AN INEVITABLE TRUISM: REGULATING AUTONOMOUS VEHICLES AS A SALE OF GOODS UNDER ARTICLE 2 OF THE UNIFORM COMMERCIAL CODE

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I. INTRODUCTION

You are in a fully autonomous vehicle cruising down a two-lane highway alongside a cliff. Suddenly, a school bus from oncoming traffic swerves in front of your vehicle; given the speed at which you are going, there is not enough time to stop. Your vehicle has a decision to make: either swerve off the cliff to avoid hitting the bus, or crash into the bus, pushing it off the cliff instead (scenario one). The algorithms driving autonomous vehicles will inevitably be forced to make such decisions.[1] Now, imagine you are in the same situation, but this time there is a malfunctioning sensor on the front of your car, and it does not detect the bus that swerved in front of you (scenario two). Both scenarios will result in an unavoidable accident, but caused by completely different issues. How can liability be regulated given the possibility of these intricate scenarios? Moreover, how will anyone know what went on inside the computer algorithm moments before the crash?

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1. The issues of morality and ethics regarding the ultimate decision that the vehicle should make are outside the scope of this note. *See* Laura Emmons, *The Reasonable Robot Standard: How the Federal Government Needs to Regulate Ethical Decision Programming in Highly Autonomous Vehicles*, 33 J.C.R. & ECON. DEV. 293, 294-97 (2020), for a discussion of the importance of governmental regulation on ethical decision making in autonomous vehicles.

Despite the difficulty of answering those questions, policy compels the need for autonomous vehicles.[2] Current events involving autonomous vehicle accidents illustrate the need for regulations.[3] The possibility of accidents gives rise to an implicit legal challenge presented by autonomous vehicles: How do we encourage autonomous vehicle production, development, and widespread utility, consistent with policy interests, while also regulating liability issues? Some suggest strict products liability.[4] Others recommend shifting insurance requirements from drivers to vehicles by adopting no-fault, vehicle-specific insurance requirements.[5] Additionally, some manufacturers either promote in-house insurance or accept liability for accidents caused by their autonomous vehicles,[6] while others in the legal community advocate treating autonomous vehicles like animals[7] or

2. *See e.g., Automated Vehicles for Safety*, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., https://www.nhtsa.gov/vehicle-safety/automated-vehicles-safety#the-topic-benefits (last visited Apr. 6, 2024).

3. *See e.g., Autonomous Vehicle Collision Reports*, CAL. DEP'T OF MOTOR VEHICLES, https://www.dmv.ca.gov/portal/vehicle-industry-services/autonomous-vehicles/autonomous-vehicle-collision-reports/ (last visited Apr. 6, 2024); Lisa Fernandez, *Surveillance Video Shows Moment Tesla S Brakes on Bay Bridge Before 8-Car Pileup*, FOX KTVU (Jan. 12, 2023, 1:52 PM), https://www.ktvu.com/news/surveillance-video-shows-moment-tesla-s-brakes-on-bay-bridge-before-8-car-pileup; Tom Hals & Hyunjoo Jin, *Tesla Hit with Proposed Class Action Over Phantom Braking Issue*, REUTERS (Aug. 29, 2022, 12:40 PM), https://www.reuters.com/legal/tesla-hit-with-proposed-class-action-over-phantom-braking-issue-2022-08-29/; Lance Eliot, *Tesla on Autopilot Slams Into Stalled Car on Highway, Expect More of This*, FORBES (May 26, 2019, 11:28 AM) https://www.forbes.com/sites/lanceeliot/2019/05/26/tesla-on-autopilot-rams-into-stalled-car-on-highway-expect-more-of-this/?sh=6b463f3b4fe5.

4. *E.g.*, David C. Vladeck, *Machines Without Principals: Liability Rules and Artificial Intelligence*, 89 WASH. L. REV. 117, 146-47 (2014) (discussing why strict liability is warranted for autonomous vehicles).

5. *See* Anat Lior, *Insuring AI: The Role of Insurance in Artificial Intelligence Regulation*, 35 HARV. J.L. & TECH. 467, 471 (2022) (discussing the application of no-fault insurance to regulate liability of autonomous vehicles); Anthony Paolino III, Note, *The Ultimate Insurance Policy: Autonomous Vehicles and Artificial Intelligence, A Statutory Proposal for a Complicated Product*, 3 ARIZ. L.J. EMERGING TECHS. 1, 2 (2018) (discussing a federally mandated no-fault insurance regulatory scheme for autonomous vehicles).

