

INNOVATION CARNIVAL



Organized by
Malabhum Institute of Technology
2024

INNOVATION CARNIVAL

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Mallabhum Institute of Technology

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Souvenir

of

Technical Essays

Published by
Mallabhum Institute of Technology

Dedicated to

The Auspicious Soul

And

Immortal Memory

Of

Sri Lakshmi Narayan Banerjee,

Whose Inspiration

Always Stands on Our Way Forward

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Forward

‘Innovation Carnival’ offers an altar of innovation and development to the students and persons from teaching and non-teaching communities. Mallabhum Institute of Technology has launched the debut version of this event which has been sponsored by two brands, Ardent Computech Pvt. Ltd. and M/S Sharada Associates. Under the banner of this event, a technical essay writing competition was held in the Institute where thirteen contributors from student, teaching and non-teaching communities have contributed this Souvenir with their articles on varied technical topics. This ‘Souvenir’ accommodates those essays which have not been edited and being published in their original forms.

Hope the ‘Souvenir’ will bear the signature of the original creations of the contributors and encourage them to be regular in the realm of writing; at the same time, it will inspire others, who could not submit their essays this time to submit the same in the years to come.

Mr. Buddhadeb Ghosh,
Co-Ordinator,
Innovation Carnival

Dr. Soumitra Chakraborty
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SALIENT FEATURES

- * RC Foundation / Structure
Steel Used - SAIL / TATA.
- * Cement - Ambuja / Ultra Tech / ACC.
- * Inside Wall - Putty.
Outside Wall - Weather Coat Paint.
- * Floor - Marble / Vitrified Floor Tiles.
- * Window - Aluminum Sliding with Grill.
- * Door - Wooden Frame with Block Board
Flush Door.
- * Kitchen - Granite Kitchen Table with Wall
Tiles.
- * Electrification - Concealed Wiring with
Finolex / Havells Wires and Standard
Modular Fittings.
- * Toilet - Marble / Vitrified Floor Tiles
Wall Tiles with Modern Sanitary Fittings.
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Sanhita Mondal

Fuzzy Logic: A Smarter Approach to Complex Decision-Making

Dr. Mousumi Karmakar

In the world of engineering, artificial intelligence, and data science, decision-making plays a pivotal role. Traditional binary logic systems, which operate on definitive true (1) or false (0) values, can sometimes fall short when tackling real-world problems. The complexity of these scenarios demands a more nuanced approach. Enter **Fuzzy Logic**, a concept that bridges the gap between binary extremes, providing more flexible, human-like reasoning.

What is Fuzzy Logic?

In simple terms, “fuzzy” refers to something that is not clear-cut or precise. In mathematics and logic, “fuzzy” means dealing with values that are somewhere in between two extremes, like “yes” and “no” or “true” and “false.”

Fuzzy logic is a mathematical framework for dealing with imprecise or uncertain information. Unlike classical logic systems, where variables must be either true or false, fuzzy logic allows variables to take on values between 0 and 1, representing degrees of truth. This is akin to how humans process information—rarely do we operate in absolutes. For example, when asked about the weather, we might say “It’s somewhat warm” instead of committing to just “hot” or “cold.”

Introduced by Dr. Lotfi Zadeh in the 1960s, fuzzy logic is especially effective in systems where precise data is either unavailable or impractical. It is designed to model reasoning that mimics human thought processes—incorporating concepts such as “partially true” or “mostly false.”

Key Features of Fuzzy Logic

- **Degree of Truth:** Instead of absolute truth, fuzzy logic assigns a degree of truth that falls on a continuum between 0 and 1.
- **Linguistic Variables:** Fuzzy logic often uses natural language expressions to describe input variables (e.g., “high temperature” or “moderate speed”), making it intuitive for modeling human reasoning.

- **Fuzzy Rules:** It uses IF-THEN rules, similar to human decision-making. For example, “IF the temperature is warm, THEN reduce the heating.”

How Fuzzy Logic Works?

