Panel: When will my car drive me to work?

Organizer: Professor Ali Niknejad, UC Berkeley

Symposium Chair: Yiorgos Makris
Poster Session Chairs:
Naofal Al-Dhahir, Kanad Basu and Sam Shichijo

October 17, 2022

TEXAS ANALOG CENTER OF EXCELLENCE

Fun Driving vs Reality

The Dream…

Self-driving cars that allow drivers and occupants to relax during journeys are not as close to launching as optimists had hoped.

https://europe.autonews.com/automakers/autonomous-vehicles-undergo-reality-check

Thank you DARPA !

At the break of dawn on March 13, 2004, 15 vehicles left a starting gate in the desert outside of Barsto

Levels of autonomy

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) AUTOMATION LEVELS

Full Automation

0	1	2	3	4	5
No Automation	**Driver Assistance**	**Partial Automation**	**Conditional Automation**	**High Automation**	**Full Automation**
Zero autonomy; the driver performs all driving tasks.	Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.	Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.	Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.	The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.	The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.

https://accoladetechnology.com/5-levels-of-autonomy-l1-and-l2/

Safety

Moral Dilemmas:

Play this killer self-driving car ethics game

Josh Constine @joshconstine / 4:18 PM PDT • October 4, 2016   ☐ Comment

What should the self-driving car do?
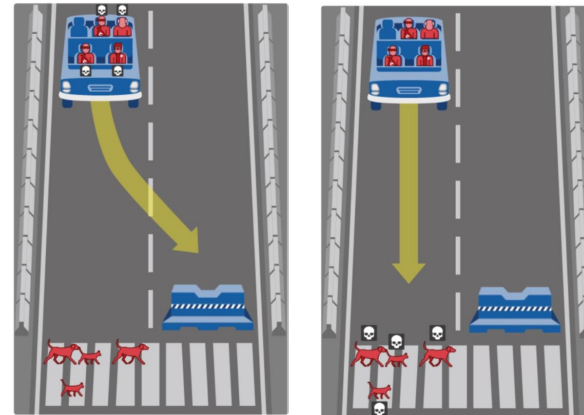
Should a self-driving car full of old folks crash to avoid puppies in the cross-walk? Is it OK to run over two criminals if you save one doctor? Whose lives are worth more, seven-year-olds or senior citizens?
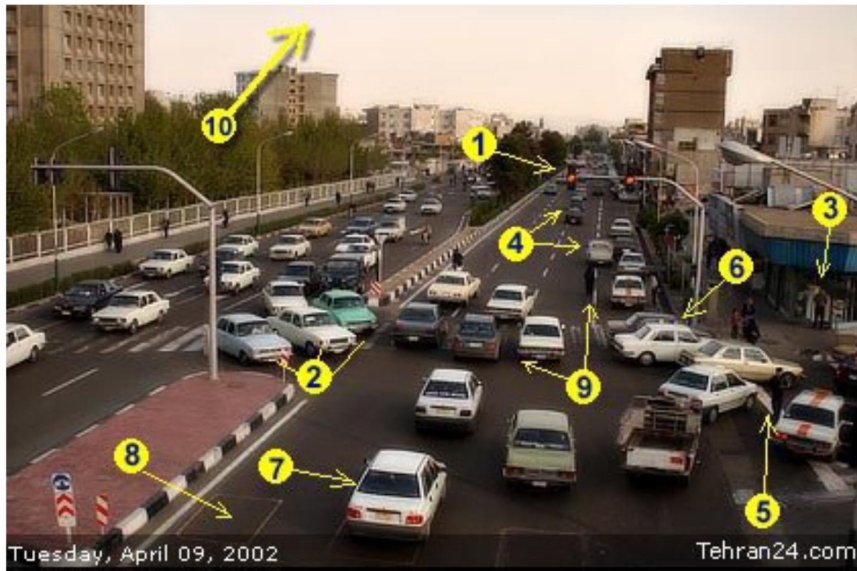
"Corner" Driving Conditions