6. *See* Fred Lambert, *Tesla (TSLA) is About to Launch Its In-House Insurance Program in More States*, ELECTREK (Mar. 22, 2021, 2:52 PM), https://electrek.co/2021/03/22/tesla-tsla-launch-in-house-insurance-program-more-states/; *Who is Responsible for a Driverless Car Accident?*, BBC NEWS (Oct. 8, 2015), https://www.bbc.com/news/technology-34475031; Stephen Elmer, *Volvo, Google and Mercedes to Accept Responsibility in Self-Driving Car Collisions*, AUTOGUIDE (Oct. 7, 2015, 12:21 PM), https://www.autoguide.com/auto-news/2015/10/volvo-google-and-mercedes-to-accept-responsibility-in-self-driving-car-collisions.html.

7. *E.g.*, William J. Tronsor, Note, *The Omnipotent Programmer: An Ethical and Legal Analysis of Autonomous Cars*, 15 RUTGERS J.L. & PUB. POL'Y 213, 271-76 (2018) (discussing agency liability of autonomous vehicles by treating autonomous vehicles as animals).

corporations.[8] Regardless of which approach manufacturers take or we formally adopt, the sale of autonomous vehicles is a sale of goods,[9] and therefore falls under Article 2 of the Uniform Commercial Code (UCC).[10] There is already a well-established body of law that directly applies to autonomous vehicles as a sale of goods.[11] With some minor changes, the UCC is ready to tackle a fully autonomous world of self-driving cars.

Part II of this Note explains how autonomous vehicles function and discusses the different types of malfunctions they can incur. Part III introduces liability solutions suggested by the legal community in tort and insurance law, and discusses their potential issues. Part IV introduces the application of Article 2 of the UCC to the sale of goods, suggests minor amendments to certain UCC sections when applied to autonomous vehicles, and advocates for a federal requirement that autonomous vehicles come with a black box data recorder, to make the UCC's inevitable application on autonomous vehicles pragmatic. This Note concludes by proposing that the UCC—with two minor amendments—provides a comprehensive approach to regulating autonomous vehicles as a sale of goods;[12] such an approach furthers the essential purpose of the UCC, balances policy interests in autonomous vehicles with a well-established body of law, resolves conflicts in this area of the law, and eliminates the need to create a brand new regulatory framework for autonomous vehicles.

II. THE TECHNOLOGY BEHIND AUTONOMOUS VEHICLES

Autonomous vehicles utilize complex technology and present novel liability issues. The Society of Automotive Engineers (SAE) has classified autonomous vehicles from levels zero to five based on their level of

8. *E.g.*, Michelle Sellwood, Comment, *The Road to Autonomy*, 54 SAN DIEGO L. REV. 829, 869-72 (2017) (discussing how autonomous vehicles should be treated as corporations for purposes of liability).

9. *E.g.*, Ouellette Mach. Sys., Inc. v. Clinton Lindberg Cadillac Co., 60 S.W.3d 618, 621 (Mo. Ct. App. 2001) ("The sale of a motor vehicle is a sale of goods and is governed by the U.C.C.").

10. U.C.C. §§ 2-101 to 2-275 (AM. L. INST. & UNIF. L. COMM'N 2021).

11. *Id.* § 2-105(1).

12. Regulating autonomous vehicles as a sale of goods is mere truism, yet this approach has been widely overlooked in the legal community.

SAE Levels of Autonomous Vehicles					
Include Driver Support Features			**Include Automated Driving Features**		
SAE	**SAE**	**SAE**	**SAE**	**SAE**	**SAE**
Level 0	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
When automated features are engaged, the driver is still driving.			When automated features are engaged, the driver is not driving.		
Driver must continuously pay attention and fully intervene when necessary.			Driver must drive if vehicle requests.	Does not require driver input.	
Level 0 features are limited to providing warnings and momentary assistance.	**Level 1** features provide steering OR brake and acceleration assistance.	**Level 2** features provide steering, brake, AND acceleration assistance.	**Level 3** features can drive the vehicle only if certain parameters are met.	**Level 4** features can drive the vehicle only if certain parameters are met.	**Level 5** features can drive the vehicle under any conditions.
Level 0 features include automatic emergency braking, blind spot warning, and lane departure warning.	**Level 1** features include lane keeping assist OR adaptive cruise control.	**Level 2** features include lane keeping assist AND adaptive cruise control.	**Level 3** features include traffic jam chauffeur.	**Level 4** features include local driverless rideshare option and the pedals / steering wheel may not be installed.	**Level 5** features include every feature in levels 0-4 and can drive under any conditions.

sees through the sensors—whether there is another vehicle approaching, a pedestrian crossing the street, or an animal wondering across the road—and commands outputs, such as turning the steering wheel, accelerating, or braking.[25]

