

FUTURE CYCLES – AN EXPLORATION OF HUMAN POWERED VEHICLES AS A CHALLENGE
TO AMERICAN AUTOMOTIVE MONOCULTURE

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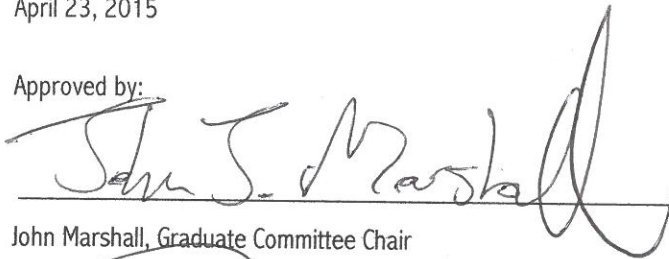
Bachelor of Fine Arts, Rochester Institute of Technology, 1993

Thesis Submitted in Partial Fulfillment of the Requirements of the Degree of Master of Fine Arts

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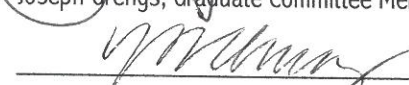
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ABSTRACT

Over the past 100 years America has developed a transportation monoculture. The United States Department of Transportation Bureau of Statistics claims that 86% of all trips made in the US are in an automobile. In the face of global energy decline, issues of climate change, the global financial crisis, and declining health, automotive dominance needs to be questioned, reconsidered, and challenged.

In this paper I describe my exploration of human powered vehicles as a challenge to automotive monoculture. I explore some of the major factors that contributed to the rise of the automobile in the United States. I introduce examples of artists, designers, and activist groups that seek to critique or replace the dominant culture of the automobile. I introduce the *Future Cycles* project and show how I use vehicles, photography, video, and exhibition to demonstrate alternative possibilities for mobility. I then discuss how these various issues intersect in my work and explore what lessons I have learned from them

KEYWORDS

Automotive Monoculture, Future of Transportation, Human Power, Enclosed Bicycle , Futurama, Diegetic prototype, Transportation Design, Transportation Policy, Highway Infrastructure, Transportation Sustainability

ACKNOWLEDGEMENTS

Thanks to the Penny Stamps School of Art and Design for the opportunity to investigate this body of work over the past three years. It has been an amazing period of exploration and discovery for me. Thank you for your support.

With special thanks to my thesis committee

John Marshall – Chair, Art and Design

Bruce Tharp – Art & Design

Joe Grengs – Urban Planning

Robert Fishman – Architecture

for your wisdom, insight, guidance, structure, and long enduring patience

Finally, I thank my wife Rachael for her support and patience during my time at U of M and her willingness to be a participant in this project.

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INTRODUCTION

Bicycles have been a huge part of my life. When I was young I lived in suburban Detroit and the bicycle got me back and forth to school almost every day until I was 16. While in middle school I worked for two summers as a bicycle mechanic with a friend to repair and sell used bicycles out of his garage. When I was in high school I began to participate in long distance touring and by the time I was 23 I had completed a full crossing of the U.S. as well as many other trips. In my early 20's I competed in 24-hour endurance racing with a personal best of 313 miles. I know the power and joy of the bicycle and I have a firm belief that with an investment of time and effort the bicycle can take you just about anywhere.

The work that I am about to share began with a simple question: *How can I make bicycle commuting possible year round in places with harsh winters like Michigan?* My interest in exploring that issue had to do with the economic, environmental, and health benefits that might be achieved if cars could be replaced with bicycles. Through the process of exploring that issue I began to look more critically at the transportation system that we have. *Where did car culture come from?* We live in a built environment completely designed for and dominated by the automobile. 120 years ago there were fewer than 300 cars in the US; travel was accomplished by walking, horse and buggy, bicycle, streetcar, train, or steamboat. That diversity of travel has been eliminated over time and replaced by the automobile. Today 86% of all trips in the US are done in a car. Currently there are over 250 million vehicles registered in the US, which consume 168 billion gallons of gas each year (D.O.T. 2012). This is not a sustainable transportation solution and raises further questions: *If it is not sustainable, what could replace it? Could I create sensible alternatives? And if so how do you get car culture to consider such alternatives?*

These are the questions that the *Future Cycles* project explores. I believe that the American transportation infrastructure will far outlive the gasoline-powered vehicles that we currently use. My goal was to explore possible alternatives that could replace the automobile and still provide the kind of autonomous travel that our infrastructure requires. With the project I focused on vehicles that combine the weather protection and carrying capacity of a car with the efficiency of a bike. My goal was to create a car-like experience in a vehicle that is human-powered and legally defined as a bicycle. Through the design, fabrication, and demonstration of these vehicles I hope to challenge the American public to consider the use of human energy and the resource of time as alternatives to fossil fuels.

THE DEVELOPMENT OF AUTOMOTIVE MONOCULTURE

The first key component in understanding the context for the *Future Cycles* project is to understand how automotive monoculture developed. In the following section I describe the beginnings of the auto culture, how it proliferated, how the vision of auto dominance was created, how that vision was funded, and how the American public accepted the vision. I finish by giving some facts about the infrastructure that has been created over the past 100 years – the century of the automobile.

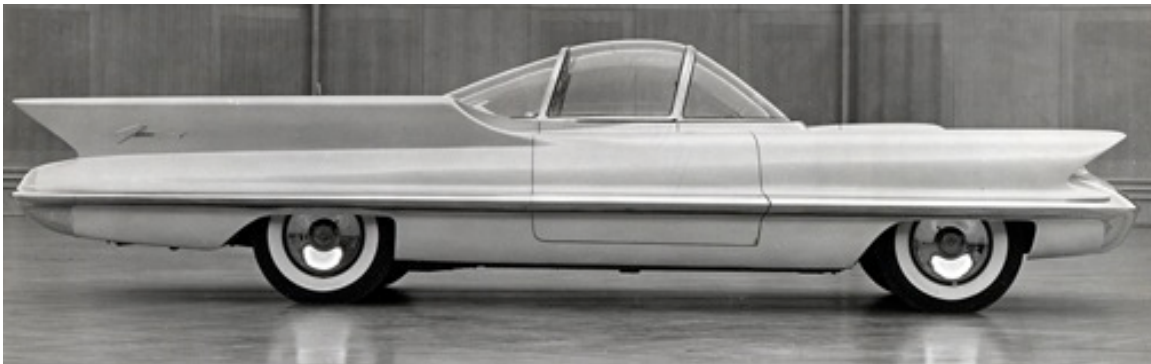


Figure 1. The 1955 Lincoln Futura concept car.

THE SEEDS OF AUTOMOTIVE MONOCULTURE – HENRY FORD

It is important to remember that Henry Ford did not invent the automobile. Experiments with self-powered vehicles had been going on for years. He was simply the one person that was able to make the intellectual shift from focusing on the car as an elite status object for the wealthy, to a vehicle that would benefit the average person. When Henry Ford started Ford Motor Company he set out to design and build the most reliable and well-designed automobile that his mechanical mind could conceive. Starting with model “A” he worked his way through the alphabet building, testing, replacing, and redesigning until he reached his 19th version in 1908, the Model T. He had created his “perfect” car.



Figure 2. Photograph of Henry Ford with an early Model T.

The Model T was more reliable, tougher, and less expensive than anything else available at the time. Realizing that he had created something extraordinary, one morning in 1909 Henry Ford made this declaration to his employees:

“I will build a car for the great multitude. It will be large enough for the family, but small enough for the individual to run and care for. It will be constructed of the best materials, by the best men to be hired, after the simplest designs that modern engineering can devise. But it will be so low in price that no man making a good salary will be unable to own one – and enjoy with his family the blessing of hours of pleasure in God's great open spaces.” (Ford 1922 p73)

His statement of 1909 became the doctrine of automotive monoculture and it has remained the doctrine of our age. Through mass production and a high wage to the unskilled worker Ford had not only invented a better way to build and sell cars, but much more importantly he had unintentionally invented the consumer society.



Figure 3. The 15 millionth Model T rolls of the assembly line in 1927.

The Model T went on to be the only car the company would produce for the next 18 years and over 15 million were made. Through mass production Henry Ford had found a way to plant an idea and capture the acceptance of the public for an object that would grow to change the face of the planet.

THE GROWTH OF AUTOMOTIVE MONOCULTURE – ORGANIC PROLIFERATION

It is important to understand that cars were initially purchased for leisure activity – an adventure item to get out of the city and explore the countryside. The automobile was not needed in the city because in most cities there was already a transportation system of streetcars and buggies that accommodated travel. However, people still wanted cars with the promise of adventure and freedom.

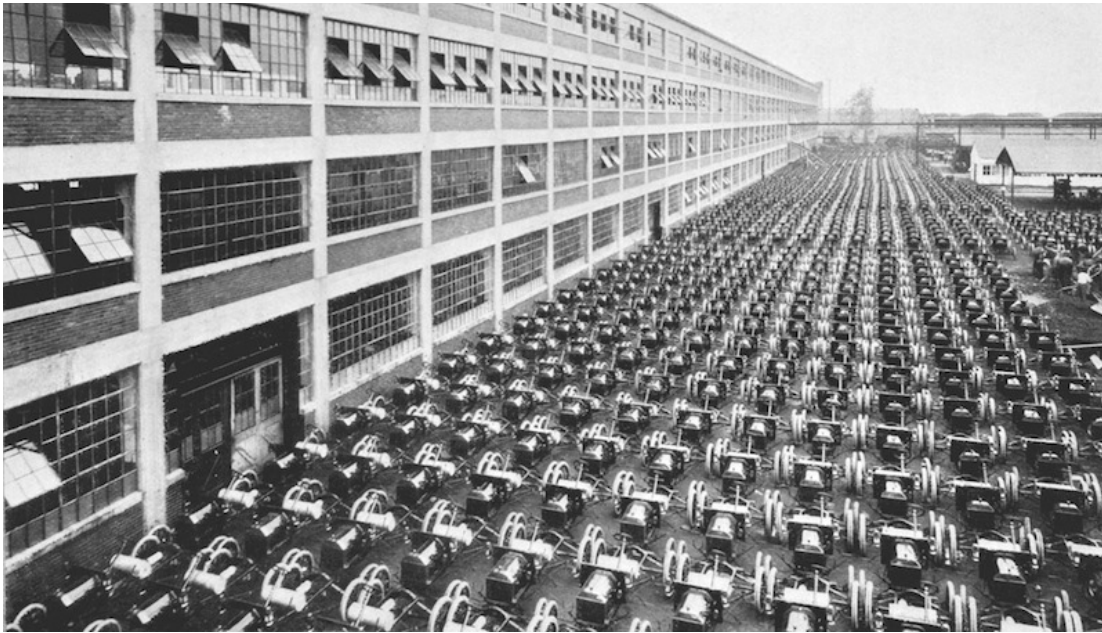


Figure 4. Model T chassis outside of Highland Park Factory in 1913.

