Impact of Driverless Cars on the Future of Airports

by

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1. Observations & Definitions
2. Current State of Driverless Cars and their likely Evolution
3. Implications on Demand for Air Transport, both passenger & freight
4. Implications on Terminal Design & Operation
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  – Today: One isn’t a world-class airport without an Automated People Mover

http://orfe.princeton.edu/~alaink/PRT_Movies/AlainRidingLHR_PRT.MOV
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  - DFW: 1st Personal Rapid Transit System
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  - What is new about the emerging class of driverless vehicles is:
    - they are explicitly designed to operate in non-exclusive environments; along non-exclusive cartways
  - Collision Avoidance Intelligence is built into Each Vehicle rather than the Cartway
Major Implications...

• Cartway Simplicity → Substantial Reduction in Infrastructure Capital Costs

• Scale Economies with Consumer Automobiles → Substantial Reduction in Vehicle Costs

• Add: Safety Enhancements & Labor Savings → Fundamental Economic Forces
2. Current State of Driverless Vehicles

- Recent advances in automated systems in exclusive environments:
  - Milan driverless Metro
  - PodCar system at Heathrow
    - Extension Plans announced
  - Driverless Trucks in Australian & Chilean Mines
2. Current State of Driverless Cars

• Much of the public interest has been promoted by the Google car.
  http://www.youtube.com/watch?v=cdgQpa1pUUE
  – It is not driverless...
    • Not yet
  – But substantial advancements have focused on:
    • Development of a self-driving vehicle that can operate in the existing environment.
      – Motivated by fact: >90% of road traffic accidents involve human error. So... remove the human from the loop.
      – Also... People often really do not want to drive.
    • Driven over 500,000 miles in self-driving mode
  • http://gawker.com/5825012/how-a-top-google-executive-nearly-killed-a-guy

• Substantial advances by auto industry:
  – Automated parking

http://www.youtube.com/watch?v=WEh7qixon36s

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  - Automated parking
  - Jam Assist (lane keeping + collision avoidance)
  - Currently available as a $3K option @ Mercedes Dealers

Mercedes-Benz
Steering-assist

http://www.youtube.com/watch?v=i7aTbSf1Ly0

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  – Partnership arrangement btwn Parts suppliers and manufacturers (ex: Continental + BMW) suggests that such options will become common place.
  – Recent successful completion of a collaborative European research initiatives demonstrating automated driving systems using low-cost sensing components
Sensor concept

- 80 m
- 0 m
- 40 m
- 60 m
- 200 m

- 76 GHz Radar
- 24 GHz Radar
- Ultraschall
- Kamera

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• Enormously Strong Business Case for such Vehicle-centric Collision Avoidance Technologies
  – Observation: Car Insurance Rates are higher for “Bad” Drivers.
  – If: $\text{Implied}_\text{Liabilities}_{\text{humanDriver}} \gg \text{Implied}_\text{Liabilities}_{\text{self-drivingTechnology}}$
    • (>90% Accidents Involve Human Error)
  – and If: InsuranceCost ($) = F (\text{Implied}_\text{Liabilities})
  – Then: InsuranceCost$_{\text{humanDriver}}$ ($) > InsuranceCost$_{\text{self-drivingTechnology}}$ ($)
  – Therefore: The Auto Insurance Industry Has opportunity to finance the adoption of collision-avoidance & self-driving technology
    • through the addition of surcharges onto policies for those that choose to not purchase and use automated vehicles or as discounts to those that do. A price leader will emerge in the industry and cause it to evolve in this direction

• Self-driving Technology has a REAL business model!
3a. Implications on Demand for Passenger Air Transport

• Long distance travel by car becomes safer and substantially more comfortable. So...
  – Short-haul air travel: Even more uncompetitive
    • Substantial disappearance of air travel < 500 km
      – especially in North America
    • Short-haul only viable as hub-spoke feeder
    • Continued Consolidation to fewer more-major airports (?)
3b. Implications on Demand for Air Cargo

- Minor implication on Air Cargo
  - today there is very little < 750km air cargo traffic.
  - What exists now has unique air requirements that will not be substantially impacted.
4a. Implications on Land-side Terminal Design & Operation

- Opportunities to Maximize Airport Land Values via ATN’s using cheaper exclusive Cartways & Vehicles.
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• Near term evolution of car rental facilities:
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- Opportunities to Maximize Airport Land Values via ATN’s using cheaper exclusive Cartways & Vehicles.
- Parking garage efficiency opportunities for storing and retrieving Self-parking Cars.
- **Near term** evolution of car rental facilities:
  
  Car rental companies may well be “early adopters” of the technology, especially with insurance initiatives.
  If they implement, then offsite parking of vehicles with close to terminal vehicle distribution. Strong implication of terminal pickup and distribution.
4b. Implications on Air-side Terminal Design & Operation

• Implication on baggage movements and distribution.
5. Summary Remarks

• Consumer-grade Self-driving cars are likely by 2030
• The technology will be Safe & Financially attractive
• Airport Investment Scenarios should seriously consider the implications of this rapidly evolving technology
Thank You

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