Fuzzy logic involves three following primary steps:

- I. Fuzzification:** The process begins by converting crisp input values into fuzzy sets. For instance, the temperature of a room could be described as “low,” “medium,” or “high,” with each value carrying a degree of membership in those sets.
- II. Rule Evaluation:** Fuzzy logic uses a set of “if-then” rules, similar to how humans make decisions. For example:
 - *If the temperature is high and humidity is high, then the fan speed should be fast.*
 - *These rules are applied to the fuzzy sets created in the first step.*
- III. Defuzzification:** Once all rules have been evaluated, the final step is to convert the fuzzy output back into a crisp value. This value is then used to control the system or make a decision.

Applications of Fuzzy Logic

Fuzzy logic has found a wide range of applications across industries:

- **Control Systems:** In consumer electronics like washing machines, air conditioners, and vacuum cleaners, fuzzy logic enhances functionality by making adjustments based on environmental conditions rather than rigid pre-programmed parameters.
- **Automotive Industry:** Modern cars often use fuzzy logic for systems such as automatic transmission, braking, and fuel management, providing smoother operations and improved efficiency.
- **Artificial Intelligence (AI):** Fuzzy logic plays a crucial role in AI systems that require adaptability and human-like reasoning, such as expert systems, medical diagnosis, and natural language processing.

- **Financial Modeling:** In economic and financial systems, where market variables are uncertain, fuzzy logic helps create models that can make more accurate predictions and decisions.

Advantages and Limitations

Advantages:

- **Flexibility:** Fuzzy logic can work with imprecise data and still produce useful results.
- **Human-like Reasoning:** The system mimics human decision-making processes, making it ideal for real-world applications.
- **Easy to Understand and Implement:** The simplicity of “if-then” rules makes fuzzy logic relatively easy to implement.

Limitations:

- **Not Universally Suitable:** In scenarios that require extremely precise data, fuzzy logic might not provide the best solution.
- **Rule Creation:** Creating an appropriate set of rules for complex systems can be challenging and requires expert knowledge.

Future of Fuzzy Logic

As the world continues to embrace automation and AI, fuzzy logic is poised to become even more critical. Its ability to handle uncertainty and mimic human decision-making makes it invaluable in industries ranging from robotics to healthcare. Researchers are exploring ways to integrate fuzzy logic with other emerging technologies, like neural networks and genetic algorithms, to create systems that are smarter, more adaptive, and capable of handling ever-more complex problems.

The Global Impact of Electric Vehicles: Benefits and Challenges

Suprakash Mondal

1.0 Introduction

The global transportation sector is at a pivotal juncture, experiencing a transformative shift towards electric vehicles (EVs) as a cornerstone of sustainable mobility. This transition is driven by escalating concerns over climate change, air pollution, and the finite nature of fossil fuel reserves. Traditional internal combustion engine (ICE) vehicles, which have dominated the market for over a century, are increasingly scrutinized for their significant contributions to greenhouse gas (GHG) emissions and urban air pollution.



Governments worldwide are implementing stringent environmental regulations and offering incentives to promote EV adoption. For instance, the European Union has set ambitious targets to reduce carbon emissions by 55% by 2030, heavily influencing automotive industries to pivot towards electric mobility. Similarly, countries like Norway have achieved remarkable success, with EVs accounting for over 54% of new car sales in 2020, setting a benchmark for global EV adoption.

Technological advancements in battery technology, coupled with decreasing costs, are making EVs more accessible to a broader audience. Innovations such as solid-state batteries promise longer ranges and faster charging times, addressing some of the primary concerns associated with EV ownership. Furthermore, the integration of renewable energy sources into the electricity grid enhances the environmental benefits of EVs, paving the way for a more sustainable and resilient transportation ecosystem.

However, the widespread adoption of EVs is not without challenges. High upfront costs, limited charging infrastructure, and concerns over battery sustainability pose significant barriers, particularly in lower-middle-class demographics and developing regions. Additionally, the environmental impact of battery production and the current reliance on fossil fuels for electricity generation complicate the narrative around EVs being a wholly clean solution.