This demand for the car and the way that the auto system spread was unique in comparison to other systems of infrastructure. In most other transportation systems the infrastructure comes first (think trains or street cars) and then the vehicles are placed on it. In this case it is the other way around. The auto manufacturers began to sell thousands and then millions of automobiles to the American people with the assumption that the cities and counties would deal with the road improvement issue. The automobile became a “force” for change that despite what any city planner or politician was thinking at the time had to be addressed. The success of the auto system came in large part by how it was financed – it was not necessary to vote, raise taxes, or acquire land – instead the individual auto owner financed the system one vehicle at a time. That organic, collective, democratic action resulted in the proliferation of this new transportation system and resulted in a powerful compulsion for the government to act. As each car was placed on the roads, the voice became louder and louder that what the American people wanted was cars. One purchase at a time, the future of the American landscape was changing. (Fishman 2015)

THE VISION OF AUTOMOTIVE MONOCULTURE – FUTURAMA

With the proliferation of cars there was a growing public sense that a new future needed to be envisioned based on the automobile. Between 1939-1940 visitors to the New York World's Fair had an opportunity to get a glimpse of that future. Inside of the General Motors "Highways and Horizons" Pavilion was an exhibition called "Futurama" conceived of and designed by Norman Bel Geddes for GM. The exhibit consisted of a sixteen minute motorized tour of the largest animated model ever built, showing the cities and the countryside in the future "World of Tomorrow"- America 1960. Covering almost four-fifths of an acre the model (Figure 5) comprised more than half a million individually designed buildings, one million trees, and more than 50,000 automobiles (including 10,000 that moved). The model portrays realistic modern cities with large thoroughfares and rural areas with modern highways, dams, and bridges. (Albrect 2012)

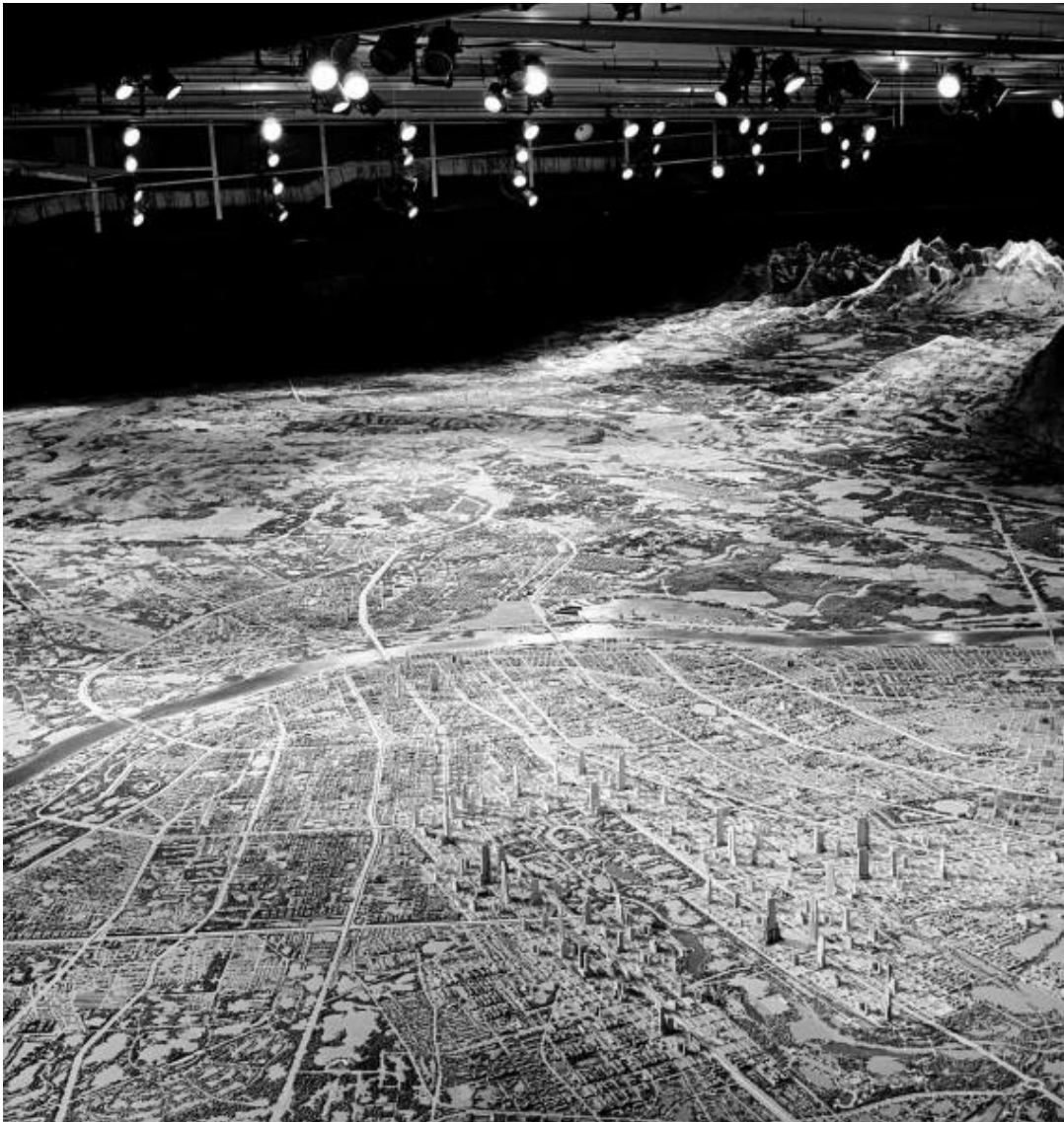


Figure 5. Photograph of the vast Futurama model 1939.

Visitors sat in upholstered two-person capsules that moved along a track through the giant model (Figure 6). Inside each capsule was a sound system with narration synchronized to explain to the visitor what they were seeing. What they saw was a highly ordered system that was based entirely around the automobile.

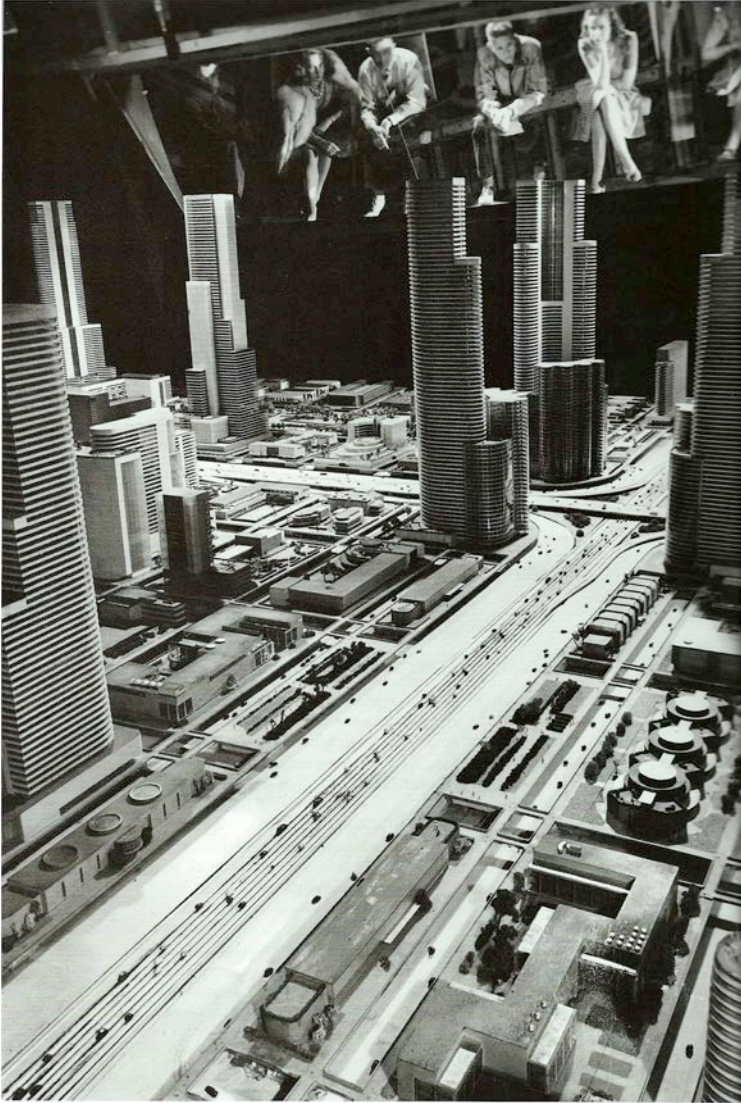


Figure 6. A view of the Futurama model and moving passenger capsules.

Norman Bel Geddes explains in his book *Magic Motorways*,

“Futurama is a large-scale model representing almost every type of terrain in America and illustrating how a motorway system may be laid down over the entire country – across mountains, over rivers and lakes, through cities and past towns – never deviating from a direct course and always adhering to the four basic principles of highway design: safety, comfort, speed, and economy.” (Bel Geddes 1940 p4)

At the end of the tour the visitor was dropped off in a full size version of part of the model they had seen before and a button was given to each one that says, “I have seen the Future.” In total five million people visited the Futurama ride and the other exhibits inside the General Motors pavilion. The impact of the exhibit was tremendous. President Franklin Roosevelt visited Futurama and after viewing asked Geddes to advise the country on a comprehensive cross-country auto transportation network. The Federal Aid Highway Act of 1944 and 1956 that followed called for a national system of interstate highways that closely resembled in concept the network Geddes envisioned. (Albrect 2012) From there the government essentially built a national infrastructure for a product without any cost to the manufacturers. This led to massive profits by the auto industry and made Detroit the wealthiest city in the United States by 1950. (Skorup 2012)

FUTURAMA FILM

In addition to the Futurama pavilion General Motors produced an accompanying 23-minute film called *To New Horizons* that documents Futurama and explains in detail the merits of the “World of Tomorrow”. The film starts in black and white and chronologically brings the viewer forward in time from the beginnings of America to remind them of the American spirit of exploration, innovation, and technical prowess. The film demonstrates how things have always improved thanks to technology and the use of the land. The emergence of the automobile and road expansion is framed within this context of positive growth and improvement.



Figure 7. Film still from *To New Horizons*.

At the 8 minute mark the film suddenly jumps to color and you are inside the Futurama (Figure 7). As the camera pans across the open spaces of lakes and forest and then the dense cities the narrator softly and relentlessly explains that; “*New ways of living and new thinking have laid the foundations for most of what is good in life today - with the promise of more tomorrow.*” And “*Thus the highways of social and commercial developments are widening without end or limit - except the imagination and vision of men who do new things.*” (*To New Horizons* 1939)

There is a certain arrogance and entitled destiny in statements like; “*A world that is far from being finished and is hardly yet begun - A world with a future in which all of us are tremendously interested, because that is where we are going to spend the rest of our lives... A future that can be whatever we propose to make it.*” (*To New Horizons* 1939)

Along side the spoken propaganda the film visually activates the model in the real world. Using close up shots of the model it makes it seem like the viewer is really there. The film contextualizes what the viewer is seeing in a way that impresses upon them the need, logic, and potential reality of such a system. It is hard to imagine how anyone could have resisted this new world. It was so attractive and seemed so inevitable. With the huge economic force of the auto industry and the federal investment in the plan to make the automobile the nationwide transportation choice, any individual left teetering on the edge of acceptance just needed a little push from Futurama and they were in too.

THE FUNDING OF AUTOMOTIVE MONOCULTURE – FEDERAL AID HIGHWAY ACTS

Before the introduction of the automobile streets and roads were built and funded by cities and counties for use by local people. Long distance travel was mostly done by rail or waterway. With the introduction of the car those norms began to shift and so did the pressure on rural roads to support the automobile. Rural roads were a terrible place for the car and so this was where the federal government first began to get involved with road building. There were several issues that drove the desire for the government to improve rural roads for use with cars. The first was “To get the farmer out of the mud” and to create farm to market routes, second the federal government’s commitment to rural mail delivery, and third the concern for national defense and the ability to move troops rapidly across the country. (Weigroff 1996a)



Figure 8. Model T on a rural muddy road.

In July 1916 Woodrow Wilson signed the first Federal Aid Road Act into law. The act gave the new federal bureau of public roads \$75 million to distribute over five years and allowed for the federal government to pay half of the states’ costs for road improvements (Lewis 2013). At first the funds were used to pave and improve existing roads of primary travel, those routes into and between cities. Then the priority of paving the cross-country routes like the Lincoln Highway to connect coast to coast. By the late 1930’s the government had plans to build an interstate system, but those plans were delayed first by war and then the disagreements on how to pay for it. In 1956 the funding was solved through a federal gas tax and the 1956 National Interstate and Defense Highways Act was passed by congress. This act represents the largest public works project ever undertaken by the US government. \$25 billion dollars was pledged to build 41,000 miles of interstate over a 10-year period. With this act everything slides into place for automobiles to dominate the American infrastructure. The history of the Federal Aid programs is listed below: (Weigroff 1996b)

Federal Aid Road Act of 1916	\$75 million over 5 years	Fed/State %	50/50
Federal Aid Highway Act of 1921	\$75 million each year	Fed/State %	50/50
Federal Aid Highway Act of 1930	\$125 million each year	Fed/State %	50/50
Federal Aid Highway Act of 1944	\$450 million total	Fed/State %	50/50
Federal Aid Highway Act of 1952	\$25 million total	Fed/State %	50/50
National Interstate and Defense Highways Act of 1956	\$25 billion total	Fed/State %	90/10

THE CERTAINTY OF AUTOMOTIVE MONOCULTURE – MAGIC HIGHWAY USA

In May of 1958, just two years after the massive funding in 1956 of the Interstate Highway System, Walt Disney's *Wonderful World of Tomorrow* broadcast "*Magic Highway USA*," a one-hour program highlighting the positive developments of the highway system. The film opens with Walt Disney running a little toy car along what appears to be a section of the Futurama model (Figure 9). He says, "Keeping on the move is an All-American custom... The most important symbol in the progress of our nation is the highway." (*Magic Highway U.S.A.* 1958)



Figure 9. Film still from *Magic Highway USA*. Walt Disney runs a model car on a highway.

