

Urban Planning & Community Design Considerations in an Era of Driverless Cars

By

Alain L. Kornhauser

Professor, Operations Research & Financial Engineering

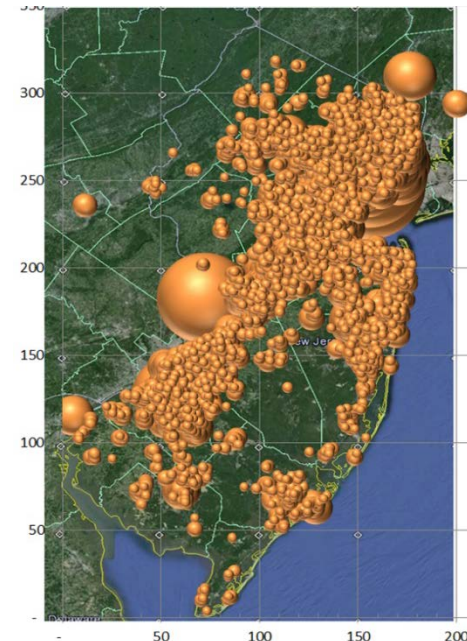
Director, Program in Transportation
Faculty Chair, PAVE (Princeton Autonomous Vehicle Engineering)
Princeton University



Presented at

Workshop on
[Travel Demand Modeling Implications of Driverless Cars](#)

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Outline

- What is a “Driverless Car” (aka SmartDrivingCar)
- The Mobility Needs of Today’s “Community Design”
- Suggest some places to try out SmartDrivingCars

What is a “Driverless Car”

(aka SmartDrivingCar)

- “Drive **Less**” Car
 - Well yes, How much **Less**?



Preliminary Statement of Policy Concerning Automated Vehicles

What is a SmartDrivingCar?



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SmartDrivingCars & Trucks

Level 0 (No automation)

The human is in complete and sole control of safety-critical functions (brake, throttle, steering) at all times.

Level 1 (Function-specific automation)

The human has complete authority, but cedes limited control of certain functions to the vehicle in certain normal driving or crash imminent situations. Example: electronic stability control

Level 2 (Combined function automation)

Automation of at least two control functions designed to work in harmony (e.g., adaptive cruise control and lane centering) in certain driving situations.

Enables hands-off-wheel and foot-off-pedal operation.

Driver still responsible for monitoring and safe operation and expected to be available at all times to resume control of the vehicle. Example: adaptive cruise control in conjunction with lane centering

Level 3 (Limited self-driving)

Vehicle controls all safety functions under certain traffic and environmental conditions.

Human can cede monitoring authority to vehicle, which must alert driver if conditions require transition to driver control.

Driver expected to be available for occasional control. Example: Google car

Level 4 (Full self-driving automation)

Vehicle controls all safety functions and monitors conditions for the entire trip.

The human provides destination or navigation input but is not expected to be available for control during the trip. ***Vehicle may operate while unoccupied.*** Responsibility for safe operation rests solely on the automated system

What is a SmartDrivingCar?

Preliminary Statement of Policy Concerning Automated Vehicles

Level	"Less"	Value Proposition	Market Force	Societal Implications

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2 "CC + Emergency Braking"	Infinitesimal	Some Safety	Small; Needs help From "Flo & the Gecko" (Insurance Industry)	"20+%" fewer accidents; less severity; fewer insurance claims

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3 “Texting Machine”	Some	Liberation (some of the time/places) ; much more Safety	Consumers Pull, TravelTainment Industry Push	Increased car sales, many fewer insurance claims, Increased VMT

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4 "aTaxi "	Always	Chauffeured, Buy Mobility "by the Drink" rather than "by the Bottle"	Profitable Business Opportunity for Utilities/Transit Companies	Personal Car becomes "Bling" not instrument of personal mobility, VMT ?; Comm. Design ? Energy, Congestion, Environment?

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Preliminary Statement of Policy Concerning Automated Vehicles

What the Levels Deliver:

Levels 1 -> 2: Increased Safety, Comfort & Convenience

Primarily an Insurance Discount Play

Levels 3: Increased **Pleasure, Safety, Comfort & Convenience**

An Enormous Consumer Play

Level 4 (Driverless Repositioning) : Pleasure, Mobility, Efficiency, Equity
*Revolutionizes "Mass Transit" by Greatly Extending the Trips that
can be served @ "zero" cost of Labor.*

(That was always the biggest "value" of PRT; zero labor cost for even zero-occupant trips)

A Corporate Utility/Fleet Play

What about Level 4 Implications on Energy, Congestion, Environment?

