Levels of Automation

Nicolas Saunier
Associate Professor
Department of Civil, Geological and Mining Engineering

June 18th 2017

Contents

Science Fiction?

Let's see how well the Active Lane Control works on the new Infiniti Q50S

Science Fiction?

Volvo develops the 'no death' car: Vehicles which drive themselves and are totally crashproof could be on British roads in eight years

- Vehicle will be fitted with sensors that can detect potential collisions and take action
- Firm claims 'nobody will be killed or injured in a new Volvo by 2020'

By RAY MASSEY, TRANSPORT EDITOR

PUBLISHED: 17:59 GMT, 4 December 2012 | UPDATED: 07:45 GMT, 5 December 2012

Comments (261) | Share +1 50 Tweet 160 Like 1k

Car giant Volvo is developing 'no death' cars that drive themselves and are impossible to crash – ready for launch in showrooms within eight years.

The computerised vehicles will be fitted with high-tech sensors and will 'refuse to be steered' into other objects.

Volvo says they will be on sale to customers by 2020, but that some of the life-saving technology will be incorporated into its vehicles even earlier – from 2014 – it says.

Scroll down for video
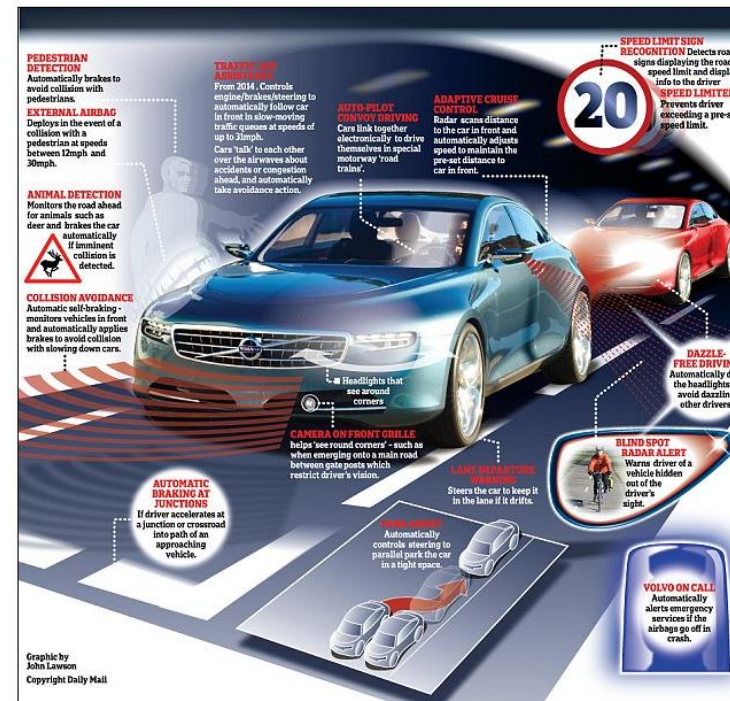
Science Fiction?

Connected Vehicles?

Levels of Automation

SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/ Deceleration	Monitoring of Driving Environment	Fallback Performance of Dynamic Driving Task	System Capability (Driving Modes)
Human driver monitors the driving environment						
0	No Automation	the full-time performance by the *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	Driver Assistance	the *driving mode*-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	Human driver and system	Human driver	Human driver	Some driving modes
2	Partial Automation	Intelligent Cruise Control +Active Lane Control	System	Human driver	Human driver	Some driving modes
Automated driving system ("system") monitors the driving environment						
3	Conditional Automation	Tesla	System	System	Human driver	Some driving modes
4	High Automation	the *driving mode*-specific performance by an automated driving system of all aspects of the *dynamic driving task*, even if a *human driver* does not respond appropriately to a *request to intervene*	System	System	System	Some driving modes
5	Full Automation	Waymo?	System	System	System	All driving modes

Standard J3016
Copyright © 2014 SAE International

Some Challenges

- Weather / Winter
- Road construction
- Legal framework
- Insurance
- Interactions with other users

Some Impacts

1. Safety
2. Road capacity
3. Increase of vehicle miles traveled
   - mobility for people who cannot drive
4. Urban planning: parking, urban sprawl
5. Car ownership: shared robo-taxis, aka Uber 2.0?
6. Jobs, jobs, jobs

Conclusion

- Remember the current alternative…
  - every year: 1.2 million dead, 50 million injured
  - history will judge us harshly if we slow down the adoption of life-saving technology for the wrong reasons

- The adoption and use of disruptive technologies are difficult (impossible?) to predict
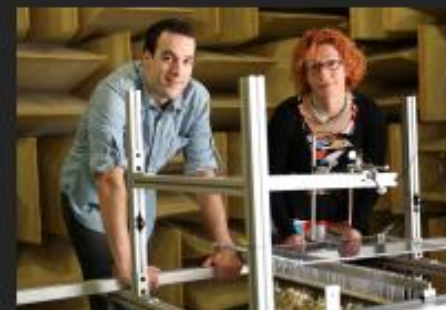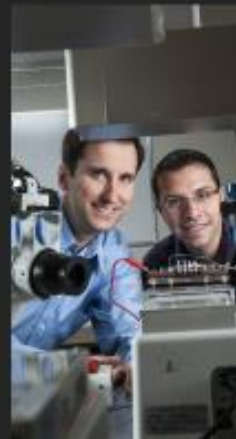
nicolas.saunier@polymtl.ca

THANK YOU !

POLYTECHNIQUE MONTRÉAL

WORLD-CLASS ENGINEERING

UT TENSIO SIC VIS