The program then unfolds by showing how the transportation system evolved in the nation and how bad it was both before the car and with the current problems of congestion. An expert highway engineer then appears to explain the logic and merits of the highway system and gives some examples of how everyone benefits from the roads. The program then shows how the process of locating land and clearing the space for the highway takes place. In remarkable disregard for environmental concerns the film explains how huge trees, forests, and mountaintops are flattened for the highway system. Phrases like, "Giant razors have shaved a path through the wilderness!" are somehow cheerfully delivered. (*Magic Highway U.S.A.* 1958)



Figure 10. Film still from *Magic Highway USA*. A path is cleared through the city.

The same disregard holds true for the displacement of people and buildings in the path of the highway. As the viewer gazes down a corridor of urban subtraction the narrator frankly says, "In cities old houses and buildings are literally chewed to bits...as the dust clears you can see a right of way through the city (Figure 10)." This portion of the film finishes by showing the powerful machinery that is used to flatten, grade, roll, and pave the highway roads.

With 9 minutes left the film completely shifts style and tone with an animated segment that resembles the Futurama *To New Horizons* film in many ways. This segment offers; "A realistic look at the road ahead and what tomorrow's motorist can expect in the years to come." Once again it praises the many positive attributes of the system and expands on the level of fantasy to include illuminated roadways, heated pavement, radar windshields, airborne emergency units, atomic tunneling machines, self-driving cars, and cantilevered skyways (Figure 11).



Figure 11. Film still from *Magic Highway USA*. Showing "a realistic look at the road ahead."

The segment includes some technologies that have since been realized like GPS mapping, the rear view camera, and self-driving cars. But the film also includes many foreboding true statements like: "The shape of our cities will change as expanded highway transportation decentralizes our population centers into vast urban areas." We will later learn that decentralization is one of the most unfortunate true consequences of the highway system.

The film closes with grand images and statements that suggest a universal worldwide system, “*These giant arteries will link together all nations (Figure 12) and help create a better understanding among the peoples of the world. The highways will be our magic carpet to new hopes, new dreams, and a better way of life for the future.*” (*Magic Highway U.S.A.* 1958)



Figure 12. Film still from *Magic Highway USA*.

The film comes 19 years after Futurama and just 2 years after the signing of the \$25 Billion Federal Aid Highway Act. I believe that Magic Highway is symbolic of the point of no return for a totalitarian system of automobile transportation. The film shows an unwavering dedication to the highway by exhibiting complete disregard for the environmental and social losses that are incurred through its building. The film ignores the casualties of diversity in transportation (loss of rail particularly) and overlooks other options that may have been possible. It captures the idealism and naivety of a nation of people, corporations, and government that seem to universally agree on a plan of action. This is the point of certainty for which the American people will operate from for the next 50+ years. It is the place I fear that we still operate from today.

THE RESULT OF AUTOMOTIVE MONOCULTURE – CONSUMING INFRASTRUCTURE

Henry Ford planted the seed, car ownership made it grow, Futurama gave us a vision, the government funded it, and Walt Disney made it seem like it was always meant to be. Just 100 years after the invention of the moving assembly line, we live in “the future” that the people, planners, and politicians of this country worked so hard to give us. We got the Futurama vision of mobility that we wanted and it is now policy and law. Here are some facts about the automotive infrastructure that Americans have created according to the United States Department of Transportation Bureau of Statistics for year 2012: (D.O.T. 2012)

- 2.6 million miles of paved roads
- 254 million registered vehicles
- 7.2 million new passenger cars sold each year
- 4.8 trillion miles traveled with all registered vehicles each year
- 168 billion gallons of gas consumed each year
- 11,750 miles traveled per passenger vehicle each year (average)
- 86% of people get to work in a car
- 0.6% of people get to work on a bicycle
- 12,271 deaths in passenger auto each year
- 726 deaths on bicycle each year
- \$3.1 Trillion -- Estimated value of our public highways and streets is
- \$1.3 Trillion -- Estimated value of the vehicles we drive is



Figure 13. Los Angeles highway traffic

The investment in this transportation solution is massive and the infrastructure will be here for a very long time. The questions we never asked in 1939 are: How long can we support this system? If the system is disrupted how would we shift to something else? Are we getting a good return on our investment of time, energy, and resources? Does the system positively or negatively impact our society? These are all questions that the Future Cycles project attempts to explore through challenging the past solution and proposing a new alternative.

FOUR CHALLENGES TO AUTOMOTIVE MONOCULTURE

The second key component in understanding the context for the Future Cycles is knowing what has been done by other artists, designers, or activists who have created work that challenges automobile culture. In the following section I present four case studies. In each case study I describe the project, investigate the artist's intent, and explore the means through which each project gets the message across. These examples will be used later to position and locate my work along the spectrum of messages and interpretations.



Figure 14. Hannes Langeder's Ferdinand GT3 RS.

HANNES LANGEDER -- FERDINAND GT3 RS – A CHALLENGE THROUGH SATIRE

In May 2010 Austrian artist Hannes Langeder released to the public his *Ferdinand GT3 RS*, which has come to be referred to as the *Pedal Powered Porsche*. The shape of the vehicle is a representation of a Porsche 911 and is built using cardboard and PVC tube with a packing tape and aluminum foil skin (Figure 15). Underneath the exterior body is a twin seat, pedal powered chassis constructed of a steel frame with standard bicycle parts. The work was disseminated to the public through design blogs on the web where a very short description was accompanied by a series of photographs that depict it in what we would think of as a typical sports car context (Langeder 2010).



Figure 15. The artist Hannes Langeder in costume with the “Pedal Powered Porsche.”

Also accompanying the photographs was a YouTube video entitled *Ferdinand GT3 RS – The World’s Slowest Porsche*. (Han-Lan 2010). In the video the artist, dressed as a sports broadcaster, stands on a racetrack with the car in the background speaking about the many features (Figure 16). He presents with all seriousness a technology that leaves out “all unnecessary components” and “reduces emissions to a low level, breaking records.” Then the artist gets in the vehicle and begins to ride slowly around the track in almost total silence – we hear birds chirping in the background. The slowness of its travel is emphasized by long shots that show the car crawling along in the vast space of the track. In the last seconds before he crosses the finish line a supercar comes up from behind, flies past him, and the video ends. I believe that the video is the most important part of the work in that it activates the object in real time and space and helps the viewer to fully understand what is being presented.



Figure 16. Video still from “World’s slowest Porsche” YouTube video.

It is difficult to know exactly what Langeder was intending with this work because the artist himself never explains his motivation either in the press or on the web site. Langeder offers only an essay written by a professor from the Art University of Linz, Austria.

Dr. Sergius Kodera writes of the *Pedal Powered Porsche*, “The bicycle Porsche immediately raises the question, what was actually the function of the original, the real, ostentatiously powerful, roaring motor vehicle?... Even the 400 HP powerhouse has no other function than to represent wealth, power or potency.” (Langeder 2010)

Through web distribution Langeder has demonstrated a powerful ability to reach a large audience with this project. As of March 2015 there were a total of 3.4 million views of this one video. The vehicle is clearly spectacle and clearly absurd, but is that absurd nature causing people to question or reflect on the values that surround vehicles?

I looked at the YouTube comments on the video to get an idea. Of the over 2400 comments there seems to be three main types of reactions. The first type is naively practical, suggesting improvements to the car that would make it perform better. The second type is short and snarky and attempts getting an easy laugh. The third type exhibits hostility toward the idea. One person writes, “Great this is all we need. It’s bad enough we have bicycle riders on the road, who think they have just as much right to be there as cars. At least you can blast past them, but this takes up the whole road! Wonder how it performs in a crash test” (Han-Lan 2010). All of these comments dismiss the vehicle as either failed engineering, farce, or nuisance and all of them fall short of the more complex dialog the artwork can evoke.

It may be a lot to ask for deep reflection to happen in the YouTube comment section, however my concern is that the project may be too easily dismissed. The *Pedal Powered Porsche* does communicate clearly that it questions the values of the supercar. It uses the intentionally inappropriate materials of tape and tin foil to pull back the curtain to reveal and represent the supercar’s smoke and mirrors. But what the project does not communicate is what should replace it. It does not point toward a potential solution. Through its farcical nature the *Pedal Powered Porsche* undermines the actual supercar quite well, but it also undermines pedal power itself.

ERWIN WURM - FAT CAR SERIES - A CHALLENGE THROUGH PARADOX

In 2001 Austrian artist Erwin Wurm began a series of sculptures called *Fat Cars*. The cars were created by taking actual vehicles and adding mass to the exterior with polyurethane foam, fiberglass, and a shiny automotive finish. The car shown below was completed in 2005 and is the second in the series (Figure 17). Entitled *Convertible Fat Car* it was built on a real Porsche 911 Carrera Cabriolet.



Figure 17. Erwin Wurms “Convertible Fat Car,” 2005

"It's all about appearances again, about the fetishism with slimness, about how rich people are generally slim and the lower classes are getting fatter and fatter," said Wurm (Pitman 2006). "By taking on the question of obesity, Wurm probes the link between power, wealth and body weight. He also wants to offer a sharp criticism of our current value system, as the advertising world demands us to stay thin, but to consume more and more" (Hufkens 2005).

"The coming-together of appropriation and obesity generates a fertile metaphor: ambition (the desire for power, the urge to accumulate goods but also knowledge or prestige) borders on the ridiculous excess of stoutness, without it being possible to say clearly when and where this aspiration, even justified, declined into stupid excess fat" (Wurm 2012 p95).

I find this work to be incredibly effective in its formal qualities and message. Since the 1920's the articulation of beautiful line and shape in the automobile has been the essence of what a car is. To tamper with that sacred value is in itself powerful. The message is even more effective for an American audience because of our relationship with the auto as a status symbol and extension of the self. To witness that image as so ugly, so out of control, is a powerful testimony to the ugliness of extreme wealth and misallocated resources. For me this message is much clearer than *Pedal Powered Porsche* – by taking an actual super car and letting it gain so much weight that it can no longer move is a metaphor for the way that excess obstructs potency. *Fat Car* gets its message across through paradox – it is self-contradictory, it contains its own opposite. The vehicle has all the aesthetics of the ideal sports car – red, shiny, polished – and at the same time it represents a complete failure of aesthetic form. It is the sports car gone flabby and represents the end result of uninhibited luxury and success. In relation to the *Future Cycles* project, *Fat Car* represents 100 years of Henry Ford's unintended consequence and is the ugly destination for total automobile dominance.

LET'S BIKE IT – A CHALLENGE THROUGH ACTIVISM

In October 2014 a group of Latvian cyclists part of the Let's Bike It community staged a creative protest during the European Week of Sustainable Mobility (Figure 18). The group showed that cars with single occupants take up more space than necessary. The riders went onto the streets of Riga with handmade representations of the boundaries of a car, which sat on the shoulders of each bike rider. Brightly colored rods were lashed together to create the skeleton of an automobile. The framework expanded the size of the individual cyclist and was representative of the difference in scale between driver and bike rider (Bike It 2014). Dissemination was limited to the single event and several design blogs that circulated the story.



Figure 18. Bike It protest in October 2014. Riga, Latvia.

