Private Room of the Wheel | A New Form of Transient Dwelling

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“private room on the wheel”

creating a new form of transient lifestyles

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thesis | may 2016
“...because he had no place he could stay in without getting tired of it and because there was nowhere to go but everywhere, keep rolling under the stars...”

— Jack Kerouac, On the Road
“I can be talking to a guy one day, and then be gone a thousand miles and come back two days later, and the guy can’t imagine what I just did.”

― Trucker Ted
The cross-country highway and road trip are deeply rooted in the American psyche, supported by the rapid growth in ownership of automobiles by American families since the 1940s, establishing a sense of freedom and leisure in their mobile lifestyles. However, other highway users have less control and freedom over their daily routine. These users are part of a vast network of international commerce reliant on the long haul.

The time long-haul truck drivers are away from home is prolonged, with the end of each day spent sleeping in fixed truck cabins and eating at banal truck stops. "I can be talking to a guy one day, and then be gone a thousand miles and come back two days later, and the guy can't imagine what I just did… Whatever his territory, the trucker's world is long and skinny, the width of a highway, punctuated with warehouses, factories, and oases called truck stops."

This thesis reconsiders the truck stop along the freeway, by studying the transport network at multiple scales, including the truck drivers’ daily routines and their live-work practices. By proposing a new truck stop prototype, it functions as a core infrastructure of the future mobile metropolis and transient lifestyle. The speculative prototypes transform into a new American landscape along the freeways, seeking to offer transitory community to those on the road, including their families, in the near future.

The truck stop’s narrow focus on providing limited and costly services to truck drivers, constitutes a missed opportunity to re-conceive of such infrastructure, as well as the truck cabin itself as flexible and transitory. Responding to existing technical and hauling criteria, "the private room on the wheel" seeks to optimize the truck cabin and plug into a new docking mechanism. Connected by the existing American highway network, this new infrastructure will better address truck drivers’ needs, and also promote a transient lifestyle based on radical mobility.
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**INTRODUCTION**
With the invention and flourishment of automobiles, the Americans enjoyed using the highway and getting to places that are even 2000 miles away. This lifestyle has deeply rooted in the American psyche. Before automobiles and trucks, the United States was heavily depending on the railroad network to carry large amount of materials between coasts for the Civil War. Pony express emerged for a short period of time to deliver important message. In 1956, President Eisenhower signed the Federal-Aid Highway Act of 1956, fully expanding the usage of highway through the United States.

Truck transport is currently the main freight transport industry in the United States, and it is expected that the United States will continue rely on using it in the future.
Two of the main users of the freeway are the truck drivers and the road trippers. They are always on the road, driving for long hours; however, they are not using the road for the same purpose.

The truck drivers are often on the right side of the freeway for safety issue, they are often separated from the other drivers.

The Environment Bubble, Reyner Banham
LOCATING THE DRIVER

- the american truck driver
- eating practices and problem
- body relations
- dwelling on the road, under the systems
"Truck Freight Demand Surges at Fastest Rate Since November 2013"

"The American Trucking Associations says a strengthening U.S. economy sent its shipping index to the second-highest level ever recorded...”

-- the Wall Street Journal

America needs truck drivers. The trucking industry is closely related to the retail sales and its demand. The freight demand is surging recently, largely due to “growing disparity in United State income distribution and the increasing strength of e-commerce sales channels”. “E-commerce retail sales are 6.2% of retail trade and are expected to grow to 8% by the end of 2017.” Products are much easier to be accessible and purchased with just one click, or two-days away. Freight transportation by trucks is popular in the United States to deliver goods across the nation within couple days, or even locally, within hours. Truck drivers are spending 11 hours (sometimes more) on the road, trying to deliver those immediate goods.
Studies from the IPUMS-CPS, Minnesota say that the most “common” job in the US in 2014 is truck driving. Yet in the same year, the American Trucking Associations (ATA) showed that not only there was, but also there will be a shortage of truck drivers. “In 2014, the trucking industry was short 38,000 drivers. The shortage is expected to reach nearly 48,000 by the end of 2015.” Some of the main causes of the truck driver shortage are:

- Demographics, Age: higher median age than other work industry
- Demographics, Gender: female drivers are taking only a small %
- Lifestyle: it’s more than just work, it’s a tough lifestyle
- More Job Alternatives Available
Approximately 7 million persons hold trucking-related jobs with 3.2 million employed as truck drivers. The American truck drivers’ ages have a wide range, some start as soon as they graduate high school, while some work for more than 40 years. The average age of male drivers ranges from 40-50, and it went up by two years: from 46 to 48 years-old over the last eight years. There is an increasing population of female truck drivers: 1.0%. The Average age of female drivers increasing by three years, from 48 to 51 years old.
These charts show the geographic profile for this occupation as a truck driver. Texas, California, Pennsylvania, Florida, and Illinois are the states with the highest employment level in this occupation. Zooming into smaller areas where most populated employment include Chicago IL, Houston TX, Atlanta GA, Los Angeles CA, Riverside-San Bernardino CA; assuming the truck drivers are living in the suburbs around those cities.

Almost every truck driver used to be paid by the miles they have driven per day, so they were reinforced to drive certain amount of miles by the truck company. However, GPS including the tracking devices on their phones could be used as the electrical log book for to log in.

<table>
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<th>Employment</th>
<th>Mean annual wage</th>
<th>Paid per Mile</th>
<th>Mean hourly wage</th>
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<td>1,625,290</td>
<td>$ 41,930</td>
<td>$ 0.28 - 0.40 / mi</td>
<td>$ 20.16</td>
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Source: Bureau of Labor Statistics
EATING PRACTICES AND PROBLEM

Convenience sample of 300 commercial truck drivers from 6 truck shows in the United States over a 10-month period (2010-2011)
Average Age: 47 years (ranging from 24 - 71 years)
86.3% male, 88.3% white

50%

26.7%

1 of every 15 people in the workforce is employed in the trucking industry
50% of truck drivers are obese
26.7% of national population are obese

I always want to cook something healthy for myself, but there is no place or time for me too cook...

I should probably get one of those slow cooker that plugs in the truck...

EATING PRACTICES AND PROBLEM

A typical day's meal for Joe
For the males, differences in the means of all four dimensions were found to be statistically significant. Although the male truck drivers were on average shorter than males in the U.S. general population, they were nonetheless heavier. The truck drivers were, on average, 13.5 kg heavier than those in the U.S. general population, and their thigh and waist circumferences were larger than those of men in the U.S. general population.

- Truck drivers are heavier than the U.S. general population, with a difference in mean body weight of 13.5 kg for males and 15.4 kg for females.
- The current truck drivers have a different anthropometric profile from their counterparts of 25 to 30 years ago, exemplified by a heavier mean body weight (by 13 kg) and larger width and girth dimensions.

U.S. Truck Driver Anthropometric Study
Source: NCBI--National Center for Biotechnology Information
The mean duration of sleep periods was 5.21 (2.84) hours, however sleep timing and duration had a biphasic distribution. The majority of sleeps (90%) occurred between 8 PM and 6 AM and were of relatively long duration, mean ¼ 5.41 (2.70) hours. A secondary cluster of sleeps (8%) occurred between 12 PM and 6 PM and were of relatively short duration, mean ¼ 1.93 (2.46) hours.

Source: Applied Ergonomics
A truck driver could drive across nation with minimal amount of time to stop and rest. These images show how one truck driver manages to travel from Chicago, IL to Vernon, CA and back to Chicago within five days. Commercial motor vehicle (CMV) drivers are limited to 11 cumulative hours driving in a 14-hour period, following a rest period of no less than 10 consecutive hours. Drivers employed by carriers in “daily operation” may not work more than 70 hours within any period of 8 consecutive days. Drivers may see their families every once a week, or sometime even longer.
The scale of the trucks remains the same in this diagram, depicting the time and scale relationship between different roles/locations.

The products of family dollars are relatively cheap, yet the truck drivers are taking dangerous responsibilities transporting those goods.
One day's routine of a typical truck driver. Note that only one to two hours of rest throughout the day.
private room on the wheel

Here’s where truck drivers sleep on the job (TO MAKE LIFE BETTER FOR YOU)

the american truck cab
inside the home
There are four major types of commercial trucks widely used in the United States freight transportation. A semi-trailer truck is the combination of a tractor unit and one or more semi-trailers to carry freight. It is variously known as a semi, tractor-trailer, big rig, or eighteen-wheeler in the United States.

