*Making decisions taking into account the well-being of the public: automation decreasing the amount of available jobs for humans.*

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**Prepared on:** October 6, 2017

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The Institute of Electrical and Electronics Engineers (IEEE) Code of Ethics was developed to regulate and guide Engineers in their professional development while promoting ethical application of technology. This code aims to encourage proper development of technological advancements because IEEE is concerned about benefiting society. An important social challenge to Engineers is finding the balance between technology development and social progress. Unfortunately, economic interests drive most of the decisions made in the Engineering realm impacting society. The most prominent negative impact that has affected the United States economy is the loss of jobs due to automation. Automation has replaced a significant amount of jobs in the country and, in ninety years, it will replace seventy percent of today’s occupations [4]. Additionally, researchers at Oxford University have concluded that half of the jobs in the United States can be automated within one or two decades [3]. The following IEEE Code of Ethics is comprised of ten principles that create a divided opinion among Engineers on how to approach the accelerated trend of automating jobs.

IEEE Principles:

1. Be responsible in making decisions taking into account safety, health, and well-being of the public. Furthermore, engineers should reveal information that will put in danger the public or the environment.
2. Avoid conflicts of interests and, if there are conflicts of interest, disclose them to affected parties.
3. Make statements, estimates, and decisions based on available data
4. Do not accept bribery
5. The enhancement of understanding of technology, its appropriate application, and consequences.
6. Improve technical ability and commit technological tasks for others only when qualified
7. Engineers should be critical of technical work. Furthermore, they should accept and rectify errors.
8. Do not discriminate on the basis of race, religion, gender, disability, age, national origin, sexual orientation, or gender identity.
9. Avoid damaging other human beings, their reputation, their property, or employment by malicious action.
10. Assist other Engineers in their professional development and support them in understanding this code of ethics.

As aforementioned, automation is threatening jobs, mostly blue-collar jobs in manufacturing facilities. Throughout history, manufacturing is the field that is affected more rapidly because the job positions are based on handling routine and repetitive tasks. Cutting pieces of metal or managing a warehouse can be automated by a machine. As a consequence, automation reduces the amount of skills needed to perform a repetitive task or removes workers [5]. As early as the nineteenth century, Luddites, English workers who destroyed machinery, focused their anger towards the knitting machine. This rage resulted in Luddites looting textile mills in northern England. In human history, each technology displaced a new cast of workers: first knitters, then farmers, and currently machinists. On average, six workers lose their jobs and wages fall seventy percent for every robot per thousand workers nowadays. For example, an electronics company named U.S. Foxconn is planning to automate a third of its job positions by 2020. Currently, the company has reduced its workforce from a manufacturing plant from a hundred and ten thousand employees to fifty thousand [3].

However, there is a misconception that only blue-collar jobs will be affected. A popular belief is that these technologies create jobs for educated people with high technical skills, most of them Engineers from diverse fields of specialty [2]. However, this is not the case with all the white-collar jobs. A new type of software called e-discovery is an example of the different ways in which automation is replacing jobs that require a university level degree. In 1978, CBS had legal issues with the United States Department of Justice. The television broadcast company hired lawyers and paralegals, to examine six million documents, who worked at high hourly rates for months yielding to a total cost of more than two million dollars. In contrast, specialized software can analyze documents in a fraction of time for a fraction of cost nowadays. In 2011, Blackstone Discovery, an e-discovery company, helped analyze one and a half million documents for less than ten thousand dollars [1].

Even though automation generates jobs for qualified Engineers, it creates new wealth without creating new jobs. In the case of technology companies, Google employs about sixty thousand workers. Moreover, Facebook is worth two hundred and seventy billion dollars; however, it employs thirteen thousand people. Additionally, WhatsApp had fifty-five employees in 2014. In contrast, companies that are worth less than technology companies usually generate more jobs. For example, General Motors employs two hundred and fifty thousand people [3]. Besides creating new wealth without creating new jobs, Information Technology (IT) departments are facing the possibility of getting replaced by systems like Amazon’s back-end A.W.S. infrastructure. This infrastructure provides cloud-based solutions where a team of on-site computer specialist was needed [4]. Ironically, Engineers who develop these new technologies are displacing their colleagues.

Another challenge that working adults face is that it takes the average worker forty weeks to find a new job. Besides the age and the lack of technical knowledge being factors that influence this prolonged time to return to the workforce, companies prefer to invest in technology and equipment than to hire professionals with experience. Investing money in newly developed equipment allows companies to increase productivity resulting in product growth without hiring workers [5].

Nevertheless, robots cannot replicate the entire intelligence spectrum of a human being. At the University of California – Berkeley, researchers developed a towel folder robot. The purpose of this project was to develop a machine that could create a stack of folded towels. The robot was able to learn how to grab the towels, but it could not figure out to locate their corners. When the robot was tested, it failed on a practical standpoint. On average, it took the robot twenty-four and a half minutes to fold each towel and ten hours to produce a stack of twenty-five towels. In addition to being unsuccessful in not achieving simple tasks due to the lack of mobility, machines are not good at reading the emotional cues of a frustrated customer [3].

Most of the occupations that have to interact with coworkers, manage people, or improve customer service should not be automated. Currently, Intel Corporation has replaced Human Resources (HR) department in some of their facilities with an automated online service where you have to exchange instant messages with a computer that helps the employees solve their issues. The purpose of replacing the HR department is to minimize the amount of employees at each facility; however, IT departments hired more skilled workers to support this new system. The implementation of this technology does not improve productivity; employees are reluctant to use the online service because of its inefficiency and lack of accuracy on its answers. Thus, Intel workers prefer to contact HR departments at other sites to help them solve their issues incrementing their amount of daily tasks.

As observed in the preceding examples, automation is becoming a challenge to the IEEE Code of Ethics. The first principle states that the Engineers need to be responsible in making decisions taking into account the well-being of the public. Unfortunately, the well-being of the public cannot be ensured if the people do not have jobs. The public will not be able to secure a stable income to support their basic necessities, housing, food, and medical service. The fifth principle promotes to understand the appropriate application and consequences of technology. Although Engineers understand the application and negative consequences of automation, they keep developing technology that eliminates human labor. Therefore, they acknowledge the inappropriate applications of the technology they develop. The ninth principle encourages Engineers to avoid damaging other persons’ employment by malicious action. Even if there is no malicious action, they are still damaging employment and, evidently, they are aware of it. Finally, the tenth principle persuades to assist other Engineers in their professional development. In the case of the IT departments being replaced by Amazon’s A.W.S. infrastructure, Engineers who commit to automation do not assist other Engineers, information technologists, in their career advancement.

The IEEE Code of Ethics is a blueprint of the exemplary behavior of an Engineer. As many of the plans, the ideas and morals used as its pillars are faultless until they are applied in real life. From the early nineteenth century to present day, society has been impacted in positive and negative aspects by technology development. However, the creation of jobs due to technology seems to start reaching its limit as automation is growing and performing blue and white-collar jobs. This unethical action of actively engaging in the reduction of occupations makes the Engineers who specialize in automation be perceived as hypocrites for not following the Code of Ethics’ values. Nonetheless, automation engineers are solely performing their jobs as required from their supervisors. As aforementioned, scholars predict a bright future for high skilled technical jobs; others insist that even Engineers will suffer from automation. Are robots going to take entirely our jobs or are they going to create more jobs? Unless the authorities force a halt to this trend, we will have to wait for future consequences.

**Work Cited**

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