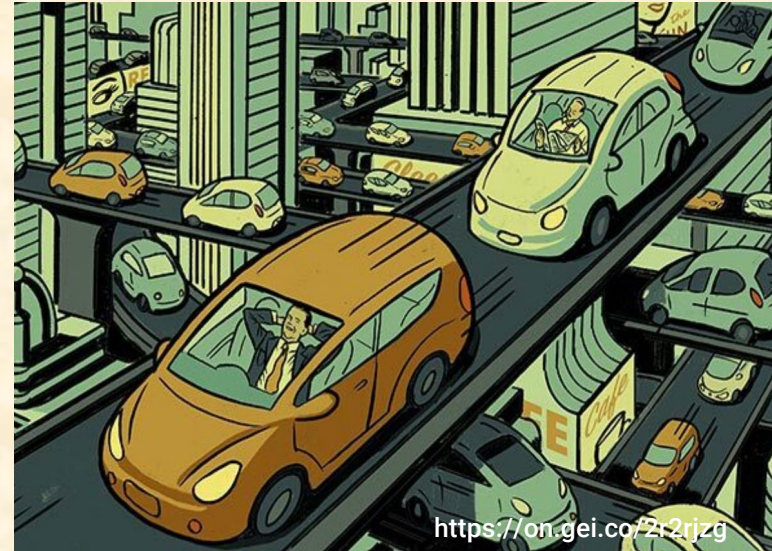


Quick Overview

- Getting past Automated Vehicle (AV) safety rhetoric
- AV safety in a nutshell
- Policy points:
 - Societal benefits
 - Public road testing
 - Municipal preemption
 - SAE Level 2/2+/3 issues
 - Federal vs. state regulation
 - Other policy issues
- Revisiting common myths



“Robotaxis Are Not Prone To Human Error” (??)

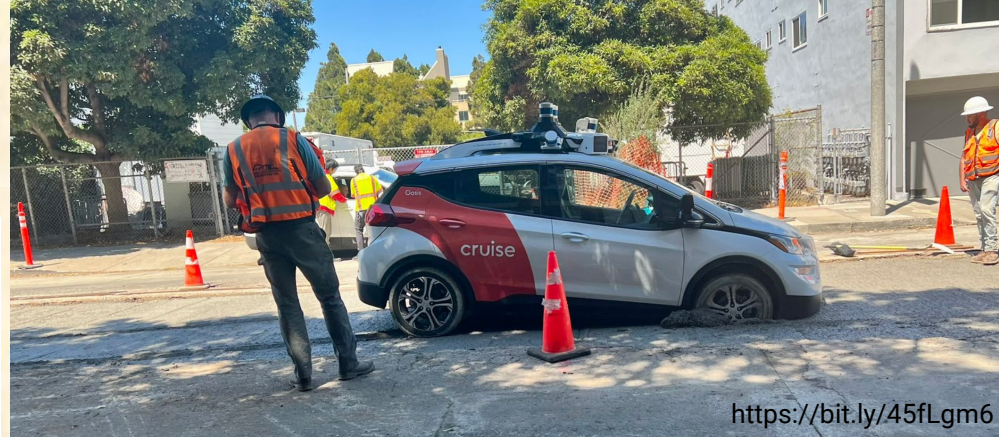
■ Instead, you get Robot Error



<https://bit.ly/CruisePowerLines>

Two Cruise cars in San Francisco became wrapped in downed Muni wires and caution tape at Leavenworth Street and Clay Street on March 21, 2022.

Courtesy of John-Phillip Bettencourt



<https://bit.ly/45fLgm6>



<https://bit.ly/3R1bGnx>

Getting Past the AV Safety Rhetoric

- Nobody knows when/if Autonomous Vehicles (AVs) will be safer than human drivers
 - Reduced fatality rates are aspirational
- Some humans drive drunk
 - On average they are still good and adaptable
- But computers lack common sense
 - Machine Learning can fail in novel situations
- Computer drivers can be imperfect
 - Might hit a bus – even if lidar sees the bus
 - **Safety must be engineered, not assumed**



Elements of AV Safety

- 1. Safe as a human driver on average**
 - ~75M to 125M miles/fatality for S.F., including impaired
- 2. Avoiding risk transfer onto vulnerable populations**
 - Pedestrian harm should not increase – even if net harm is reduced
- 3. Avoid negligent computer driving**
 - Running red lights and stop signs is not OK
- 4. Conform to industry safety standards**
 - Including SAE J3018 for public road testing
- 5. Address other ethical & equity concerns**
 - Avoid local preemption; manufacturer accountability for harm

Policy Point: Societal Benefit

■ Benefits accrue only after AVs are safe and reliable

- 100++ million miles to confirm reduced fatalities
- Near term, “safe” might mean lower reliability

➤ Ask the hard questions

- What benefits will there be right now?
 - “Benefits disabled” but no wheelchair access
 - “Already saving lives” with about 1 million miles
 - “Promise unprofitable thing X” with no regulation
- What public costs will there be right now?
 - Congestion and blocked emergency responders
 - Risk of harm from still-under-development software on public roads

A Swarm of Self-Driving Cruise Taxis Blocked San Francisco Traffic for Hours

More than a half-dozen Cruise-branded Chevy Bolts were reportedly stuck blocking lanes for hours.