Given these complexities, the inevitable reality of autonomous vehicles is that their sensors (hardware) can malfunction and the algorithm (software) that drives them is bound to glitch or at times be faced with an ethical decision to make based on an impending crash ahead.[26] Recall the introductory hypothetical. If, based on sensor input, the software driving the vehicle decides that hitting the car in front is the safer option, rather than swerving to the side, the result will be that of scenario one. Moreover, unintentional malfunctions that are bound to happen can throw the entire sense-plan-act chain apart and cause a collision. For example, if the software glitches in the plan phase, there may be erratic steering and acceleration outputs, notwithstanding proper sensor input. Alternatively, if a sensor malfunctions in the sense phase, the software in the next phase will not have an input to base its decisions on. Consequently, this will result in scenario two from the introductory hypothetical. Both scenarios will ultimately in unavoidable accidents, despite stemming from different causes.[27]

III. DISPARATE APPROACHES TO REGULATING LIABILITY AND THEIR IMPEDIMENTS

The intricacies of autonomous vehicle malfunctions present novel liability issues that the legal community has suggested to modulate with tort law, federal regulations, and no-fault, vehicle-specific insurance. However, the current suggestions in tort and insurance law are neither economically feasible nor practicable on their own.

First, imposing strict products liability on manufacturers chills technological development and harms public policy interests of using autonomous vehicles. Although some may argue that "manufacturers are better equipped to anticipate and guard against defects,"[28] as well as spread

25. *See* Srivastava, *supra* note 21, at 2; Yuxiao Zhang et al., *Perception and Sensing for Autonomous Vehicles Under Adverse Weather Conditions: A Survey*, 196 ISPRS J. PHOTOGRAMMETRY & REMOTE SENSING 146, 155 (2023).

26. *See* Emmons, *supra* note 1, at 317.

27. The National Highway Safety Administration (NHTSA) and California Department of Motor Vehicles are already tracking accidents involving autonomous vehicles. *Standing General Order on Crash Reporting*, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., https://www.nhtsa.gov/laws-regulations/standing-general-order-crash-reporting (last visited Feb. 21, 2024); *Autonomous Collision Vehicle Reports*, CAL. DMV, https://www.dmv.ca.gov/portal/vehicle-industry-services/autonomous-vehicles/autonomous-vehicle-collision-reports/ (last visited Oct. 20, 2022).

28. Sellwood, *supra* note 8, at 855.

litigation losses to consumers,[29] "imputing additional liability to the manufacturer ultimately becomes a barrier to the deployment of autonomous vehicles."[30] Despite the fact that some manufacturers are currently voluntarily accepting liability for accidents caused by their vehicles as a marketing scheme,[31] this will become a greater burden and hinder technological development once fully autonomous vehicles are mass produced. Absent some qualification, such as setting a maximum statutory limit on how much manufacturers can be strictly liable for,[32] strict products liability will essentially sway manufacturers away from vigorously developing levels four and five autonomous vehicles[33] and incentivize more disclaimers.[34]

Second, no-fault, vehicle-specific insurance requirements are not economically feasible and disincentivize manufacturers from creating safer cars while simultaneously providing manufacturers an opportunity to sell mandatory insurance to their customers. Under a no-fault regulatory scheme, "accident victim[s] can receive compensation directly from their 'own insurance company instead of having to show the fault of another driver to recover losses from [that] driver's insurance company.'"[35] Accordingly, manufacturers are already beginning to offer in-house insurance for accidents caused by their autonomous vehicles.[36] Doing so is favorable to manufacturers because it keeps their vehicle data and statistics private,[37] and offers a good marketing scheme. This Note does not suggest elimination of insurance entirely in the autonomous vehicle market, but instead, emphasizes that "[d]espite the advantages of this approach, this scheme may lead to problems of adverse selection, diminished bargaining power of the customer,

29. *Id.*

30. *Id.* at 857.

31. *See* Elmer, *supra* note 6.

32. It is important to note that although setting a maximum statutory limit on a strict products liability approach to regulating autonomous vehicles may seem like it addresses certain issues, it could also pose as a major obstacle against recovery for those who are severely injured in cases involving autonomous vehicle collisions.

33. *See* Shuttleworth, *supra* note 13.

34. *About Autopilot*, TESLA, https://www.tesla.com/ownersmanual/model3/en_us/GUID-101D1BF5-52D2-469A-A57D-E7230BBEE94B.html (last visited Nov. 7, 2023) (Tesla's disclaimer) ("Autopilot is designed for your driving comfort and convenience and is not a collision warning or avoidance system. *It is [the driver's] responsibility to stay alert, drive safely, and be in control of the vehicle at all times.*") (emphasis added).

