CODE BOUND AND DOWN . . . A LONG WAY TO GO AND A SHORT TIME TO GET THERE: AUTONOMOUS VEHICLE LEGISLATION IN ILLINOIS

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I. INTRODUCTION

It appears the visionaries had it all wrong. In the latter half of the twentieth century, many envisioned a twenty-first century filled with flying cars and robotic domestic assistants.[1] Although the latter may be nearing reality,[2] the former is not yet here. Perhaps these mid-century soothsayers were looking through foggy lenses, and what they were really seeing was a future of robotic cars. If so, they were certainly correct.

Vehicles that do not require human input to operate or navigate are quickly becoming relevant in both the business and legal communities.[3] Such autonomous vehicles are being developed by nearly every major automobile manufacturer[4] and have been the subject of recent legislative enactments in Nevada,[5] Florida,[6] and California.[7] Although autonomous vehicles are likely not prohibited in Illinois,[8] it is in the best interest of the

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1. *See generally The Jetsons* (Hanna-Barbera 1962-1963, 1985-1987); BACK TO THE FUTURE PART II (Amblin Entertainment 1989).
2. *See Overview*, WILLOW GARAGE, http://www.willowgarage.com/pages/pr2/overview (last visited Apr. 28, 2013).
3. *See* CTR. FOR AUTOMOTIVE RESEARCH, TRANSP. SYS. ANALYSIS GRP. & KPMG LLP, SELF-DRIVING CARS: THE NEXT REVOLUTION 10 (2012), *available at* http://www.kpmg.com/US/en/IssuesAndInsights/ArticlesPublications/Documents/self-driving-cars-next-revolution.pdf (business community publication) [hereinafter CTR. FOR AUTOMOTIVE RESEARCH]; Sven A. Beiker, Symposium, *Legal Aspects of Autonomous Driving*, 52 SANTA CLARA L. REV. 1145, 1147 (2012) (legal community publication).
4. *See Emerging Technology: Driving Safety, Efficiency and Independence*, GEN. MOTORS, http://www.gm.com/vision/design_technology/emerging_technology.html (last visited Apr. 28, 2013); Erico Guizzo, *Toyota's Semi-Autonomous Car Will Keep You Safe*, IEEE SPECTRUM (Jan. 8, 2013, 5:51 GMT), http://spectrum.ieee.org/automaton/robotics/artificial-intelligence/toyota-semi-autonomous-lexus-car-will-keep-you-safe.
5. NEV. REV. STAT. §§ 482A.010-.200 (2011) (amended 2013).
6. FLA. STAT. §§ 316.003, 316.85, 316.86, 319.145 (2012).
7. CAL. VEH. CODE § 38750 (West 2012).
8. *See* BRYANT WALKER SMITH, AUTOMATED VEHICLES ARE PROBABLY LEGAL IN THE UNITED STATES 49-78 (2012), *available at* http://cyberlaw.stanford.edu/files/publication/files/2012-Smith-AutomatedVehiclesAreProbablyLegalinTheUS_0.pdf.

state to expressly authorize their operation and account for situations that may arise and are not covered under current law. Illinois and its citizens will benefit from enacting legislation now, rather than waiting for autonomous vehicles to become more prevalent.

This Comment will focus on the reasons why the Illinois General Assembly should enact autonomous vehicle legislation and the considerations that should be taken into account while drafting such legislation. Part II of this Comment will provide an overview of various autonomous vehicle technologies and a method for classifying them based upon the number of situations and the amount of control they have over a vehicle. Part III will present autonomous vehicle legislation and regulations recently enacted by other states. Part IV will discuss why current Illinois laws governing motor vehicles are inadequate for autonomous vehicles and present benefits of enacting legislation. Finally, Part V will provide suggestions that the Illinois General Assembly should consider when drafting legislation.

II. BACKGROUND

A. Overview of Autonomous Vehicles

Before an earnest discussion about legal regulation can begin, it is important to understand autonomous vehicles from a technological standpoint. An autonomous vehicle is one that does not require real-time human input to operate or navigate.[9] Instead, these vehicles use various sensors and computer software to collect and process information about the surrounding environment.[10] This collecting and processing of information is accomplished by using the same method as human drivers.[11] Autonomous vehicles collect information about both internal conditions, such as speed and direction, and external conditions, such as the environment and vehicle location.[12] To collect information about its surroundings, an autonomous vehicle may employ several different methods.[13]

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9. *Id.*
10. *Id.*
11. NIDHI KALRA, JAMES ANDERSON & MARTIN WACHS, LIABILITY AND REGULATION OF AUTONOMOUS VEHICLE TECHNOLOGIES 4 (2009), *available at* http://www.dot.ca.gov/newtech/researchreports/reports/2009/prr-2009-28_liability_reg_&_auto_vehicle_final_report_2009.pdf; *see also* ALLIANCE FOR SAFE DRIVING, LICENSE TO DRIVE (2d ed. 2005) (terming this process as IPDE: Identify, Predict, Decide, Execute).
12. Beiker, *supra* note 3, at 1147.
13. *Id.*

The first method is the use of sensors.[14] Examples of sensors of external information include cameras, radar systems, lasers (e.g., LIDAR), and Global Positioning System (GPS) units.[15] The second method is the use of vehicle-to-vehicle (V2V) communications.[16] These communications are exchanges of data between nearby vehicles about parameters such as vehicle position, speed, and location.[17] V2V communications allow vehicles to make better decisions about their own proposed actions because they are aware of the actions and proposed actions of nearby vehicles.[18]

The third method is the use of vehicle-to-infrastructure (V2I) communications.[19] These communications are similar to the V2V communications except they exchange data between vehicles and highway infrastructure.[20] The information detected by the sensors is then processed with a computer system using algorithms.[21] These algorithms "detect obstacles, categorize situations, [and] plan [a] path [for the vehicle to take]."[22] Using the knowledge it has acquired about the situation and the plan it has formulated, the computer controls the steering, acceleration, and braking of the vehicle.[23]

