which every single millimetre of space, surface and equipment has been microscopically designed, where every material and texture has been equally carefully considered, and whose every conceivable attribute, from colour and pattern to temperature and brightness, can be differently specified, adjusted and controlled by those who ride within it. Furthermore, in the way this car interior is guided through space, the car's technology allows the driver to foresee, predict, manage, avoid and generally survive an enormous range of differing road, traffic and journey conditions, and to do so in a way that alternatively involves, integrates, questions, checks, ignores or absolves the driver in the process of moving the car forward in a speedy, efficient and safe manner.

In all this technology, therefore, we see that commonly available auto-based equipment has largely outstripped many of the depictions offered in film, excepting, of course, some of the more fantastical weaponry and transformative capabilities of 007's Aston Martin and Lotus sports cars. Indeed, where cars in movies in the 1950s and 1960 helped to prepare the public for the consumption of new automobiles technologies, educating them in what would soon be available for purchase, the situation is now all but reversed, with current cars being at the forefront of all electronic, digital and information technologies. As a result, cars are now increasingly like hybrid entities where intelligence and intentionality are distributed between humans and non-humans (Thrift: 2004, 49). This is a trajectory which, in terms of a human being becoming defined by their ability to control and drive a car, has been tracked in film from *La Glace à Trois Faces* to the *Fast and Furious* series (various directors, 2001-). Similar themes regarding the conflation of man and machine range from film noir movies such as *Touch of Evil* (Orson Welles, 1958), where the car is shown as an extension of the human body, right through to avant-garde art movies such as Matthew Barney's *Drawing Restraint* 7 (1993) and *Cremaster Cycle* (1994-2002), where body and machine mesh together within complex themes of creation, biology, psycho-sexuality, myth and identity (Frankel, 2001; Arthur, 2001). As a truly technological hybridity, we see this starkly in movies like *Death Race 2000* (Paul Bartel, 1975) and its remake *Death Race* (Paul W.S. Anderson, 2008), and particularly in the earlier film's lead driver Frankenstein who survives through multiple bodily reconstructions. An even more explicit conflation of driver

and machine comes in *Tron* (Steven Lisberger, 1982) and *Tron Legacy*

(Joseph Kosinski, 2010) where the lead characters are sucked into the

inner digital workings of a computer, in which they have to compete

in the Light Cycle races and other arenas for their survival.

Rendered as pure digital code, and no longer physically human, yet

still 'driving' virtual vehicles, these driver-riders continue to

exist only to the degree that they can work both with and against the

computer that forms the world around them. 'You are hard-wired into

the car,' explained motor racing expert Trevor Carlin about *Tron*-

style driving, 'and can almost make it do things by thought'

(Anderson, 2010).

This notion of driver and car forming a cyborgian entity, as

given its most extreme mainstream filmic representation in the two

Tron films, marks a profound shift in the relationship of the

operator to the machine. For example, in the early days of motoring,

enthusiasts like Filson Young emphasise the need for drivers to

understand how the car worked. 'The first duty of every motorist,' he

asserted, 'is to understand his car thoroughly in every detail'

(Filson Young: 1905, 177). Here, the motorist (or perhaps, for Filson

Young's wealthy associates, a private mechanic) is expected to know

how the car might be operated, maintained and repaired, such that the

driver becomes a mirror of car, able to attend to any problems that

may arise. The motorist should 'not be content with a merely

superficial knowledge of ''how the thing works,"' argued Filson

Young, 'but should make himself thoroughly the master of the

construction of his machine and the working of all of its parts'

(Filson Young: 1905, 197). As a result of these duties which must

have seemed like a labour of love, early motorists frequently spoke of their vehicles in animalistic terms, seeing them as breathing creatures with whom they maintained a living relationship. One such motorist, for example, spoke of 'the almost human consciousness of the machine' and praised 'the patient ready response which it makes to any call on its powers' as well as 'the snort with which it breasts the hill, and soft sob which dies away when it has reached the summit'. All this made the automobile 'as companionable as any living being'(Filson Young: 1905, 236).