35. Sellwood, *supra* note 8, at 865.

36. *See* Lambert, *supra* note 6.

37. Opposed to disclosing accidents to a national insurance company, in-house insurance helps manufacturers keep important, accident-related data acquired from autonomous vehicles private.

and logistics problems of manufacturers acting as insurers."[38] The policy behind the Federal Rules of Evidence for liability insurance[39] reasons that "courts have with substantial unanimity rejected evidence of liability insurance for the purpose of proving fault" because "knowledge of the presence or absence of liability insurance would induce juries to decide cases on improper grounds."[40] In the case of autonomous vehicles, the presence of liability insurance will induce manufacturers to manufacture and sell vehicles on improper grounds because, instead of focusing on developing safer cars, manufacturers will become insurance giants with their main focus on actuarial science. Thus, driving autonomous vehicles essentially made by insurance companies would be similar to flying on airplanes designed and manufactured by shoe companies, such as Adidas or Nike.

Third, treating autonomous vehicles as entities themselves—like animals or corporations—assumes the vehicle owner has *some* level of control over the decisions the computer algorithm makes in fully autonomous mode, and thus, presents feasibility issues. One scholar advocates treating autonomous vehicles like "dangerous animals" by imposing strict liability on their owners.[41] This approach appeals to "tort theorists who believe that injurers should be liable to victims when they subjected their victims to a nonreciprocal risk."[42] This view of strict liability is based on the fact that, because "individual[s] [are] dictating to their autonomous vehicle[s] where to take them, it seems more reasonable to state that the owner[s] of the vehicle[s] and not the manufacturer [are] creating the risk[s] their vehicle[s] impose[] on others."[43] Although this may sound logical at first, it is actually unreasonable to hold consumers liable for the actions of a car that makes its own decisions. Further, consumers have no input in the design, manufacturing, and programming process of autonomous vehicles. Moreover, the owners of dangerous animals can decide whether or not to take their animals out for walks or, whereas, in a presumably soon to be fully autonomous world, consumers will not have another choice for transportation.[44]

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38. Lior, *supra* note 5, at 489.

39. FED. R. EVID. 411.

40. *Id.* (Notes of Advisory Committee).

41. Tronsor, *supra* note 7.

42. *Id.* at 272.

43. *Id.* at 273-74.

44. Everyday, technological advancements in artificial intelligence lead us closer to becoming a fully autonomous world. In a fully autonomous world, both public and private transportation services will presumably be autonomous. Accordingly, arguing that consumers have a *choice* of whether or not to put others at risk through use of their autonomous vehicles is therefore ephemeral.

Another scholar suggests regulating autonomous vehicles like corporations.[45] Under this approach, the vehicle is treated as a corporation.[46] The owner of the vehicle owns one hundred percent of its "shares," thereby acquiring limited liability status for accidents caused by the vehicle while still being held responsible as the "director" of the corporation.[47] Thus, a fiduciary duty is placed upon the owner-director to maintain the vehicle-corporation.[48] This theory is based on the premise that "[i]n the autonomous vehicle sector, compliance could take the form of ensuring the vehicle's technology is up-to-date, is regularly serviced, and complies with road safety standards."[49] The issue with this premise is that, even if a vehicle is kept "up-to-date" and "is regularly serviced," accidents may nonetheless occur due to hardware or software malfunctions. Moreover, consumers will not always know whether the software driving their vehicles "complies with road safety standards," or how to update the software to comply with road safety standards if they do discover such a lack of compliance. It is evident that absent some other qualification to this approach, treating autonomous vehicles as corporations alone does not help solve the situations of scenarios one and two, as presented in the introductory hypothetical.

IV. A COMPREHENSIVE APPROACH TO REGULATING AUTONOMOUS VEHICLES AS A SALE OF GOODS

A. The Uniform Commercial Code and the Sale of Goods

The UCC is a well-established body of law that furthers policy interests and regulates liability for the sale of goods.[50] First, express and implied warranties under Article 2 of the UCC regulate liability for the sale of goods and ensure products perform and operate as intended.[51] Second, the UCC provides an extensive framework to support express and implied warranties. It permits manufacturers to contractually alter express and implied warranties,[52] specifies how and when manufacturers may waive them,[53]

45. Sellwood, *supra* note 8, at 869-70.

46. *Id.*

47. *Id.* at 870.