B. Classifications of Sensor-Equipped Vehicles

However, these truly autonomous vehicles are only one of four categories of vehicles that use sensors and computers to operate a vehicle.[24] Sensor-equipped vehicles can be classified into the four categories depending upon the number of situations and the amount of control they have over the vehicle.[25] These groups, starting with low capability and no control and ending with complete capability and control, are: (1) Warning and Information, (2) Assisted Driving, (3) Automated Driving, and (4) Autonomous Driving.[26]

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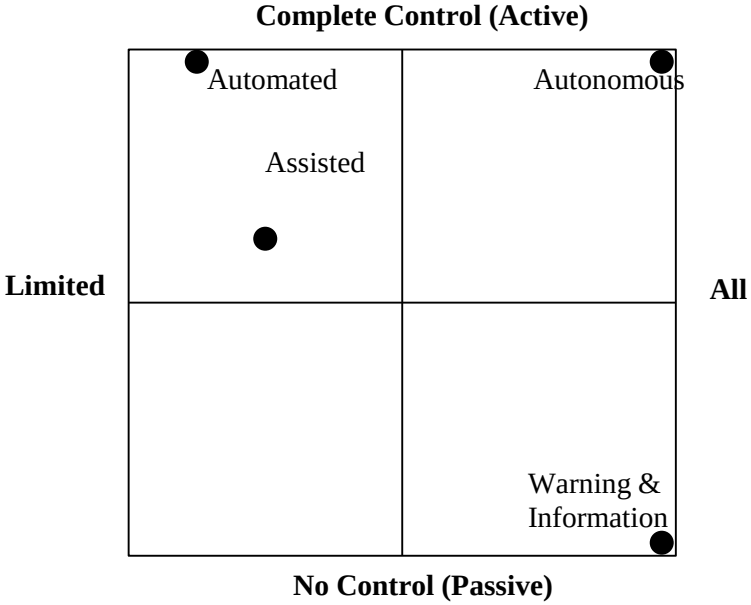
14. *Id.*
15. *Id*.
16. CTR. FOR AUTOMOTIVE RESEARCH, *supra* note 3, at 12.
17. U.S. Dep't of Transp. Research and Innovative Tech. Admin., *Vehicle-to-Vehicle (V2V) Communications for Safety*, INTELLIGENT TRANSP. SYSTEMS (July 18, 2013, 10:04 AM), http://www.its.dot.gov/research/v2v.htm.
18. *Id*.
19. CTR. FOR AUTOMOTIVE RESEARCH, *supra* note 3, at 12.
20. U.S. Dep't of Transp. Research and Innovative Tech. Admin., *Vehicle-to-Infrastructure (V2I) Communications for Safety*, INTELLIGENT TRANSP. SYSTEMS (July 18, 2013, 10:04 AM), http://www.its.dot.gov/research/v2i.htm.
21. Beiker, *supra* note 3, at 1147.
22. *Id*.
23. *Id*.
24. *Id.*
25. *Id*.
26. *Id.* at 1147-48; *see infra* Figure 1.

Figure 1: Capabilities of Sensor-Equipped Vehicles



Falling within the Warning and Information group are vehicles that contain passive systems to help a driver operate the vehicle in certain situations.[27] Presently, many automobile models contain such sensor systems to increase vehicle safety.[28] These systems, known as Advanced Driver Assist Systems (ADAS),[29] include back-up alerts, parking distance information, lane departure warnings, and blind spot detection.[30] ADAS help the driver collect information about the vehicle's surroundings, but do not contribute to the driver's processing of the information or execution of driving tasks based upon it.[31] Thus, vehicles in the Warning and Information group are constantly providing information to the driver but never take control over any part of the vehicle.[32] Therefore, vehicles in the Warning and Information group require a human driver to operate the vehicle at all times.[33]

The Assisted Driving group consists of vehicles that, without input from the driver, complete specific tasks in specific cases.[34] Examples include adaptive cruise control—cruise control that automatically adjusts

27. *Id*.
28. CTR. FOR AUTOMOTIVE RESEARCH, *supra* note 3, at 10.
29. *Id.*
30. Beiker, *supra* note 3, at 1147.
31. *See* CTR. FOR AUTOMOTIVE RESEARCH, *supra* note 3, at 10.
32. Beiker, *supra* note 3, at 1147.
33. *See id.*
34. *Id*.

vehicle speed to maintain a safe distance from vehicles ahead[35]—and lane change assistance.[36] The Assisted Driving technologies complete all steps in the driving process, but the actions they take are only one of many required at any given moment.[37] For instance, adaptive cruise control can manage the braking and acceleration of the vehicle, but it cannot perform the task of steering.[38] Therefore, vehicles in the Assisted Driving group also require a human driver to operate the vehicle at all times.[39]

The Automated Driving group is also limited to specific situations, but these vehicles can perform all tasks within that situation.[40] Examples include vehicles that complete all steps of the parking process once a space has been selected and vehicles that do not need human control while driving in highway situations.[41] Another example is a vehicle that can handle all driving tasks, but only in areas that have previously been mapped to collect information about the area, such as road markings and traffic lights, which rarely change over time.[42] These technologies complete all steps in the driving process and, unlike those in the Assisted Driving category, can take all necessary actions required at a given moment.[43] However, at that given moment, the vehicle must be in a certain situation, such as the parking process.[44] Vehicles in this category do not require the presence of a human driver while they are in the specific situation for which the technology was designed.[45] However, if the vehicle is outside that specific situation (for instance, selecting an open parking space), a human driver is required.[46]

Finally, the Autonomous Driving group consists of vehicles capable of completing all driving tasks in all situations.[47] These vehicles can complete all steps of the driving process, can take all necessary actions required at a given moment, and, unlike those in the Automated Driving group, can function in all situations.[48] Therefore, autonomous vehicles can be thought of as "give and go" capable—a human is only required to give a destination