I find this event inspiring and effective. The project is about rights – rights to safety, rights to equality, and rights to public space. Bicyclists want to be treated as equals, not as second-class citizens. That message is sent in a very powerful way. The group could have purchased a billboard, made a film, hired a lobbyist, etc. Instead, by using a bounding box to define the spatial dimensions of an automobile, they reinforce the fact that the protest is about the right to space. The act also reminds car drivers of the vulnerability that bicycles experience. The riders strap on onerous cages and ride through the rain in a protest that operates along the same lines as a sit in – using the body in an activity that requires endurance or hardship. The drivers that are delayed by the procession will probably be annoyed, but hopefully will question their own choices inside of their comfortable steel boxes. The project is a demonstration of the antithesis of speed and power that shows these riders are slow and vulnerable. There is also a parallel interpretation of this work that points out the inefficiencies of automobiles - the ridiculous amount of energy, resources, and space that cars consume as compared to bicycles. Assuming many of the drivers that saw the procession were the only person inside their car further emphasizes the point.

On both levels the protest serves to make visible what was otherwise invisible – that the bicycle has equal rights to the resource of space and that the car squanders that resource along with that of the resource of energy and materials.

ORGANIC TRANSIT – THE ELF – A CHALLENGE THROUGH PRODUCTION

Organic Transit is a small company located in Durham, North Carolina. The company was started by Rob Cotter who formerly spent time working for Porsche, Audi, and BMW in the racecar segment. He left after a few years to pursue his interest in human-powered vehicles, joining the leadership of the International Human Powered Vehicle Association, and organizing the American Solar Cup in 1988, the first solar car race in the U.S. (Maximov 2013).



Figure 19. Organic Transit's ELF

In December 2012 Organic Transit completed a successful Kickstarter campaign to begin production of their first human powered commuter vehicle, the *ELF* (Figure 19). The campaign raised \$225,789 selling 51 units -- more than doubling their sales goal. Within a year they had sold over 300 *ELFs* and two years later they had distributors in Portland, Oregon and in Europe, with plans to boost production to 1,200 in their third year (Wysocky 2014). The *ELF* is a single seat recumbent bicycle with an aluminum frame, 3 speed internally geared hub, 750 watt electric assist motor, and a 100 watt solar panel on the roof for recharging the battery. It weighs a total of 160lbs. It has a 20 MPH top speed, a 15 mile battery range, and recharges with full sun in 7 hours. It meets the federal legal definition of a bicycle and so in most states does not need a license, insurance, or registration (Organic Transit 2015).

When asked about his motivation Cotter explains that his primary aim in starting Organic Transit (Figure 20) is environmental. "I feel I have an obligation to do the cleanest things I can possibly do," he says. "The most environmentally damaging thing each of us does every day is get in our car and drive," says Cotter. "And 40 percent of trips are under 2 miles. What the hell are we doing? And I'm an American too, I'm guilty of all those things. But there's not a lot of options." When considering how to address that issue Cotter says, "We saw the space available between the bicycle and the car... It's a great big hole in there" (Maximov 2013).



Figure 20. Organic Transit team in Durham, NC. Rob Cotter appears in the brown jacket front center.

The Organic Transit *ELF* is essentially a bicycle with some of the added functionality of a car. It replaces the extreme capacity of a standard automobile with a vehicle that can deal with a large percentage of the daily need of transportation at a small fraction of the energy cost. It also becomes an excellent way to dissipate ecological guilt through the investment of time and human effort as a means of transport. It is a signifier of “green” lifestyle and becomes a status symbol in certain ideological communities. It is marketed to bicyclists or borderline bicyclists as an extension of the capabilities of the bicycle.

There is nothing conceptually brilliant about the *ELF*; it is just one possible solution to the growing need for highly efficient transportation. But the fact that it is real, functional, and in production has a power that other challenges to auto monoculture do not. There is nothing more challenging than the production of an alternative that really could replace the car. The *ELF* is therefore essentially the exact opposite of the *Pedal Powered Porsche* – the *Porsche* satirizes the automobile and highlights the futility of pedal power. Instead the *ELF* ignores the automobile and highlights the sensibility of pedal power, demonstrating that it can work for lots of people. The *Pedal Powered Porsche* shows the public what we can’t do, the *ELF* shows what we can.

DEMONSTRATING POSSIBILITY

The third key component in understanding the context for *Future Cycles* is to understand the primary means by which the challenge is delivered. In the previous section I gave four examples of how other artists, designers, and activists have delivered their challenge to automotive monoculture through satire, paradox, activism, and production. When considering the primary means for delivering *Future Cycles*' challenge, I believe the most accurate way to describe it is through demonstration. In this section I will describe "Diegetic Prototyping" and "Design Fiction" as means to "demonstrate possibility" with the intention to impact and shift public sentiment.



Figure 21. Film still from 1950 film *Destination Moon*.

DIEGETIC PROTOTYPING

The term “Diegetic Prototyping” was coined by David Kirby in an article called “Future is Now - Diegetic Prototypes and the Role of Popular Films in Generating Real-world Technological Development.” In the paper Kirby points out that films, “*construct cinematic representations of technological possibilities as a means by which to overcome obstacles and stimulate a desire in audiences to see potential technologies become realities*” (Kirby 2009). He introduces the term “diegetic prototype” “*to account for the ways in which cinematic depictions of future technologies demonstrate to large public audiences a technology’s need, viability and benevolence*” (Kirby 2009). To put it in more plain language the article looks at the way that film can be used to create acceptance in the public for objects or ideas that would otherwise be foreign or rejected. Kirby uses this example to illustrate what he means:

“On 19 September 1981 audiences witnessed the first successful implantation of a permanent artificial heart. The patient, a 20-year-old woman, did not experience any physical complications after the surgery. As she walked out of the hospital the doctor told her that he had given her ‘a heart as good as any God ever made’. We will never know how long this woman lived with her new heart because this transplant took place within the fictional film Threshold, not in the real world.” (Kirby 2009)

In that same month, LIFE magazine broadcast the arrival of the artificial heart – even though it had not yet been installed in any real person (Figure 22).



Figure 22. The cover of LIFE Magazine September 1981

The first actual recipient of a permanent artificial heart was 61-year-old Barney Clark (Altman 1982). He got that heart on Dec 2 1982 – over a year after the film was released. The film was created at a time in which the technology for the permanent artificial heart was reaching the point that it could be viable in humans. But there was resistance from doctors, health policy makers, and the general public with concerns of the ethics of such an apparatus. Those who were promoting the artificial heart needed a tool with which to change these perceptions. Filmmakers and scientists worked together to create this film that begins by challenging the old method of heart transplant and then provides a compelling reason why an alternative should be adopted.

In order to make a compelling argument the technique requires three things to be established: the need, viability, and benevolence of the object or situation (Kirby 2009). Looking at the *Threshold* film you can see that it does this quite successfully by demonstrating these three things about the artificial heart:

- It is necessary – former methods of human heart transplant are inhuman and unreliable
- It is viable – it is successfully transplanted in a young woman
- It is benevolent – it leads to quality of life without altering the patient

This technique is used in many other films as well. In science fiction films about space, attractive speculations about the future can be used to motivate actions in the real world. A great example is the 1950 film *Destination Moon* - which works hard to be scientifically accurate (at least for 1950) in order to give understanding to space travel and help raise public support for an eventual trip to the moon (Figure 23).



Figure 23. Still from 1950 film *Destination Moon*

The term diegetic comes from the root Greek word diegesis: a narrative or plot. Today the word is mostly used in relation to film or theater - a diegetic element is an element that belongs to the world on stage or in front of the camera. It is the people, the things, the events – everything that is of that world. Non-diegetic elements therefore come from outside that world - on screen text, the score, and narrative voice over. The point of Kirby's argument is to contextualize the prop inside of a narrative that activates its possibility as a viable object in that world.

With a close reading of Kirby's text I believe that to get the result of public acceptance for a diegetic prototype it takes three steps. First the prototype needs what Kirby calls, "technical sincerity" or "self consistency." The object needs to have an actual taxonomy of use so that as the object is used in the diegesis it appears to have an embedded knowledge or history. In the movie *Threshold* this was fairly easy to accomplish because the artificial heart was already an actual object with a high degree of scientific knowledge and procedure surrounding its use. In *Destination Moon* the events depicted were speculative and so it was up to the scientists and filmmakers that were driving the production of the film to be sure that what was depicted represented the most plausible way (at the time) to go to the moon (Crowther 1950).



Figure 24. Still from 1981 film *Threshold*

The second step is to embed the prototype within the narrative, which we have discussed. It is through the narrative that the object transforms from prop to "performative artifact" and is contextualized by showing its necessity, viability, and benevolence.

The third step happens as a result of the success of the first two. If believability is achieved and the object is contextualized within the narrative then the public may be ready to accept it – to adapt it into the world of the known. You have achieved "pre product placement" as Kirby defines it (Kirby 2009). The power of film! The desire for the artificial heart, the desire to go to space, and the desire for the highway system were spread through the portable, repeatable, and consistent delivery system of film.

Kirby's paper is focused on the diegetic prototype as used in film. I propose that we also consider that diegetic prototypes can demonstrate potential technologies directly to the public in the real world. Futurama (see page 6) provides a great example of this because Futurama operated as a diegetic prototype to promote a system of automobile monoculture. It showed the necessity, viability, and benevolence of the system in such a way that the public could identify – yes that is what we want!



Figure 25. Detail of highway interchange from Futurama model 1939

Nothing like what is shown in this photo (Figure 25) existed in 1939, yet in just a few years our country began its largest construction project in history – the nationwide interstate system – that would make objects like this commonplace. That kind of public acceptance is not generated by a good speech or editorial column. It takes a powerful concrete vision that can be experienced and understood by many people to move an entire nation's collective desire. Diegetic prototyping and design fiction (which I describe on the following page) are very useful tools for promoting massive change.

DESIGN FICTION

Design Fiction is related to Diegetic Prototyping and represents its “real world” counterpart. However, design fiction doesn't tell stories -- instead, it utilizes prototypes that imply a changed world (Sterling 2013a). Science fiction writer Bruce Sterling has become the de facto spokesperson for Design Fiction. In his 2013 article on Wired.com he claims that, "Design fiction is the deliberate use of diegetic prototypes to suspend disbelief about change." In essence design fictions are creative acts or real objects that put the viewer into an alternative conceptual place where they can experience ways that life could be different (Sterling 2013a). Revital Cohen's *Artificial Biological Clock* (Figure 26) is a great example of design fiction. Looking as if it is a high tech medical device, its function is purely fictional and comments on how technology may influence biological processes.



Figure 26. Revital Cohen: *Artificial Biological Clock*, 2008

As seen in Cohen's work, design fiction is a form of design that explores speculation and fantasy. It acts as a disruption to the familiar. It destabilizes the known and allows new propositions to be considered (Sterling 2013b). Design fiction can be shared and activated much like the diegetic prototypes in David Kirby's writing. To that point Bruce Sterling states, "Nowadays, a small creative team of design-school students can put together a pretty good internet video about a speculative project. If it's clever, catches the public eye, and provokes some social-media virality, a design fiction can do useful things" (Sterling 2013a). As Sterling points out this type of distribution and impact is available to anyone who understands the principles behind design fiction. In a way this access democratizes the power and message that TV and film used to have. In a time when imagining a different kind of future is so important, this tool is valuable because the future must be imagined by people -- instead of corporations.

FUTURE CYCLES

The *Future Cycles* project in its entirety consists of three vehicles and three videos as well as a launch of the project at the North American International Auto Show and the press that was achieved through it. In this section I describe each vehicle and its accompanying video as well as the exhibition and dissemination that followed. Each vehicle starts with a unique speculative exploration of form and function. The vehicles are sequential: each one being a response to what was learned from its predecessor. The design process of the vehicles had me reading articles on steering geometry, looking for the perfect part for a suspension, exploring surface options for the exterior, and finding bicycle parts with a certain look. It also had me researching federal and state legal definitions of the bicycle. At the federal level the bicycle is defined as, “a two or three-wheeled vehicle with fully operable pedals and an electric motor of less than 750 watts.” (107th Congress. 2002) That is fairly easy to understand. The problem is that each state has its own definition for what defines a bicycle – some match the federal definition, some are more strict, and others less strict.