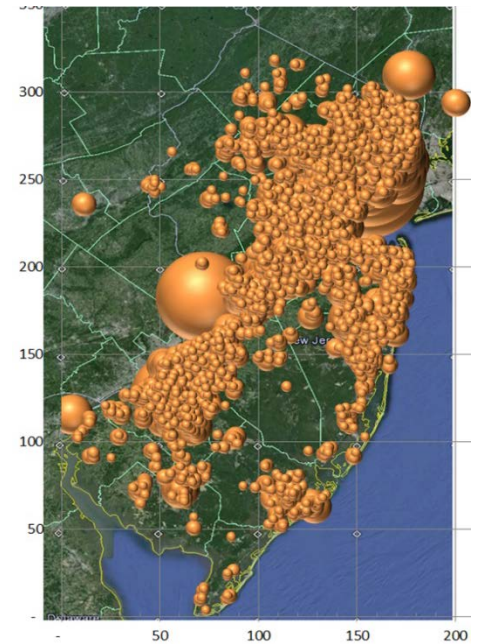
- What if a “Community Design” (New Jersey) only had
 - Walking,
 - Bicycling,
 - NJ Transit Rail
 - aTaxisfor mobility.

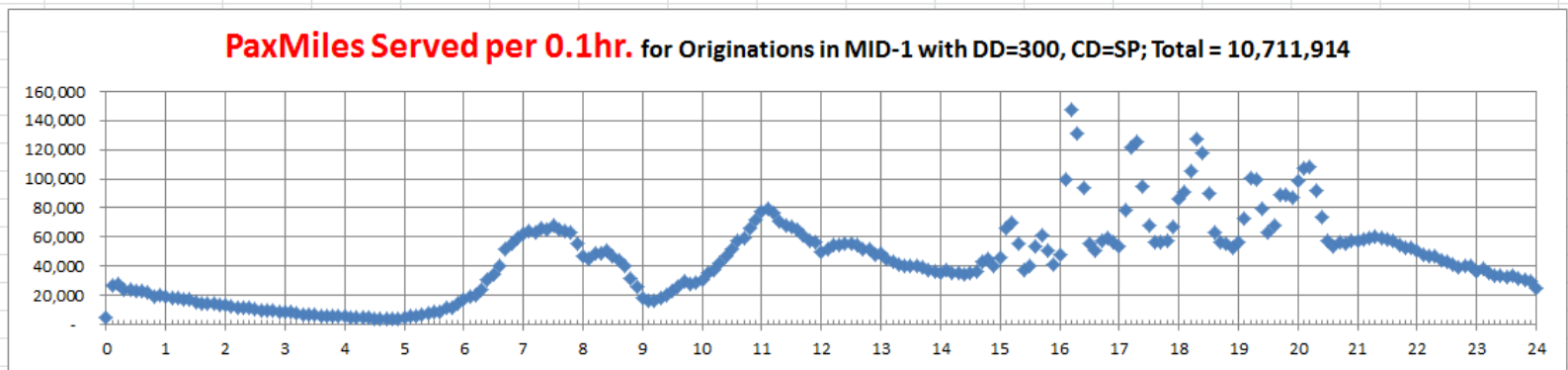
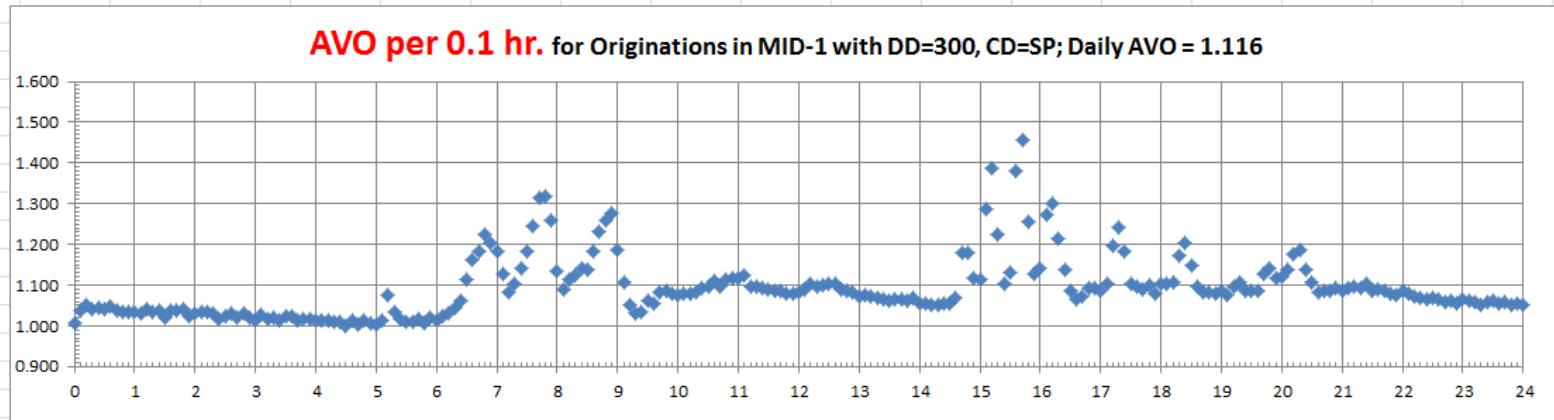
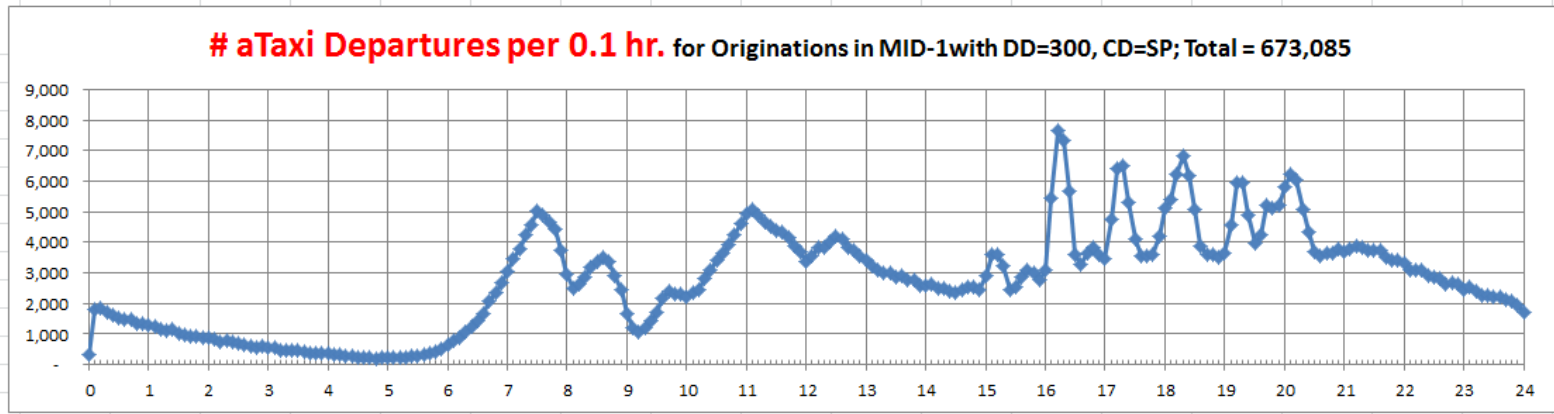
What are the Societal Implications of that Mobility (Energy, Pollution, Congestion) ?