35. *Id*. at 1148.
36. *Id*. at 1147.
37. *See* ALLIANCE FOR SAFE DRIVING, *supra* note 11 (stating that the steps in the driving process are: collecting and processing information, and taking action).
38. Beiker, *supra* note 3, at 1148.
39. *See id.* at 1147.
40. *Id*.
41. *Id*.
42. Evan Ackerman, *UK Unveils 'Affordable' Self-Driving RobotCar*, IEEE SPECTRUM (Feb. 19, 2013, 13:42 GMT), http://spectrum.ieee.org/automaton/robotics/artificial-intelligence/uk-affordable-self-driving-robotcar.
43. *See* Beiker, *supra* note 3, at 1147.
44. *See id.*
45. *See id.*
46. Ackerman, *supra* note 42.
47. Beiker, *supra* note 3, at 1148.
48. *Id.*

and then the vehicle can complete all other tasks on its own.[49] These vehicles are the ultimate achievement of autonomy and, consequently, are the most difficult to develop because of the large number of possible variable external environmental factors the vehicle could encounter.[50] A considerable amount of testing is required to ensure vehicle safety and ability in a potentially unlimited number of situations.[51]

One alternative to using software to make decisions is a concept known as platooning.[52] Platooning uses a lead car driven by a professional driver to escort a group of trailing vehicles.[53] The lead car communicates information to the trailing vehicles such that they will follow the same path taken by the lead car.[54] Platooning can only be utilized in the middle part of a trip; a human driver must complete the task of driving before joining the platoon and after leaving the platoon for a specific destination.[55] Therefore, platooning falls into the Automated Driving category because the vehicle can complete all steps in the driving process and can take all actions required at a given moment, but the vehicle must be within a platoon.[56]

C. Classification of Driving Tasks

The classifications of sensor-equipped vehicles recognize that driving is not merely one action, but instead a combination of various responsibilities.[57] Primary tasks include selecting: (1) destinations, (2) which roads to take to get to those destinations, (3) which lanes to use, including turning and merging information, on those roads, and (4) the speed and location within those lanes.[58] Secondary tasks include "the adjustment of safety features such as windshield wipers, lights, and turn signals."[59] Tertiary tasks include the control of "comfort features such as the radio or air conditioning."[60] Due to sensor-equipped vehicles performing driving tasks from various levels, drawing a precise line

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49. *See id.*
50. *See* Erik Coelingh & Stefan Solyom, *All Aboard the Robotic Road Train*, IEEE SPECTRUM (Oct. 26, 2012, 18:15 GMT), http://spectrum.ieee.org/green-tech/advanced-cars/all-aboard-the-robotic-road-train ("Just to verify Volvo's pedestrian detection with fully automatic braking had required driving more than 500,000 [kilometers] and collecting more than 3 terabytes of data . . . .").
51. *Id.*
52. *Id.*
53. *Id.*
54. *Id.*
55. *Id.*
56. *See id.*
57. SMITH, *supra* note 8, at 9 (identifying three levels of tasks depending upon their necessity).
58. *Id*. (labeling these tasks as "trip," "route," "path," and "position," respectively).
59. *Id*.
60. *Id*.

between conventional and automated vehicles can be difficult.[61] However, making such a distinction is important when creating legislation so it is clear which vehicles fall within the scope of that legislation.

In conclusion, autonomous vehicles are those that do not require real-time human input to operate or navigate. Instead, they use software or instructions from another vehicle to collect and process information regarding the driving process. Further, depending upon the extent of their capability and control, the vehicles can be classified into one of four groups: (1) Warning and Information, (2) Assisted Driving, (3) Automated Driving, or (4) Autonomous Driving.

III. RECENT DEVELOPMENTS

In the past year, several state legislatures have passed statutes explicitly authorizing the operation of autonomous vehicles on highways within their respective states.[62] Examining the approaches taken by these other states is useful because their strengths and weaknesses can be acknowledged when drafting legislation for Illinois.

A. Nevada

Nevada became the first state to expressly authorize the use of autonomous vehicles in March 2012.[63] The Nevada statute begins by defining several terms, including "artificial intelligence,"[64] "autonomous vehicle,"[65] and "sensors."[66] The definition of autonomous vehicle expressly indicates that it only applies to vehicles that can drive "without the active intervention of a human operator."[67] Therefore, the statute only applies to vehicles that fall within the Automated Driving and Autonomous Driving groups.

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61. *Id*. at 10-11 (noting various approaches: Nevada, Florida, and California attempted to draw a clear line between automated and conventional vehicles in their statutes; a German approach has been to define up to five levels of automation; the National Highway Traffic Safety Administration has not decided on an approach; and the Department of Defense has rejected making a distinction at all).
62. *See* NEV. REV. STAT. §§ 482A.010-.200 (2012) (amended 2013); CAL. VEH. CODE § 38750 (West 2012); FLA. STAT. §§ 316.003, 316.85, 316.86, 319.145 (2012).
63. NEV. REV. STAT. § 482A.010 (2012) (effective Mar. 1, 2012).
64. NEV. REV. STAT. § 482A.020 (2012) ("[T]he use of computers and related equipment to enable a machine to duplicate or mimic the behavior of human beings.").
65. NEV. REV. STAT. § 482A.030 (2012) ("[A] motor vehicle that uses artificial intelligence, sensors and global positioning system coordinates to drive itself without the active intervention of a human operator.").
66. NEV. REV. STAT. § 482A.050 (2012) (the statute indicates that the term "includes, without limitation, cameras, lasers and radar.").
67. § 482A.030.

Then, instead of setting forth requirements on its own, the legislature chose to require the state's Department of Motor Vehicles to draft regulations authorizing autonomous vehicle usage.[68] However, the legislature did give the Department some specific areas to regulate, such as minimum safety standards, insurance requirements, testing procedures, and geographic boundaries.[69] The legislature also required the establishment of a separate driver's license endorsement for operating autonomous vehicles that "recognize[s] the fact that a person is not required to actively drive an autonomous vehicle."[70]

In the regulations it enacted, the Department answered many questions that were ambiguous when applying traditional vehicle law to autonomous vehicles. For example, one regulation provides that the person who "causes the autonomous vehicle to engage, regardless of whether the person is physically present in the vehicle" is deemed the driver of the vehicle.[71] In the realm of testing autonomous vehicles, the regulations provide for the responsibilities of drivers upon an accident. After an accident or citation issuance, the operator must submit information to the Department within ten days after the accident or issuance.[72]

B. Florida

Florida was the second state to pass autonomous vehicle legislation.[73] The Florida legislation begins with a definition of "autonomous vehicle" that resembles Nevada's because it only contemplates vehicles that are capable of operating without a human.[74] Therefore, it appears the Florida legislation also applies only to vehicles that fall within the Automated Driving and Autonomous Driving groups.

