



RoboTaxi Incidents in USA (SF/ Austin)

Agenda:
December 11, 2025
Current Incidents involving Robotaxis

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MoneyWatch

U.S. expands investigation into Waymo over robotaxis driving around stopped school buses

By Mary Cunningham

Updated on December 8, 2025 / 8:03 PM EST / CBS News

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Federal regulators said they are expanding an investigation into Waymo this week, following reports that the company's self-driving cars navigated around school buses stopped on the road in Austin, Texas.

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Tesla robotaxis face scrutiny after erratic driving caught on camera during Austin pilot

By Mary Cunningham

June 25, 2025 / 10:32 AM EDT / CBS News

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The National Highway Traffic Safety Administration is investigating Tesla after incidents involving the electric car maker's robotaxis were caught on camera this weekend during a pilot in Austin, Texas.

NHTSA, which operates under the Department of Transportation and regulates automobile safety, said it contacted Tesla after videos surfaced showing instances of the company's self-driving taxi driving down the wrong side of the road and braking erratically.

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TESLA

Tesla 'Robotaxis' keep crashing despite 'safety monitors'

Paul Lambert | Oct 29, 2025 - 1:56 pm PT | 136 Comments

Feat from elec

Forbes

INNOVATION ▾ TRANSPORTATION

Tesla Robotaxi Reports 5 Crashes In Austin In July, Hides Details

By Brad Templeton, Senior Contributor

Published Sep 18, 2025, 09:45pm EDT | Updated Sep 22, 2025, 01:06pm EDT

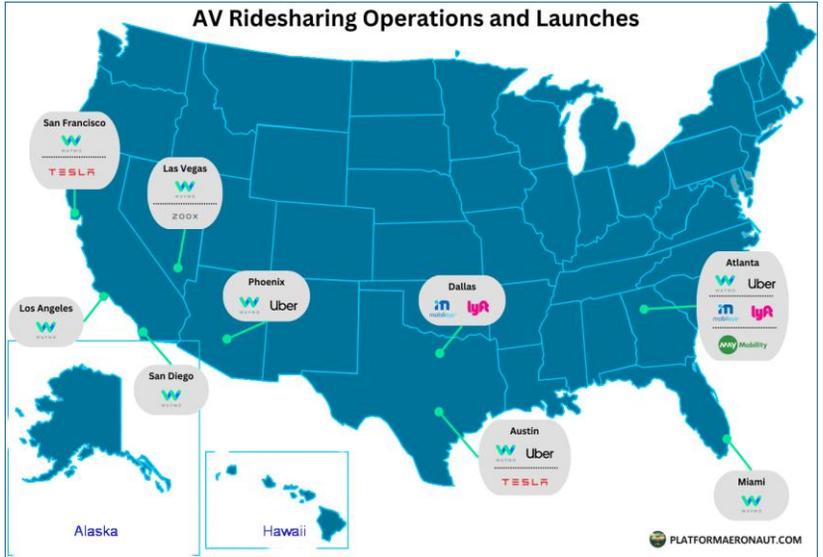
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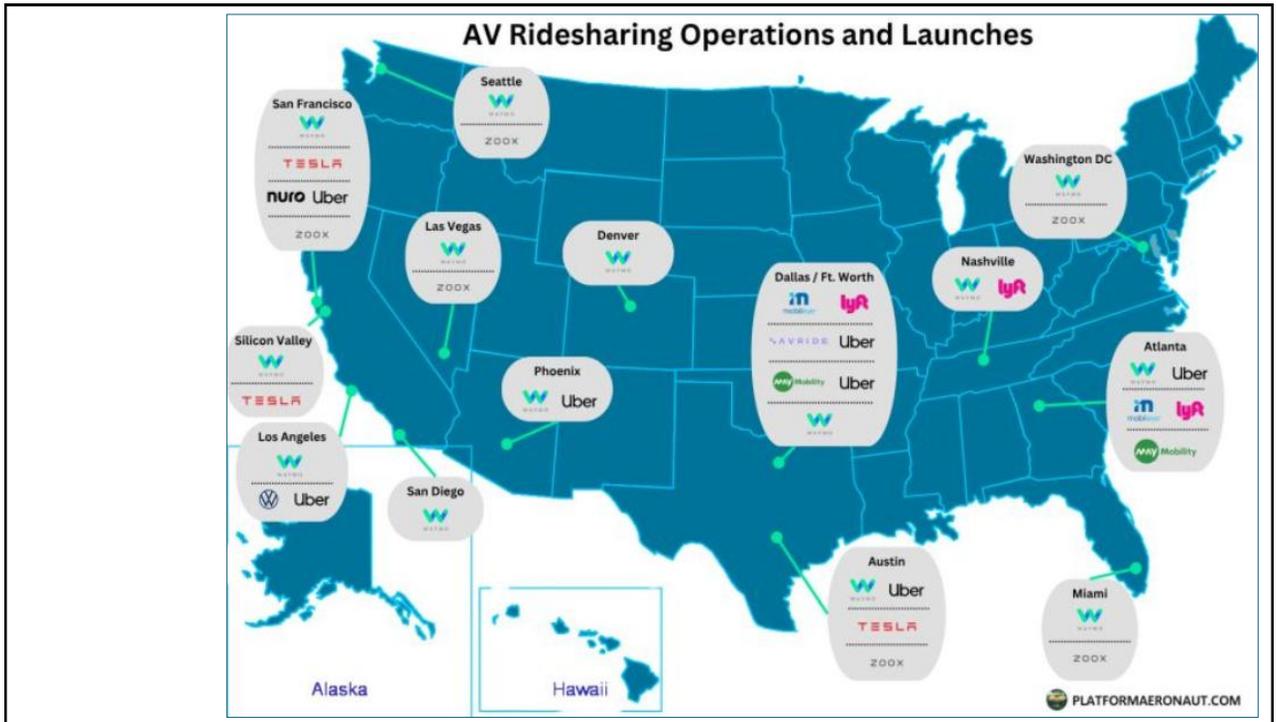
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West .
Southwest .
Southeast

