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Software Safety for Vehicle Automation

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Overview: ADS Safe Software Needs

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- Approach to software-based system safety needs to change due to:
  - Changing validation approaches
  - Changing relevance of perception defects
  - Changing role of human driver
  - Changing computing architecture
  - Changing safety expectations, standards, regulation
  - Building trust with stakeholders

- Required for success:
  - Software & system safety as core competencies
    - Can't outsource safety for automated vehicle integration
  - Significant investment in people, skills, processes for:
    - System engineering
    - Safety engineering, safety culture

ADS = Automated Driving System

ADS Technology:

Sold Based on Safety

[Waymo VSSA; https://bit.ly/2QuYhai]

Sensors → Computers → Vehicle Control

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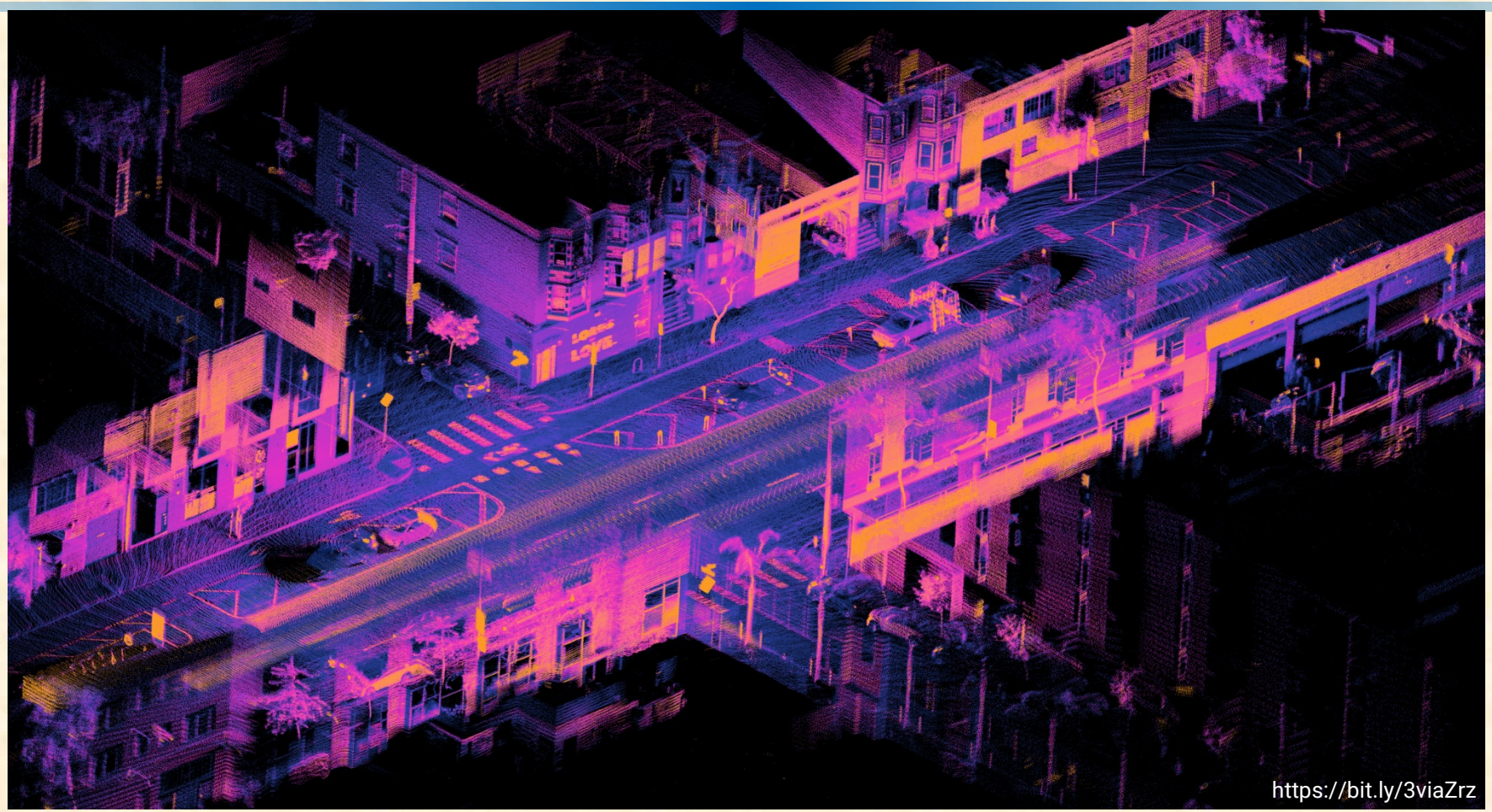