Unlike Nevada, the Florida Legislature did not assign rulemaking responsibility to an administrative agency, opting to create requirements on its own. However, the legislation does require the Florida Department of Highway Safety and Motor Vehicles to submit a report to the Florida Senate and House of Representatives suggesting additional legislation or regulation that may be required.[75] The legislature followed Nevada's lead with respect to determining the identity of the driver of an autonomous

68. NEV. REV. STAT. § 482A.100 (2012).
69. *Id.*
70. NEV. REV. STAT. § 482A.200 (2012).
71. NEV. ADMIN. CODE § 482A.020 (2012).
72. NEV. ADMIN. CODE § 482A.130(4) (2012).
73. FLA. STAT. § 316.85 (2012) (effective July 1, 2012).
74. FLA. STAT. § 316.003(90) (2012) ("[T]echnology installed on a motor vehicle that has the capability to drive the vehicle on which the technology is installed without the active control or monitoring by a human operator.").
75. FLA. STAT. § 316.86(3) (2012).

vehicle by deeming the person who causes engagement of the vehicle the driver.[76] One interesting deviation from Nevada's approach is the lack of a requirement of a special driver's license endorsement. The legislation allows any possessor of a valid license to operate an autonomous vehicle.[77]

Continuing, the legislation provides for certain provisions relating to the testing of autonomous vehicles and shielding original manufacturers from liability when a third party converts a conventional vehicle into an autonomous one.[78] Lastly, the statute states specific requirements that autonomous vehicles in the state must meet and accounts for future federal regulations.[79]

C. California

Most recently, California authorized autonomous vehicle operation.[80] The first subdivision of the statute sets out definitions.[81] Like Florida, California also carves out an exception for technologies in the Automated and Assisted Driving groups.[82] Unlike the other states, California's statute only allows operation of autonomous vehicles for testing purposes.[83] Also, the statute requires the presence of a human in the driver's seat when the vehicle is operating autonomously.[84] The third subdivision requires the manufacturer of an autonomous vehicle to make certain certifications, similar to Florida's requirements, to the California Department of Motor Vehicles before it can be operated on public roads within the state.[85] One interesting requirement is that of a "separate mechanism . . . to capture and store the autonomous technology sensor data for at least 30 seconds before a collision occurs" and the preservation of that data for three years.[86] Another subdivision requires the Department to adopt further regulations, including regulations that address vehicle operation without a human present.[87] A second interesting requirement is one requiring the manufacturer of autonomous technology to "provide a written disclosure to

76. § 316.85(2).
77. § 316.85(1).
78. § 316.86.
79. FLA. STAT. § 319.145 (2012) (requiring means to engage and disengage the technology, visually indicate autonomous operation inside the vehicle, and alert the operator of failures).
80. CAL. VEH. CODE § 38750 (West 2012) (effective Jan. 1, 2013).
81. VEH. § 38750(a).
82. *Id.*
83. VEH. § 38750(b).
84. *Id.*
85. VEH. § 38750(c) (requiring a mechanism to engage and disengage the technology, a visual indicator inside the vehicle, a method to alert the operator of a failure, multiple methods for the operator to retake control, and compatibility with federal regulations and standards).
86. VEH. § 38750(c)(i)(G).
87. VEH. § 38750(d).

the purchaser . . . that describes what information is collected by the autonomous technology equipped on the vehicle."[88]

D. Federal Government

In addition to looking at the recent actions of the Nevada, California, and Florida Legislatures, it is important to note the lack of action at the federal level with respect to autonomous vehicles. At least one author has noted that the Federal Motor Vehicle Safety Standards promulgated by the National Highway Traffic Safety Administration "do not categorically prohibit automated driving."[89] Further, under the police powers of the state, the operation of a motor vehicle is subject to regulation by the state government.[90] Therefore, it appears the Illinois General Assembly will not have to consider any federal requirements when it creates legislation, but it may decide to account for future regulations.[91] However, further discussion of federal regulation is beyond the scope of this Comment.

IV. ANALYSIS

Although Illinois currently has an extensive amount of statutory and judicial laws relating to motor vehicles, new legislation is needed to directly address autonomous vehicles for two reasons. First, the current laws are inadequate when applied to autonomous vehicles. Second, Illinois and its citizens will benefit from enacting legislation now, rather than waiting for autonomous vehicles to become more prevalent.

A. Current Laws are Inadequate

Autonomous vehicles present unique situations of automobile operation that differ from the traditional method of a human driver. Due to these differences, the current laws governing automobile operation are inadequate to govern the operation of autonomous vehicles. Some of the key differences include the identity of the driver, requirements on the driver's actions, and requirements on the vehicles themselves.[92]

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88. VEH. § 38750(h).
89. SMITH, *supra* note 8, at 44-45 (noting that the rules do not expressly require a driver, do not prohibit electrically-actuated braking and steering systems, or create other requirements that would burden autonomous vehicles).
90. *See* Haswell v. Powell, 230 N.E.2d 178, 180 (Ill. 1967).
91. *See* FLA. STAT. § 319.145 (2012) (providing that future federal regulations found to be in conflict with the state statute shall supersede).
92. SMITH, *supra* note 8, at 49.

1. Identity of the Driver

The first difficulty encountered when applying current laws to autonomous vehicles is determining the identity of the driver. In the context of conventional vehicles, referring to "the driver" of a vehicle is natural because a driver is a practical necessity. Further, determining the identity of the driver is quite easy because it is the person "in physical control of a motor vehicle."[93] Physical control includes controlling the braking, accelerating, steering, and other mechanisms. However, in the context of autonomous vehicles, determining the identity of the driver becomes more difficult because of unique situations. For instance, an autonomous vehicle can have a nonhuman driver, multiple drivers at one time, or a human driver who is not physically present within the vehicle.[94] From a practical standpoint, identifying the driver of an autonomous vehicle may appear trivial. Nevertheless, from a legal standpoint, an identity is essential to determine whom to hold accountable if the vehicle violates statutory requirements and prohibitions or causes injuries and damages.[95]

Under current law, a driver is "[e]very person who drives or is in actual physical control of a vehicle."[96] In addition to "natural person[s]," current law considers a legal entity, "firm, copartnership, association, or corporation," to be a person as well.[97] These two definitions may adequately cover the situation of a vehicle having multiple drivers and a human driver who is not physically present, but they do not cover the situation of a nonhuman driver. The lack of guidance from the legislature leaves open several possibilities as to the identity of the person who could be considered the driver: (1) The person who caused the vehicle to begin operating,[98] (2) the person or entity who designed and manufactured the vehicle,[99] or (3) the person or entity who authored the software algorithms that process information and take actions.[100] The uncertainty of the identity of the driver of an autonomous vehicle under current laws strengthens the argument that legislation is needed before these vehicles begin to populate Illinois roadways.