This article delves into the multifaceted impacts of EVs on a global scale, examining both their environmental and economic benefits, as well as the challenges that need to be addressed to realize their full potential. By analyzing current trends, policy frameworks, and technological innovations, we aim to provide a comprehensive overview of how electric vehicles are shaping the future of transportation and the environment.

2.0 Future Trends and Solutions

As the electric vehicle (EV) market continues to evolve, several emerging trends and solutions are poised to address the current challenges and enhance the positive impacts of EVs globally. These advancements span technological innovations, infrastructure development, policy initiatives, and sustainability practices.

2.1 Advancements in Battery Technology

Battery technology remains at the forefront of EV innovation. The development of solid-state batteries represents a significant leap forward, offering higher energy densities, faster charging times, and improved safety compared to traditional lithium-ion batteries. Companies like Toyota and QuantumScape are pioneering solid-state battery research, aiming to commercialize these batteries by the mid-2020s. Solid-state batteries can potentially reduce the reliance on scarce materials like cobalt and nickel, mitigating some of the environmental and ethical concerns associated with battery production.

Moreover, advancements in battery management systems (BMS) and thermal management are enhancing battery longevity and performance. Improved BMS can optimize charging cycles and prevent overcharging, thereby extending battery life and reducing the frequency of replacements. These innovations contribute to the overall sustainability of EVs by lowering the environmental footprint associated with battery production and disposal.

2.2 Global Decarbonization Efforts

The transition to EVs is intrinsically linked to broader decarbonization efforts across the energy sector. As countries commit to reducing their carbon footprints, the integration of renewable energy sources into the electricity grid becomes paramount. For example, the European Union's Green Deal aims to make Europe the first climate-neutral continent by 2050, with significant investments in wind, solar, and hydroelectric power to support EV charging infrastructure.

Smart grids and energy storage solutions are also critical components of this decarbonization process. Smart grids enable more efficient distribution and use of electricity, accommodating the fluctuating demand from EV charging. Additionally, large-scale energy storage systems, such as battery farms and pumped hydro storage, help balance supply and demand, ensuring a stable and reliable power supply for EVs.

2.3 Policy Changes and Investment

Government policies and investments play a crucial role in accelerating EV adoption and addressing existing challenges. Subsidies and tax incentives continue to lower the financial barriers for consumers, making EVs more affordable. For instance, India's Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme provides financial incentives for EV purchases and infrastructure development.

In addition to consumer incentives, governments are investing in public charging infrastructure to alleviate range anxiety and improve the convenience of EV ownership. Countries like the United States and China are committing billions of dollars to expand their charging networks, with a focus on high-traffic areas, highways, and urban centers. Public-private partnerships are also emerging as a strategic approach to fund and deploy charging stations efficiently.

Furthermore, emission regulations are becoming more stringent, compelling automakers to increase their EV offerings. The European Commission has announced plans to ban the sale of new ICE vehicles by 2035, a policy that is likely to drive significant investment in EV technology and infrastructure.

2.4 Sustainability and Recycling Initiatives

Addressing the environmental impact of battery production and disposal is critical for the long-term sustainability of EVs. Recycling initiatives are being scaled up to recover valuable materials from used batteries, reducing the need for new resource extraction. Companies like Tesla and Umicore are investing in recycling technologies to improve the efficiency and scalability of battery recycling processes.

Moreover, circular economy principles are being integrated into the EV industry, promoting the reuse and refurbishment of battery components. Second-life applications, where used EV batteries are repurposed for energy storage in renewable energy systems, offer a sustainable solution to extend battery life and reduce waste.

3.0 Integration with Autonomous and Connected Technologies

The convergence of EVs with autonomous and connected technologies is shaping the future of transportation. Autonomous EVs can optimize driving patterns for energy efficiency, further reducing emissions. Vehicle-to-grid (V2G) technologies allow EVs to interact with the power grid, providing stored energy during peak demand periods and enhancing grid stability.

