

AI Ethics In Automotive Manufacturing

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October 21, 2024

I work in the field of automotive manufacturing, specifically for Mercedes-Benz as a prototype technician. This sector has long been defined by the need for precision, efficiency, and innovation. With technological advancements accelerating, particularly in artificial intelligence (AI), the sector is experiencing a profound transformation. AI has the potential to significantly alter how vehicles are designed, manufactured, and maintained, while also impacting how they function in daily life. It is worth noting that these technological changes and advances bring complex ethical challenges that need careful navigation, especially in areas such as job displacement, safety, and privacy. Ethical frameworks such as the Association for Computing Machinery (ACM) Code of Ethics and the Institute of Electrical and Electronics Engineers (IEEE) Code of Ethics are essential in guiding professionals in the responsible use of AI technologies.

The ACM Code of Ethics emphasizes key principles such as avoiding harm, respecting privacy, and being honest and trustworthy (ACM, n.d.). It serves as a guide for computing professionals to prioritize public welfare and uphold transparency in decision-making. These principles are directly applicable to AI in the automotive sector, particularly regarding the safety of autonomous vehicles and data privacy concerns. Similarly, the IEEE Code of Ethics underscores the importance of prioritizing the "safety, health, and welfare of the public," as well as promoting "honesty" and "ethical responsibility" across all engineering practices (IEEE, n.d.). In the automotive industry, these codes provide a framework to ensure that AI is integrated responsibly, emphasizing safety, fairness, and ethical data usage. By adhering to these principles, professionals can better navigate ethical challenges such as job displacement, ensuring autonomous vehicle safety, and protecting data privacy.

The impact of AI is reshaping the automotive manufacturing industry, presenting both opportunities and ethical challenges in three primary areas: automation, autonomous vehicles, and data management. Each area represents a significant shift that requires careful ethical consideration. Here are a few examples.

The increasing adoption of AI to automate complex tasks in manufacturing has drastically improved efficiency and precision, but it has also presented an ethical dilemma regarding job displacement. Robots powered by AI are used for tasks such as assembly, welding, and painting with greater consistency than human workers. While automation reduces errors and enhances production speed, it can lead to widespread job loss that affects individuals who rely on these positions. According to the IEEE Code of Ethics, engineers should "accept responsibility in making decisions consistent with the safety, health, and welfare of the public" (IEEE, n.d.). This includes acknowledging the social impact of AI and considering measures to mitigate the effects on workers who may be displaced by automation.

AI is crucial in developing autonomous vehicles, which have the potential to revolutionize transportation by reducing human error and improving safety. Autonomous vehicles use sophisticated AI algorithms to make real-time decisions, navigate traffic, and respond to obstacles. However, the ethical concerns surrounding autonomous vehicles extend to scenarios where the AI must make split-second, life-or-death decisions, such as prioritizing the safety of passengers or pedestrians in unavoidable accidents. The ACM Code of Ethics mandates that professionals "avoid harm" and "respect privacy" in their work (ACM, n.d.). These principles are particularly relevant as autonomous vehicles continuously collect and analyze data, necessitating robust safety protocols and privacy protections.

As a final example, AI systems in automotive manufacturing and autonomous vehicles collect substantial amounts of data, including potentially sensitive information. This data can be used to optimize manufacturing processes, predict maintenance requirements, and enhance the driving experience. However, the extensive collection of data raises ethical concerns about user privacy and the potential misuse of personal information. The ACM Code of Ethics emphasizes transparency and the protection of privacy, advising professionals to be clear about how data is used and to ensure that individuals' privacy is not violated. Similarly, the IEEE Code urges engineers to uphold public trust by maintaining confidentiality and safeguarding data. These codes guide professionals to address privacy concerns proactively as AI becomes more integrated into manufacturing and automotive technology.

Per the assignment instructions, I chose to use the Army's method for ethical analysis, especially considering I am an Air Force veteran. Applying the Army method allows for a systematic evaluation of the AI-related ethical issues from both a Christian worldview and professional ethical standards. Two examples of the Christian worldview and the professional view in the realm of automation and job displacement are as follows. In the Christian worldview, Christianity teaches that every person is made in the image of God and that work has intrinsic value. The Bible emphasizes compassion and justice, especially when addressing the impact of technological changes on individuals. In Micah 6:8, the call to "act justly, love mercy, and walk humbly with your God" encourages fair treatment of workers affected by automation. From this perspective, industries should support displaced workers by offering retraining programs, providing fair compensation, and seeking ways to reintegrate them into the workforce.

In the professional view, the IEEE Code of Ethics similarly stresses the importance of considering the broader impact of technology on society. While the Code does not specifically address compassion, it does call for social responsibility and the ethical use of technology. Engineers should consider strategies to minimize the negative consequences of automation on employment, such as creating alternative job opportunities or investing in skill development for affected workers. Regarding autonomous vehicles and safety, the Christian worldview places high value on the sanctity of life and protecting others. In Matthew 22:34-40, Jesus' teaching to "love your neighbor as yourself" implies a moral duty to prioritize human life in all circumstances. For autonomous vehicles, this means designing AI systems that prioritize safety and minimize harm to passengers and pedestrians alike.

The ethical concern extends beyond just technical reliability; it involves ensuring that the AI makes morally sound decisions in critical situations. The professional view says that both the ACM and IEEE codes emphasize minimizing harm and prioritizing safety. The ACM Code of Ethics requires thorough testing and validation of AI systems to ensure they meet the highest safety standards. Similarly, the IEEE Code highlights the need for engineers to protect public safety through their work. While these professional guidelines focus on the practicalities of technical safety, the Christian perspective introduces an additional layer of moral responsibility, emphasizing the preservation of life in all design decisions.

While the Christian and professional ethical perspectives share common goals of promoting safety and fairness, they approach the issues from different angles. The Christian

worldview incorporates broader moral and social considerations, emphasizing human dignity, compassion, and the protection of life.

In contrast, professional ethical codes like those from the ACM and IEEE focus more narrowly on technical standards, legal compliance, and practical safety measures. From both the Christian and professional perspectives, respecting privacy is essential. The Christian worldview, guided by Matthew 7:12's principle of treating others as one would like to be treated, supports responsible data management that protects individuals and prevents exploitation. Similarly, the ACM and IEEE ethical codes emphasize transparency and safeguarding sensitive information, aligning well with the Christian emphasis on dignity and ethical data use.

AI presents transformative opportunities and ethical challenges in automotive manufacturing. While it promises to improve efficiency, enhance safety, and revolutionize data management, it also raises concerns regarding job displacement, autonomous vehicle safety, and data privacy. Both Christian ethics and professional codes like those of the ACM and IEEE offer valuable insights into addressing these concerns. The Christian approach provides a broader ethical framework that prioritizes compassion and justice, while professional standards ensure that AI technologies are safe, reliable, and socially responsible.

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