93. *See* 625 ILL. COMP. STAT. 5/1-115.8 (2010).
94. *See* SMITH, *supra* note 8, at 49-63.
95. *Id.* at 63.
96. 625 ILL. COMP. STAT. 5/1-116 (2010).
97. 625 ILL. COMP. STAT. 5/1-159 (2010).
98. SMITH, *supra* note 8, at 60.
99. *Id.* at 61.
100. *Id.*

2. Requirements of the Driver

The second inadequacy of current laws relates to requirements the driver of a vehicle must follow. One such requirement is having a license or permit.[101] In general, to be licensed as a driver in Illinois, a person must be between the ages of eighteen and sixty-nine and must be physically and mentally able to safely operate a motor vehicle.[102] The licensure requirement and age limitations could lead to an odd result if the driver of a vehicle is determined to be the person or entity who manufactured the vehicle, or the person or entity who authored the software algorithms. For instance, vehicle manufacturers and software designers would need to obtain a driver's license in Illinois, otherwise the vehicles they produce would be operating illegally. Another problem could arise if these manufacturers and designers, either natural persons or entities, are less than sixteen years old because they would not qualify for the required license.[103] Further, if the person is indeed an entity, then the wisdom of making the entity wait until it has existed a certain number of years before it can be a driver is called into question.[104] Although these possibilities seem doubtful now, their chances of occurring will rise as autonomous vehicles become more numerous, and enacting legislation now could help prevent odd and unintended results from ensuing.

Another requirement of drivers is the need to be in the same physical location as the vehicle. If a vehicle is involved in an "accident resulting in injury to or death of any person or damage to any vehicle which is driven or attended by any person," the driver is required to give personal information and show proof of licensure to the person struck or the other driver.[105] Additionally, the driver is required to assist injured persons in seeking medical treatment.[106] These two requirements inherently assume a human driver is always present when a vehicle is operating and would be difficult to satisfy if the driver of the vehicle was not in the vehicle at the time of the accident. Another statute prohibits a vehicle from standing unattended unless the engine is stopped and the key is removed from the engine.[107] Applied literally, this statute would make it illegal for an autonomous vehicle with no passengers to stop at a red light or stop sign.

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101. 625 ILL. COMP. STAT. 5/6-101 (2010).
102. 625 ILL. COMP. STAT. 5/6-103 (2010). Sixteen-year-olds are issued driver's licenses under a graduated license provision. *See* 625 ILL. COMP. STAT. 5/6-107 (2010).
103. § 5/6-103.
104. *See* SMITH, *supra* note 8, at 64 (discussing how a company created decades ago, such as General Motors, may meet a state's minimum age requirement, but a newer company, such as Google, would not).
105. 625 ILL. COMP. STAT. 5/11-403 (2010).
106. *Id*.
107. 625 ILL. COMP. STAT. 5/11-1401 (2010).

The last requirement of drivers is one that is perhaps uniquely human: acting in a "reasonable," "proper," and "prudent" manner.[108] Although countless cases have decided which actions are "reasonable," "proper," and "prudent" with respect to traditional vehicles, autonomous vehicles will present new actions to be assessed. There has been speculation as to how some actions associated with autonomous vehicles will be judged, but a clear directive from the Illinois General Assembly would give courts guidance.[109] In addition to giving courts guidance, autonomous vehicle legislation would also give drivers guidance on the requirements to which they must adhere.

3. Vehicle and Equipment Requirements

Applying current laws to autonomous vehicles not only presents challenges with respect to drivers, but also with respect to the vehicles themselves and their equipment. Motor vehicles are required to have mirrors,[110] wipers, and an unobstructed view through the windshield and rear and side windows.[111] However, the sensors of an autonomous vehicle may be able to successfully operate without mirrors or wipers and even if the views through the windows are obstructed.[112] Although requiring these things when they are not needed is not truly an inadequacy, it illustrates the discrepancies that can occur when the current laws are applied to situations involving autonomous vehicles.

B. Legislation Will Bring Several Benefits

Due to the inadequacy of current Illinois laws addressing situations encountered by autonomous vehicles, the Illinois General Assembly should follow the lead of other states and enact autonomous vehicle legislation. Although the technology is still in its infancy, there are several benefits to enacting legislation now. These benefits include giving the judicial system guidance when hearing disputes, creating a positive economic effect, reducing the environmental impact associated with automobile usage, and reducing injuries and fatalities resulting from automobile accidents. There is also the possibility for disadvantages associated with autonomous vehicles, but they are likely inevitable regardless of whether legislation is

108. *See* Rules of the Road, 625 ILL. COMP. STAT. 5/11-100 to -1431 (2010). These terms appear in one hundred sections of the chapter.

109. *See* SMITH, *supra* note 8, at 73-74 (discussing humans becoming responsible for instructions given to autonomous vehicles, the resulting actions of the vehicles, and vigilance over the vehicle's operation).

110. 625 ILL. COMP. STAT. 5/12-502 (2010).

111. 625 ILL. COMP. STAT. 5/12-503 (2010).

112. *See* Beiker, *supra* note 3, at 1147.

passed. Further, passing legislation may help offset some of these downsides.

1. Judicial Guidance

Providing the judicial system with guidance on how to handle disputes involving autonomous vehicles is one major benefit of enacting legislation. Autonomous vehicles are already in use on Illinois roadways,[113] and if one were the subject of a litigated dispute, the court would be stuck trying to apply the current laws to a situation they were not designed for. Literally applying current laws to situations encountered by autonomous vehicles could lead to odd and unintended results. Further, courts would be required to make decisions of public policy without direction from the legislature. However, by enacting legislation on the subject, courts would have a more suitable set of rules and standards by which to evaluate actions taken by autonomous vehicles.