(Its all about Ride-Sharing)

Currently

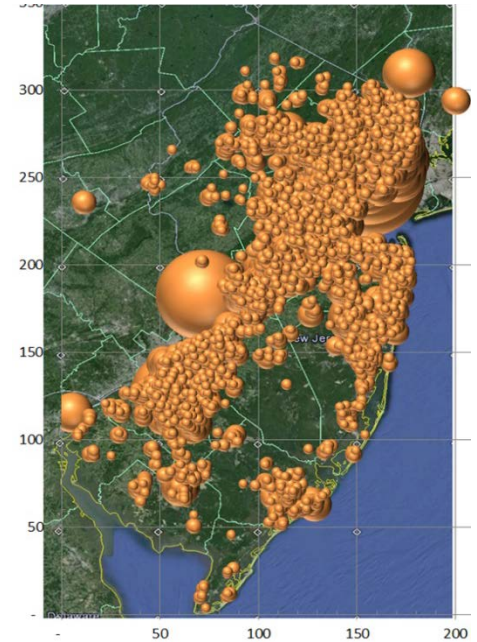
- **New Jersey's "Community Designs" (32 million Trips per day) are Served by**
 - The Automobile (~ 28 million)
 - Walking + bicycling (~3 million)
 - Bus + rail Transit (~1 million)
- **That Demand is enormously diffuse in time and space**





However

- If New Jerseyans are willing to wait around for a little while (< 5 minutes) for someone else to show up that is going in the same direction at the same time (“casual ride-sharing”):
- **AVO ~ 2.0 for the whole State for a whole day, and**
- **Substantially higher in peak directions at peak times**
- Implications:
- **Congestion is eliminated**
- **Energy, Pollution and Environmental Impacts are cut in half.**





Preliminary Statement of Policy Concerning Automated Vehicles

What the Levels Deliver:

Levels 1 -> 3: Increased Safety, Comfort & Convenience

Primarily a **Consumer Play**

Level 4 (Driverless Opportunity) : Mobility, Efficiency, Equity
*Revolutionizes "Mass Transit" by Greatly Extending
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(That was always the biggest "value" of PRT; zero labor cost for even zero-occupant trips)

Primarily a **Fleet Play**

Initial Deployment...

- Needs to be Driverless
 - With Excellent Pedestrian Recognition
- **Doesn't** Need To Be...
 - Fast
 - Everywhere
- Let's start Slow and Narrow:
 - Like CityMobile2...
 - Say 10-25 mph
 - Along a Corridor, or
 - Throughout one of the Sun Belt's Retirement Communities

What About.....



What About.....



[Driverless electric shuttle to be trialled in Singapore](#)
[\(video of Luxembourg Demonstration\)](#)

Slide 84

What About.....

2nd Ave. Sagas



What About..... Arizona/Florida Retirement Community



Discussion!

Thank You

alaink@princeton.edu

www.SmartDrivingCar.com