In the immensely complicated world of contemporary car technology, all of this has now completely changed, and no longer do drivers expect to maintain personal relationships with their vehicles, or even to know how the car's systems might work. Today, a driver might know which tasks certain technologies might perform (illuminate, communicate, accelerate, brake, heat/cool etc), yes, but how the various electronic and mechanical systems actually function, almost certainly not. Hence the intelligence is no longer mirrored between car and driver, still less conflated into a single cyborgian man-car device, but distributed between them, with the intelligence to operate (the driver) being quite separate from the technological function of actually working (the car). Furthermore, certain aspects of operation which previously might have been given over to the driver are now taken up by the car, such as ABS braking (which has replaced skillful cadence braking to avoid skidding during an emergency stop), active cruise controls (which alter the speed and even steering of the car in order to maintain a safe distance from other vehicles), or, of course, sat-nav (which absolves the driver

from map-reading and navigation). Conversely, certain tasks which might previously have been assumed by or limited by the car have now been taken up by the driver. For example, speed is now rarely governed by the mechanical capabilities of the car and is now more usually controlled by the driver's sense of what of is a safe, legal and morally justifiable speed to attain. In a similar way, the distance travelled is often no longer governed by a car's reliability or fuel range but by the driver's own bodily and mental comfort.

The internal spatial interface of the car - the steering wheel, pedals, dashboard, central console and myriad other buttons, dials and displays - is an integral part of this distribution system, not so much passing control from human to non-human, or vice-versa, as creating an extensive, dispersed intelligence, whereby 'the automobile' is made up not solely from the physical object of the car but also from the driver and their interaction together (Dant, 2004). In addition, all of this takes place not despite of but in integration with the driver moving in their car, whether that be either across the country at relative higher speeds, or in lower speeds among the hustle and bustle of city life.

As a result, we are now beginning to see the possibility of whole shifts in the driving experience that result from the application of new technologies. In particular, car designers are speculating about vehicles that are less about driving as an act and about reaching a destination as a goal, and more about creating connections as an act, and making associations and relationships as a goal. For example, where some drivers have seen their car as 'like a living room' where 'people can get together and have a nice time'

(Benson, Macrury and Marsh: 2007, 16), the Toyota Personal Mobility
(PM) concept car of 2003 takes this sociability one step further, and
is aimed at 'meeting, linking and hanging out together'. To do this
it uses LED technology to change the color of the vehicle to indicate
'emotions' and situations, navigation technology so that multiple PMs
can team up, such that one PM can become the lead vehicle, while
others follow on autopilot, and where vehicles can simply join up
with other PMs and their drivers. The aim here is not so much the
production or driving of individual vehicles, but the creation of 'a
mobile community'. Toyota has further explored this concept through
its more recent i-REAL, i-unit, i-foot and i-swing vehicles. The i-
Unit and i-REAL devices, for example, have such features as colours
which change according to the emotion of the driver, plus
'comprehensive communication capabilities for gaining, knowledge, for
contacting others, and for communicating'. This includes exchanging
information between cars as they pass each other by, which thus
become 'part of the city,' integrating 'private transportation and
personal mobility with the urban infrastructure' (Design Platform
Japan: 2008, 80-3). The Mio concept of 2010 developed by the Brazil
arm of Fiat has similar aims. This car was designed by crowdsourcing
via the company's website and social networking technologies like
Twitter, with around 17,000 collaborators contributing their thoughts
about the Mio's size, materials, maintenance and propulsion system as
well as integration of infotainment systems, head-up displays and
other controls, social networking capacity, on-board biometry and
traffic automation. The result is a two metres long city car,
equipped with mobile phone integration, multimedia player, GPS and

touchscreen controls, with Fiat hoping to further develop the car into the 'steering wheel free era' with 'on-board intelligence that enables the vehicle to drive itself' (Fiat, 2013).