Figure 27. *Future Cycles* exhibit at the Duderstadt Center University of Michigan, March 2015

Recognizing that there are 50 differing definitions for the bicycle in the United States, I decided to design in such a way that each of the three vehicles is legally classified as a bicycle in at least one state. This allows them to be used in those states without a license, without registration, and without insurance. The FireFly is legal in all 50 states and the Cyclone is legal in just one, Ohio, because Ohio is the only state that allows 4-wheeled bicycles. On paper the Zeppelin is legal in around 16 states, but it is unclear how it would actually be treated because of its electric power and may be interpreted differently by different law officials. To make it even more complicated the federal law claims to supersede state law in terms of the definition of a bicycle, but the states are responsible for setting the standards for the operation of vehicles on the streets. Needless to say, exploring and testing the limits of the law in relation to human powered vehicles is an ongoing part of what this project is about.

FIREFLY

FireFly was the first exploration in the *Future Cycles* project. It responds to the growing interest in using bicycles for year round daily transportation. The challenge is that constantly changing weather in Michigan (especially in the winter of snow, ice, and darkness) discourages the year-round use of bicycles. I speculated that if there was a human powered vehicle that could address those issues, then people would be more likely to consider the bicycle as an alternative to the car. If this vehicle was then used on the public roads it would challenge drivers to consider an alternative and question the dominance of automobiles as the sole means of transportation.

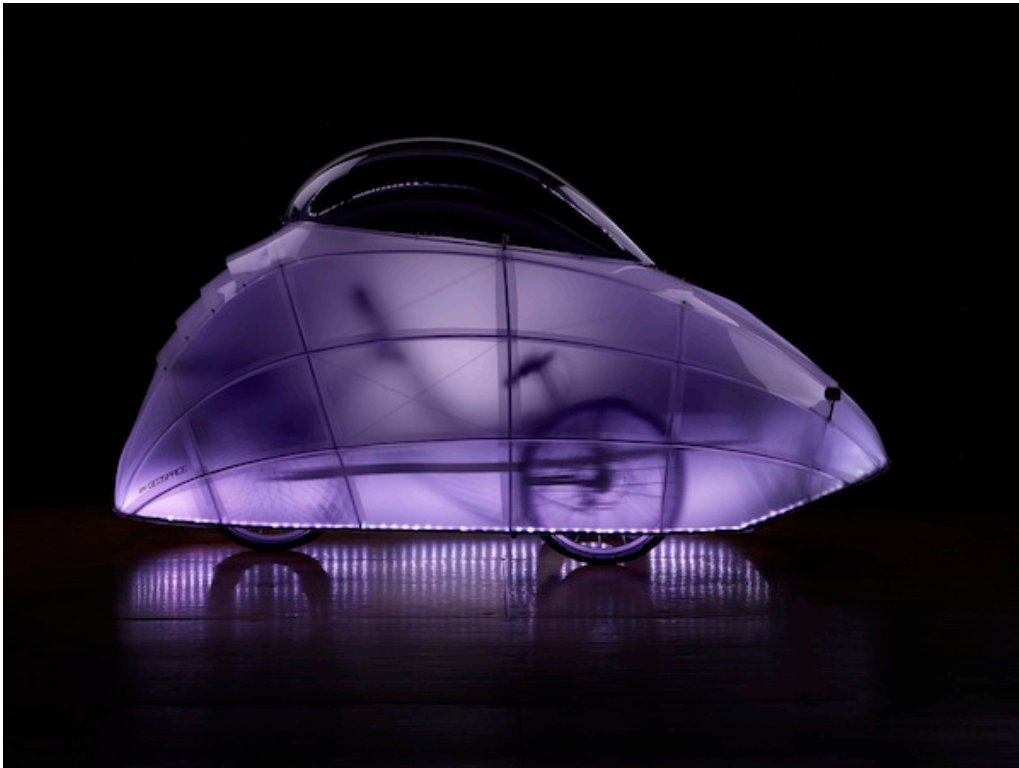


Figure 28. *FireFly*, 2013

I approached this project as a straightforward attempt to design a vehicle that would respond to the above speculation. I determined that the design should meet the formal requirements listed below:

- It should be enclosed from wind/snow/rain.
- It should have three or more wheels for stability.
- It should offer a removable shell for warm weather riding.
- It should provide space to carry groceries or back pack without getting wet.
- It should be visible for easy identification day and night.

Using those requirements I designed *FireFly* and fabricated the vehicle by modifying an existing recumbent trike for the chassis. A weather protecting shell made of aluminum rods and thin frosted plastic was fabricated and connected to the front of the existing bike by an arm and large hinge. A clear acrylic vacuum-molded canopy covers the rider's head, allowing for good visibility. LED headlights protrude from the front on small stands while a multi color LED light strip points upward around the perimeter of the shell. The LED strip illuminates the surface of the shell at night, making the *FireFly* highly visible. The resulting vehicle weighs about 90 pounds and is propelled by pedaling through an 8-speed internally geared hub. *FireFly* is perceived and experienced mostly as a bicycle, but it also has some car-like qualities in its ability to protect from weather and carry a small load.



Figure 29. *FireFly*, 2013

Once the fabrication was complete, I had the *FireFly* professionally photographed and then created a video that shows the vehicle in use in the context of nighttime city driving. The one-minute video operates like a TV car commercial - showing the vehicle in action. The narrative of the video demonstrates the vehicle's ability to cover a distance from suburb to city, to operate in traffic, to achieve speed, and to be visible (Figure 30). The video frames the car negotiating the real transportation infrastructure – traveling successfully with other vehicles. It is my hope that the placement of the vehicle in this context creates a perception in the viewer that this is a viable transportation option. That core belief of its potential reality is critical to establishing the overall sense in the viewer that this option is plausible.



Figure 30. Still from *FireFly* video 2013

CYCLONE

If the *Firefly* is a bike with some car-like qualities, then the *Cyclone* is a car with some bike-like qualities. The idea for *Cyclone* was to move as close to “car” as possible while maintaining human powered propulsion. The *Firefly* started with a practical goal to provide weather protection and to that added a little fantasy; The *Cyclone* started with a fantasy and to that added a little practicality. I speculated that if I really wanted to attract car culture, then the best way would be to use the visual language of the most highly respected forms within that culture – the classic luxury car. My goal with the vehicle was to create an object that fully embraced luxury in material and surface, but at the same time required human power to propel it.



Figure 31. *Cyclone*, 2014. Shown in front of the Henry Ford Estate, Dearborn, MI

I approached the *Cyclone* project in a way that would respond to this speculation and determined that the design should meet these formal requirements:

The form should be as car like as possible.

The form should reference a recognizable and valued yet enigmatic visual language of luxury vehicle.

The fit and finish should be of a high quality to follow the expectation of quality vehicles.

The vehicle should be able to move, but it does not have to be able to move quickly.

The resulting vehicle has a body of a monocoque construction made of a wood frame, foam panels, and a hard shell of fiberglass. Parts for the suspension, steering, and drivetrain were designed in CAD and cut with a CNC laser. These parts along with bicycle shocks and aluminum tubing were used to support the connection of the wheels to the body. The vehicle weighs about 400 pounds and is powered by two people pedaling through a standard 24-speed mountain bike drive train. At each side of the driver’s rotating legs there are sliding levers that steer the vehicle and have the shifters and brake levers mounted to them. The interior is constructed of polished aluminum, mahogany, and leather and has seating for an additional two passengers in the back (Figure 32). The doors and the clear acrylic windows are removable for better airflow.



Figure 32. *Cyclone*, 2014. Polished aluminum, mahogany, and leather interior.

Once the fabrication was complete, I needed a fitting place to photograph and film the vehicle in order to activate the message of luxury. I was able to reserve Henry Ford's Fairlane Estate as the location and brought both a photographer and a videographer out for the one-day shoot. A two-minute video was created in which the opening scene shows the *Cyclone* from a distance parked in front of the estate. As the camera approaches the car for a closer look, the viewer sees a handsomely dressed couple (my wife and I) come out of the estate, get into the car, and ride away. Through that process the viewer comes to understand that the vehicle is powered by pedaling. The video frames the car as part of a luxury lifestyle, but the fact that the car needs to be pedaled is an ironic parallel in the narrative. My hope is that the juxtaposition shown in the film gets people thinking about their expectations surrounding luxury and speed.



Figure 33. Still from *Cyclone* video 2014

ZEPPELIN

If the *Firefly* is mostly bike and the *Cyclone* mostly car, then the *Zeppelin* attempts to blur the line between. It uses everything I have learned from the first two vehicles and attempts to create a truly hybrid bike/car. *Zeppelin's* size, shiny surfaces, and complex machinery are that of an automobile, but the obvious use of standard bicycle equipment clearly says bike. Its seating arrangement as a two-seater and the immense storage in the back give it car-like functionality, but the hard seats and sparse amenities signal discomfort and hard work to keep it moving. With the *Zeppelin* I speculated that a functional hybrid would be able to get both a visual impact and the usability needed to demonstrate an alternative possibility on the streets. It has a level of fantasy in its futuristic form and yet a solid functionality apparent in its fabrication and engineering.

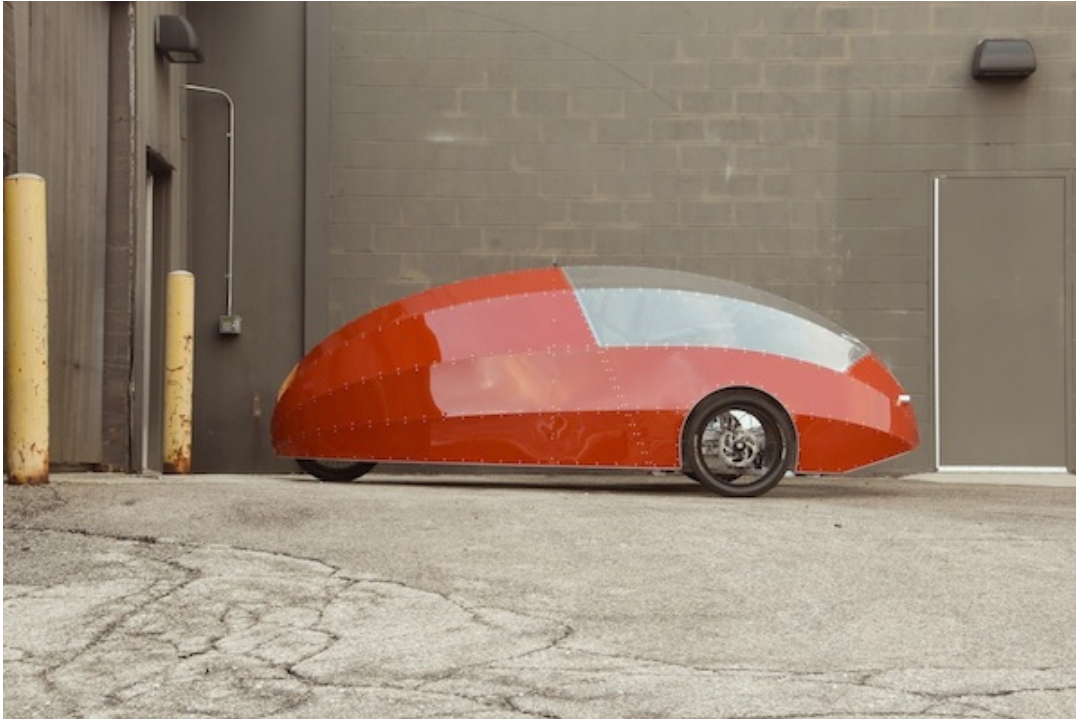


Figure 34. *Zeppelin*, 2015

I approached the *Zeppelin* project in a way that would respond to this speculation and determined that the design should have these formal requirements:

Its form should reference the size of a car and maintain the side-by-side seating arrangement.

It should be as light and simple as possible.

It should be as aerodynamic as possible.

It should have electric assist so that it is quick enough to move in city traffic.

