

Executive Summary

APS 1018 History and Philosophy of Engineering course teaches us the history and the background of engineering and how it came in to existence, in the form that we can experience today. It also explains the connection between culture and technology and how it has shaped the Victorian era's proud and respected engineer into an Engineer who has a weak discourse and less recognition from the society today. What people don't realize is that no matter how much engineers are awkward, socially inept or with 3" short pants, they have contributed to the society, technology and to the culture as we know it today. Among thousands of artifacts that they have developed through hardship, dedication, sacrifices and passion, Transistor stands out as the basic molecule of the modern technology which revolutionized the culture. This Project strives to investigate the history of this technological marvel and compare its impacts on culture, economics and social behaviour.

Bipolar Transistor effects were first observed by John Bardeen and Walter Brattain at AT&T's Bell Labs in Murray Hill, New Jersey, the research carried out during November 17th, 1947, to December 23rd, 1947. Solid State Physics Group leader William Shockley saw the potential and the trio developed the Transistor which won them the Noble Price in Physics in 1956 "for their research on semiconductors and their discovery of the transistor effect".

With this breakthrough it was possible for us to shrink the Computers which earlier occupied an entire building to fit into our palms today. This revolution in the field of Electronics made a massive impact on both Cultural and Technological advancements and declines. In this project Technological and Cultural changes due to the invention of the Transistor are discussed and analyzed.

In conclusion it is possible to say since the invention of the Transistor, Engineering industry and the STEM professions have been exponentially changing, evolving and advancing. With this invention Cultural and socioeconomic behavior has changed drastically and the society has begun to highly depend of the technology, even for simple day to day tasks which either did not exist before or inherited since the Stone Age.

Many industries including transportation and logistics, aviation, space exploration, agriculture, surveillance, medicine and any other industry which involves a simple mobile phone has a direct

relation and is influenced from the invention of the Transistor. Currently it is not a far cry if stated that most of these industries have become enslaved to this technological marvel.

There are some changes to be seen at the horizon of changing the materials that have been used to make semiconductors (Transistors). It is evident from the fact of changing the basic materials used in semiconductors from gold to cosmologic radiation resisting materials. Scientists have been carrying out experiments with diamond base material which can further reduce the size of these transistors thus reducing the density of the integrated circuits (ICs). But the simple physics behind this technology has not changed since its inception in 1947.

With the emergence of the semiconductor transistors there has been a boom in all STEM professions and most of the technical and engineering professions came to existence such as IT and telecommunication engineering, as a by-product of this invention.

There are also many positive and negative implications seen due to this advancement in technology with the invention of the transistor. Mainly social distancing, reduced face to face discussions and presentation, misunderstood social communications and behaviours, bioweapons, exploitation of bio warfare, extensive surveillance, much of the security issues and even guided missiles can be named as a few of them. On the positive side, reduced travel and transportation times, global village concept, increased communications and surveillance capacities, extensive exploration capabilities, better navigation capabilities and the capability to discover new and effective medicines can be considered as few of the benefits. Every invention has its pros and cons, as in most cases Transistor has brought more to the society and to the engineers. All the engineers are experiencing less burden and increased productivity thanks to the Transistor and its advancement of the technology in every sector. Surveyors can do a topographical survey single handed and an engineer can do a design, validate, render and provide shop drawings in few days.

In simple words it is possible to say that in the case of Transistor, this is an example of technology shaping the culture. The Transistor's contribution to modern social, economic and cultural aspects is countless and it can be considered as the unseen atom of the technology around us. Nowadays it can only be seen with an electron microscope and the transistors today are way more efficient, convenient and powerful than their predecessors from 1947. Hence the

invention of the Transistor (Semiconductor) can be considered as the greatest technological outbreak in the 20th century.

From the case of the development of transistor, we can conclude how vastly this little wonder has expanded our scope of technological development in every field of science. However, the same invention has had hostile impacts on our culture and well-being as well. Even while perusing the current pandemic situation that the world is faced with, the gap between the nations that the transistor and its dependant innovations have reduced, by bringing in the needed enhancements in the field of transportation, may it be ground, sea or air, has in turn contributed to the fast spread of the COVID-19 virus as well. We know how ships and cruise liners and airplanes have acted as the carrier of this virus, by exposing the entire world population in matters of days.