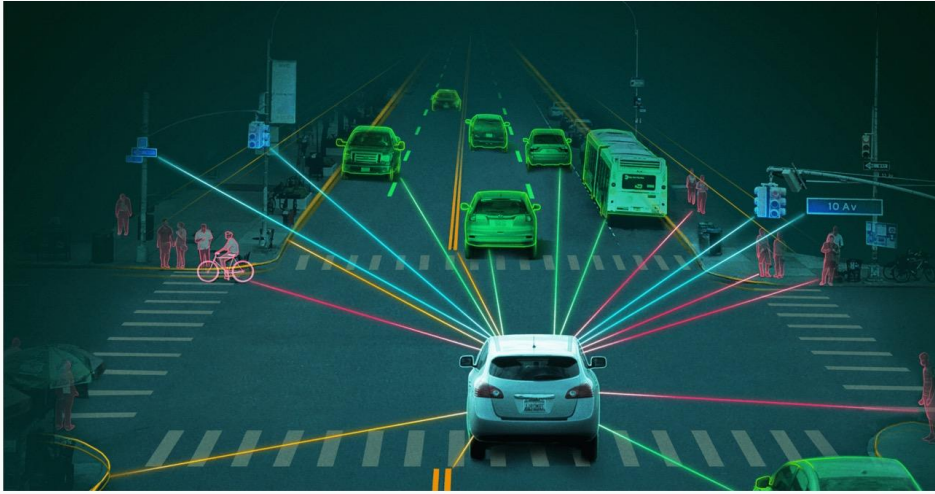Photo from tehran24.com
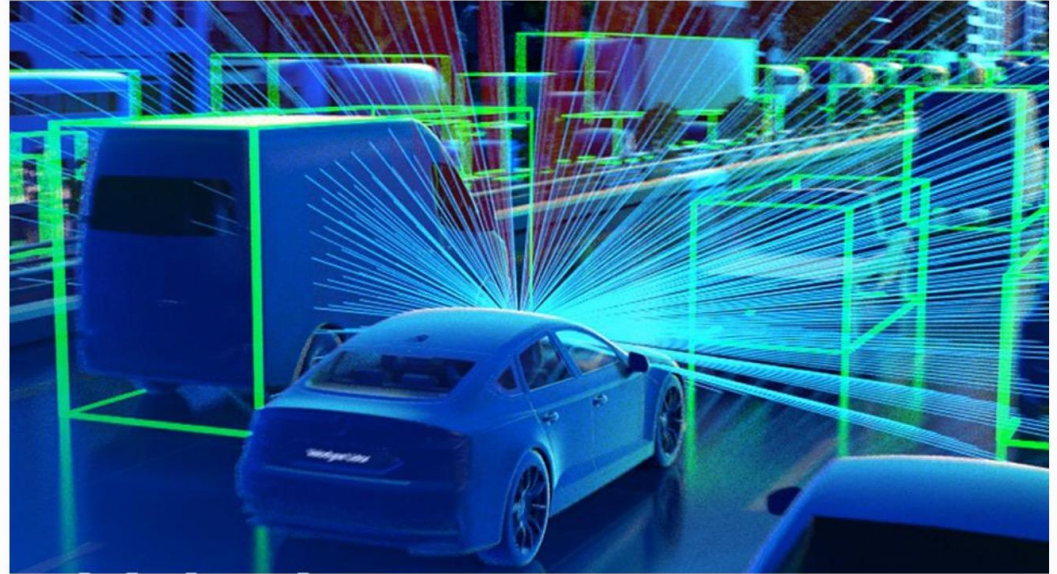
Good god!
Anatomy of urban chaos

By Farhad Radmehrian

Morning rush-hour traffic in Jakarta, Indonesia, is shown here. Gridlock this tight could paralyze a driverless car. Credit: Supri/Reuters

Urgently Needed: Sensors!

Research in Autonomous Driving – A Historic Bibliometric View of the Research Development in Autonomous Driving