The resulting vehicle was designed in CAD with much of it ultimately produced through CNC fabrication. The body is a shell structure made from 1/16" clear polycarbonate with an aluminum perimeter frame and center support. All of the polycarbonate panels and the aluminum supports for the body were cut on CNC machines and then assembled using rivets. The chassis is an all aluminum tubular frame with a ribbed aluminum deck that supports a large cargo area. Like the *Cyclone*, it is steered through the use of levers with the shifters and brakes mounted to them. The vehicle weighs 270 pounds and is powered by two people pedaling a standard 24-speed mountain bike drive train as well as a 750 watt rear hub electric motor. Together the motor and the pedaling can propel the *Zeppelin* to a cruising speed of up to 25 mph on flat ground.



Figure 35. *Zeppelin*, 2015

Once the fabrication was complete, I wrote several potential narratives for the video that I would use to activate the work. For *Zeppelin* I wanted a simple story that framed the vehicle as part of a sustainable lifestyle. I also wanted to highlight the vehicle's ability to travel a distance, operate in traffic, and carry a large amount of cargo. In the end a three and a half minute video was created that depicts the car in use by a practical couple (again my wife and I) that lives in the country. The video opens with the couple travelling on dirt roads toward an unknown destination. Through their travels the viewer discovers that they are moving into a small city. The car is seen in traffic, turning corners, stopping, and starting. Eventually the *Zeppelin* pulls up in front of a farmers market where the couple gets out, unloads a large amount of cargo, sets up their booth, and begins selling their products. It is my hope that the placement of the vehicle inside an ongoing narrative allows the viewer to firmly believe that this car is a part of the real world. It is a vehicle that people use everyday to support their livelihood.



Figure 36. Still from *Zeppelin* video, 2015

AUTO SHOW AND PRESS COVERAGE

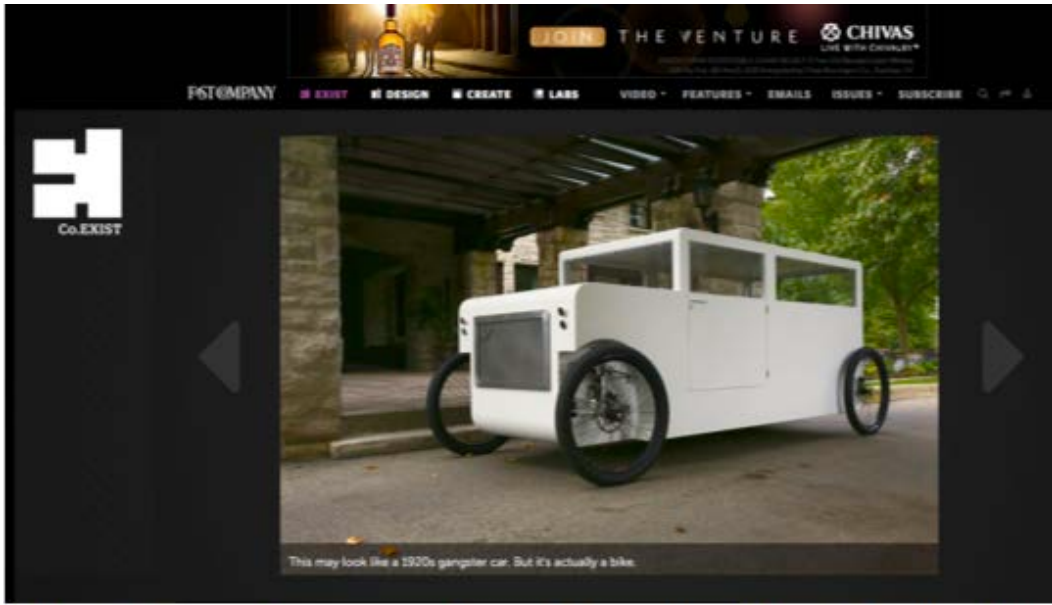
Once I had designed and begun to work on *Zeppelin*, I started to consider where the best place to release these vehicles to the public would be for maximum impact to car culture. Detroit was close by and every January 800,000 people attend the North American International Auto Show. I began to dream of releasing the vehicles there. On an October afternoon I scanned the Auto Show web site for a clue as how to make a pitch to get *Future Cycles* into the show. After memorizing my speech I dialed the main office number, got transferred to student exhibitions, and within a few minutes had verbal acceptance for *Future Cycles* at the Auto show. On January 9 I drove into the complex with *Cyclone* and *Zeppelin* - feeling like I was delivering two Trojan Horses (Figure 37). I was given a 20' x 20' booth between the College of Creative Studies and Kettering University with which to exhibit the two vehicles. I had decided not to bring the *FireFly* so as not to crowd the booth and in order to focus on the more car-like vehicles of *Cyclone* and *Zeppelin*.



Figure 37. The *Zeppelin* is unwrapped inside the North American International Auto Show

The show opened to the press on January 12, 2015 and I was ready with a solid web site and a complete press kit. The auto show is covered by 5000 reporters from all over the world for the first two days and I had hoped that I may get quite a bit of interest. I wanted to see who would pick up the story and how they would frame it. It turned out that there was no interest from any mainstream news outlet. I generated interest only from the local NPR station WDET who did a 3-minute radio interview with me and from a couple bloggers who write about alternative energy.

Thankfully I was not relying just on the Auto Show press to get the word out. I began sending the press release to the design blogs on opening day and by the end of the week had distribution on Core77, DesignBoom, Dezeen, Fast Company, and many smaller blogs. DesignBoom took my press release almost as written whereas others added their own editorial spin or asked specific interview questions to be incorporated in the story. The most effective story and headline was the one from Fast Company who had invested the time to interview me and incorporate a slightly more edgy tone. The title of the article was "The Most Interesting Car at the Detroit Auto Show is Actually a Bike" (Figure 38). The article clearly delivers my intention for the project in this quote: "'*Future Cycles* offers a challenge to the approach of an auto industry that affirms and perpetuates our current transportation system,' says Cameron Van Dyke. 'My hope is to engage everyday American drivers in a dialogue that demonstrates that other solutions might be possible or even preferable.'" (Peters 2015)



The Most Interesting Car At The Detroit Auto Show Is Actually A Bike

Figure 38. Headline from Fast Company article

The 2015 North American International Auto Show turned out to be a great platform from which to release the *Future Cycles* to the press. As shown by the Fast Company article it created a compelling narrative of, “small time designer brings bikes into the largest car event in the world.” It also created another benefit in that the mental image created by the reader of the *Future Cycles* exhibit puts it in the same physical space as the Fords, Teslas, and Alfa Romeos that are in the rest of the show. The reader did not know that in reality it was in the basement sandwiched between two other colleges – on ugly carpet, with bad lighting.



Figure 39. *Future Cycles* booth with visitors

In comparison to the press coverage my experience on the show floor was also great, but quite a bit different. It was an exercise in stamina: 14 days in a row, standing in a booth, wearing the same clothes, eating the same food, and answering mostly the same questions. How much does it weigh? How fast does it go? Is it street legal? How hard is it to pedal? These are the burning questions of my auto show visitors. The large banner, the unique cars, and the videos running in a loop attracted many to stop and try to figure out what was going on (Figure 39). The videos were as important to attracting and conveying the message as the cars themselves. I often had small crowds of people gathered around the screen. Those who stopped and engaged in the conversation were sometimes bicyclists, wondering if this way of travel might work for them. Others that stopped were simply curious and gave me a chance to engage them in some different thinking (Figure 40). It was encouraging how often people who were not bicyclists would say, "You know I think you might be on to something" or "This would be a great way for me to get back into shape."

As you might expect there was a huge range of comments both affirmative and skeptical. Some of my favorites are: "You got a winner! No license, no insurance, that would be great for a lot of guys in Detroit" or "No one would be fat if we had to drive these" or "When the whole thing collapses these will be the only thing on the road" or finally "Still Love my Silverado." There was lots of humorous dialogue as well. For example I overheard a man say to his friend, "If some careless teenagers come along in a pick up truck you are going to be toast!" His friend replied, "Yes, but what a cool way to die!"

Only once did an antagonistic person bother to engage with me. I had an intense conversation with an indignant man who stated "bicycles get a free ride on 'our' roads!" His rationale was that he pays gas tax and bicycles do not. He also explained in a curious logic that bicycles put him "at risk" because he is afraid he is going to hit them. In other words if there is a problem with cars and bicycles he clearly knew what to blame. I did not argue with him, mainly because he quickly walked off after making his last oppositional statement.



Figure 40. Cameron engages visitors interested in the *Zepelin*

This encounter reminded me of the persona I had chosen to operate out of from the beginning of the show. My goal was to be approachable, to engage people on their level, to honestly answer their questions, and entertain their doubts, but always with the intension to move the conversation toward why I did such a project and to present the greater issues surrounding transportation (Figure 41). I wanted to challenge in a way that was not antagonistic and would allow non-defensive consideration. With this approach it was fascinating to find that people would sometimes stay in the booth for a half hour or more - watching the videos, asking some questions, closely investigating the vehicles, and discussing with a friend the pros and cons. The curious work attracted curious people, which I think led to some real reflection on the state of the American transportation.



Figure 41. Cameron explains the mechanical aspects of the Zeppelin to interested visitors

DISCUSSION

I have now explained the context of the *Future Cycles* project and I have also described the project itself including the three individual vehicles, the videos, the auto show, and the press response. I now want to discuss the impact of the project, what it means, and what lessons I have learned. I would like to do that by investigating the effectiveness of the challenge of Future Cycles through four categories: Physical Provocation, Cultural Signifier, Diegetic Prototype, and Sensible Alternative. These categories represent different modes with which to challenge automotive monoculture and each vehicle can operate in more than one mode. I will be using all four case studies in combination with the three vehicles I have built as points of reference to help that investigation. At the conclusion of this section I provide a visualization graph of the relative effectiveness of each vehicle in the four categories.

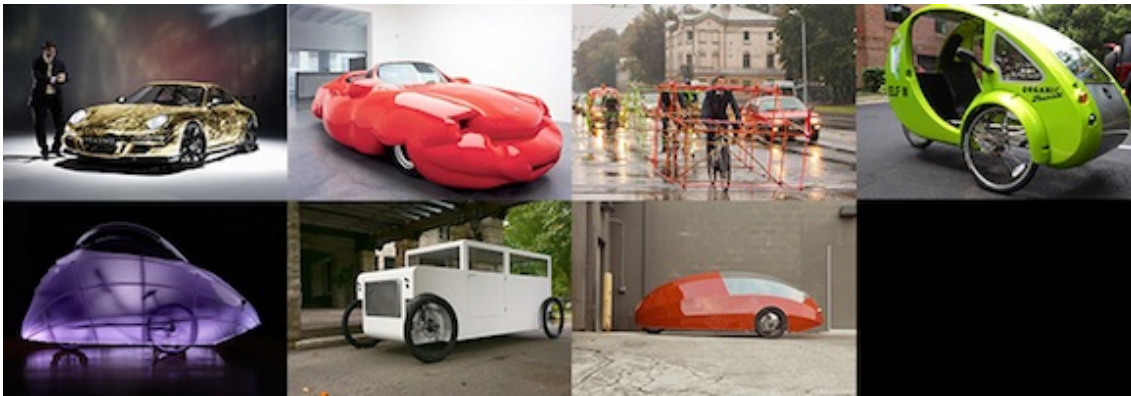


Figure 42. From upper left corner: *Pedal Powered Porsche*, *Fat Car*, *Bike It*, *ELF*, *FireFly*, *Cyclone*, and *Zeppelin*

CHALLENGE AS A PHYSICAL PROVOCATION

I am defining physical provocation as an action that makes someone angry, annoyed, or compelled to react. A provocation is an offense to an individual's personal space or values. In terms of the vehicles we have been discussing, I think that *Bike It* is our strongest example of a challenge by provocation. The vehicles are large, slow, and seemingly unnecessary. They intentionally disrupt the flow of morning traffic and through their presence demand, "Respect our equal rights!" This disruption relates to Bruce Sterling's "disruptive technologies." The *Future Cycles* are new propositions, unfamiliar to other drivers, which are not compatible with the standard expectations of other drivers. I put these vehicles on the roads and look to see what they disrupt. This action is effective at frustrating those who arrogantly claim to own the roads because of their size, weight, speed, and because they pay gas tax.