- **Climate and Weather Stability**
 - Regulatory Friendliness
 - **Road Geometry**
 - Fleet Logistics
 - Mapping and Simulation Constraints
 - Waymo Targets Early-Adopter **Tech Cities**
 - NHTSA and Incident Management Load
- Tesla vs Waymo Difference



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Company	Deployment Pattern	Active Cities	Technology	National Footprint
Waymo	Sun Belt corridor (West → Southeast)	SF, LA, Phoenix, Austin, Atlanta	L4 robotaxi, LiDAR-heavy	Limited to selected cities
Cruise	Dense urban clusters (SF, TX cities)	Phoenix (restart), Dallas (supervised)	L4 robotaxi, Camera + Radar	Restricted (post-2023 reset)
Tesla	Nationwide (non-geofenced)	Austin robotaxi (pilot)	Vision-only E2E, L2/L3, some L4 pilot	All states
Zoox	One-city focus + limited expansion	Foster City, Las Vegas, SF test	L4 custom robotaxi	Very narrow footprint

Interpretation
Why the patterns differ

Waymo

(Climate + regulation + geofencing)

- Needs dry weather
- Needs city approvals
- Geofenced L4/ ODD-specific deployment

Tesla

(Nationwide because FSD is not geofenced)

- No HD maps
- No city-by-city approval
- End-to-end learning allows broad deployment

Cruise

Dense urban showcase

- Wanted to prove competence in hardest zones
- Paid the price with higher incident sensitivity

Zoox

(Slow, vehicle-specific expansion)

