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Advancement in Engineering Technology: A Novel Perspective

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Abstract

Background/Objectives: In this paper we will be discussing about the impact of technology on our daily lives. How everybody is dependent upon technology in one or other way. **Methods/Statistical Analysis:** Technology has played a significant role in the evolution of the society. Science has produced many new ideas but to harvest those ideas, technology is a must. With the huge requirement of engineering equipment's, the industry needs specialists who can manage and operate these technologies. Detailed information about the merits and demerits of technology is also mentioned in this paper. **Findings:** Technology has affected the environment on a great scale; in some cases, technology is even replacing human being or use of manpower. So proper counter measures have been mentioned, which can be used to control and limit harmful effect.

Keywords: 3 R's, Advanced Technology, Computation, E-waste, Engineering

1. Introduction

To satisfy the need of consumer there has been huge advancement in technology. Engineering industries are offering a wide range of products and services to meet the demand of consumer. With each passing day, technology is advancing resulting in high output efficiency. Technology is a process, which combines different methods and techniques to produce engineering goods, which can be used for betterment of society. However, everyone uses technology with different purposes, which can be harmful for the society, such as weapons of mass destruction (nuclear). Technology has made a significant difference in the lives of people by providing comforts but at the same time technology is also producing unwanted products such as e-waste, which is harmful for both human beings and environment. Technology is being used everywhere and on daily basis for example in mobile phones, com-

puter systems, laptops, industries, electronic, mechanical, electrical devices and many more. An individual can easily operate these devices, as they are not complex to use. Our lives are directly or indirectly dependent upon technology. Initially technology usage began with the conversion of natural resources into user-friendly tools¹.

2. Technology, Engineering and Science

Technology, Engineering and Science are related to each other but the difference between them is not clear². Science is the systematic study of the system or the natural world by observations and experiments resulting in new innovations. The techniques used for observations and experiments can be termed as scientific methods or technology. Technology is the product of science, to

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invent something from science; proper observations and techniques are always required³.

Engineering is the process, which requires both science and technology for designing and production of components or tools.

As science can produce many new ideas but to harvest those ideas, technology is required. Engineers are the ones who designs different technologies to get the best output. They maybe three different terms but each of them requires each other to discover or invent something by doing scientific research⁴.

3. Engineering Technologists

With the huge requirement of engineering equipment's, the industry needs specialists who can manage and operate these technologies⁵. For this very purpose, specialized engineers are being prepared who are dedicated and masters in designing and development of engineering products. These engineers can work in product designing, manufacturing units, product testing units and many others. The courses of these engineers are same to the normal engineering but in this field more focus has been made on practical knowledge instead of theoretical. The difference between engineering technologists and engineering graduates are engineering graduates spends their time planning whereas engineering technologists works on implementing and making their plan work⁶.

4. Growth and Demand of Technology

As said by the co-founder of Intel Gordon Moore, the number of transistors on a chip would increase to double after every 18 months after the invention of Integrated Circuits⁷. This was later proved and presently it is known as Moore's Law. To keep a track on growth of technology is not possible but we can just do a normal analysis, which can show us the growth of technology. For example 10 years ago mobile phone were used by only less than one-fourth of the world's population but at present with decrease in cost and high output efficiency, the usage of mobile phones is increased to almost 90 percent.

This was just an example of one electronic device, increase in usage with its economic advantages in one region⁸. There are many other devices in which, a great increase in usage has showed up such as computers,

audio players, cameras and many more. The IT and electronic industry has seen a huge demand of technology. Companies are expecting to generate more than 55% of their revenue from the digital market⁹. Consumers are ready to spend high amounts for their preferred technologies. They know what they want to buy and when they want to buy; but they just need the highly advanced technology to use¹⁰. Due to high demand, these industries are providing employment on a huge basis; to meet the requirement of the consumer, which is a very good initiative also but at the same time, many industries are adopting technology in their production units, which is leaving people jobless¹¹. High demand of electronic equipment's has led to increase in consumption of natural resources, leading to create imbalance in environment.