Connected EVs equipped with advanced telematics and IoT devices can offer real-time data on vehicle performance, energy consumption, and maintenance needs. This connectivity facilitates more efficient fleet management and supports predictive maintenance, thereby extending the lifespan of EVs and reducing operational costs.

Table 1: Global Market Leaders in EV Manufacturing (2023)

Rank	Company	Country	Market Share (%)	
		Annual EV Production (units)		
1	Tesla	United States	25	1,200,000
2	BYD	China	18	850,000
3	Volkswagen	Germany	12	600,000
4	Renault-Nissan-Mitsubishi	France/Japan	10	500,000
5	Hyundai-Kia	South Korea	8	400,000
6	General Motors	United States	7	350,000

7	BMW	Germany	5	250,000
8	SAIC Motor	China	5	240,000
9	Stellantis	Netherlands/Italy	4	200,000
10	Ford	United States	3	150,000

Source: Bloomberg New Energy Finance (2023), "Global Electric Vehicle Market Trends."

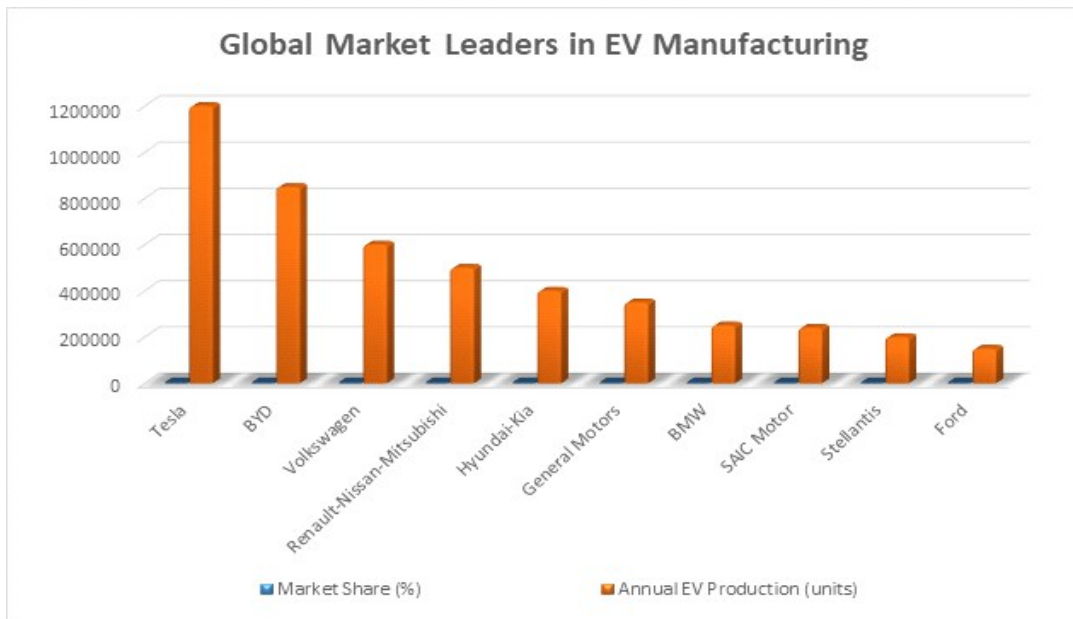


Fig 1: Global Market Leaders in EV Manufacturing 2023

Table 2: Carbon Emissions Comparison between EVs and ICE Vehicles

Vehicle Type	Tailpipe Emissions (g CO ₂ /km)	Lifecycle Emissions (gCO ₂ /km)	Energy Efficiency (%)
Electric Vehicle (EV)	0	50-60	60-70
Hybrid Electric Vehicle	70	100-120	45-50
Gasoline Vehicle	180	200-250	20-25
Diesel Vehicle	160	180-220	25-30

Source: International Energy Agency (IEA), "Global EV Outlook 2021."