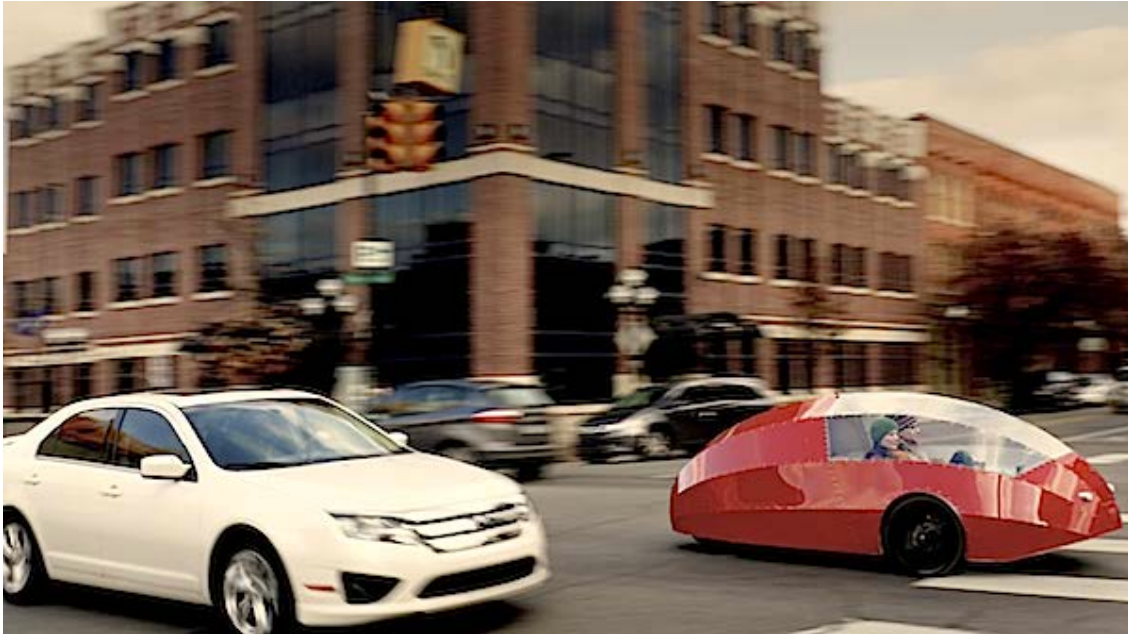


Figure 43. *Zeppelin* claiming its legal right to the road.

In terms of the other vehicles I have presented, all except for *Fat Car*, are capable of this provocation because they all are legal to operate on the road. In that space they make a statement about rights in a way similar to *Bike It*. Bicycles do have a legal right to the road, but that right is rarely exercised and therefore forgotten by car drivers. The presence of these vehicles on the streets acts as a reminder of and a barrier to the total possession of the streets by automobile monoculture. This is a very important part of the *Future Cycles* project. The act of riding these vehicles on the roads becomes a process of taking back what began to slip away 100 years ago – our diversity of transportation.

Interestingly I don't seem to have too much support for this mode of challenge. The web site Bike_Rumor.com hosted a lively debate about the *Future Cycles* after an article was posted on January 15, 2015. Based on blog feedback from bicyclists -- those in supposed agreement with my goals -- none of them saw disruption as a viable way to get a message across. One blogger writes, "I can appreciate the idea behind the creation, however, those vehicles would be impractical on our road system. Too wide and slow." Another blogger writes, "Yup... I too am disappointed in the speed. 25mph is too slow for road transit considering how wide this is. You'd just be pissing off drivers" (Krueger 2015). I find it fascinating that these self-identified avid bicyclists would be so concerned about upsetting car drivers. This made me realize just how hopelessly protective Americans are of car culture. The fact that no one in all of the blog comments I read about *Future Cycles* ever once mentioned that being "in the way" might serve some useful end, made me realize that in fact almost all of us have adopted a car-centric worldview. This is understandable. Since we were children our parents told us to "watch out for cars!" We learned to respect that thing

and the places it lives as sacred and dangerous. Our tendency to fear the car has been impressed on our minds since we were children and it will be hard to reverse.

However, if reversing and challenging the car-centric worldview is the goal then I think that being on the streets and “in the way” is a good method to reach this goal. As I began writing this chapter it was clear to me that *Bike It* was going to be the strongest challenge by provocation. However, as I scanned the rest of the vehicles, I assumed that *Fat Car* and then the *Pedal Powered Porsche* would be high on the provocation spectrum and the *ELF* would be at the bottom. After all, the *Fat Car* is supposed to be provocative and the *ELF* is just trying to fit in. However, as I considered the net effect to car culture, I realized that being present as a provocation was far more effective than representing provocation in an art gallery somewhere. If change is the goal, then engaging the audience of car culture on the streets -- where they are -- is powerful. This got me excited about the *ELF* as a stealthy provocation. Curiously, when I went online to find an image of the *ELF* in traffic to illustrate my point, I could not find a single image except the one below (Figure 44). Every other image I encountered pictured the *ELF* alone away from traffic.



Figure 44. ELF travels down an alley in the only image I could find with the ELF on a street with automobiles in it.

Clearly Organic Transit has no intention of “pissing off drivers” -- that is not a good business model. They do not want the *ELF* to be seen as a “disruptive technology,” but rather hope that it is compatible with cars. I think Organic Transit overlooks an opportunity to push their earth friendly goals. There are close to 2000 of these on the road now. How provocative would it be to have 2000 little vehicles running around disrupting traffic? The fact is, the vehicle is street legal with a top speed of 20 MPH, so ultimately it will get in the way. Like it or not, it will become a provocation.

CHALLENGE AS A CULTURAL SIGNIFIER

I am defining a cultural signifier as a symbol or image of culture that represents an underlying meaning or value. It can also be a visual language that is applied to objects in order to impart certain associations within a culture. This idea of applying language to signify association is used all the time. One example is the Harley Davidson brand, which conveys a tough manliness mixed with American pride. Such language is now applied to all kinds of things that are not motorcycles -- clothing, pickup trucks, shoes, and toys. The fact is, people desire these products to signify or create something in themselves. A sports car or super car is certainly a good example of this as well. In the U.S. many teenage males have posters of Porsches and Ferraris hanging on their wall – signifying the speed, power, and potency that they personally desire to have. Both Erwin Wurm and Hannes Langeder use that signification to make their point. In the case of *Fat Car* it takes the positive cultural signifier of the supercar and burdens it with the negative cultural signifier of extreme obesity. That paradoxical shift from powerful supercar to overburdened impotence is an effective metaphor for a delusional self-image and the way that wealth can ultimately inhibit. The image (Figure 45) by artist Quentin Devine (Devine 2010) is a humorous misinterpretation of *Fat Car* that unintentionally reinforces the message that – whether it is fat or muscle – the American fascination with “more” should be questioned.

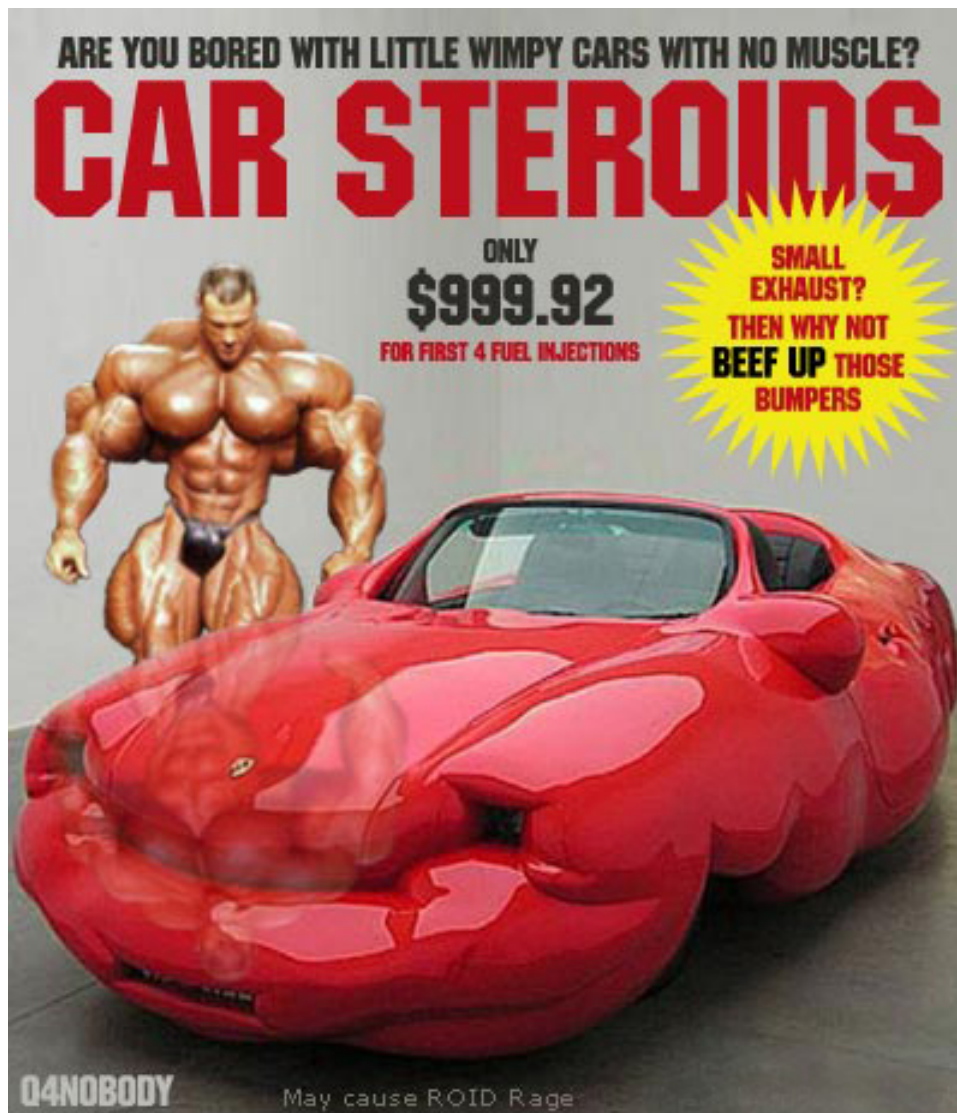


Figure 45. Artist Quentin Devine links *Fat Car* with a body builder to shift interpretation.

Of the *Future Cycles*, *Cyclone* is the vehicle that most effectively uses cultural signification as its greatest strength. It does this by referencing another type of highly esteemed vehicle -- the classic luxury car. *Cyclone* is full of embedded references to Henry Ford's Model T, the Hummer, the I Pod, the Rolls Royce, and the Chris Craft. Its chronologically inconsistent or anachronistic design language creates the enigma that *Cyclone* presents as a "Retro Futuristic Human Powered Luxury Car." The video also uses many luxury signifiers -- the estate, the circle drive, the clothing, and the body language of the actors -- while at the same time signifying weakness through pedal power. This abstract collection of associations has the potential to create both positive and negative responses, with some people seeing something to aspire to and others wanting to throw Molotov cocktails. My goal with *Cyclone* was to set up a space where these associations can be explored and wrestled with.



Figure 46. *Cyclone* as signifier of both luxury and weakness.

In terms of the *Zeppelin*, *FireFly*, and *ELF*, they all signify futurism because streamlined pods seem to be what the future looks like. All the way back to *Futurama* and *Magic Highways*, vehicles from the future were bubble shaped. Since these vehicles are propositions for the future, they gain implied credibility because they look like they are forward thinking. Of the three, *Zeppelin* also uses cultural signification like *Cyclone* because it contains a stylized visual language of blimps, airplanes, and Buckminster Fuller's Dymaxion car. All of these references are symbols of the modern age and so, like *Cyclone*, a retro futurism defines *Zeppelin* and gives it credibility.

The end goal of a cultural signification in these designs is to create credibility and desire. Since these vehicles are propositions meant to generate openness for their acceptance, the use of a visual language that is accepted and valued by the audience is very important if one hopes to attract their interest. Ultimately, the *Future Cycles* project is driven by the need to adjust to a changing future. But that future has to be cool so that people will be attracted to it, and therefore desire that future to come.

