NOTTINGHAM TRENT UNIVERSITY

Autonomous Vehicles In The Pro Peloton: Opportunities And Threats

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ENGINEERING YOUR FUTURE

Wouldn’t it be great for cyclists if…

- …drivers were never under the influence of alcohol or drugs.
- …drivers always obeyed the rules of the road.
- …drivers never fell asleep at the wheel.
- …drivers were never distracted.
- …drivers could monitor the road ahead and mirrors at the same time.
- …drivers were aware of upcoming hazards.

It can go wrong… would autonomy be welcome?

Connected and Autonomous vehicles in context

- Can we believe the hype? / Should we believe the fear?
- How do CAVs really work?
- What are some of the risks associated with CAVs in the context of the Pro-peloton?

- *This is here NOW and has been for some time…*

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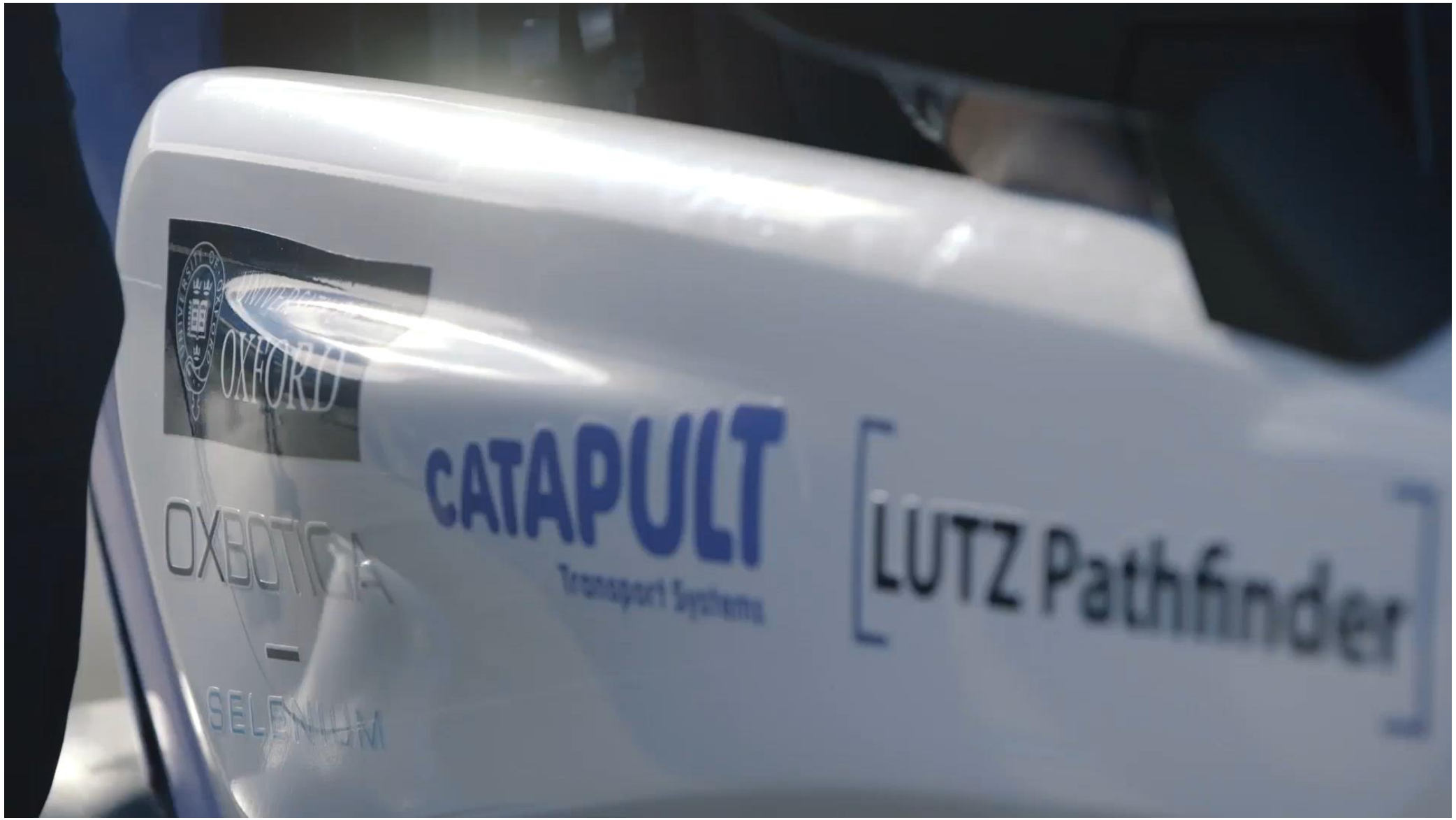
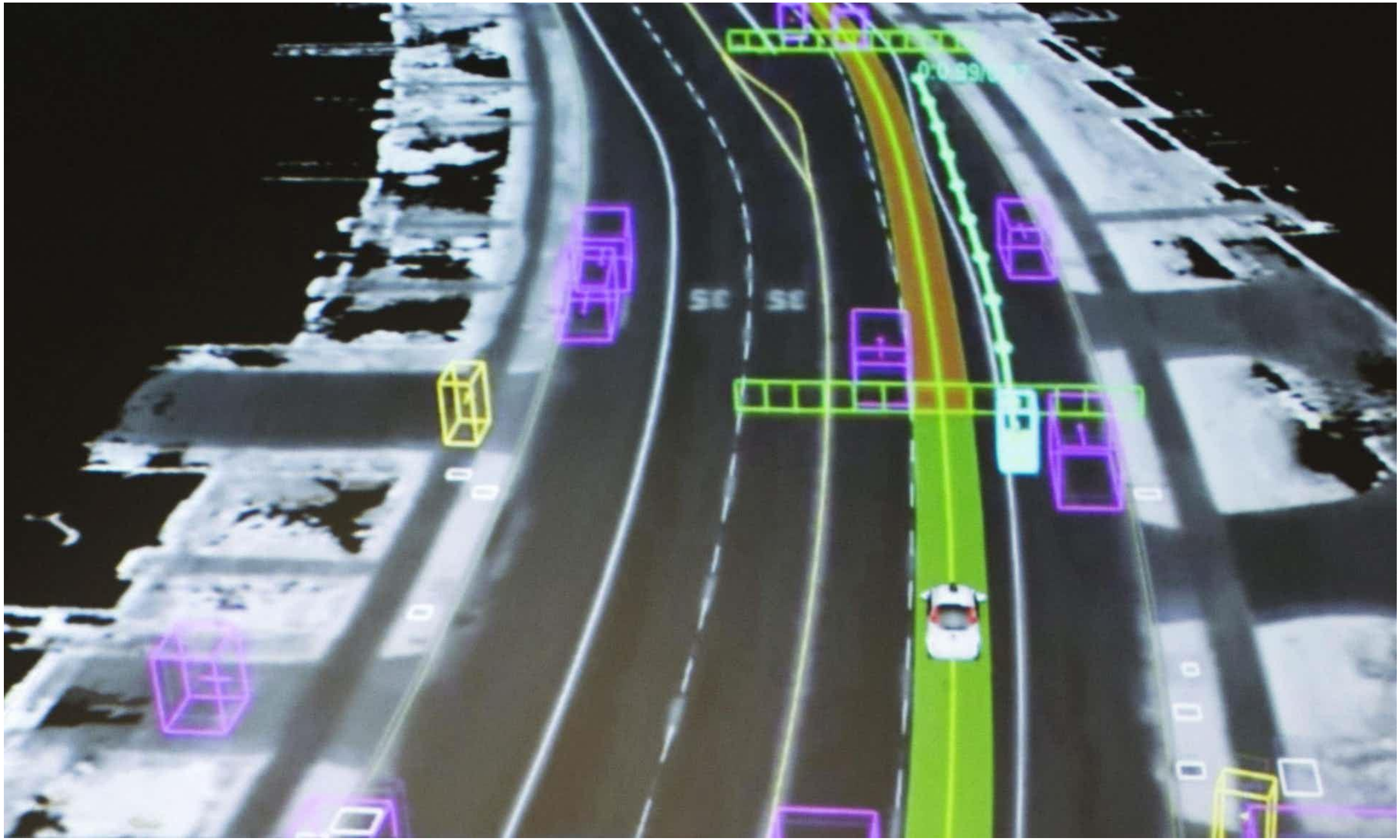
Level 4 High automation:	The car can drive itself in almost all circumstances. Human control may be needed if systems fail (e.g. in poor weather) but the car can safely proceed if the driver is unable to take control. Human control may be possible at the human's request.
Level 5 Full automation:	There is no possibility for the human operator to physically drive the car. The human occupant is effectively a passenger.