BY ROB STUMPF | PUBLISHED JUL 5, 2022 12:49 PM EDT

NEWS



<https://bit.ly/45xmpdo>

Policy Point: Public Road Testing

■ There is no such thing as driverless testing

➤ Safety driver should stay in until safety is proven

- Require SAE J3018 testing safety standard
- Test with driver not touching controls
- “Beta” is road testing, not SAE Level 2



NTSB investigators on-scene in Tempe, Arizona, examining the Uber automated test vehicle involved in the collision.
(NTSB photo)

➤ Driver-out should be testing the business model, not safety

- Software updates need driver-in qualification testing

Policy Point: Municipal Preemption

- Companies push for municipal preemption
 - Argue that cities will ban AV testing
 - How is this working out in San Francisco?
- Middle ground: responsive to local conditions
 - Munis can forbid testing for specific situations
 - School zones during student transit times
 - Parades, fires, 1st amendment events, construction
 - Munis can selectively suspend service
 - Keep away from emergency scenes after firefighter incidents
 - Avoid high-activity neighborhoods after fire truck crash
 - Munis must be able to enforce traffic laws

Two Waymo Cars Block San Francisco Traffic Again As Robotaxi Stalling Incidents Rise 300 Percent

The self-driving cars were left motionless by heavy San Francisco traffic due to the Pride Parade and Giants game on Sunday.

By Adam Ismail

Published June 27, 2023 | Comments (17)



<https://bit.ly/3DZTpza>

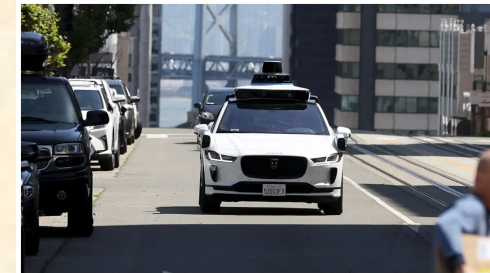


Photo: Justin Sullivan (Getty Images)

Policy Point: SAE Level 2/2+/3 Vehicles

- Already deployed on roads
 - Fatalities, injuries due to driver complacency
 - No substantive regulations beyond sparse recalls
 - Level 3 “gives driver time back”
 - Is driver criminally liable for a fatality?
 - Mercedes Benz only talks about product liability
 - Create a clear duty of responsibility for the computer driver
 - When computer is driving, manufacturer is responsible party
 - Defined, non-zero safe harbor transition time back to human driver
 - Liability attaches to manufacturer for inadequate driver monitoring
- ➔ Detailed proposal for state regulation on this topic



Image: Mercedes-Benz AG

Policy Point: Federal vs. State Regulation

- Problem: computer driver is “equipment”
- NHTSA/FMCSA should control equipment
 - Ability of computer driver to adhere to state laws
 - [ANPRM NHTSA-2020-0106](#) AV framework
- States should control computer driver behavior
 - Hold computer drivers to same duty of care as a human driver
 - Determine and enforce driving behavioral rules
 - Ability to revoke driver licenses based on negligent driving
 - Munis need ability to enforce & report negligence to state DMV



[Dall-e]

Other Policy Points

■ Economic impact

- Saturation of fully automated vehicles is decades away
- City-by-city / route-by-route for foreseeable future
- Still need humans for remote support, maintenance, testing
- Still need people for last few feet of delivery, security, etc.

■ Required arbitration

- Impairs transparency (and safety) with secret outcomes
- Degrades balance of power if mandatory

■ Equity issues

- Will underserved populations benefit without regulatory mandate?
- Will road testing impose risk on the vulnerable?



Quick List of Myths

- “Humans are terrible drivers” / “94% Human Error”
 - Computers lack common sense; they make mistakes too
- “We have 5 MILLION miles of testing”
 - Proof of saving lives requires 100 million to 1 billion miles
- “Level 2/2+ makes cars safer”
 - AEB helps safety; Some Level 2/2+ systems decrease safety
- “We, the manufacturer, take responsibility” (for product liability)
 - The more urgent issue is tort/criminal, not product liability
- “Current laws and regulations are enough” → FALSE
 - Liability issues; Software safety regulation; L2+ loophole
 - Little regulatory pressure for promised benefits

- Liability-based proposal for state AV regulation & podcast
 - <https://safeautonomy.blogspot.com/2023/05/a-liability-approach-for-automated.html>
- Video lecture series on autonomous vehicle safety:
 - Keynote AV Safety overview video : https://youtu.be/oE_2rBxNrfc
 - Mini-course: <https://users.ece.cmu.edu/~koopman/lectures/index.html#av>
- “Safe Enough” book & talk video:
 - <https://safeautonomy.blogspot.com/2022/09/book-how-safe-is-safe-enough-measuring.html>
- UL 4600 AV safety standard book & talk video:
 - <https://safeautonomy.blogspot.com/2022/11/blog-post.html>
- US House E&C testimony:
 - <https://safeautonomy.blogspot.com/2023/07/av-safety-claims-and-more-on-my.html>