

„Pojazdy Autonomiczne : Nadzieje i Dylematy”

Włodzimierz Choromański

Jakie nadzieje ?

Wprowadzenie autonomizacji pojazdów zgodnie z wszystkimi analizami dokonywanymi na świecie ma zredukować liczbę wypadków samochodowych (czy na pewno????)

Wprowadzenie pojazdów na różnym poziomie autonomizacji w sposób istotny zwiększa mobilność osób starszych oraz niepełnosprawnych

Pojazdy autonomiczne optymalizują trasy przejazdu pojazdów a tym samym zużycie paliwa (którym będzie najprawdopodobniej energia elektryczna, wodór lub LNG)

Pojazdy autonomiczne rewolucjonizują transport i nasze życie. Mają wpływ na praktycznie wszystkie aspekty naszego życia. Zmieniają praktycznie obraz przemysłu motoryzacyjnego

Jest jeszcze jeden powód, dla którego rozwój pojazdów autonomicznych jest tak dotowany .. Ale o tym później



Driving at different levels of automation over the course of a journey



Human driver is driving

Automated Driving System (ADS) is driving

Fallback-ready user is supervising

LVL 2

Vehicle with partial automation – human is always driving



LVL 3

Vehicle with conditional automation – ADS is driving whilst ADS is engaged, with supervising role for human fallback-ready user

Eg. Human drives the start of the trip, hands over to the ADS as they enter a freeway, continues to supervise while the ADS drives, then takes back control to exit.



[Local Rd]

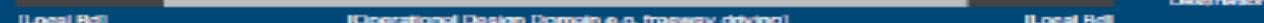
[Operational Design Domain e.g. freeway driving]

[Local Rd]

LVL 4

Vehicle with high automation, with manual controls to operate at lower level of automation – ADS is driving whilst ADS is engaged

Eg. Human drives the start of the trip, hands over to the ADS as they enter a freeway, then takes back control to exit.



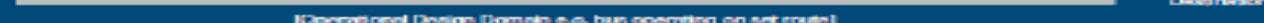
[Local Rd]

[Operational Design Domain e.g. freeway driving]

[Local Rd]

LVL 4

Vehicle with dedicated high automation – ADS is always driving but operational design domain is restricted



[Operational Design Domain e.g. bus operating on set route]

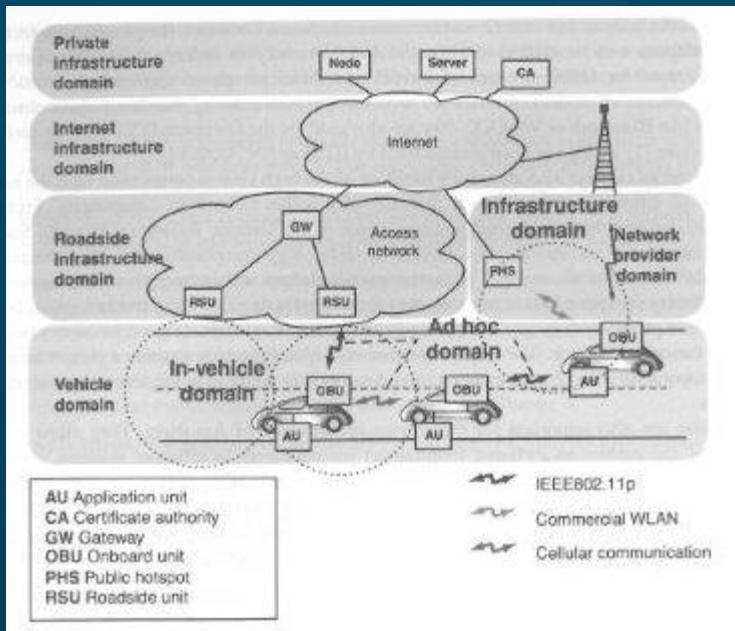
LVL 5

Vehicle with full automation – ADS is always driving



[Operational Design Domain e.g. bus operating on set route]

Automotive Internet Working



Jak modelować pojazdy – symulacje komputerowe ??????????????

Jaka Infrastruktura dla pojazdów autonomicznych ??????????????