https://bit.ly/3viaZrz

Machine Learning / Deep NNs

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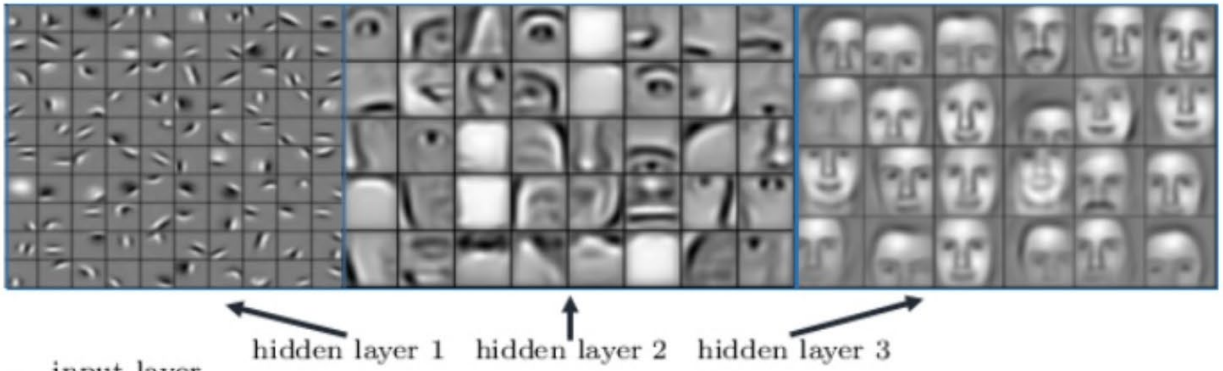
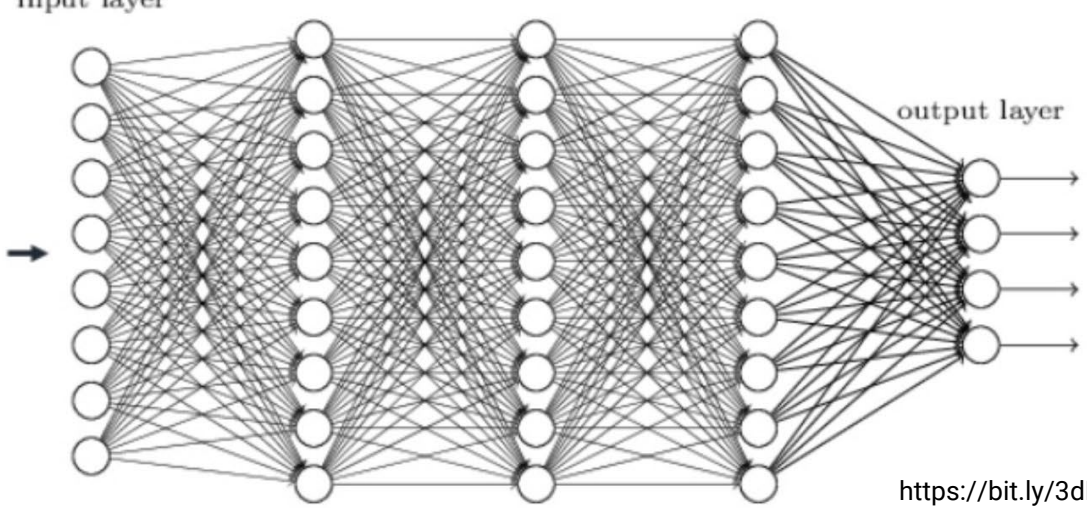
Learn by example:

Deep neural networks learn hierarchical feature representations





https://bit.ly/3dMSV2S

The “Race To Autonomy”