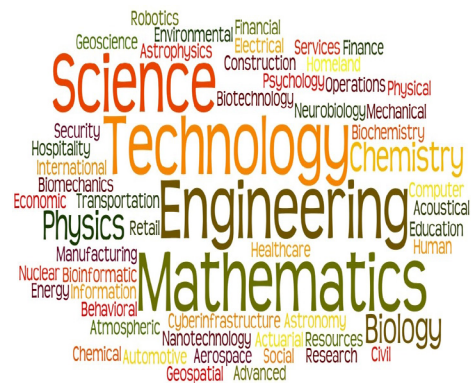


Figure 1. Stem .

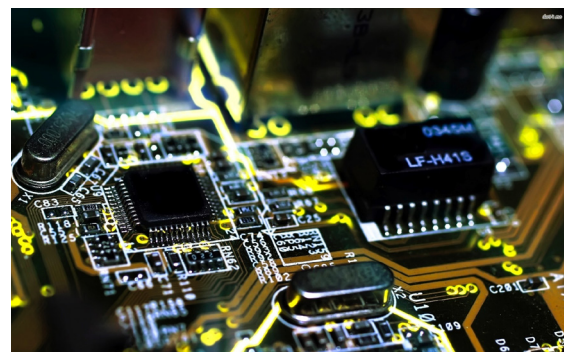


Figure 2. Integrated circuit.

5. Relation of Integrated Circuit with Technology

Technology is the process used in different systems to perform a particular task or achieve an object. In present world, almost every digital system requires an IC.

Integrated circuit is a combination of electronic circuits. Electronic circuit consists of combination of resistor, transistor, capacitor, inductor and diodes. IC is the main component responsible for controlling current and voltage. The Integrated Circuit is further divided into four different types depending upon the size of chip and number of transistors.

- SSI – Small Scale Integration (Less than 100 Transistors)
- MSI -- Medium Scale Integration (Less than 1000 Transistors)
- LSI -- Large Scale Integration (Less than 10000 Transistors)
- VLSI – Very Large Scale Integration (More than 100000 Transistors)

The technology initially started with 10 μm but at present 20 nm or ultra-scale technology is already into existence and work is in progress to further reduce the chip size to 14 nm and less.

- 1 μm = 1000 nm
- 1 nm = 1/10,00,000,000 m

As the size of chip is decreasing the output power efficiency is increasing, by consuming less power. If we take 20 nm in our consideration, which has 30 percent higher speed and consumes 25 percent less power as compared to 28 nm. The density of 20 nm as compared to 28 nm is 1.9 times. In the area of research, we can design different devices using simulators by using these chip size and different IOs and analyzing them on the basis of temperature, frequency, voltage, capacitance and time.

With the advancement in technology, consumers are getting reliable and highly efficient engineering products.

6. Dependence of Human on Technology

Earlier human being could not live without food but at present the situation has totally changed. Now human beings cannot live without technology such as mobile phones, computers and other gadgets, which are required on daily basis by an individual. This is not just a statement but a survey conducted by different organizations, which stated more than half of the world's population, is addicted or dependent upon technology.

In some cases, technology is even replacing human being or use of manpower. Now days, even doctors are not required for the operations, as computers can operate the patient itself. An airplane can fly itself by switching to autopilot. Robots are being created to make-work easier. Robots can work as a substitute to human being with high efficiency. Some more examples, which shows dependence of human beings over technology. Dependence upon Internet, at present people are totally dependent upon Internet for their work. It is impossible for the young generation to work without an email or without Google. Dependence upon phone, People are so much into their phones that they don't live the moment. They just believe in capturing the moment through video or picture. If somebody's phone is lost, what he/she has a few numbers, which are stored in his/her mind but else, everything is lost. Dependence upon e-market; these days people have become so lazy that they don't even want to walk to the store to buy the stuff. They order it online and delivery at the doorstep. These were the common examples.