Autonomous Car

Pojazdy autonomiczne szczególnym wyzwaniem (największym wyzwaniem) :

- informatycznym
- sprzętowym
- prawnym

*Powertrain – control system, sterowanie układem napędowym
Control of spark timing – sterowanie układem zapłonowym
Idle speed control – sterowanie prędkością obrotową dla biegu jałowego
Transmision control*



Google Car L4

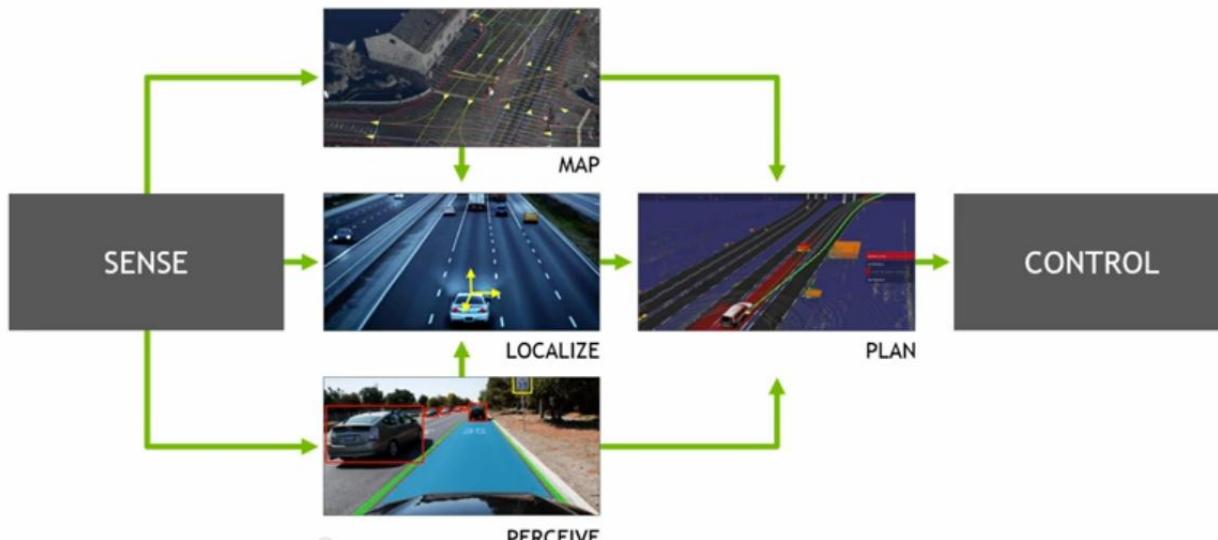
*Cruise and headway control
Antilock Brake and Traction control system
Vehicle Stability control
Four wheel steering
Activ Suspension
Preventing Collision
Longitudinal Motion Control and Platoons
Automatem Steering and Lateral Control
A.Galip Ulsoy, Huei Peng, Melih Cakmakci „Automotive Control System” Cambridge University Press 2013*

Internetworking

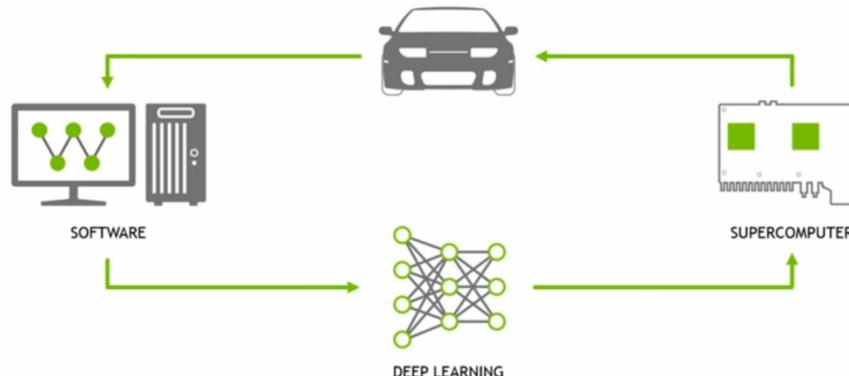
Timo Kosch, Christoph Schroth, Markus Strasserger and Marc Bechler „Automotive Internetworking „ A John Wiley @ Sons LTD 2014