48. *Id.*

49. *Id.*

50. Article 2 of the UCC dates as far back as 1906 and has a long-established history of case law and application. *See Uniform Commercial Code*, UNIF. L. COMM'N, https://www.uniformlaws.org/acts/ucc, (last visited Nov. 12, 2022).

51. U.C.C. §§ 2-313 to 2-315 (AM. L. INST. & UNIF. L. COMM'N 2021).

52. *Id.* § 2-316.

53. *Id.*; *id.* § 2-719.

outlines remedies available from breach of warranty claims,[54] delineates what to do when there is a conflict between express and implied warranties,[55] and even provides an avenue for third-party beneficiaries to recover.[56] Third, Article 2 of the UCC furthers society's interest in owning goods, balances liability issues, and promotes fair dealing between manufacturers and their customers.[57]

B. Issues with the Uniform Commercial Code as it Stands When Applied to Autonomous Vehicles

It is undisputed that vehicles are classified as goods under the UCC.[58] It therefore logically follows that regulating autonomous vehicles as a sale of goods is *an inevitable truism*, regardless of which theory of liability in tort or insurance law is suggested by the legal community. Unless the federal government enacts a statute that exempts autonomous vehicles from the UCC, *it will apply*.[59] However, as the UCC currently stands, some sections present issues when applied to autonomous vehicles. To illustrate these problems, each pertinent section is first listed, then discussed in relation to autonomous vehicles.

1. Express and Implied Warranties (UCC §§ 2-313, 2-314, 2-315)

First, UCC § 2-313 "creates an express warranty that the whole of the goods *shall conform to the sample or model*."[60] Second, under UCC § 2-314(2):

> Goods to be *merchantable* must be at least such as
>
> (a) *pass without objection in the trade* under the contract description; and
>
> (b) in the case of fungible goods, *are of fair average quality within the description*; and
>
> (c) are *fit for the ordinary purposes* for which such goods are used; and

54. *Id.* § 2-719.

55. *Id.* § 2-317.

56. *Id.* § 2-318.

57. *See Uniform Commercial Code*, *supra* note 50.

58. *E.g.*, Ouellette Mach. Sys., Inc. v. Clinton Lindberg Cadillac Co., 60 S.W.3d 618, 621 (Mo. Ct. App. 2001); *see also* U.C.C. § 2-102 (AM. L. INST. & UNIF. L. COMM'N 2021).

59. A contractual approach to regulating autonomous vehicles as a sale of goods under Article 2 of the UCC has been widely overlooked in the legal community at the time of this writing. It is imperative to address the issues presented in this Note because Article 2 of the UCC, as it currently stands, applies directly to regulating the sale of autonomous vehicles.

60. U.C.C. § 2-313(1)(c) (AM. L. INST. & UNIF. L. COMM'N 2021) (emphasis added).

(d) *run, within the variations permitted by the agreement*, of even kind, quality and quantity within each unit and among all units involved; and

(e) are adequately contained, packaged, and labeled as the agreement may require; and

(f) *conform to the promises or affirmations* of fact made on the container or label if any.[61]

Third, under UCC 2-315, where the seller has reason to know any "particular purpose"[62] for which the goods are required, "there is unless excluded or modified under the next section an implied warranty that *the goods shall be fit for such purpose*."[63] These express and implied warranties are centered around an important assumption: that the consumer *knows*[64] of a malfunction. For consumers to *know* whether a product is "merchantable,"[65] "of fair average quality within the description," "conforms to the sample or model," "fit for the ordinary purposes," "fit for a particular purpose," runs "within the variations permitted," or "conforms to promises or affirmations," they must first *sense*[66] some type of malfunction, infirmity, impairment, error, glitch, problem, or abnormality with the product. After all, if the consumer does not know of or sense an infirmity with the product, there would not be a case for breach of warranty. Recall the introductory

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61. *Id.* § 2-314(2) (emphasis added).

62. The official comments to the UCC provide a helpful comparison between a "particular purpose," and an "ordinary purpose" of goods. U.C.C. § 2-315 cmt. 2 (AM. L. INST. & UNIF. L. COMM'N 2021) ("A 'particular purpose' differs from the ordinary purpose for which the goods are used in that it envisages a specific use by the buyer which is peculiar to the nature of his business whereas the ordinary purposes for which goods are used are those envisaged in the concept of merchantability and go to uses which are customarily made of the goods in question. For example, shoes are generally used for the purpose of walking upon ordinary ground, but a seller may know that a particular pair was selected to be used for climbing mountains.") (emphasis added).