- The **day cab** has no sleeper berth, mainly used for locally or short-distance travel.
- The **Mid-Roof** cab has a flat roof with compact areas containing two beds.
- The **Raise-Roof** cab has a sloped roof with larger headroom and also contains two bed bunks.
- The last type is the largest with a sleeper room attached to a day cab.

Different sizes of truck cabs with different sizes of sleeper berth.
1. overall length
2. trailer length: 28’-53’
3. maximum width: 8.5’
4. maximum height: 14.5’
5. tire height: 3.6’
6. gross weight: 80,000 lbs
7. tractor-trailer air gap
components inside truck cab
bed bunk inside truck cab
beds folded up, day
beds folded down, night
Cab-over-engine dimensions
13'00"
8'00" 7'6"
on freeway

truck stop / on side of the road
Truck driver is only able to see the road or the cars in the front that are 20 ft away.
Truck cabin is strictly designed in a way that certain things can be reached in a hand’s reach. One of the things that is within an arm’s radius are two handbooks required by law (Emergency Handbook, and the Regulation Book).

An arm’s reach: 2.6-3 ft in diameter
Truck Cabin Dwelling Unit:
Maximum height: 101”
Maximum width: 101”
314.8 cu ft
material evolution timeline of automobile

**Model T**
largely steel automotive body

*“mild steel”
*“low carbon steels”

**Wood**

First automobile was invented by Karl Benz. Wooden Frames and body

**Steel**

steel in automobiles

**1885**

LATE 19TH CENTURY


Car body was consisted of:
1. metal sheet
2. aluminum
3. wooden frame

**Monocoque Body (metal)**
a construction technique that utilizes the external skin to support some or most of the load.

**Body Frame Integral**
unibody (body + frame) car

**Body on Frame**
body and frame are separated

**Aluminum**

power-train applications
truck cabs

alloyed with other metals to strengthen

**Magnesium**

used in power-train applications
truck cabs

**Carbon-Fiber Reinforced Polymer**
applied to racecars: shell and tires

**Fuel Economy**
Emission

**1900**

Model T

1910

Wooden Frames and body

1920

Steel

1930

Monocoque Body (metal)

1940

Body Frame Integral

1950

Body on Frame

1960

Aluminum

1970

Magnesium

1980

Carbon-Fiber Reinforced Polymer

1990

2000

2010

2020

Kenworth T680’s stamped aluminum construction

Daimler Concept truck - all-composite truck cab body

“Aluminum Use is Growing”
“Composites Catch On!”

Joining Alternatives
Driving has been linked to an increased risk of skin cancer due to sun exposure through the windows, which do not filter UVA rays. Truck driver Bill McElligott’s facial skin is damaged on his left side by driving for long distances without UV protections. This condition could be altered by changing the window to be tinted in UVA protection.

To minimize drag resulting from crosswinds and turbulent air, tractor-trailer gaps should be minimized or aeroskirts should be used to smooth the airflow. Beyond approximately 30 inches, every 10-inch increase in tractor-trailer air gap increases aerodynamic drag by approximately 2%. If axle weights allow, slide the fifth wheel forward to minimize the gap and reduce wind resistance.¹

There is a need for change in the near-term (2015) that not only the truck cab but also the truck stop should provide higher standard for the truck drivers. The truck stops should no longer be a “product” resulted from US Highway System and trucks, but should be functioning autonomously and at the same time revive its identity.

The truck stop’s narrow focus on providing limited and costly services to truck drivers, constitutes a missed opportunity to re-conceive of such infrastructure, as well as the truck cabin itself as flexible and transitory. Responding to existing technical and hauling criteria, “the private room on the wheel” seeks to optimize the truck cabin and plug into a new docking mechanism. Connected by the existing American highway network, this new infrastructure will better address truck drivers’ needs, and also promote a transient lifestyle based on radical mobility.
BETWEEN THE small and BIG

truck stops: temporary homes
iowa 80
“I argue against the common idea that modernization of society is bringing about placelessness by the commodification and standardization of many public places (Relph 1976; Auge´ 1995). Although chains prevail in the industry (Charter 1997), the sense of place that exists for long-haul drivers is not eradicated, but merely shaped, by this oligopolization.”
BMW SUV Volume: 100 cu ft
FreightLiner Volume: 314.8 cu ft
Typical Truck Stop Amenities:
- ATM
- Trucker Store
- Convenience Store
- Restaurant / Fast Food

