

Daily Journal

www.dailyjournal.com

MONDAY, DECEMBER 19, 2016

PERSPECTIVE

Isaac Asimov's laws and the rise of self-driving cars

By Patice Gore

Autonomous vehicles (AVs) are being heralded as the next major technological development that will change the way humans live. AVs rely on computers to monitor and sensor the vehicle and its external environment in order to drive its occupants from location to location. While AVs may revolutionize human life, the development of the technology will necessitate a change in the law, public policy and ethics, among other areas. One critical area of concern raised by AVs is their impact on vehicle safety.

Proponents of autonomous technology contend that driving will become safer because computers, rather than humans prone to distraction, will control the navigation of vehicles. Developers of AV technology argue that AVs will be designed to minimize the loss of human life and will abide by Isaac Asimov's three laws of robotics (recently reemerging in the 2004 movie "I, Robot"). Specifically, the first of Asimov's three laws, which states that "a robot may not injure a human being or, through inaction, allow a human being to come to harm."

Even if the estimates of increased driving safety are correct and AVs are indeed programmed not to injure humans, situations will arise in which an AV cannot avoid a fatal accident. The

manner in which AV computers address those types of situations is a major area of concern for skeptics of autonomous technology. As a general standard, many agree that robotics, including autonomous technology, should be governed by utilitarian principles. In a situation involving the unavoidable loss of life, the AV should be programmed to maximize the number of survivors and minimize the number of deaths, regardless if those killed are the occupants of the vehicle. AV technology is so new, it is not clear that these types of vehicles are capable of collecting the data necessary to accurately assess the risk to human life under various circumstances. Current versions of AVs still struggle with sensing certain common external conditions such as fog, let alone sensing the presence of other humans. In attempt to address this shortcoming, Google has designed its vehicles to stop when it encounters an unexpected situation. As AVs grow more common in use, operators will demand a more robust response from AVs. Consequently, AV manufacturers, owners, and operators should consider their vehicle's ability to gauge the risk to human life before deploying AVs on public roadways, based on the ethical, moral and legal implications of AVs.

Assuming AVs are able to gauge the potential risk to human life presented by different

scenarios, the default utilitarian principles do not adequately address all of the potential scenarios an AV will encounter. For example, if an AV faces an emergency in which the number of lives lost would be the same under any scenario, which of the scenarios should the AV select if there is no concern regarding minimizing the loss of life? Should the AV assess the age and physical condition of the victims in each scenario and select a course of action which will save the lives of younger, more physically healthy individuals? Or should the AV make a random selection? While discussions on the ethics sounding AVs assume that basic algorithms can be programmed into AV computers, the scope of the algorithm is very difficult to define.

To avoid or defend against product liability lawsuits arising from the use of AVs, programming AVs to use utilitarian principles when responding to life-threatening scenarios appear to be the best practice for AV manufacturers. Generally, the law recognizes that a reasonable amount of risk is necessary and unavoidable. As past lawsuits involving product safety and liability have shown, most notably, the Ford Pinto case — *Grimshaw v. Ford Motor Co.*, 119 Cal.App.3d 757 (1981) — public perception (and coincidentally, jury verdicts) does not always coincide with sound legal principles. This

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Isaac Asimov, 1920-1992

unknown variable — how society will feel about how AVs respond to life-threatening emergency situations — further complicate the establishment of concrete guidelines for AVs to abide.

Although only a theoretical consideration at this point, once AVs are more widely deployed on public roadways, AV manufacturers, operators, and the public will have to develop concrete, rules on responding to risks to human life. The task of formulating a generally-accepted decision-making framework may be the most difficult and complicated aspect of developing autonomous technology and may be AV's largest roadblock yet.

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