

Impact of Autonomous Vehicles on a Typical Canadian City

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Agenda

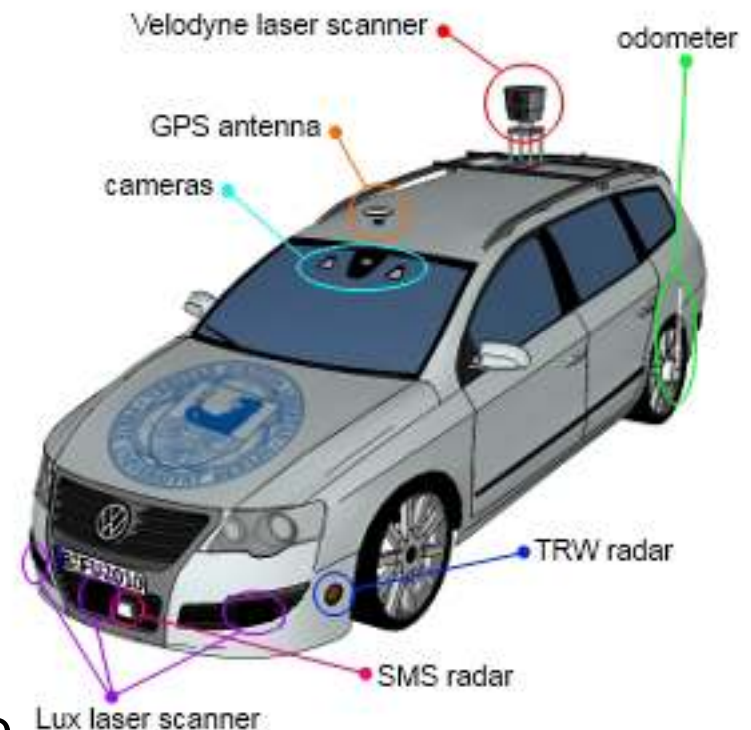
- Status of autonomous vehicles
- Overview of impacts
- Impact on transit
- Impact on roads and transportation
- Impact on businesses
- Impact on governments
- Impact on urban planning
- Conclusions

Terminology

- Autonomous Road Vehicles (ARVs)
- Self-Driving Cars
- Driverless Vehicles
- Autonomes

Autonome Characteristics

- Sensors typically:
 - LiDAR
 - optical
 - radar
 - infrared cameras
 - GPS
 - wheel encoder
- Combination
 - 360° view
 - Monitors movements in real time
 - Reacts in milliseconds



Globis Consulting Inc.

Google Lexus



AutoNOMOS Labs

VW



Stanford Audi



Status

- Google's ARVs have logged over 800,000 km
- Laws passed in Nevada, Florida, California, Washington D.C.
- 13 other US States have bills in process
- No similar laws planned in Canada

Three companies licensed to test ARVs in Nevada



Google, Audi,
BMW/Continental

Known Development Challenges

- Reversing
- Extreme weather
- Work zones
- Road alterations
- Pedestrian prediction
- Facial reading
- Rare events



Timeline

- Model year 2014: first semi-autonomous cars
- 2018: Google's forecast for its first fully autonomous car
- 2020: GM, Volvo, Nissan, BMW, etc. say their first fully-autonomous cars will be launched

Overview of Impacts

- Disruptive technology, paradigm shift
- Greatest change in transportation since the invention of cars over a century ago
- Substantial benefits for drivers + changing demographics = expected widespread deployment
- One ARV replaces approximately six private cars
 - Significantly increases market penetration

Impact on Collisions

- ~90% of collisions due to driver error
- Societal cost \$62B/yr = 4.9% of GDP*
- Computers safer drivers than humans
- Google's objective: 50% reduction in collisions, fatalities, injuries
 - Expect we can do better than that
- No such thing as a “crash-proof car”

* Source: 2007 Transport Canada study.

Impact on Transit

- Development of small, custom-designed, fuel efficient mini-taxis / micro-buses
- Cost is about \$1 per one-way trip*
 - vs \$2.40 - \$4.65 in Ottawa on OC Transpo
- Transportation-as-a-Service (TaaS)
- No bus stops, no park-and-ride, no subsidy
- For riders: better service at a lower cost
- For transit companies:
 - Incorporate micro-buses as part of the fleet
 - Or let the private sector do it; ridership decreases

* Source: The Earth Institute, Columbia University

Impact on Roads and Transportation

- Reduced collisions
- Reduced space per vehicle: longitudinally and narrow vehicles can double up in lanes
- Impacts on vehicle licensing, driver licensing, vehicle standards
- Improved mobility for seniors / handicapped people
 - Hitachi already launched 1st gen vehicle in Japan

Hitachi ARV for Seniors / Disabled



Impact on Businesses

- Convergence: taxis / car share / rental fleets
- Car insurance:
 - Reduced claims = reduced premiums
 - Who is liable if computer is driving?
 - Long term: Lloyds speculating on bundling insurance with cost of car
- Parking lot operators: payment methods
- Automated delivery vehicles
- Opportunities for Canadian technology companies

Impact on Governments

- Reduction in car crashes = fewer organ donations
- Hospitals will see fewer collision victims
- Electric ARVs = increased demand for electricity and charging points
- As above: impacts on vehicle licensing, driver licensing, vehicle standards

Impact on Urban Planning

- Decreased space needed for parking
- Improved urban air quality
- Land values less dependent on proximity to transit stations
- All lead to greener/more sustainable cities

Conclusions

- ARVs will be with us sooner than most people think
- Almost all of us will be impacted by this
- Opportunities and threats for governments and businesses
- We all need to plan for this, starting now

Question for Cdn. Governments

- US governments planning for ARVs:
 - US DOT has started planning for ARVs
 - Laws passed in Nevada, Florida, California, Washington D.C.
 - 13 other US States have bills in process
- European governments also planning for ARVs in similar way
- Why is no Canadian federal, provincial or municipal government planning for ARVs?

Questions for Transportation Professionals

- *“What are we as transportation professionals doing about preparing for the biggest revolution that we will have seen on our road network since the invention of the car some 130 years ago?”*
- *Why have we not already started planning for this inevitable paradigm shift that will transform not just our roads, but society as well?*
- *What should we do to prepare?”*

Paul Godsmark, ITE Blog

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- Questions?
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