- Custom vehicle requires custom ODD
- Heaviest engineering constraints

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The Cruise Story

Year	Milestone	Incidents
2013	Cruise founded	The original product: Autonomous kit for Audi cars
2016	GM acquires Cruise (~\$1B)	GM buys Cruise for >\$1 billion (2016): Changed Cruise forever Cruise became GM's "flagship autonomy project" Vehicles used: Chevrolet Bolt Evs, Equipped with LiDAR, radar, cameras, and high-compute units
2017- 2018	Heavy SF testing on Chevy Volt/Bolt platforms	Cruise Origin (no steering wheel) in January 2020,
2020	Cruise Origin robotaxi revealed	SF was risky: San Francisco is the hardest AV city in the U.S.: Complex features, Narrow roads, Steep hills, Dense pedestrians Cruise started there too early.
2021	First driverless rides at night	First paid robotaxi rides (late night only) No human drivers in some zones at night (supervised, limited) Behind the scenes: <ul style="list-style-type: none"> • Operators, emergency responders, and residents reported: • Frequent "zombie car clusters" (10–20 Cruise cars stuck together) • Wrong-lane entries • Blocking buses & ambulances • Entering emergency scenes • Getting tangled in construction sites • Slow reaction to pedestrians
2023 - Oct	Major pedestrian dragging accident Exposed fatal flaws:	The pedestrian dragging incident (oct 2, 2023)
2023 - Nov	Cruise grounded nationwide	
2024 - 2025	Rebuild phase, safety overhaul	Limited supervised testing only (no robotaxis)



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Tesla's current deployments in Austin in 2024–2025:

Tesla's robotaxi concept *is planned*, but all operational timelines remain uncertain

- Supervised FSD v12 fleet learning, not a robotaxi service
- No paid rides, no fully driverless operation, and no approved ODD



Date / Period	Incident Type	Severity	Operational Impact
June	Over-cautious stopping	Low	Software tuning update pushed
June	Lane selection error	Low	Geofenced small zones temporarily
June	GPS multipath misalignment	Low	Mapping + localization refinement
June	Pedestrian misclassification (low-light)	Low	Model confidence threshold adjusted
July	Phantom braking event	Medium	OTA patch to reduce false positives
July	Road-work confusion	Low	Added temporary cone-detection heuristics
August	Ride terminated early	Low	Routine fail-safe response
August	Wrong curb-side drop-off	Low	Added dynamic curbside spacing logic
September	Unprotected left-turn hesitation	Low	Behavior cloning data updated
September	Minor bumper contact (non-injury)	Low	No fault attributed to robotaxi
November	Stop-and-creep instability	Low	OTA update deployed
November	Passenger-reported issue	Low	Motion planner refined
December	Heat-related sensor derating	Low	Thermal controls adjusted

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Waymo

Safety issues & regulatory scrutiny



May 2024	U.S. regulatory investigation initiated by NHTSA reuters	Reports of “unexpected behavior” or minor collisions involving Waymo robotaxis. Waymo issued a recall in 2025 (for about 1,200 vehicles) to update software to better detect and avoid roadway barriers
Mid-2025	The NHTSA investigation was officially closed around reuters	The closure does not mean the end of oversight
Late 2025	Multiple reports, especially from the Austin Independent School District . Claiming Waymo vehicles illegally passed stopped school buses with flashing red lights and stop arms reuters	After those 19+ incidents, Waymo acknowledged a “software issue.” On December 5, 2025, it issued a voluntary software recall for its fleet to fix how the cars handle school-bus situations.
By January 20, 2026	The NHTSA has demanded detailed answers from Waymo new-york-post	Whether Waymo temporarily suspended operations near schools at pickup/drop-off times, and whether the software fix is sufficient
	Meanwhile, other incidents continue to occur beyond school buses, there have been publicized cases of robotaxis performing questionable maneuvers like: <ul style="list-style-type: none"> • illegal U-turns • aggressive driving 	It is sparking debate about how cautious or aggressive driverless cars should behave

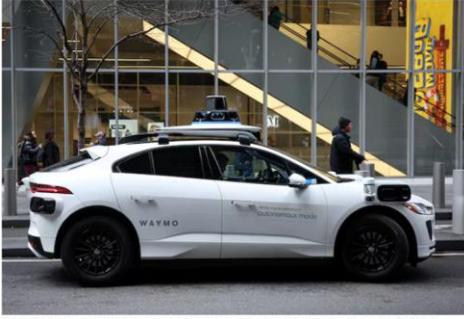
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Reuters World Business Markets Sustainability Legal Commentary Technology Investigations