There are many more. Human being created technology for their leisure but the day is not far when technology will take over the human beings. At that time there will be no use of human beings.

7. Technology Advancements

The advancement in technology has led to save time and cost of production of IT and Electronic industries. Advancement in technology has also led to a significant change in quality of life. This has helped them to manage and gain competitive advancement over other companies. A very common example is advancement in 3G and 4G broadband services; different companies small or big are facing tough competition from each other due to less cost of advertisement through Internet services. Earlier in the past only big companies had the budget to advertise products through T.V or any other source. But with advancement in technology, small companies with fewer budgets can advertise their products via Internet services. The invention of car and with advancement in technology with each passing decade has resulted in super-fast cars, covering distances at short time frame. For more fast and comfortable travel, trains and flights are easily available. Which can cover the distance in the shortest time frame. Advancement in technology has both Positive and Negative effects. Positively, advanced technology has helped to do work in simplified way, increased time

efficiency, high yield production, easy and simplified communication, and improvement in educational system and health care system. Technology has helped many innocent people by saving their lives. Doctors, students and researchers have created many new medical technological tools to carry out extensive operations and treatments for the patients. With the advancement in technology, there has been a significant increase in life expectancy. The more the technology is advancing, the more it is affecting our personal and social life. Technology has affected our sleeping habits, social life, physical problems due to bad body postures, eye and ear problems, and high amount of energy consumption. The biggest problem with technology is Electromagnetic radiations effects on human health, which can later result in fatal diseases such as cancer and many more. The safety standards set at present for electronic devices which radiate electromagnetic radiations are not enough to protect human health. Experts suggest usage of these devices to be minimum when required. Less exposure to these devices is better as these radiations penetrate into the body as air. But technology creates problems at some point of time if not used in an appropriate way. Threat possessed by technology can be overcome by proper use of technology as well as with the further technological development.

8. Economic Prosperity of Growing Technology

In Today's world the economic growth of a Country, Region, State, Company or any department is directly proportional to the level of innovation of technology. With the advancement in technology and adopting development policies, an innovation economy can be developed for long-term period. For example, the growth in communication sector, with the advancement in Internet services; people are opting these broadband or dongle services with high speed Internet. The more they invest, the more economic growth of company and nation.

9. E-waste

The main problem with technology is its disposal after usage, which is commonly known as e-waste. E-waste is defined as discarded electronics and electrical devices. As the demand of electronic devices is increasing, the size of electronic waste is also increasing with the same rate.

Millions of Tons of e-waste is being produced every year globally.

A proper treatment of e-waste is required so that it has no effect on human health. The most significant impact of e-waste is on human health. Developed countries have the technology to dispose of e-waste properly whereas developing countries are unable to dispose of e-waste with proper precautions and safety measures due to improper utilization of technology or lack of technology, which has direct impact on the health of local people living in that area. The best alternative to treat e-waste is by using three R's (Reduce, Reuse and Recycle). The most common effect is, after dumping into landfills; the chemical leaches into the water table. Later the hazardous chemical gets dissolve in water, affecting the agricultural land and drinking water. The contamination of water is also affecting the marine life on a very great extent.



Figure 4. Renewable resources.

10. Summary

In this article, the advancement in technology has been discussed, which we are using for daily purposes. I have mentioned the positive and negative aspects of technology, which plays a great role in growth of an individual, group, society, company or a country. Human beings are more and more dependent on it for small to big work purposes. The technology has its own merits and demerits but that totally depends upon us, how we utilize it. A brief introduction of technology with appropriate examples has been given in the article. The article also consists of the technical specifications of few technologies. Future

aspects of technology have also been mentioned above in this article. Due to advancement in technology, there has been a boom in the world's economy. Proper management and disposal of discarded electronics and electrical items is also being mentioned above. Technology is nothing but a tool, when harnessed properly can lead to skies full of opportunities.

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