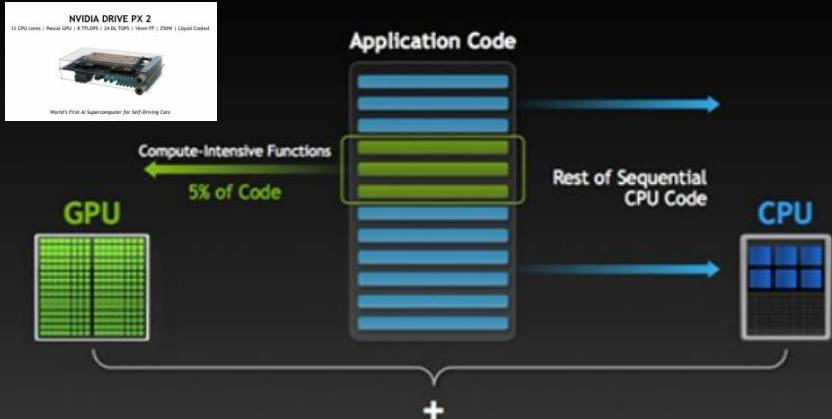
THE BASIC SELF-DRIVING LOOP



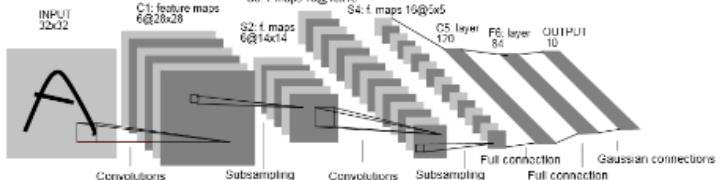
SELF-DRIVING IS A MAJOR COMPUTER SCIENCE CHALLENGE

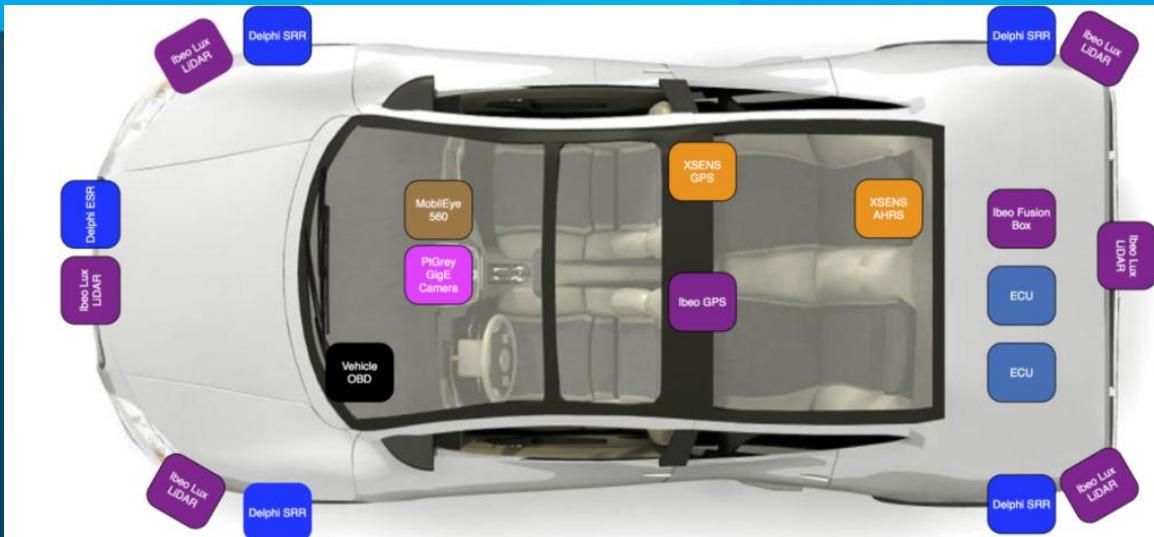


How GPU Acceleration Works



Sieci konwolucyjne (ang. convolutional nets)





Świat

Kosztowne badania

Długofałcowe badania

Polska

Małe nakłady

Krótkie Badania i Szybkie efekty

Czy możemy wyjść z impasu ?