Waymo to issue recall over self-driving vehicles driving past stopped school buses

By David Shepardson

December 6, 2025 8:40 AM GMT+9 · Updated December 6, 2025



Waymo driverless taxi parks in lower Manhattan in New York City, U.S., November 26, 2025. REUTERS/Brendan McDermid [Purchase License Rights](#)

Dec 5, 2025 · Business

Waymo agrees to software recall to fix illegal school bus passing

Jason Muller

Dec 5, 2025 · Business



Waymo robotaxis in San Francisco. Photo by JESSICA KENNEL/FP via Getty Images

Waymo said late Friday it will issue a voluntary software recall in response to a federal safety probe of its self-driving cars for illegally passing school buses.

Why it matters: In announcing the recall, Waymo said it believes recent software fixes were sufficient to boost safety, and that it won't suspend service in school districts, as requested by [officials in Texas](#).

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RoboTaxi Incidence Taxonomy

December 18, 2025

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Robotaxi Incident Taxonomy: Mapped to Global Standards

ID	Incident Category	Typical Sub-Cases	Primary System Domain	Relevant ISO / Standards / Regulatory References
C1	Collision Events	V2V: Vehicle-Vehicle V2P: Vehicle-pedestrian/Cyclists V2O: Vehicle - Objects	Perception Prediction Planning	ISO 21448 (SOTIF) ISO 26262 (Functional Safety) UNECE R157 (ADS safety)
C2	Traffic Rule & Behavioral Violations	Signal violation wrong-way illegal lane use	Policy Planning	ISO 21448 UNECE R157 SAE J3016 (Driving task allocation)
C3	Stall Immobilization Events	Frozen vehicle deadlock unrecoverable safe-stop	Decision-making Control	UL 4600 ISO 21448 UNECE WP.29 ADS Guidelines
C4	Operational Environment Misinterpretation	Construction zones temporary signage police signals	Perception Mapping	ISO 21448 UL 4600 NHTSA ADS Best Practices
C5	Emergency Priority Vehicle Interaction	Fire trucks Ambulances police vehicles	Policy Perception	UL 4600 UNECE R157 ISO 21448
C6	Localization & Mapping Failures	GPS drift map mismatch urban canyon	Localization	ISO 21448 ISO 26262 SAE J3016
C7	Weather & Visibility Degradation	Fog rain, snow, dust/ sand, glare	Sensor performance	ISO 21448 UL 4600 UNECE ODD specification guidance
C8	Motion & Ride Quality Events System Faults Human Interaction & Operations Cyber / Communication Events Policy & ODD Limitations	Phantom braking, harsh jerk, Sensor failure, OTA regression Remote-ops error, passenger misuse V2X loss, backend outage, data corruption Excessive conservatism, service refusal	Motion planning System reliability Operations System security ODD definition	ISO 21448; UNECE R157; ISO 22179 ISO 26262; ISO 24089 (OTA updates); UL 4600 UL 4600; UNECE WP.29, HMI-Guidelines ISO/SAE 21434 (Cybersecurity); UNECE R155 ISO 21448; UNECE R157 (ODD compliance); SAE J3016

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Mapping of Real Robotaxi Incidents to Taxonomy