63. U.C.C. § 2-315 (AM. L. INST. & UNIF. L. COMM'N 2021) (emphasis added).

64. "Knowing" about a malfunction for the purpose of this note is *anything* that consumers perceive to be out of line with how they believe the product is intended to operate, which may form a basis for their breach of warranty *claim*. *Know*, DICTIONARY.COM, https://www.dictionary.com /browse/know (last visited Oct. 27, 2022) (defining "know" as "to perceive or understand as fact or truth; to apprehend clearly and with certainty; to have established or fixed in the mind or memory; to be cognizant or aware of").

65. It is important to note that "merchantable" under the implied warranty of merchantability does not mean absolute perfection. DAVID G. OWEN & MARY J. DAVIS, PRODUCTS LIABILITY AND SAFETY: CASES AND MATERIALS 118 (Saul Levmore et al. eds., 8th ed. 2020) ("'The implied warranty of merchantability does not impose a general requirement that goods precisely fulfill the expectation of the buyer. Instead, it provides for a minimum level of quality.' . . . To state a claim, 'a plaintiff must allege a fundamental defect that renders the product unfit for its ordinary purpose.'").

66. *Sense*, DICTIONARY.COM, https://www.dictionary.com/browse/sense (last visited Nov. 14, 2023) (defining "sense" as "to perceive (something) by the senses; become aware of;" "to grasp the meaning of, understand").

hypothetical again. Would the consumer (or an injured third party) *know* there was a malfunction in either scenario one or two?

2. Exclusion or Modification of Warranties (UCC § 2-316)

UCC § 2-316 allows waiver of implied warranties, *inter alia*, "when the buyer before entering into the contract *has examined the goods or the sample or model as fully as he desired*."[67] The important assumption here is that the buyer is in fact able to inspect the vehicle for conformity before purchase. In the hypothetical scenarios, could potential buyers inspect to their satisfaction the AI algorithm inside autonomous vehicles that is responsible for making those life-or-death decisions?[68]

3. Statute of Limitations in Contracts for Sale (UCC § 2-725)

Under UCC § 2-725, a claim for breach of warranty must be made within four years of when tender of delivery is made, except "where a warranty explicitly extends to future performance of the goods and discovery of the breach must await the time of such performance the cause of action accrues *when the breach is or should have been discovered*."[69] The algorithms driving an autonomous vehicles affects the vehicle's future performance on public streets and can be updated over the air as frequently as the manufacturer likes.[70] Recall the introductory hypothetical. In the case of the introductory scenario, when should—or when could—the driver of the autonomous vehicle have discovered the breach? The answer is simple: after the crash. Even then, the consumer would not know whether the cause was a malfunction, intentional decision made by the vehicle, or if it was solely the school bus's fault.

67. U.C.C. § 2-316 (3)(b) (AM. L. INST. & UNIF. L. COMM'N 2021) (emphasis added).

68. This same concept can apply to any AI application. For example, how can a buyer of an iPhone sufficiently inspect the algorithm inside their phone? The answer is simple: through use. If the consumer senses through use that the iPhone does not work properly, the consumer will notify the Apple Store. Similarly, in the case of non-autonomous vehicles, drivers can sense a problem through use because they are in control of the vehicle. However, with autonomous vehicles, the driver does not operate the vehicle when it is in fully autonomous mode because the algorithm is in control. Therefore, as the introductory hypothetical illustrates, the driver will not be able to tell when something is wrong with the AI algorithm.

69. U.C.C. § 2-725(2) (AM. L. INST. & UNIF. L. COMM'N 2021) (emphasis added).

70. See Scooter Doll, *Over-The-Air Updates: How Does Each EV Automaker Compare?*, ELECTREK, (June 7, 2022, 5:00 AM), https://electrek.co/2022/06/07/over-the-air-updates-how-does-each-ev-automaker-compare/, for more information on over-the-air updated in vehicles.

4. Third-Party Beneficiaries (UCC § 2-318)

UCC § 2-318 allows third-party beneficiaries to recover from a seller for a breach of warranty.[71] Each of the three alternative options for recovery begins, "A seller's warranty whether express or implied extends to . . . ."[72] Thus, recovery is explicitly based on express and implied warranties. As a result, the same important assumption required for express and implied warranties to be effective for consumers of autonomous vehicles—that the buyer must *know* or *sense* an infirmity with the product—applies to third parties. If a bystander got injured in the introductory hypothetical when the autonomous vehicle swerved, would the third party *know* whether the injury was caused by a malfunction of the autonomous vehicle, intentional decision of the autonomous vehicle, or solely by the school bus?