INTERNATIONAL JOURNAL OF INNOVATION AND ECONOMIC DEVELOPMENT

https://www.forbes.com/sites/alanohnsman/2020/01/07/lidar-pioneer-velodyne-debuts-100-auto-safety-sensor-as-self-driving-cars-pace-to-market-slows/?sh=2a18f4f36cbc
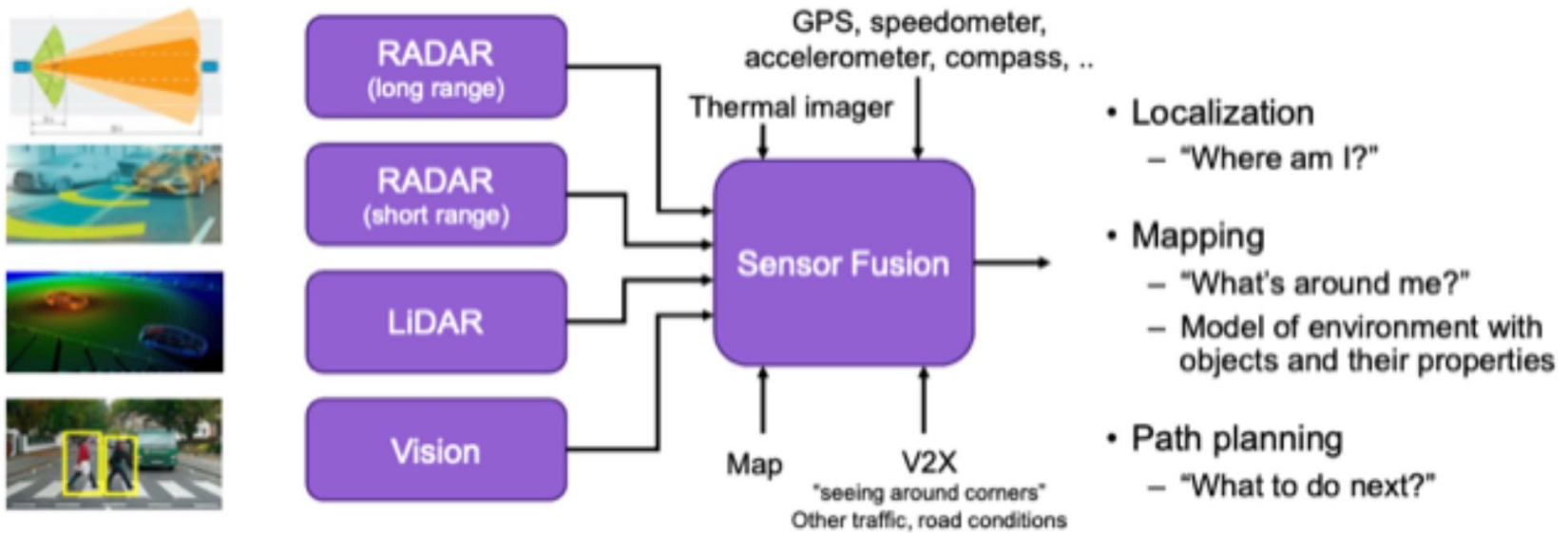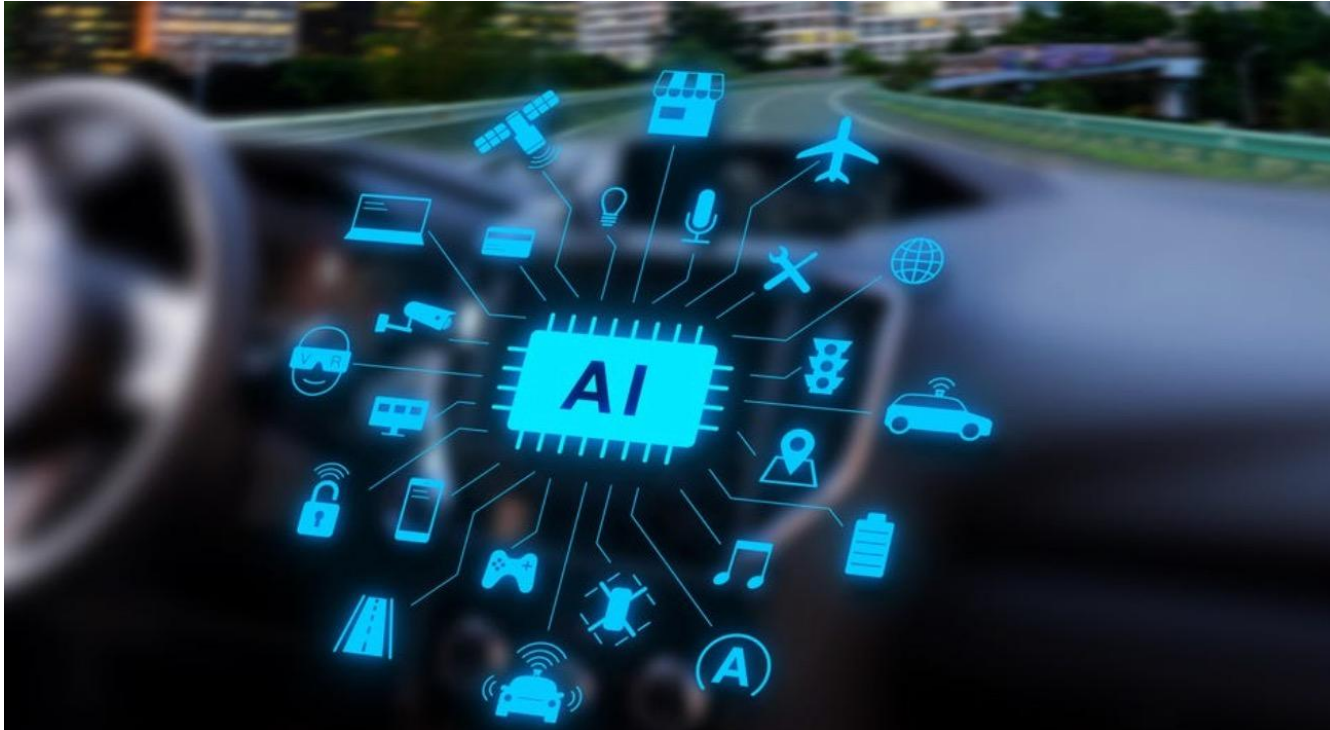
Sensor Fusion