Category	Incident Category	Waymo (US)	Cruise (US)	Baidu Apollo Go (China)	AutoX (China)
C1	Collision Events	Low-speed V2V crashes dog collision (2023, SF)	Pedestrian drag incident (2023, SF) multiple V2V	Minor V2V & V2P incidents	Minor V2V during testing no severe injuries reported
C2	Traffic Rule & Behavioral Violations	Hesitation / improper yielding at turns	Improper left turns blocking intersections	Conservative rare misinterpretation	Lane-use ambiguity at complex junctions
C3	Stall / Immobilization Events	Vehicles frozen in construction at dead-ends	Mass freezing event (Aug 2023, SF)	Occasional safe-stop deadlocks in pilot areas	Rare immobilization remote recovery used
C4	Operational Environment Misinterpretation	Construction cones temporary signage confusion	Construction zones caused repeated stoppages	Temporary road works misread in Beijing/Wuhan	Temporary lane closures caused slowdowns
C5	Emergency & Priority Vehicle Interaction	Fire truck & police interaction challenges School Bus Incidents, Austin	Blocking fire engines (SF Fire Dept complaints)	Emergency vehicle yielding overly conservative	Limited public data mostly handled via geofencing
C6	Localization & Mapping Failures	Urban canyon lane-offset issues (SF)	Map mismatch during reroutes	HD map mismatch in rapidly changing roads	Lane offset errors in mixed traffic
C7	Weather & Visibility Degradation	Fog-related halts in SF	Nighttime + fog worsened perception	Rain, dust, and smog degradation cases	Rain and glare affect vision-only segments
C8	Motion & Ride Quality Events System Faults Human Interaction & Operations Cyber / Communication Events Policy & ODD Limitations	Hard braking Sensor redundancy triggered Police hand-signal misinterpretation safe stop No major public incidents	Sudden braking discomfort complaints Software logic failure Remote-ops delay	Overly cautious acceleration / braking Sensor calibration faults reported Remote operator intervention	Conservative jerk profiles reported Compute reset events during trials Remote ops used for recovery Limited public disclosure

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Linden EZ10 incidence Columbus OHIO

Dated: December 23, 2025

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Columbus, Ohio Incidence

Columbus halts self-driving shuttle pilot program following sudden stop; NHTSA steps in

Alexa St. John | Automotive News | 02/25/2020

Autonomous Vehicles

A passenger falling aboard a self-driving shuttle as part of a pilot program in Columbus has put the project on hold less than three weeks after it began.

The daily shuttle service in the Linden neighborhood in Columbus, Ohio, was halted after one of the pilot's vehicles from French manufacturer EasyMile made a sudden stop around noon Thursday, Feb. 20. One passenger fell from her seat to the floor of the shuttle as a result.

NHTSA on Tuesday ordered a suspension of passenger operations for 16 autonomous shuttles operated by EasyMile in 10 U.S. states including Utah, Texas, Colorado, New Jersey, Florida, Ohio, California and Virginia pending an examination of "safety issues related to both vehicle technology and operations."



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- **EasyMile Project**
 - 16 autonomous shuttles
 - across 10 states

- **Smart Columbus Initiative**
 - US\$ 1.10 million
 - 2@12-passenger Low-Speed Self-Driving Shuttles
 - EZ10 – French Operator
 - The Pilot Program: Feb 05, 2020 ~ Feb 2021
 - Test Drive: Feb 05, 2020
 - Speed: 7 mph (11 kph)
 - Linden Neighborhood

- **Linden Incidence**
 - Feb 20, 2020
 - Sudden Brakes @ 7 mph (11 kph)
 - A female passenger fell onto the floor from seat
 - sustaining minor injuries
 - A human operator/ and a passenger were also aboard

- **Test Drives Halted NHTSA**
 - Feb 20, 2020
 - Orderd a suspension of passenger operations
 - 16 EasyMile autonomous shuttles across 10 states
 - Until pending investigation

- **Service Resumed**
 - July 29, 2020 ~ March 2021
 - transport boxes of food for people
 - during the COVID pandemi



Linden Incidence

The passenger was not “dropped out” of the shuttle externally; rather, she fell inside the vehicle due to the abrupt stop from her seat.

Lesson Learned

- **False Positive (NHTSA Investigation Report)**
 - Investigators determined
 - Autonomous Emergency Braking (AEB) safety layer, not by a collision or system failure.
 - though there was no clear external obstacle.