Fig 2

Road technologies are also being developed along similar lines, such as the 2010 wireless charging systems for electric cars by Delphi Automotive, WiTricity Corp and HaloIPT. For example, HaloIPT's Induction Power Transfer (IPT) uses pads set into the surface of the M25 and other freeway-type roads - an arrangement which recalls the electronic control strips of Motorama and *Design for Dreaming* - supplying the driver with not just power but traffic, news, entertainment and other digital data. 'Your electric car helps you with your journey,' boast the designers. 'It interfaces with your entertainment and plays your favourite playlists on the media player. It reminds you that you have an important meeting tomorrow. It handles your email. It is your assistant while you travel.' (Anon., 2013a,b). In the kind of future world envisaged here by motoring technologists, the driver is almost entirely removed from the physiological business of driving as an activity that has a specific destination in mind or kinaesthetic pleasure as a goal. The driver's senses are instead more attuned to the social connections made possible by this community-oriented vehicle, allowing them to work, rest and play at will. This is what Paul Virilio calls 'accelerated temporality,' the ultimate cognitive mapping, a way of knowing not only where one is physically, geographically, but also informationally, in the context of work, pleasure and social life

(Redhead: 2004, 46). This is the mobile phone to the power of ten, offering increasing mobility of communication *and* transportation.

All of this suggests that car driving is no longer about actually driving, that is in terms of a driver personally controlling the car, and more about allowing the driver to get on with other things. As Virilio puts it, the 'driving by instinct' of pioneer motorists which first gave way to 'driving by instruments' has now been replaced by the 'auto-pilot' (Virilio: 1998, 21). As with the kind of concept vehicles produced by Toyota and other car manufacturers, this is most readily seen in the kinds of near-future visions of what might be around the corner. *Demolition Man* (Marco Brambilla, 1993), for example, set in 2032 'San Angeles,' shows police officer Lenina Huxley making video calls from an automated version of the General Motors Ultralite concept car on the San Angeles freeway, only turning on self-drive when she arrives in the city centre. With the added reassurance of safety features like 'Secure-Foam' crash-activated interior protection and tyres which auto-inflate if punctured, Huxley is able not only to converse with colleagues but voice-activate the radio, access computer files and do other work while on the move. Similarly in *Minority Report* (Steven Spielberg, 2002) a driverless car allows John Anderton, chief of the 'Precrime' police force, to negotiate the vertical, horizontal and banked automated 'Maglev' (magnetic levitation) freeways of 2054 Washington DC while making video calls (Anon., 2004b). Later on, a Lexus 2054 EV concept car created specially for the movie provides a greater freedom of transport, with both Anderton and nemesis Witwer using versions of this advanced electric two-seater to propel

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themselves around the city. Yet another concept car was created for *I, Robot* (Alex Proyas, 2004), this time a spherically-wheeled 2035 Audi RSQ equipped with automated control systems, mainframe computer connection, audio-visual crash warnings and holographic head-up-display system. All of this allows Chicago homicide detective Del Spooner to access computer files, review digital paperwork and even sleep in a jet-fighter style cockpit while being ushered at high speed along an underground freeway (Anon, 2004a).

Here, then, we return to the kinds of fantastical vision first promoted by Futurama, *To New Horizons*, Motorama and *Design for Dreaming* - that is a world of transportation wherein the 'driver' is absolved of the need to actually drive, and instead can give themselves over to the automatic control systems in order to do other things. Indeed, in this kind of automotive world to drive is not the most important thing at all. Instead, the intention is to distribute drivers out of their car interiors and into other worlds, so that they can meet new people, have conversations and establish new relationships, have new thoughts and ideas, and even perhaps - as the concluding shot of *Design of Dreaming* and Toyota's socially-oriented Toyota Personal Mobility vehicle both show - fall in love.

This is not, however, quite the end of the story of the automobile interior, for, despite the positivist technologically-driven modern dream promoted in many of these films, a flip-side is also frequently on display. As *Demolition Man*, *Minority Report* and *I, Robot* all show, whatever the advantages and attractions of automated vehicles with advanced propulsion, safety and communication technologies, and even if these technologies do free drivers to get

on with their work, friendships and love-lives, then drivers will still relish the option of being in control. In *I, Robot*, when robo-psychologist Susan Calvin asks detective Del Spooner what he thinks he is doing when he turns off the automatic controls at high speed along one of the Chicago freeways, Spooner replies simply 'I'm driving'. Ultimately, therefore, it is not an entirely driver-free form of driving which is being extolled, rather a multi-faceted kind of automobile world in which automated driving is one of the options, but not sole alternative, on offer. One might conclude, then, that, whatever the technological possibilities of doing otherwise, people seem to still wish to actively (physically and mentally) engage with the architecture and cities around them.