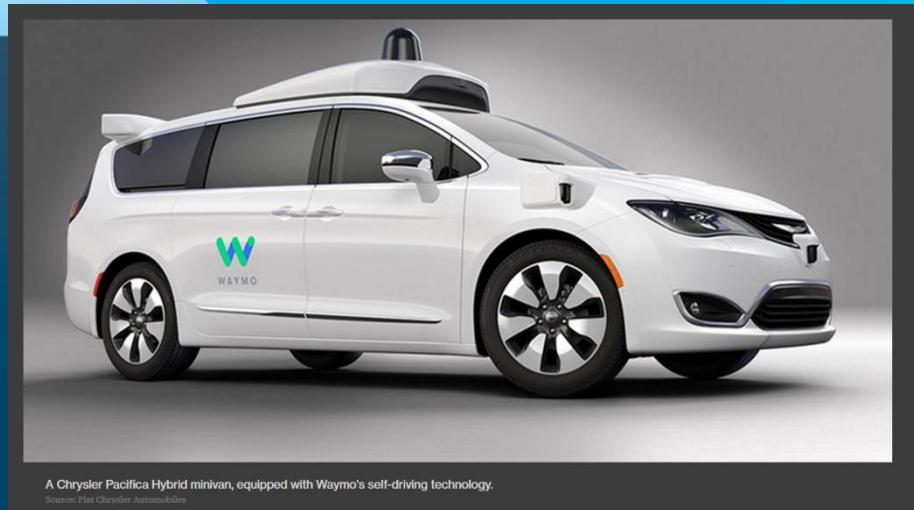
Changing driving laws to support automated vehicles

Discussion Paper October 2017



The truth is more complex. The most advanced self-driving technologies work only in an extremely limited set of environments and weather conditions. And while most new cars will have some form of driver assistance in the coming years, autonomous cars that drive in all conditions without human oversight are still many years away.





Bloomberg Philanthropies THE ASPIRE INSTITUTE

Initiative on Cities and Autonomous Vehicles

About



mapbox

Mapbox © OpenStreetMap Improve this map

Is your city getting ready for AVs? This is a guide to

As the pace of autonomous vehicle (AV) innovation picks up, cities have become the proving ground of choice. Tech giants, automakers, and startups alike are focused on cities because that is where future customers live and work.

According to research by the Goldman Sachs Group, less than 10 per cent of travel in North America is taken in non-personally owned vehicles. However, report author Bern Grush – a systems engineer and futurist – says that by 2030, that percentage may climb to 25 per cent or higher as more people turn to robo-taxis, micro-transit and ride sharing. Why? Because automation will make these systems more reliable and far cheaper than today's taxi and bus services — and even personal ownership, for an increasing number of travellers.

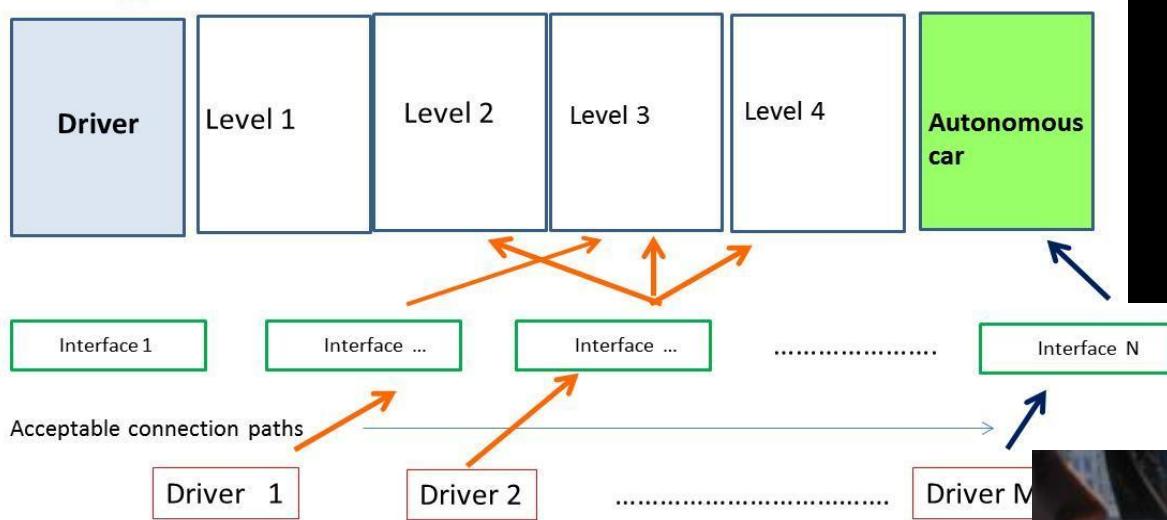
On Wednesday, the House of Representatives did something that's woefully uncommon these days: It passed a bill with bipartisan support. The bill, called the SELF DRIVE Act, lays out a basic federal framework for autonomous vehicle regulation, signaling that federal lawmakers are finally ready to think seriously about self-driving cars and what they mean for the future of the country.

