Alexander Chin   3/30/18

110260158

<center>Self-Driving Cars in the Modern World</center>

As numerous car manufacturers and technology companies begin testing and showcasing self-driving car capabilities, it is only a matter of time until self-driving cars become a part of daily life. Self-driving cars are said to bring about several benefits in society such as greater traffic and less pollution. While cars running on autopilot are slowly becoming a reality, there are plenty of concerns when it comes to letting machines dictate the road. Just this month, a self-driving Uber vehicle hit and killed another person. Companies are faced with tough ethical choices for when an autonomous car faces an unavoidable collision. Someone must decide how a car will act in such a situation and who ultimately takes responsibility when tragedy strikes. The following articles, seek to to describe the current state of self-driving cars in society, how they will affect us in the future, and current questions and issues surrounding them.

In the first article, "Self-Driving Cars," Mike Daily, Swarup Medasani, Reinhold Behringer, and Mohan Trivdei, discuss the history and current state of self-driving cars in Asia, Europe, The United States and in academia. The authors indicate that self-driving vehicles are actively being tested in Asian cities such as Singapore, Shanghai and Tokyo in hopes of a fully functioning autonomous car before the year 2020. Meanwhile in The United States, some states have allowed the testing of partially automated cars controlled by human driver in case of emergencies. The authors additionally discuss important technological advances like Europe's Eureka PROMETHEUS (Programme for a European Traffic of Highest Efficiency and Unprecedented Safety) Project that has gone to provide support and development for many of the driver assistance technologies used in modern day cars. They go on to point out that various

universities United State universities are actively contributing to the research and development of self-driving cars by creating new technologies in machine learning, path planning, and deep learning. The authors indicate that some challenges about the safety of self-driving cars and legal regulation are being investigated by government agencies, companies, and academics. While this article does not fully develop a solution to the big questions surrounding self driving cars, it provides a sufficient background on the topic.

In "Self-Driving Cars and the Law", Nathan A. Greenblatt, an intellectual-property lawyer, further discusses current laws surrounding autonomous cars, possible resolutions to technical logistical issues, and why self-driving cars should be developed as quickly as possible. Greenblatt tells his reader that laws around self-driving cars are typically general and specific to certain areas. Currently, most laws dictate how and where companies can test their self-driving cars while there are little few formal laws to dealing with automated vehicles. He claims that the lack of formalized laws leave room for uncertainty and indicates this uncertainty is the cause of the slow development of self-driving cars. Greenblatt explains manufacturers can face liability lawsuits, punitive damages, and be forced to recall product lines. In order to resolve lawsuit problems, he proposes that computer drivers should be viewed similarly to human drivers. Autonomous cars would follow negligence laws rather disregard design-defect laws. Greenblatt finally urges the swift distribution self-driving cars because of the potential to save thousands of lives from accidents, prevent millions of injuries, create overall safer roadways, and decreasing pollution with economy optimized cars. In this article, readers are given a possible way to deal with legal issues concerning self-driving cars. The subsequent articles dive deeper behind the ethics and morality of autonomous vehicles while also further clarifying other aforementioned content.

In "Responsibility and the Moral Phenomenology of Using Self-Driving Cars," by Mark Coeckelbergh, a philosophy professor from the University of Vienna discusses who takes responsibility in the event of an accident with a self-driving car. Coeckelbergh also attempts to define where the assignment of responsibility falls by taking an objective third-party view of the situation. He defines responsibility as taking action in response to a situation and declares that an autonomous car reshapes the current experiences of drivers. He states that cars have already disengaged people from each other such that they view other cars as machines, not machines with passengers. This dangerous thought leads Coeckelbergh to pose concerns that a self-driving car may void drivers of responsibility for their actions on the road. In the case of semi-autonomous cars, Coeckelbergh claims that a less engaged driver is potentially even more dangerous to those around them because they lack constant awareness of their surroundings. Problems arise in both situations but he concludes his paper indicating that further research and development of automated machines must account for human perception and responsible use of such machines.