2. Economic Benefits

A second benefit of enacting legislation is the resulting positive economic effects it could have. One such effect is increased dependability for travel time to a destination.[114] Most drivers are aware of increased congestion during morning and evening commute times. However, irregular congestion accounts for nearly 30% of the delay faced by drivers and another 40% occurs during off-peak hours.[115] The technologies employed by autonomous vehicles, including V2V and V2I communications, will allow them to determine the quickest route to their destinations based on historical data and current conditions.[116] In addition to reducing travel time for individual motorists, knowing the travel time between locations will also help businesses become more efficient in transporting their goods or dispatching their services.[117] In sum, being able to accurately predict travel times will help increase the efficiency of businesses and individuals, which in turn will have a positive economic effect.

A second effect is productivity improvements for certain workers.[118] On average, 80% of U.S. workers spend fifty minutes commuting to and

113. *See* Doug Newcomb, *What It's Like to Ride in a Self-Driving Car*, WIRED (Feb. 7, 2013, 2:17 PM), http://www.wired.com/autopia/2013/02/continental-autonomous-vehicle (documenting the author's ride in an autonomous vehicle along Lake Shore Drive in Chicago).

114. CTR. FOR AUTOMOTIVE RESEARCH, *supra* note 3, at 28.

115. *Id.*

116. *Id.*

117. *Id.*

118. *Id.* at 29.

from work every workday.[119] Autonomous vehicles will allow commuters, who previously had to devote their full attention to driving, to work on tasks they otherwise would not have been able to, thus making efficient use of their time. Certainly, not all workers will be able to perform work tasks while traveling. However, a significant number will essentially gain nearly an additional hour of time to complete tasks due to the use of autonomous vehicles.[120]

Another positive economic effect will result from job creation in new industries and from new business models that will accompany autonomous vehicles.[121] One potential new industry would consist of travelers subscribing to an on-demand vehicle service.[122] Such a service would be similar to today's rental car industry, but when the user arrives at the destination, the vehicle would drive to its next assignment rather than stay in the user's possession.[123] There are also industries that we do not know of yet. Just as many of today's industries would have been unfathomable in a pre-Internet world, the infiltration of autonomous vehicles will bring with it industries that we cannot foresee at this time. Also, the increase in autonomous vehicle usage will present opportunities for business models catering to the entertainment and information needs of vehicle passengers.[124] Lastly, enacting legislation will reduce the uncertainty of, and perhaps encourage, testing of autonomous vehicles within Illinois. This certainty may encourage universities and other enterprises within the state to experiment with and test autonomous vehicle technologies. Such experimentation and testing could ultimately result in job creation, which would strengthen the economy of the state.

In addition to creating positive economic effects, autonomous vehicle legislation will also help prevent negative economic situations from arising. One such situation would involve all of Illinois's neighboring states allowing autonomous vehicles while Illinois does not. Although several major interstate highways are situated in Illinois, such a situation could create an incentive for travelers using autonomous vehicles to avoid traveling through Illinois so that they could continue using their vehicle's autonomous driving capabilities. Fewer travelers on highways within the state would result in fewer customers for businesses that serve the traveling public, which would ultimately have a negative impact on the state's economy.

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119. *Id.*
120. *Id.*
121. *Id.* at 28, 31.
122. *Id.* at 28.
123. *Id.*
124. *Id.* at 31.

3. Environmental Benefits

The third benefit of enacting legislation is the role it would play in reducing the environmental impact associated with automobile usage. One way the environmental impact would be reduced is through improved fuel efficiency of autonomous vehicles.[125] As discussed above, autonomous vehicles are capable of navigating in a more efficient manner than human drivers. By selecting the most efficient route for a trip, autonomous vehicles will help alleviate the 1.9 billion gallons of wasted fuel each year in the United States due to traffic congestion.[126] Additionally, the platooning method would reduce fuel use by up to 20% by reducing the amount of drag experienced by following vehicles.[127] The increased safety of autonomous vehicles, discussed below, will also obviate the need for safety features that contribute to the weight of vehicles.[128] Removing these features could result in a 20% reduction in weight and thus a 20% increase in fuel efficiency as well.[129]

A second way the environmental impact would be reduced is through a more efficient use of existing infrastructure. A Columbia University study indicates that by using autonomous vehicles, the capacity of existing roadways could be boosted by 273%.[130] This increased capacity is the result of the capability of autonomous vehicles to safely travel closer together than those vehicles with human drivers.[131] By using existing infrastructure more efficiently, less land would need to be converted to highway use. In addition to being an environmental benefit, the increased capacity of existing infrastructure would also provide a financial benefit to Illinois because it would reduce the amount of money that needs to be spent on infrastructure expansion. Instead, those funds could be spent on maintenance of existing infrastructure or used for other pressing needs within the state. Further, some existing infrastructure might be capable of conversion to alternative modes of transportation, such as pedestrian or bicycle paths.[132]

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125. *Id.*
126. *Id.*
127. *Id.*
128. *Id.*
129. *Id.*
130. Evan Ackerman, *Study: Intelligent Cars Could Boost Highway Capacity by 273%*, IEEE SPECTRUM (Sept. 4, 2012, 14:42 GMT), http://spectrum.ieee.org/automaton/robotics/artificial-intelligence/intelligent-cars-could-boost-highway-capacity-by-273.
131. *Id.*
132. CTR. FOR AUTOMOTIVE RESEARCH, *supra* note 3, at 26.

4. Reduction of Injuries and Fatalities

The final, and perhaps most important, benefit of enacting autonomous vehicle legislation is the likely reduction of injuries and fatalities resulting from vehicle accidents. One report found that 95% of vehicle accidents were caused by driver error, as opposed to weather conditions or vehicle malfunction.[133] In 2011, the most recent year for which data is available, there were 918 fatalities as a result of traffic accidents in Illinois.[134] Further, across the United States, over 10% of all traffic accident fatalities in 2011 were the result of a distracted driver.[135] Based on these statistics, if all vehicle traffic in Illinois was comprised of autonomous vehicles, vehicle accidents would theoretically be reduced by 95% because there would no longer be driver error.

