

Engineering ethics of nanotechnology

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Engineering Ethics of Nanotechnology From a social perspective, ethics refers a set of moral principles that guide individual behavior with other members of an integrated society. With respect to professional context, ethics refers to systematic recommendations and regulations meant to govern professional's conduct in his or her undertakings. Engineering, just like any other professional field, has definite workplace ethics. These ethics draws a line between right and wrong within a given engineering situation. Currently, one ethical issue within the field of engineering technology is on the applicability of nanotechnology. Nanotechnology is an upcoming engineering field which has attracted both positive and negative criticism from stakeholders within the public domain. In this essay, we will develop a comprehensive understanding on nanotechnology. In addition, subsequent sections will involve detailed extrapolation into the depth and breadth of ethical issues surrounding nanotechnology as a branch of engineering. Nanotechnology As an engineering field, nanotechnology involves the study, design and production of machines and equipment at atomic level. Nanotech derives its name from the concept of nanometer, which is a unit of measure equal to 1/billionth of a meter. In this case, a nanotech involves design and production of machines from extremely miniature dimensions. Machines that can be produced from this form of technology include robots, electronics like computers and cell-phones. During its inception in the 1980s, there were numerous criticisms surrounding viability of this brunch of engineering. However, projects conducted by nanotechnology companies today suggest that there is a high possibility of success in production of nanotech equipments (Poel 34). Allegedly, nanotech will be instrumental in addressing future needs of equipment and machines within the medical and

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communication industry. In addition, equipment produced from this type of technology could find substantial application design and production of military weapons. Ethical Issue: Unintended Consequences of Nanotechnology

One ethical issue surrounding nanotechnology involves dangerous unintended consequences of this technology. During the 1920s when nuclear fission was discovered, scientists were fascinated about the breakthrough. At first, nuclear fission was regarded as the best alternative for hydroelectric energy. Its intended purposes were meant to address future energy needs in an increasingly industrialized population. However, Japanese cities of Hiroshima and Nagasaki became victims when nuclear technology was used for military purposes. In this context, nanotechnology is still at its development stages, and there is a high possibility of it becoming successful. Despite imminent breakthrough in this nanotech field, stakeholders are increasingly becoming worried on the unintended consequences of continuing with such an uncertain engineering technology (Baillie 62).

i. Global Security Concerned stakeholders are quick to admit the fact that potential benefits of developing machines with atomic and molecular specifications are immense. However, such benefits come with invariably restrictive dangers. Researchers behind these nanotech projects assert that nanotech units will possess technical attributes similar to biological cells. This means that machines made from this technology can undergo self-repair as well as growth. Consequently, nanotech devices will improve energy production, storage as well as conversion of energies within weaponry systems. Current trends in global security show that terrorism features a major vice that undermines political and social harmony. Production of nanotech machines and weapons may significantly

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compromise on fights against terror groups (Baillie 84). These machines can be used by terrorists in carrying out violent attacks on innocent civilians. This technology will provide an avenue through which lethal weapons of chemical and biological nature can be concealed and unleashed. In this case, nanotechnology undermines aspects of future global security.

ii. Abusive Restrictions Another unintended use of this engineering technology involves application of abusive restrictions and regulations. Currently, the US and other strong military organizations are employing unethical means of tracking individual's movements and communications. Current software technologies, which by all means will be substantially inferior to nanotechnology, facilitate unethical monitoring of persons in the society. Truth of the matter is that nanotechnology will enable development of sophisticated and microscopic devices. In addition, these devices will be complemented by presence of suitable artificial intelligence developed from the same technology (Lowenstein 01). In this case, there is possibility that presence of extremely sophisticated devices coupled with superior artificial intelligence may enable American agencies like CIA to employ unethical surveillance on anyone across the world. In this context, lack of privacy constitutes one of the unintended uses of nanotechnology.

iii. Threat to Humanity Apart from its use in production of military weapons and surveillance systems, nanotechnology may also present unprecedented dangers to humanity. Recently, Japan experienced an earthquake that interfered with some of its nuclear production plants. This was an isolated case of nuclear accidents which threatened human lives. Similarly, biological and chemical weapons produced from nanotechnology may compromise on safety of human lives. In this context, one can imagine a case where a

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biological weapon developed using this technology is effective enough to carry extremely miniature units capable of infecting 40 billion people with a deadly virus. Such imminent possibility can be worse whenever such miniature units are self-guided and can reach human targets across vast distances (Poel 35). In case of an accident like an earthquake or accidental drop of such weapons, it is possible that the entire human population on earth will be affected. In this case, nanotech weapons and medical products on lethal biological systems could be extremely dangerous. Conclusion In conclusion, it is undeniable that every professional undertaking should be guided by strict ethical guidelines. These ethical guidelines are meant to safeguard interest of stakeholders like the public. In this case, the ethical issue of unintended consequences of nanotechnology serves as an illustration of current ethical issues surrounding engineering technology (Poel 34). In order to ensure objectivity, this ethical issue should be addressed prior to making any significant progress in developing nanotech machines. Works Cited Baillie, Caroline. *Engineering and Society: Working Towards Social Justice*. San Rafael, Calif.: Morgan & Claypool Publishers, 2009. Print. Lowenstein, Bruce. *Special Issue on Nanotech Challenges: What Counts as a Social and Ethical Issue in Nanotechnology?* HYEL. Org, 2005. Web 1 December 1, 2013. <http://www.hyle.org/journal/issues/11-1/lowenstein.htm> Poel, Ibo. "How Should We Do Nanoethics? A Network Approach for Discerning Ethical Issues in Nanotechnology." *Journal of Nanoethics* 12. 4 (2008): 32-37.