C. Solutions That Make the Uniform Commercial Code a Comprehensive Approach to Regulating Autonomous Vehicles as a Sale of Goods

With two minor amendments and a federal requirement that autonomous vehicles come with a black box data recorder—an industry standard in the airline industry[73]—Article 2 of the UCC provides a comprehensive approach to regulating autonomous vehicles as a sale of goods.[74]

First, the statute of limitations under UCC § 2-725 should be extended every time an autonomous vehicles receives a software update to its autonomous driving system.[75] A vehicle's software can be updated over-the-

71. U.C.C. § 2-318 (AM. L. INST. & UNIF. L. COMM'N 2021). The points made in this Note apply regardless of which alternative is adopted.

72. *Id.* The remainder of each alternative option addresses how far the horizontal privity requirement should reach, e.g., immediate family members, those reasonably expected to use the product, natural persons, corporations, etc. Each alternative also addresses whether this specific portion may be altered by the manufacturer. The ultimate decision as to which alternative the states should adopt is a matter left for the legislature and outside the scope of this Note.

73. *Cockpit Voice Recorders (CVR) and Flight Data Recorders (FDR),* NAT'L TRANSP. SAFETY BD., https://www.ntsb.gov/news/Pages/cvr_fdr.aspx (last visited Nov. 5, 2022) ("Large commercial aircraft and some smaller commercial, corporate, and private aircraft are required by the FAA to be equipped with two 'black boxes' that record information about a flight"); see Kevin Bonsor & Nathan Chandler, *How Black Boxes Work*, HOW STUFF WORKS, https://science.howstuffworks.com/transport/flight/modern/black-box.htm (last visited Oct. 20, 2022), for additional information on how black box data recorders used in airplanes work.

74. U.C.C. §§ 2-101 to 2-275 (AM. L. INST. & UNIF. L. COMM'N 2021).

75. It does not matter whether the statute of limitations is extended by six months, one year, or two years. The extension must only provide a reasonable amount of time for the new algorithm to be put to the test through use. The duration of such an extension after every software update is a decision to be left to the legislature. Additionally, to prevent opening the floodgates to claims

air as frequently as the manufacturer wants.[76] If a vehicle's software is updated three years and eleven months after the original tender of delivery, the algorithm driving the vehicle—making life and death decisions—is essentially brand new and devoid of the rigors of everyday use, despite the fact that the vehicle is approaching end of its four-year statute of limitations. Additionally, as the introductory hypothetical illustrates, it would be very difficult to determine when the breach was or should have been discovered in cases involving autonomous vehicles under UCC § 2-725. Therefore, extending the statute of limitations by a defined period of time after software updates to the autonomous driving algorithm will continuously incentivize safety, while keeping the litigation flood gates closed to other types of claims after the four-year mark.[77]

Second, express and implied warranties under UCC §§ 2-313, 2-314, and 2-315 should not be waivable for autonomous vehicles—they should be coextensive with the statute of limitations under UCC § 2-725.[78] Using the UCC approach to regulate autonomous vehicles, instead of a strict liability scheme, will incentivize technological development because manufacturers will not always be held liable, regardless of who is at fault. However, to prevent manufacturers from simply waiving all warranties under the UCC, and because buyers cannot necessarily inspect an algorithm to their satisfaction, warranties should not be waivable for autonomous vehicles. Disallowing waivers of warranties will force automotive manufacturers to stand behind their express statements of their products, and ensure their products are "merchantable,"[79] "fit for the ordinary purposes,"[80] and fit for a

unrelated to safety concerns, only software updates affecting the autonomous drive function should extend the statute of limitations period.

76. *See* Doll, *supra* note 70.

77. Extending the statute of limitations after software updates to the autonomous drive system is entirely feasible because when software updates are performed, the date and time are already automatically logged (either electronically, when updates are done over-the-air, or manually, if the vehicle is serviced at the dealership).

78. Disclaimers of implied warranties under certain conditions are already prohibited by the Federal Magnusson Moss Act. 15 U.S.C. § 2308 ("No supplier may disclaim or modify . . . any implied warranty to a consumer with respect to such consumer product if (1) such supplier makes any written warranty to the consumer with respect to such consumer product, or (2) at the time of sale, or within 90 days thereafter, such supplier enters into a service contract with the consumer which applies to such consumer product."). See CAL. CIV. CODE. §1792.3, for California's more restrictive approach ("No implied warranty of merchantability and, where applicable, no implied warranty of fitness shall be waived, except in the case of a sale of consumer goods on an "as is" or "with all faults" basis where the provisions of this chapter affecting "as is" or "with all faults" sales are strictly complied with.").