OXFORD
OXBOTICA
SELENIUM
CATAPULT
Transport Systems
LUTZ Pathfinder



"Our vision is that by 2020 no one should be killed or seriously injured in a new Volvo car" (Håkan Samuelsson, President and CEO, Volvo Cars, 2014)

http://www.volvocars.com/intl/about/vision-2020/life-saving-innovations#

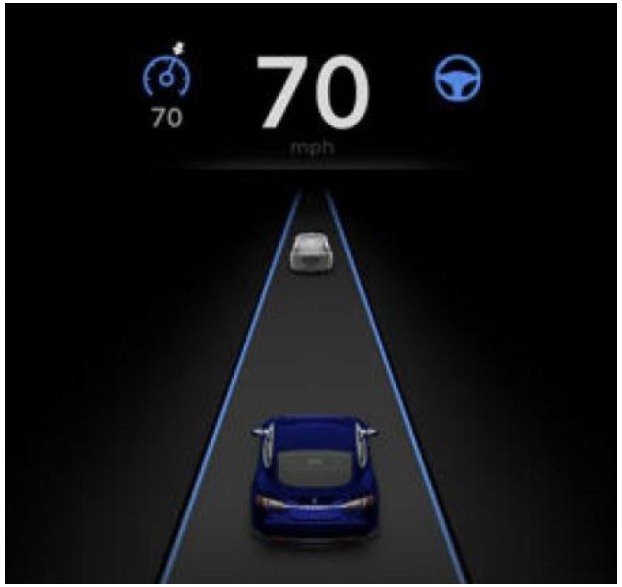
Technologies – Tesla Model S

- Radar - Bosch
  - Forward facing in grille, 160m range
- Visual optical (camera) - MobilEye
  - Forward facing in front of mirror, monochrome, 1MP
- Ultrasound
  - Low speed, close proximity

LIDAR

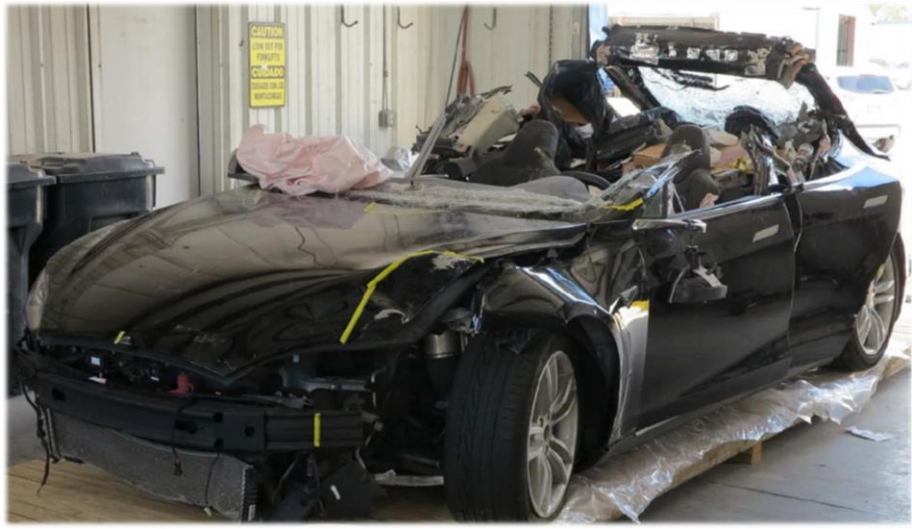
Features – Tesla Model S

- Autopark
  - With driver in vehicle
  - Without driver in vehicle
- Speed Assist
- Lane Assist
  - Side collision warning
  - Lane departure warning
  - Autosteer
- Forward collision avoidance
  - Collision warning
  - Emergency braking
- Autopilot
  - Traffic-aware cruise control
  - Autosteer
  - Auto lane-change



Predictable scenarios - many collisions can be avoided

Novel scenarios – things can go wrong



National Transportation Safety Board 2017, HWY16FH018

Change in behaviour of other road users

- Who recognise that the car with ‘move out of the way’

Unpredictable behaviour of road users – e.g. spectators

Assertiveness of systems? Risk of crime?

Need to break the rules of the road

TheMiscMan ©YouTube

Conclusions

- There are many aspects of autonomy that should be welcomed by the cycle race community.
- Teams and organisers should be cautious in selection and specification of vehicles that might include hard-wired automation and safety features.
- It is highly likely that safety systems designed to keep road users safe under ‘normal’ driving will be counter-productive when used in close proximity to cycle races on closed roads.

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