**Speech 5 September 2017
Speech at the Driving Future Platform in
the European Parliament**

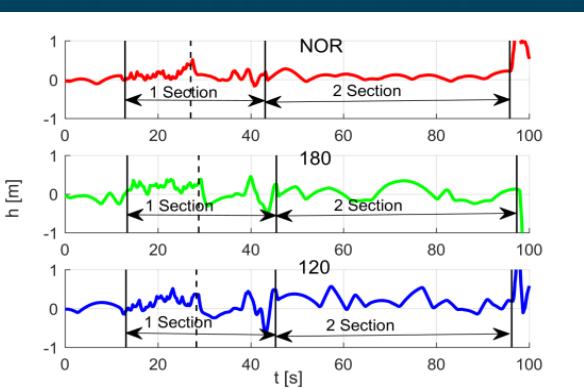
FRANKFURT (Reuters) - German industrial group Siemens has agreed to buy Dutch self-driving software specialist Tass International for an undisclosed sum to strengthen its automotive business, it said on Wednesday.



Level of CAR Automation



Warsaw University of Technology



Dual user interface (steering wheel + joystick) to make optimum interior dedicated also to wheelchair users

In-wheel outer-rotor motors to make floor flat and slim

Hybrid electric energy storage/source



Road clearance control by wire („active” suspension)

Hybrid braking system

Steer by wire

Break by wire

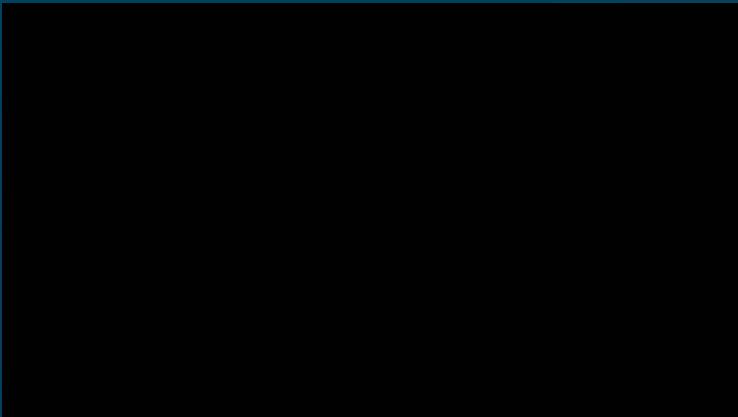
Regenerative braking

Accelerate by wire

POLSKIE SZANSE

Informatyka

Nietypowe zastosowania miejskie , które mają szanse osiągnąć sukces





ITS
POKA

INNOVATIVE ECONOMY
SYSTEMS
NATIONAL COHESION STRATEGY

above the ground

EUROPEAN UNION
EUROPEAN REGIONAL
DEVELOPMENT FUND



(metropol) ERTICO
ITS EUROPE

Commissioner
Violeta Bulc
while visiting the
project Eco-Mobility



road network shared by public
Transport: / bus trolley /,
private cars (electric,
conventional,
automated, working in
traditional
mode or car sharing)



PRT system and ECO-car, developed in the
framework of ECO-Mobility project
(the project was led by
Prof.W.Choromanskiego and cofinanced
By European Regional Development Fund)



Horizon 2020 HMASSUT - Prometheus

Systems Integration: PRT, eco-car, automated car level
2 or 3 / V2I /. The ability to use vehicles with PRT infrastructure.
Ability to implement the system into existing transport infrastructure

The Hybrid, Modular and Automated System for Sustainable Urban Transport



SciTech
Poland

UNIVERSITY
of WARSAW
Warsaw University
of Technology

Coffee break.



Prezentacja systemu na Targach
Hanover Messe 2017



Już mamy konkurencję



**USA. Amerykańska przyszłość
autobusów? Przetrwają jeśli się**

**Rosyjski rywal Google'a też
buduje autobus autonomiczny**

**Helsinki. Autobus bez kierowcy
rusza na publiczne drogi**

**Putin o sztucznej inteligencji:
kto opanuje tę technologię,
będzie rządził światem**



Dziękuję za Uwagę