The following article "Will My Next Car Be a Libertarian or a Utilitarian?" by Tom Fournier, chief technology officer at Opus Inspection, describes his perspective on the ethical dilemma of how should self-driving cars respond to extreme situations and who will decide how these machines will act. Fournier presents his readers with a modified trolley problem, a famous thought experiment in the field of ethics. He proposes a scenario is given where a car must hit either two young children in the street or swerve into hit a single bystander. Fournier concedes that there is no correct choice for a human driver but in the case of a autonomous car. For an autonomous car he explains that it is unclear who should decide on these tough decisions. Although the aforementioned scenario is an extreme case, Fournier clarifies that minor traffic

infractions such as speeding and passing a lane boundary to avoid a pothole happen all the time. The author considers a solution where drivers take on a ethics exam in order to program their self-driving car to act similarly to its driver. Still a conflict arises, are self-driving cars made to act to ensure the safety of as many people as possible or is it ultimately the human driver's choice to make? This is a gray area that is open for discussion but Fournier indicates that drivers cannot always be trusted to make the most ethical choice. He concludes his article, leaving an unresolved question on how to deal with autonomous vehicle ethics.

In the final article, the authors revisit the trolley problem and incorporate the discussion of self-driving cars. The article "Ethics of Accident-Algorithms for Self-Driving Cars: an Applied Trolley Problem?" has authors Sven Nyholm and Jilles Smids describe issues that accident-algorithms must handle for self-driving cars. In order to illustrate their points, Nyholm and Smids contrast the ethics of self-driving cars against the famous trolley problem. They claim that the trolley problem is a logical starting point when discussing ethics of self-driving car but the trolley problem is not sufficient enough to describe ethical problems surrounding self-driving cars. The trolley problem proposes a controlled environment where a single individual decides on whether to flip a switch to either have a trolley collide with five people or one person. In comparison, the authors argue that the accident-algorithms for self-driving cars have decisions faced by multiple stakeholders (companies, governments, drivers, pedestrians) , unlimited amount of variable circumstances, moral and legal responsibilities and a large degree of uncertainty. Because of these reasons, Nyholm and Smids state that the trolley problem cannot be considered when designing accident-algorithms. Instead they propose key details of self-driving cars that should be addressed and indicate that there many other relevant ethical issues that must be considered. They urge that a structure of what is ethical needs to be agreed upon and

decisions on how to make self-driving cars should be based on these decisions. The authors conclude their paper by presenting general ethical issues that will need to be addressed in the discussion of self-driving cars. They indicate the need to define decision making, contingency planning, moral and legal responsibility, and ethical reasoning on risks. Knowing that the proposed issues are not the only problems surrounding self-driving cars, Nyholm and Smids indicate that more questions will arise and there is a lot of work to be done in the field of self-driving cars.

In these five articles, readers are given several viewpoints and questions on self-driving cars. Some articles outline the benefits of self-driving cars, safer roads, less pollution, less accidental injuries and deaths. Each one takes a philosophical standpoints and all commonly address that self-driving cars create ethical and legal questions that are not fully answered. Some solutions are proposed but ultimately a final decision on how to handle the issues surrounding self-driving cars will only be answered with time and ongoing discussion.

Bibliography

Coeckelbergh, Mark. "Responsibility and the Moral Phenomenology of Using Self-Driving

    Cars." *Applied Artificial Intelligence*, vol. 30, no. 8, Sept. 2016, pp. 748-757.

    EBSCO*host*, doi:10.1080/08839514.2016.1229759.

Daily, Mike, et al. "Self-Driving Cars." *Computer (00189162)*, vol. 50, no. 12, Dec. 2017, pp.

    18-23. EBSCO*host*, doi:10.1109/MC.2017.4451204.

Fournier, Tom. "Will My Next Car Be a Libertarian or a Utilitarian?: Who Will Decide?." *IEEE*

    Technology & Society Magazine, vol. 35, no. 2, 6/1/2016, pp. 40-45. EBSCO*host*,

    doi:10.1109/MTS.2016.2554441.

Greenblatt, Nathan A. "Self-Driving Cars and the Law." *IEEE Spectrum*, vol. 53, no. 2, Feb.

    2016, pp. 46-51. EBSCO*host*, doi:10.1109/MSPEC.2016.7419800.

Nyholm, Sven and Jilles Smids. "The Ethics of Accident-Algorithms for Self-Driving Cars: An

    Applied Trolley Problem?." *Ethical Theory & Moral Practice*, vol. 19, no. 5, Nov. 2016,

    pp. 1275-1289. EBSCO*host*, doi:10.1007/s10677-016-9745-2.