Fig. 1: Sensor fusion. Source: Synopsys

Other sensors: Audio, MIMO/SAR Radar, multiple cameras, …

AI/ML ?

GPU/CPU on wheels?

ANNOUNCING
NVIDIA DRIVE WITH NEW ORIN AND AMPERE
5W TO 2,000 TOPS — ONE PROGRAMMABLE ARCHITECTURE

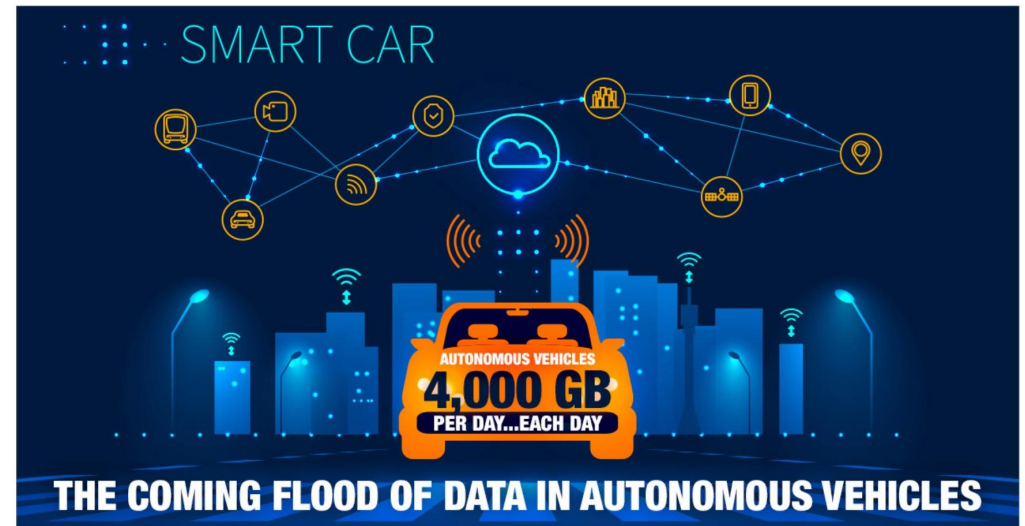| ADAS	L2+	L5
Windshield NCAP	Autopilot	Robotaxi
10 TOPS, 5W	200 TOPS, 45W	2,000 TOPS, 800W
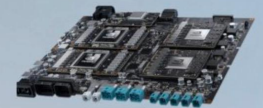
← SINGLE SCALABLE ARCHITECTURE — SOFTWARE COMPATIBLE →

Do we need a "5G" network? A smart city?

The Key to Autonomous Driving: The 5G Network

Aug 10, 2017

SMART CAR

AUTONOMOUS VEHICLES
4,000 GB
PER DAY...EACH DAY

THE COMING FLOOD OF DATA IN AUTONOMOUS VEHICLES

V2V Communication?

https://www.gihub.org/infrastructure-technology-use-cases/case-studies/vehicle-to-vehicle-v2v-connectivity/

Panelist

Adeel Ahmad
Radar Systems Algorithm Engineer
Texas Instruments Inc.

Panelist

Franklin Trujillo
Head of Technical Program Management
for Product Infrastructure
Waymo

Panelist

Jianming Ma
Director
TxDOT

Panelist

Murtaza Ali
Vice President of Systems Engineering
Uhnder Inc.

Panelist

Dave Copps
CEO
Worlds

Panelist

Matt Markel
Radar Systems
Ghost Autonomy

Panelist

Balazs Simacsek
Director
Head of Hardware Security Architecture
NXP Semiconductors