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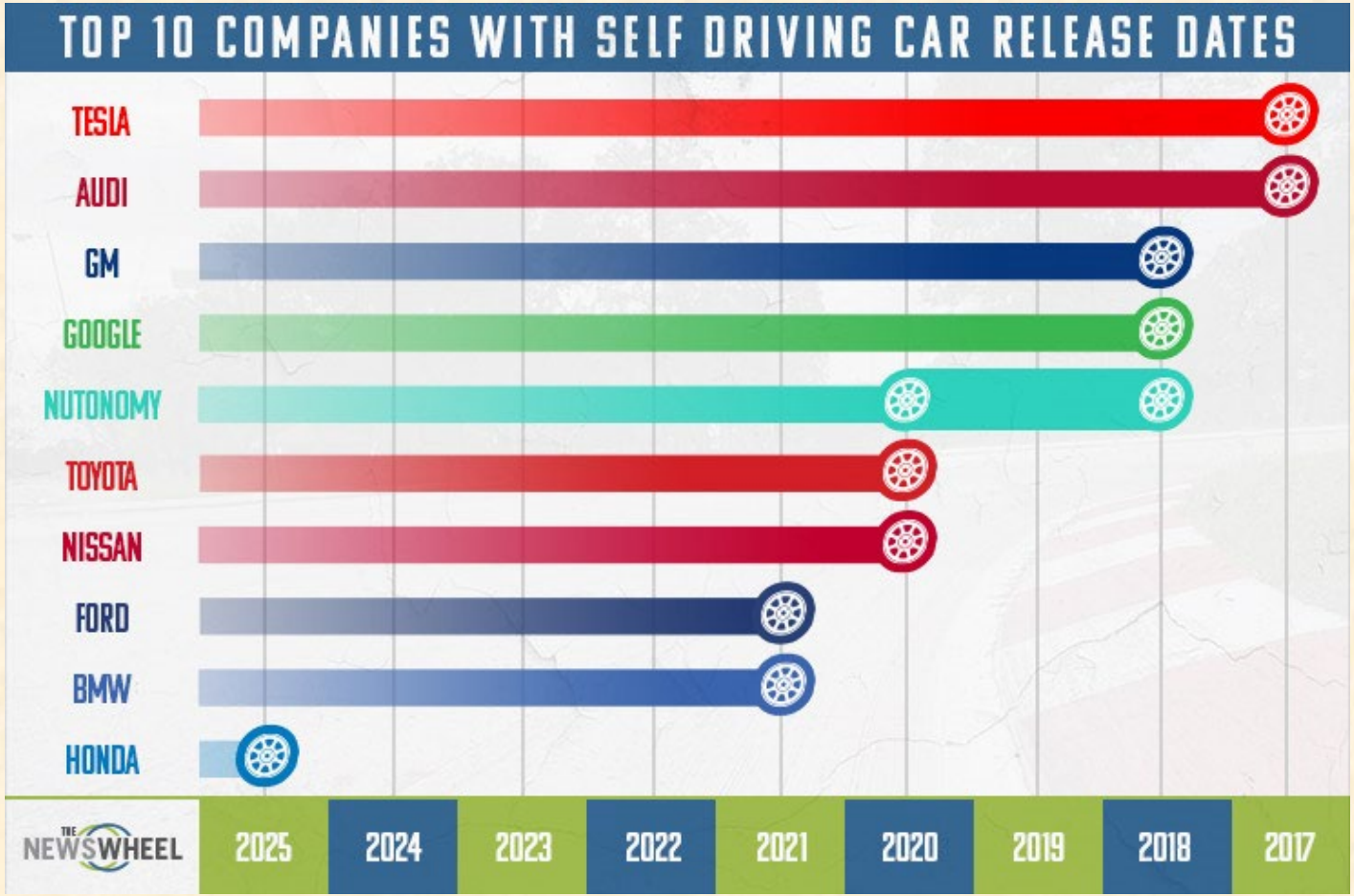
- 2017 Edition
- But in 2021 we know it’s going to take a long time to deploy at scale



Urgent Integration & Validation Issues

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An internal source from Volkswagen explained that ID.3's software issues were mostly due to a lack of qualified personnel.

The True Winner Must Be Safe

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SELF-DRIVING CARS —

How terrible software design decisions led to Uber's deadly 2018 crash

NTSB says the system "did not include consideration for jaywalking pedestrians."

TIMOTHY B. LEE - 11/6/2019, 4:52 PM

https://bit.ly/32JrLUt

Technology

Uber offloads troubled self-driving unit to startup Aurora

The division came under scrutiny after a self-driving Uber struck and killed a pedestrian in Tempe, Ariz., in 2018.

12/2020 https://wapo.st/3tSzSd5

An Uber self-driving vehicle goes through a test track in Pittsburgh in 2019. (Justin Merriman for The Washington Post)

Automation Changes Safety Needs

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- Building trust
- Skilled Personnel
- Standards & Regulation
- Role of human driver
- Sensors & Perception
- Validation approaches
- Computing architecture
- Safety Expectations