Admittedly, a few industries may be negatively impacted by a reduction in the number of vehicle accidents, but they may be able to make up for the loss in business with new opportunities.[136] Additionally, increasing safety on Illinois roads is a stated goal of the Illinois Office of the Secretary of State;[137] undoubtedly, the resulting safety benefits would outweigh any business concerns.

C. Possible Disadvantages

Autonomous vehicles will also come with disadvantages, but they will likely occur regardless of whether legislation is enacted; therefore, it may be more beneficial to address them directly with legislation. These disadvantages include threats to personal privacy and data security.[138]

1. Lack of Personal Privacy

Personal privacy is already becoming more difficult to protect due to the prevalence of mobile phones, and the increased use of autonomous

133. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEP'T OF TRANSP., DOT HS 811 059, NATIONAL MOTOR VEHICLE CRASH CAUSATION SURVEY 23-26 (2008), *available at* http://www-nrd.nhtsa.dot.gov/Pubs/811059.pdf.

134. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEP'T OF TRANSP., DOT HS 811 701, 2011 MOTOR VEHICLE CRASHES: OVERVIEW 5 (2012), *available at* http://www-nrd.nhtsa.dot.gov/Pubs/811701.pdf.

135. *See id.* at 4.

136. CTR. FOR AUTOMOTIVE RESEARCH, *supra* note 3, at 25 (noting that two affected industries might be vehicle repair shops and hospital emergency rooms, but repair shops may be able to find new opportunities in "aftermarket personalization of vehicles").

137. Ill. Sec'y of State, *About Us*, CYBERDRIVEILLINOIS.COM, http://www.cyberdriveillinois.com/about_us/home.html (last visited Apr. 28, 2013).

138. CTR. FOR AUTOMOTIVE RESEARCH, *supra* note 3, at 27.

vehicles will only make such protection more difficult.[139] By exploiting the network of vehicles and infrastructure sensors, individuals' whereabouts and location histories may become susceptible to hacking and misuse.[140] Beyond personal privacy, corporations may face the prospect of having trade secrets revealed through disclosure of vehicle data collected by the network.[141] However, the use of these sensors and networks will not only be inevitable, but will also be a requirement for the full realization of the benefits autonomous vehicles will provide.[142] Therefore, a balance will need to be struck between effective functioning of the networks and privacy protection.[143] Conversely, being able to ascertain individuals' locations or routes may have a positive effect. For instance, such information will allow businesses to provide location-based services or help the Illinois Department of Transportation analyze road use patterns to plan maintenance and improvements.[144] It is also possible that these privacy concerns are unfounded, much like the way Samuel Warren and Justice Louis Brandeis feared an extreme lack of privacy resulting from the proliferation of "instantaneous photographs and newspaper enterprise."[145]

2. Data Security Breaches

In addition to the risks to users of autonomous vehicle networks, the network itself will also face security threats. Like any other network, the network of autonomous vehicles and infrastructure sensors may be targeted by hackers or terrorists to bring the system down or impair its functionality.[146] Although the responsibility of mitigating these threats will ultimately fall to the technological community, the possibility of their occurrence should be remembered when drafting legislation.[147]

Although there are some disadvantages associated with autonomous vehicles, the Illinois General Assembly should still enact autonomous vehicle legislation. In addition to helping neutralize the disadvantages, the benefits of judicial guidance, positive economic effects, reduction of negative environmental impact, and reduction of injuries and fatalities provide a strong argument for expressly allowing autonomous vehicles to operate on Illinois roads.

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139. *Id.*
140. *Id.*
141. *Id.*
142. *Id.*
143. *Id.*
144. *Id.*
145. Samuel D. Warren & Louis D. Brandeis, *The Right to Privacy*, 4 HARV. L. REV. 193, 195 (1890).
146. CTR. FOR AUTOMOTIVE RESEARCH, *supra* note 3, at 27.
147. *See id.*

V. PROPOSED RESOLUTION

While drafting legislation to expressly authorize autonomous vehicles, the Illinois General Assembly will have decisions to make about the overall breadth of the legislation and the specifics contained within it. The choices made by the Nevada, California, and Florida Legislatures can help guide the Illinois General Assembly's decision-making process. The breadth of the legislation should be restrained to minimize the impact on human drivers and promote innovation. Further, the legislation should apply only to vehicles in the Automated and Autonomous Driving groups and should allow general use of autonomous vehicles rather than restricting their use to testing purposes.

Before beginning the process of drafting autonomous vehicle legislation, the Illinois General Assembly should first determine the breadth it would like the legislation to have. One option is to redraft the entire Illinois Vehicle Code, incorporating autonomous vehicles. The other option is to leave the current Vehicle Code intact and draft a separate section pertaining specifically to autonomous vehicles. Nevada, California, and Florida employed this second option and it is more beneficial because there will still be vehicles driven by humans.[148] The diffusion of autonomous vehicles onto Illinois roads will be gradual because not all vehicle owners will immediately purchase autonomous vehicles.[149] The result is that there will be a period where vehicles driven by humans will share Illinois roads with autonomous vehicles. Thus, the current Vehicle Code will still be applicable to human drivers, which leads to another benefit: certainty of the law's application. If the General Assembly were to redraft the entire Vehicle Code, many situations that are well settled under current law would be subject to new laws that may lead to different results. Therefore, it appears the best option would be to follow the lead of other states and enact separate legislation for autonomous vehicles to help reduce the impact on human drivers.

Another consideration with respect to the breadth of the legislation, including responsibilities left for administrative regulation, is its effect on technological innovation. When creating a new medium for innovation, like explicitly allowing autonomous vehicles, care must be taken not to stifle the freedom to innovate within it.[150] Over-regulating prevents the

148. *See* NEV. REV. STAT. §§ 482A.010-.200 (2011); CAL. VEH. CODE § 38750 (West 2012); FLA. STAT. §§ 316.003, 316.85, 316.86, 319.145 (2012).

149. *See* CTR. FOR AUTOMOTIVE RESEARCH, *supra* note 3, at 17 (presenting three scenarios for autonomous vehicle adoption: aggressive, base case, and conservative).