Sustem
Fuctioning
correctly

- Emergency braking logic
- human-unsafe
- Braking jerk ≈ 0.4–0.6 g (high for standing / elderly passengers)

- interior safety design gap
- human-machine interface failure

- **NHTSA Recommendations 2020**
 - Seat belts
 - Audible warnings
 - Revised braking profiles
 - Passenger briefing procedures

L4 Responsibility Model Comparison

Japan vs EU vs US

Aspect	Japan	European Union (EU)	United States (US)
Primary Legal Framework	Road Traffic Act (amended), MLIT L4 Guidelines	UNECE framework (R157 + national transposition)	State-level laws + NHTSA ADS guidance
Recognized "Driver" in L4	System / Operating Entity	System / Operating Entity	Operator / Company (varies by state)
Human Onboard Requirement	Not required	Not required	Not required
Passenger Responsibility	None	None	None
Dynamic Driving Task (DDT)	System	System	System
Fallback within ODD	System	System	System
Remote Operator Role	Supervisory (not a driver)	Supervisory (not a driver)	Supervisory; authority varies by state
ODD Definition	Strict, regulator-approved	Strict, type-approval based	Operator-defined, state-approved
Liability Orientation	Operator-centric	Manufacturer / Operator-centric	Operator-centric (tort-based)
Safety Assurance Basis	Guidelines + safety case	Type approval + compliance	Self-certification + reporting

[AV Collision Report Standards](#)
[gmw_report](#)
[china_Appalo](#)
[carnews_china](#)
[china_autoX](#)

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Contrast with Japan / EU (important)

Aspect	Tort-based (US)	Rule-based (Japan / EU)
Liability assignment	After incident (court)	Before operation (law/regulator)
Responsibility clarity	Case-by-case	Explicit
Safety assurance	Ex post	Ex ante
Role of courts	Central	~ Limited (L4 not yet on scenes)
Role of regulator	Light	Strong

Ex ante (Japan ~EU)

- Safety demonstrated before operation begins. This includes:
- Safety cases
 - Regulatory approval
 - Design reviews
 - Hazard analysis
 - ODD definition and validation

Trust Slow

Ex post (US)

- Safety is evaluated after an incident occurs. This includes:
- Accident investigation
 - Litigation
 - Liability determination
 - Court judgments
 - Post-incident corrective action

Rapid Uncertain

Hybrid models

Approvals: strong ex ante approval
 Monitoring: continuous ex post

Ex ante vs Ex post Approach in Autonomous Driving

Aspect	Ex Post Safety Assurance	Ex Ante Safety Assurance
Timing	After incident	Before deployment
Who enforces	Courts / Investigators	Regulator / Certification body
Main tools	Tort law, liability claims	Safety case, standards compliance
Goal	Assign responsibility	Prevent accidents
Typical standards	Tort law, product liability	ISO 21448, ISO 26262, UL 4600
System trust	Established through precedent	Built in advance
Regulatory style	Reactive	Preventive

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Lessons

- Treat Non-Collision Events as Safety-Critical
- Jerk Matters More Than Speed
- False Positives Are a First-Order Risk
- Japan Must Avoid “Pilot = Proof of Safety”
- Interior Safety Standards Must Be Elevated
- False Positives Are a First-Order Risk

Air Brakes + L4 AEB Is a Serious Risk Amplifier

Air brakes are:

- Excellent for stopping heavy vehicles
- Poorly suited for frequent false-positive emergency stops

Emergency braking logic in L4

- Is binary by design (stop vs not stop)
- Prioritizes obstacle clearance over comfort

Combine the two and you get

- High braking force
- Short reaction window
- Significant jerk
- Multiple passengers losing balance simultaneously



This is **exactly the Linden failure mode** multiplied by:

- 4 × mass
- 3–4 × passengers
- Standing elderly riders

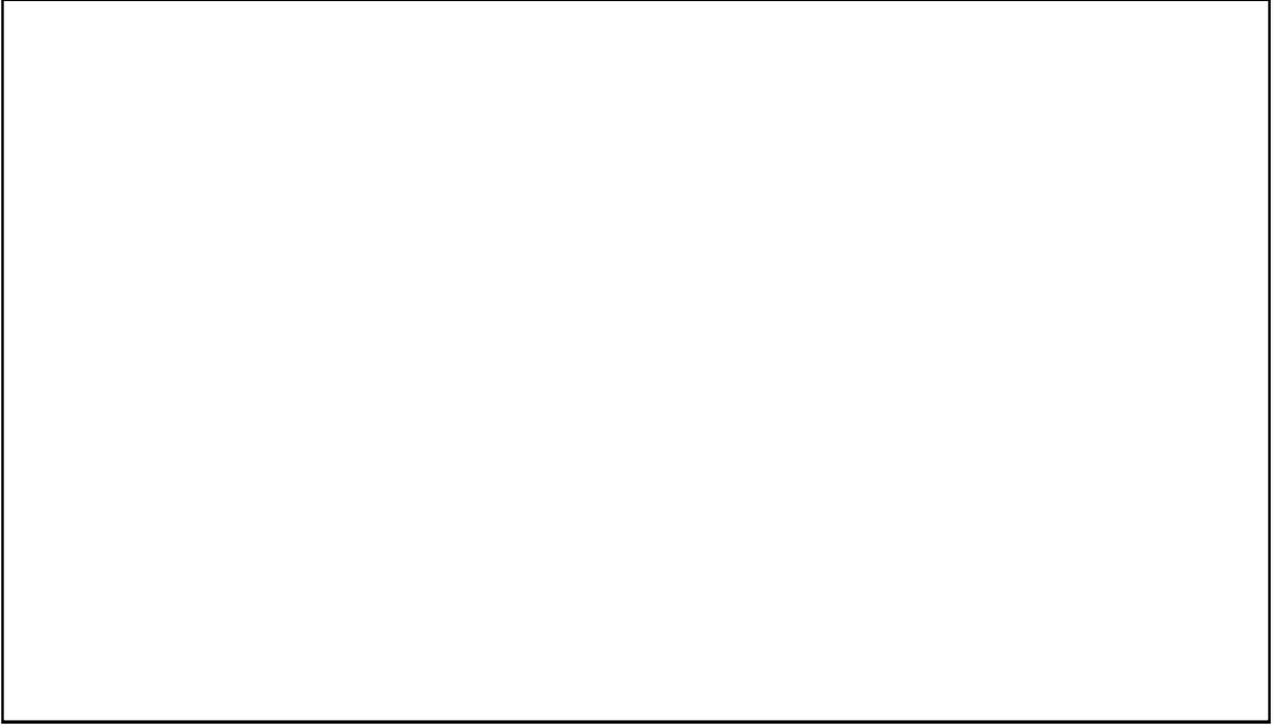
Comparative Risk Table — Linden Shuttle vs Isuzu 28-Seater

Parameters	Linden Shuttle (EasyMile EZ10)	Isuzu 28-Seater Bus	10-Seater Shuttle
Vehicle length	~4.0 m	~10.0 m	~5.0–6.0 m
Gross vehicle mass (approx.)	~3 tons	10–13+ tons	~4–5 tons
Passenger capacity (max)	~8	28 seated / ~ 43 (original)	~ 8 - 10
Standing passengers	Limited / discouraged	High probability	Minimal / avoidable (Low Roof)
Brake system type	Electric / hydraulic	Pneumatic (air brakes)	Electric / hydraulic
Typical operating speed	7–12 km/h	20–40 km/h (even if limited)	15–25 km/h
Emergency brake modulation	Fine / smooth	Coarse, stepwise	Fine / smooth
Probable jerk at sudden stop	Medium (≈0.3–0.5 g equivalent)	High (≈0.5–0.8 g equivalent)	Low–Medium (≈0.3–0.5 g)
Passenger fall cascade risk	Low–Medium (1–2 persons)	High (multiple passengers)	Low

Context	Best Japanese term By Muhammad Mursaleen
Public explanation / slide	急加減速 (きゅうかげんそく)
Technical appendix	ジャーク (jerk)
Passenger feeling	ガクツとする動き

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