79. U.C.C. § 2-314(2) (AM. L. INST. & UNIF. L. COMM'N 2021).

80. *Id.*

"particular purpose."[81] This approach will balance incentivizing manufacturers to develop new technology without the fear of being held strictly liable while ensuring that consumers are guaranteed warranties on extremely dangerous products that they cannot inspect as fully as desired.

Lastly, a federal regulation should be enacted requiring autonomous vehicles to come with a black box data recorder[82] that records and stores all sensor values for the duration of the statute of limitations in which a breach of warranty claim may be brought. Black box data recorders are already required by the Federal Aviation Association and are an industry standard in the airline industry.[83] They record invaluable data from every sensor and input.[84] When an aviation accident occurs, the black box is retrieved and the sensor input values from moments before the crash are extracted and analyzed.[85] The data is then used to determine the cause of the crash.[86] The same can be done for autonomous vehicles. An autonomous vehicle already comes with a fully built infrastructure of sensors and computers to effectuate the car's sense-plan-act design. The requirement of a black box in autonomous vehicles can be as simple as modifying the vehicles' existing computers to record data from every sensor and store a recording of all sensor values for the duration of the statute of limitations for a breach of warranty claim.[87] Because the existing sense-plan-act infrastructure is already operated by computers reading sensor values, this approach requires minimal effort on the part of on manufacturers to adhere to the proposed federal regulation requiring the use of black box data recorders in autonomous vehicles.

Such a federal mandate will make regulating autonomous vehicles under Article 2 of the UCC entirely comprehensive and feasible. Collecting sensor data from a black box after a crash will help identify the cause of an accident involving an autonomous vehicle. In scenarios one and two, recorded data

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81. *Id.* § 2-315.

82. *See* Bonsor & Chandler, *supra* note 73.

83. *Cockpit Voice Recorders (CVR) and Flight Data Recorders (FDR)*, *supra* note 73; *see also* Bonsor & Chandler, *supra* note 73.

84. *Cockpit Voice Recorders (CVR) and Flight Data Recorders (FDR)*, *supra* note 73; *see also* Bonsor & Chandler, *supra* note 73.

85. *Cockpit Voice Recorders (CVR) and Flight Data Recorders (FDR)*, *supra* note 73; *see also* Bonsor & Chandler, *supra* note 73.

86. *Cockpit Voice Recorders (CVR) and Flight Data Recorders (FDR)*, *supra* note 73; *see also* Bonsor & Chandler, *supra* note 73.

87. The "sense-plan-act" infrastructure already monitors sensor and driver input values. The black box data recorder does not have to be an additional physical part. Instead, a programmable feature can be added to one of the computers on board. The new feature can record sensor and driver input values while driving. This information can be stored as a compressed, miniscule file on the cloud, within the vehicle itself, or both.

from sensors would show exactly what the car saw moments before the accident and what rationale the vehicle had for either swerving off the cliff or crashing into the school bus. If the data from the black box proves that there was a malfunction with the vehicle, then express and implied warranties under UCC §§ 2-313 – 2-315 will be breached. If, on the other hand, the data shows that the vehicle made an intentional decision, the basis of that decision can be accurately evaluated.[88] With a black box, third-party beneficiaries will also be able to recover under UCC § 2-318 because the recorded data will verify the cause of the accident.

Using the UCC as a foundation to regulate autonomous vehicles provides a well-established body of law to use as a framework, furthers the essential purpose of the UCC, balances policy interests, resolves liability conflicts, and eliminates the need to adopt a brand new regulatory scheme. With the two minor amendments, and a federal requirement that autonomous vehicles come with a black box data recorder, the longstanding history and certainty of case law under the UCC can be used to tackle novel issues of liability for autonomous vehicles. Additionally, the UCC's purpose of ensuring fair dealing between manufacturers and consumers will be furthered while creating uniformity in how liability is regulated in this area of the law. Thus, society's policy interests in having autonomous vehicles will be furthered.

V. CONCLUSION

Although policy reasons compel the need for autonomous vehicles, autonomous vehicles present novel challenges to liability regulation. Legal scholars have suggested various approaches in tort and insurance law. Despite the fact that each approach has its own impediments, autonomous vehicles are a sale of goods; therefore, regardless of which approach is taken, Article 2 of the UCC applies. Article 2 has its own limitations when applied to autonomous vehicles. However, with two minor amendments, and a federal requirement of a black box data recorder, the UCC provides a comprehensive and well-established approach to regulating autonomous vehicles as a "sale of goods."

88. This data can be used to see precisely *what* ethical and moral decisions autonomous vehicles are making in specific situations in order to further the regulation of ethical and moral decision making in autonomous vehicles. Emmons, *supra* note 1, at 328-29.