150. *See* Eli Dourado, *The Next Internet-Like Platform for Innovation?* Airspace *(Think Drones)*, WIRED (Apr. 23, 2013, 6:30 AM), http://www.wired.com/opinion/2013/04/then-internet-now-airspace-dont-stifle-innovation-on-the-next-great-platform/ (noting that we are now seeing the benefits of not over-regulating the internet during its infancy).

industry from innovating because approval of certain activities will have to be obtained from regulators beforehand.[151] Although this problem might not be much of a barrier for larger entities, smaller entrepreneurs will face a burden in developing new, important, and useful products and services associated with autonomous vehicles.[152] Further, comprehensive regulation at this time would likely be a wasted effort because the complete implication of, and issues resulting from, autonomous vehicles are uncertain at this time.[153] Therefore, the dual goal of autonomous vehicle legislation in Illinois should be to provide a basic framework for operation of autonomous vehicles within the state and provide for the situations that the current laws do not address.

With respect to the specifics of any potential legislation, one of the first decisions will be which types of vehicles the legislation will cover. The capabilities of some vehicles are compatible with the current laws. For instance, vehicles in either the Warning and Information or the Assisted Driving groups require a human driver, and thus the current laws adequately cover these vehicles.[154] To avoid legislating in an area already covered by the current laws, the goal of the automated vehicle legislation should be to cover only situations that the current laws do not address. These situations are those encountered by vehicles in the Automated Driving and Autonomous Driving groups because of their lack of a human driver.[155] Therefore, Illinois legislation should expressly state that it applies only to vehicles that are capable of driving without the active control or monitoring of a human operator.

Nevada, California, and Florida have all taken this approach by expressly stating they intend to cover only vehicles that do not need "the active control or monitoring" or "active intervention of a human operator."[156] Currently, there is no data to support that this is the best choice. However, covering only these vehicles makes the most sense because if a human driver is required to operate the vehicle, that situation would not differ from the situations currently faced by drivers in conventional vehicles, and current laws sufficiently account for these situations. Therefore, Illinois legislation should stay consistent with the other states and limit its scope to vehicles in the Automated Driving and Autonomous Driving groups.

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151. *Id.*
152. *Id.*
153. *Id.*
154. *See* Beiker, *supra* note 3, at 1147.
155. *See id.*
156. NEV. REV. STAT. § 482A.030 (2012) ("active intervention of a human operator"); CAL. VEH. CODE § 38750(a)(2)(B) (West 2012) ("active control or monitoring of a human operator"); FLA. STAT. § 316.003(90) (2012) ("active control or monitoring by a human operator").

The scope of the legislation leads to the next consideration: terminology. Although breaking the technologies into numerous discrete groups helps consider them from a technological standpoint, doing so from a legal standpoint, at this time, is likely unsound. Much debate can be had over the meaning of the terms "automated" and "autonomy," but the goal of the Illinois legislation should be to make apparent which vehicles are covered with as little ambiguity as possible.[157] The accepted terminology, both in legislation and public discourse, is "autonomous vehicle."[158] Therefore, to avoid confusion and promote consistency among the states, Illinois should use the term "autonomous vehicle" to describe its legislation. After all, the terminology used is less important than what it covers, so the statutory definition of "autonomous vehicle" is what truly matters.

Another decision will be who is allowed to operate autonomous vehicles and for what purposes. California allows autonomous vehicles to be operated only for testing purposes by a person with a certain type of license.[159] Regulations enacted in Nevada allow persons with a special license endorsement to operate autonomous vehicles for general use.[160] The Florida statute does likewise.[161] The benefit of allowing autonomous vehicles to be used for general purposes, as opposed to allowing them only to be used for testing purposes, is that no further legislative action will be necessary. However, if Illinois enacts legislation that allows testing, but not general use, it will evidence the legislature's intent to disallow autonomous vehicles for general use. Thus, before autonomous vehicles can be used for general purposes, the legislature would have to explicitly allow it. Therefore, the best course of action is to allow autonomous vehicles for general use.

Another consideration is how much rulemaking to do in the statute itself. On the one hand, the Nevada Legislature decided to only authorize autonomous vehicle use and set forth very basic requirements, while assigning the rest of the rulemaking authority to the state's Department of Motor Vehicles.[162] On the other hand, the California and Florida Legislatures decided to set forth a number of requirements in the statutes themselves.[163]

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157. *See* SMITH, *supra* note 8, at 11 n.40 (noting the different dictionary meanings of "automation" and "autonomy," as well as the difficulty of assigning terms-based vehicle capabilities).

158. *Id.* (noting the use of the term "autonomous" in the Nevada, California, and Florida statutes and the frequency with which various alternatives are searched for on Google).

159. VEH. § 38750(b).

160. NEV. ADMIN. CODE § 482A.040 (2012).

161. FLA. STAT. § 316.85 (2012).

162. NEV. REV. STAT. § 482A.100 (2012).

163. *See* VEH. § 38750; FLA. STAT. §§ 316.003, 316.85, 316.86, 319.145 (2012).

In conclusion, the Illinois General Assembly should restrain the breadth of any autonomous vehicle legislation it enacts to minimize the impact on human drivers and foster innovation. Additionally, such legislation should only apply to vehicles in the Automated and Autonomous Driving groups and should allow general use of autonomous vehicles rather than restricting their use to testing purposes.

VI. CONCLUSION

The increasing acceptance and use of autonomous vehicles in the coming years will bring attention to their interaction with the law. Under current Illinois law, it appears autonomous vehicles are not prohibited. However, legislation expressly authorizing their operation is not only needed, but will also bring several benefits to Illinois and its citizens. These benefits include giving the judicial system guidance when hearing disputes, creating a positive economic effect, reducing the environmental impact associated with automobile usage, and reducing injuries and fatalities resulting from automobile accidents.

The Illinois General Assembly should limit the scope of any autonomous vehicle legislation it enacts to vehicles that do not require human drivers. Additionally, the Assembly should use conventional terminology and allow autonomous vehicles to be operated for general use, rather than only for testing purposes. Although the initial authorization of autonomous vehicles will likely require further amendment as the technology advances, beginning with a strong, yet open framework will allow autonomous vehicle technology to provide the maximum benefit to the citizens of Illinois.