Essay 1: Robotic Cars and Ethics Troy Pandhumsoporn
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The first thought that usually arises to mind when someone mentions "robotic car" would be Google's Self-Driving Cars, or other related autonomous vehicles that Google experimentally employs. You may have seen one driving around Mountain View, California (Google Headquarters) or Dallas, Texas[4]. Although other automobile companies and DARPA are developing robotic cars, none are as prominent in reoccurring in the news as Google's progressive improvements/updates with its project. Proper programming is the cornerstone of successful automated cars, which one can attribute that Google's quality production code would prevail in the competition. Robotic cars still have yet to achieve the independence and fluid practicality portrayed by the movies and literature—encountering problems in its programming and hardware technological limitations when applied towards actual environmental and social interactions. Beyond the engineering challenges, robotics cars incur complicated ethical ramifications on accountability between the end users, engineers, company manufacturers, and its artificial intelligence on making such decisions.

The engineering problem(s) with robotic cars and ethics stems from primarily automation programming with some hardware limitations. Advanced sensors in conjunction with on-board computer systems and artificial intelligence are expected to substitute human instincts and judgment to make normal to ethical, split-second decisions. As an example of a hardware issue, LIDAR technology is used to generate an elaborate 3D map of a physical area combined with high-resolution world maps from the Web; however, it has problems identifying some potholes or humans signaling the car to stop (Lee, 2014). Programmers and embedded-system designers have more accountability on bad outcomes to code for random scenarios that had no previous design into the on-board computer systems. Another factor with robotics cars is cyber security, which unlike human counterparts; hijacking attempts with normal cars from conferences like DEFCON have been successful in communicating with and controlling cars, likely through the CAN automotive bus protocol, with acceleration and braking.

The ethical problems concerning robotics cars are mostly limited to trust and its liability issues when something goes wrong. Understandably, the current laws that apply to automobiles assume that there is a living driver/human in the vehicle; automated cars are a new territory where a new set of laws would have to be formulated to judge whether they are ready to be implemented alongside human drivers on the road. (Lin, 2013) Laws alone cannot guide robotic cars as during times of emergency/crisis; rules conflict with moral ethics that automated cars may not understand the nuances to weight one ethics over another. Such examples would includes driving over the speed limit to get to a hospital, or driving with a broken headlight or one partially deflated/ tire to get back home or to a mechanic, in which the automated car would simply not run at all (Lin, 2014). Moreover, individuals would also have to fully trust programmers to follow ethical practices in their coding; otherwise, any incident involves shared liability between the customer and the manufacturer.

The ethical tool used to evaluate the problem of ethics of robotic cars would be the six parts of ethics: intentions, rules, consequences, virtues and vices, institutions and culture. As one of the first tools introduced in the course, this method provides a good general coverage of connecting robotics cars to the ethical responsibilities of programmers, human users, and companies involved. Since robotic cars and ethics are more of an anticipated forecast of events, the other ethical tools are not relevant enough to justify a solution to the problem. In other words, the three intellectual values, three kinds of justices, code of ethics, risk = harm x probability tools are valuable evaluating an established, ethically “bad/questionable” issue. Robotic cars are still a new technology. While overlapping in similarity to the six parts of ethics, the four approaches of ethics “ethical tool” includes casuistry. Casuistry depends on case-by-case reasoning and offers an inconclusive solution to the problem due to complexity of hypothetical, what-if-scenarios that robotic cars should encounter when implemented. No life-threating injuries involved with self-driven cars have been reported since robotic cars are still in the development and experimentation stage using cardboard cutouts and other pre-planned obstacles. (Lee, 2014)

Aside from following the standard ACM procedures in programming robotic cars, we can apply the ethical tool towards the issue of hacking, insurance companies, and the cars’ ethics itself. The first line of defense is having proper knowledge and following secure programming practices to prevent hacking attempts. Hacking practices cannot fully be stopped by any ethics, but only discouraged by stricter laws and penalties set by governmental institutions. The ethics of robotic cars that may cause auto-insurance companies to lose business is one of consequences of emerging technology, unless it provides something like hacker protection. In the hypothetical situation with cars equipped with an ethics setting, car manufacturers attempt to reduce liability of robotics cars by passing/sharing the responsibility with customers. (Lin, 2014) The consequences of that decision are no-win scenarios for both the customer and manufacturers, with both choosing between two worse vices instead of virtues. The existence of the ethics setting provides some premeditation to murder by willingly prioritizing one group of people’s lives over another based on religion, age, ethnic background, economic status, and proper auto insurance. Because this difficult ethical dilemma provides a mutually destructive situation, the affected party would have to look towards rules set by agencies or modern culture to define the best case scenario.

Using our chosen ethical toolkit, a possible solution to the ethical concerns of robotics cars would start out with understanding and analyzing the intentions the audience involved: programmers, engineers, and manufacturers. As part of engineering culture, the software, hardware, and build quality of materials of robotic cars are checked for safety, reliability, and adherence to pre-programmed ethical rules. Engineers can perform trial-and-error systematic experimentation and in-the-field testing to cover consequences as well as making judgments involving virtues and vices. These simulations provide a physical, interactive realization of possible ethical scenarios. Moreover, the data collected from these experiments can be used to conduct more experiments that improve on optimizing its performance and resolving troubleshooting issues. Over time, rules can be developed based on those consequences and governmental/protection agencies (institutions) that enforce regulations are created to maintain standards. The community culture (non-engineering related) can also help to address and update rules on ethical issues concerning robotic cars that were not anticipated early on.

The future concerning ethics and robotic cars are still under development, because the technology has not yet transitioned to everyday use. A multitude of unimaginable scenarios can occur when autonomous vehicles are fully implemented which are capable of reshaping society in several ways. In retrospect, the invention of the automobile had made long-distance work possible and increased the rate of business. Cars provide easy transport of supplies to not-too-far places and deliver people to hospitals, malls, restaurants, and other places of interest. In conclusion, robotic cars can usher in great advantages and inadvertent effects to the world, so it is up to us humans to apply our knowledge of ethics step-by-step of the journey to a brighter future.

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