Iowa 80 Truck Stop Amenities:
- ATM
- Trucker Store
- Convenience Store
- Restaurant
- Showers
- Laundry
- Museum
- Hair Salon
- Dental
- Chiropractor

Super Truck Showroom = 30,000 sf
Main Building = 100,000 sf
Parking for 900 trucks and 15 fuel pumps
The Daimler truck industry has just introduced the “piloted” truck that would be on the road in 30 years or so. This would change completely that the truck driver is not going to be driving all the time, but they still need to be present to watch over the road.

If trucks are piloted in the future, what would happen to the truck stops? What is the permanency of the truck stop?
TRANSPORTABLE DWELLING

Diogene, Renzo Piano

Nakagin Capsule Tower, Kisho Kurokawa

The Environment Bubble, Reyner Banham

TRANSITORY CITY

Instant City, Archigram

Fun Palace, Cedric Price

New Babylon

in the process of producing analytical drawings...
The Instant City is reacting as the “traveling metropolis”, where a package of components are coming to a community, giving it a taste of the metropolitan dynamic of central London. Instant City is celebrating the idea of a circus community, a spontaneous community brought by a traveling apparatus.

The Instant City by Archigram is designed with the notion of relinking the metropolitan events to the “slow-moving, often undernourished” areas of Britain.

A huge traveling apparatus (the flying zeppelin) is used to carry and drop all the adaptive component to a town. The components include audio-visual display systems, projection television, trailered units, pneumatic and lightweight structures. This involves the ‘hardware’ (or the design of the buildings and places) and ‘software’ (or the effect of information and programmation of the environment).

The theoretical concept of instant community has potential to be applied to the framework of the future truck stops.
REDESIGNING THE CAB

private room on the wheel
inside the american truck cab and
more...
scheme 1 - 3.3
The first idea started with a cab that could be expanded in a linear way. When it's not used, it could be collapsed behind the truck cab. And it's fully expanded and jointed with other truck cabs where truck drivers and their families could occupy.

Major changes happen inside the truck cab are eliminating the obstructive storage cabinets it used to have.

The first scheme set it off to exploring the potential of a new type of truck stop or dwelling condition at a truck stop, by working between two scales: the truck cabin and the truck stop.

scheme 1 - expandable cab
A slightly developed scheme is developed where it’s looking into how the back of the truck cab could be fully used in its potential. By moving all the storage into the back, the truck cab is more spacious for the truck drivers, and the furnitures are less hefty or obstructive.

This new back wall of the truck cab is designed to be the “backbone” structure of the cab. It contains not only storage, but also foldable bed and chair.

In the future, the truck drivers could go online to order one and pop into the back of their truck cabs.
scheme 2 - the umbrella + firepit
scheme 3 - deployable truck cab
This fully deployable truck cab is operated by one mast that could be telescoped outward and attached to the docking mechanism. After connecting to the docking station, a tent is expanded out along with the mast. The “floor” is also expanded out to reach and dock, it would also become the “floor” for the truck driver’s families.

This truck cab allows truck driver and families member to gather and functions as similar to a “motel room” for them. Sometimes when truck drivers arrive to their destinations early, they could call their families to meet at the docking mechanism.
FUTURE MOBILE LIFESTYLE

- Iowa 80
- Future docking mechanism
- The new American road
- Reconnection as a community
**APPENDIX & BIBLIOGRAPHY**


http://atri-online.org/ (American Transportation Research Institute)

http://bi.galegroup.com.libezproxy2.syr.edu/essentials/article/GALE%7CA3923764017u-nysl_ce_syr http://hfs.sagepub.com.libezproxy2.syr.edu/content/54/5/849 (US truck driver anthropometric study and multivariate anthropometric models for cab designs)


Cover Image - AS in DS: An eye on the road
Figure a - http://www.trucking.org/
Figure b - photo taken by the author during a road trip
Figure 1 - CNBC.com
Figure 2 - iHS.com
Figure 3 - http://www.npr.org/sections/money/2015/02/05/382664837/map-the-most-common-job-in-every-state
Figure 4 - American Trucking Association (ATA)
Figure 5 - Applied Ergonomics

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