CHALLENGE AS A DIEGETIC PROTOTYPE

I am defining diegetic prototyping as the use of film narratives and real-life narratives to contextualize speculative objects within the real world in order to generate openness to these types of new objects. This is what the *Future Cycles* project is about – “demonstrating possibility.” Starting with the *FireFly* I have been exploring how these speculative vehicles – vehicles of fantasy – can be presented to the public in such away as to open up the space of possibility for new types of vehicles. In developing the *Future Cycles* project I held fantasy as the most important factor in my design process. I am a firm believer that with diegetic prototyping it is emotional connection that best drives consideration and adaption. I prefer to use emotional connection over pragmatic reasoning to create acceptance because human logic is not nearly as reliable as human emotion.



Figure 47. *FireFly* as part of real life narrative

Although my focus was on fantasy as a primary motivation in the work, it was also my commitment to design and build fully resolved propositions that reflect what David Kirby calls in his *Diegetic Prototype* article “technical sincerity” (see page 24). In order to make a convincing argument as a diegetic prototype the vehicles needed to be well made and look as though they are items of production. They should appear to be retail objects with an assumed distribution method. My logic was that if they look like products that could be purchased by the viewer, then it gives the viewer the mental space to imagine ownership. I accomplished this in *Future Cycles* by actually applying methods of production (reproducible designs, use of CNC technology, outsourcing specialty processes) in order to fabricate the vehicles. I also designed in such a way that considered daily and long-term functional issues that would be helpful for use over the long-term. These choices would indicate within the film and real-life narratives that the object had been highly considered – designed, tested, and refined – the way any “real” product would have been. These decisions work together to create the technical sincerity necessary for activation as a diegetic prototype.

Once I had achieved technical sincerity in the vehicles, I could begin to transform them into what Kirby calls, “performative artifacts” inside of a narrative. I have already described the basic narrative plot of each individual video in the *Future Cycles* section earlier in this paper. Here I would like to make a comparison between the way in which the *Future Cycles* films operate and the other film examples I have given. With my short films I am trying to explore and create a speculative vision of the future and open up the way for its arrival – much in the same way that *Destination Moon* opened up a vision for what going to the moon might look like. I am not trying to sell specific solutions like *Thresholds* sells the artificial heart or the *To New Horizons* film sells highways. In both of those cases the filmmakers knew specifically what they wanted as an end result and used the narrative to frame specific points to get to that end. The Futurama especially seems to be a calculated and strategically placed piece of propaganda. When it comes to the case study vehicles, the *Pedal Powered Porsche* is the only one with a video and it is used in the opposite way that I am using video – it ultimately demonstrates the impossibility of pedal power. Finally the *ELF*, does not have a diegetic video, though it could have benefited greatly from one. The Organic Transit web site is full of written claims and specifications about the *ELF* along with a few homemade videos, but nothing that captures the human imagination and demonstrates the vehicle as part of the sustainable lifestyle that it claims to enable.



Figure 48. Film still from Cyclone video

A critical part of making diegetic films effective is to get people to see them. I uploaded the videos to YouTube and embedded the video links in my press materials and on the web site. As of April 2, 2015 the *FireFly* video has been viewed 47,507 times; the *Cyclone* 17,946 times; and the *Zeppelin* 21,189 times. Several thousand people also watched the videos at the Auto Show. The reason I mention the number of views is to point out that many more people experience the project through the video than experience it in person. Therefore this is a very useful and even preferable way to distribute the work. At no cost to me I was able to deliver this proposition to people all over the world who have an interest in design, bicycles, or cars. A global conversation becomes possible through the portable, repeatable, and consistent delivery system of film.

I want to finish this chapter by talking about real life narratives as another diegetic prototyping tool. In the same way that objects are contextualized through film, objects can be contextualized through a visible integration in people’s lives. This is ultimately the goal with my vehicles – for people to use them every day as a means of transportation inside of the narrative of their lives. That is what the *ELF* is demonstrating. The vision of Rob Cotter is duplicated daily in aluminum, bolts, and plastic and then spread physically around the world where unpaid “actors” develop the story. These examples of both a film and real-life delivery of narrative illustrate that diegetic prototyping is an effective tool to bring a message of possibility to people where they are.

CHALLENGE AS A SENSIBLE ALTERNATIVE

I am defining “sensible alternative” as an alternative that demonstrates the ability to replace a typical solution with an option that wisdom proves to be better either now or in the future. In this case, it is the replacement of the gasoline-powered car. One of the great difficulties in creating an alternative to the car is the fact that the automobile is such an incredibly well-designed object with 100 years of history and improvement behind it. Over time it has become a miracle of engineering, capacity, comfort, performance, safety, and versatility. Unfortunately that miracle is supported by systems that will not last. From an energy standpoint, a material standpoint, and an emissions standpoint the gasoline-powered car will eventually need to be replaced. The problem is that, at least for now, the gasoline-powered car establishes the standard to which all other options are measured. It is going to be very hard to beat the car on physical performance and so any chance for an alternative has to beat it in other categories of performance – economic, environmental, and health. That is where the *ELF*, the *Zeppelin*, the *FireFly*, and the *Cyclone* come in because they address those three issues and provide a sensible alternative to people who value those things above the ability to get somewhere quickly.



Figure 49. The *Zeppelin* traveling on dirt roads outside of Ann Arbor, MI.

The issue of speed is at the center of the debate. Conversations at the Auto Show helped me realize that speed is almost the only factor that is being considered when judging alternative options. Americans associate speed with efficiency, but only one kind efficiency – that of time. That does not take in to account the other side of the equation – the economic, environmental, and health costs of speed. In regard to the *Future Cycles* as sensible alternatives, they essentially reverse the equation. The *Future Cycles* pay for the cost of transportation with the resource of time and investment of human energy. One of the tag lines I adopted at the Auto Show was, “These vehicles run on time.” Time is a sustainable resource that can be used as a sensible alternative to fossil fuels. Perhaps ironic because in a sense all gasoline powered vehicles run on time as well – the millions of years it took to decompose and recompose the fossil fuels with which they burn.

Through the discussion so far I have been trying to make a point – sensibility is a matter of perspective. At the Auto Show I learned that the *Cyclone* does not make sense from a typical American perspective. However, in terms of sense, one could easily ask how sensible a gasoline-powered automobile is. It burns finite resources; produces toxic gases; costs tens of thousands of dollars to build, maintain, and insure over its life span; weighs thousand of pounds; and can kill people if they are hit by it.

At the 2015 Auto Show Ford Motor Company released the 2017 Ford GT Supercar. It is a 600 HP supercar, with an EcoBoost V6 Twin Turbo, a top speed of 200 mph (Ford 2015), and an unreleased price estimated to be around \$400,000. It was the hit of the show -- everyone wanted to see the new GT. Having the GT upstairs from my exhibit at the Auto Show turned out to be a useful point of juxtaposition in regard to *Future Cycles*. Whenever doubt about the sensibility of my propositions crept in, it was useful to ask people to consider if they thought a 600HP vehicle made any sense – the same question that Hannes Langeder was asking with the *Pedal Powered Porsche*.



Figure 50. The 2017 Ford GT Supercar at the North American International Auto Show 2015

This issue of sensibility brings me back to the root issue of perspective. Since the start of the Auto Show I had been getting the basic message that the *Future Cycles* don't fit into the automobile infrastructure. I agree with that. Use of them on the road in 2015 will create frustration and dangerous situations with other drivers because of the speed differential. We have a challenging conflict of interests on our hands. We need to explore alternatives, but how do we implement those alternatives on the roads without being run over by a system with 100 years of momentum behind it? Our perspective will need to shift to accommodate a spectrum of solutions that engage the economic, environmental, health, and performance issues. We will need to rethink the way we judge our mobility options so that we have a more holistic perspective of performance and efficiency. The *ELF*, the *Zeppelin*, the *FireFly*, and the *Cyclone* all provide a transportation option designed for the U.S. infrastructure. Anyone willing to invest the resource of time and human effort can move these vehicles almost anywhere an automobile can go. At the moment the necessity of adopting vehicles of this sort doesn't seem that pressing. We have found new sources of cheap energy, cheap materials, and we can still breathe the air. There will come a point where shifts in these factors cause us to seek alternatives. In my opinion, it would be wise to begin to explore new types of vehicles that address the issues of a changing world.

CONCLUSION

The current state of transportation in the US is not sustainable. We are surrounded by a system that consumes so much of our resources and at the same time damages our health and the environment. We need to transition from automobile use to more diverse and flexible options that adapt to the changing economic, energy, and health conditions that we face in the world. Through the Future Cycles project I have been able to imagine, build, and exhibit vehicles that challenge automotive monoculture to explore alternatives for that transition. I have had the experience of presenting the vehicles at the Detroit Auto Show, one of the largest car events in the world, and received the benefit of public feedback through the show and the press coverage that was generated. I have learned a great deal through the process. I have learned how to design and build human powered vehicles. I have learned how frame vehicles inside film narratives and create short videos. I have learned how to write a good press release and get media attention. I have learned how to survive a 14-day trade show.

What I am still learning is how to effectively challenge automobile monoculture. From the beginning of this project I was not trying to develop a product for sale or get people to buy one of my vehicles. I was simply trying to get people to imagine new potential realities. I think I was able to do that for many curious people at the Auto Show and hopefully for many more through website dissemination. From the emails I have received, I know I was able to directly inspire others around the world that have been tinkering with these ideas themselves. However, impacting American automobile monoculture at large is a more difficult matter. In the last section of this paper, I talked about four ways to challenge automotive monoculture: physical provocation, cultural signification, diegetic prototyping, and by providing a sensible alternative. I believe that those four modes correctly identify the facets of an effective challenge to monoculture. But to make that challenge compelling, to effect real change in everyday car culture, all four need to be convincing at the same time.

It is the persistent strengthening of all of these modes of challenge that will increase the impact of this project and there are several ways to do that. The first is to strengthen what to this point has been the weakest part of the argument – I need to be out on the streets using the vehicles. I think this is the most powerful way to impact the public because drivers are forced to either welcome it as a diegetic prototype or experience it as physical provocation. The second is to continue to bring the Future Cycles to where car culture is. In America almost every town in the summer has a classic car event. The biggest one of these events and the largest single auto event in the world happens at the “Woodward Cruise” in Detroit every August. I plan to ride Cyclone on the streets there and let it represent all four modes of challenge. A third way to increase impact would be to engage audiences on the bicycle side of the equation. My goal there would be to encourage cyclists to expand their vision of the bicycle as an everyday solution, to be aware of their rights to the road, and to inspire their boldness to assert that right.

The fourth, and perhaps, most crucial way to impact change is to continue to focus on building a better alternative. The Zeppelin is on the right path, but in order to provoke serious consideration, the alternative needs to have increased performance and even lower costs. Not that it has to perform like a car, but it should at least be viable in a select range of locations and situations. For example, the bicycle as it exists is totally viable in certain conditions. For a single rider traveling short distances in nice weather with very little to be carried – the bicycle works great. My goal would be to expand the range of usability for which very low-cost transportation alternatives can function and make that range large enough that more people could see themselves using them. In essence, creating a sensible alternative involves finding the point at which the loss of performance is logically and emotionally offset by the understood and appreciated value of the vehicle’s positive impact.

I know I have not achieved that goal yet because I haven't reached that point for myself. At the point at which I find a solution that I am excited to use as my own daily transportation – that is the tipping point of the effectiveness. Because essentially I will be my first customer – my first true believer. In the end I don't think that there is any other motivation in design as effective as trying to solve a difficult problem for yourself. In a sense that is the only way it can be done – the designer must own any problem they are trying to solve. That is where this project started. In my introduction I talk about the important role that bicycling has played in my life in the past. Once I finished college and started a business I ignored that influence for a long time and like many became completely dependent on the car. Through this work I am trying to reconcile the conflict I have in my own life between my desire for the performance and comfort of the car with my desire for the cost, health, and environmental benefits of the bicycle. This internal conflict represents the challenge that we face as a society at large. If I can solve this conflict for myself, then I believe that I can start to demonstrate real possibility for alternative modes of transportation to American automotive monoculture.

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