4.0 Conclusion

Electric vehicles represent a pivotal advancement in the quest for sustainable transportation, offering substantial environmental and economic benefits. They play a critical role in reducing greenhouse gas emissions, improving air quality, and decreasing dependence on fossil fuels. The global adoption of EVs is accelerating,

driven by technological innovations, supportive government policies, and increasing consumer awareness.

However, realizing the full potential of EVs requires addressing significant challenges, including high upfront costs, limited charging infrastructure, and sustainability concerns related to battery production and disposal. Future trends indicate promising solutions through advancements in battery technology, comprehensive decarbonization efforts, robust policy frameworks, and enhanced recycling initiatives.

As the world moves towards a more sustainable future, the continued evolution of electric vehicles, supported by collaborative efforts across industries and governments, will be essential in mitigating environmental impacts and fostering a cleaner, greener planet. Embracing these changes not only benefits the environment but also opens up new economic opportunities, driving innovation and job creation in the green technology sector.

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Quantum Computing and Its Future Impact

Archana Dey

Technologies like quantum computing have the potential to revolutionize computing. Unlike traditional computers, which use devices to process information in binary form (0 or 1), quantum computers use qubits, which are multi-state devices that can exist simultaneously. With their ability to process large amounts of information simultaneously, quantum computers can now solve certain problems faster than ever before. The introduction of quantum computing could lead to advances in information science, biology, artificial intelligence, and cryptography.

This is particularly important for quantum computing capabilities. In classical computing, a bit can exist in a state of 0 or 1. Instead, a qubit can exist in a superposition of 0 and 1 simultaneously. Two qubits are connected to each other regardless of distance, so their states affect each other. Quantum computers can achieve similar results by performing tasks that traditional computers cannot due to their unique capabilities. Quantum computing can accelerate drug discovery and self-healing by simulating molecular interactions and structures. Because quantum computers are more powerful than classical computers, they will be able to model complex molecules, providing new insights and treatments for diseases that are currently difficult to understand and treat. Bringing advantages and problems to the field of cryptography.

Today's encryption techniques protect sensitive information by relying on the vulnerability of traditional computers, which take a long time to decipher information. However, a quantum computer can calculate these numbers in just a few seconds. It is important that we develop quantum-resistant encryption algorithms immediately to ensure cybersecurity in the future.

Quantum computers have the ability to improve machine learning models, allowing AI to solve more complex problems thanks to the speed and evolution of AI algorithms. These developments could revolutionize sectors such as finance, logistics, and self-management. By simulating and testing data at the quantum level, it is possible to discover new data with better properties. Potential insights into this knowledge include improving building materials, increasing strength and reducing weight, improving solar energy collection, etc.

There is a huge possibility. Keeping the qubit safe is a major challenge. Since qubits are not very sensitive to anything else, even the slightest disturbance can cause the qubit to go out of control. The quantum decoherence problem must be solved before quantum computers can be considered useful in everyday use.

Quantum computing is therefore expensive and difficult to scale. Current quantum computers have the potential to limit the advances in technology needed to realize their full potential. Tools for complex problems in science and technology.

The Future Effects of Quantum Computing

Quantum computers will soon be used to solve specific problems in areas such as cybersecurity, banking, and medicine. Companies and governments are now investing heavily in quantum computing research to take the lead in harnessing the vast potential of quantum computing.

Quantum simulations of climate models can improve climate models and help predict and mitigate the effects of climate change. Quantum optimization algorithms could make the world more efficient and reduce waste in supply chains and logistics. Although quantum computing is still in its infancy, the implications are clear. Quantum computing could change the future in ways that are not yet fully understood, by advancing artificial intelligence and revolutionizing industries like cybersecurity and healthcare. Once we overcome the current hurdles to quantum computing, it could become one of the most powerful tools ever created by humans.

Summary:-

Concept of computing and problem solving has been greatly advanced by the introduction of quantum computing. Quantum computing is still in its infancy, but its impact is clear. Quantum computing has the potential to completely transform the future in ways that are not yet fully understood, by improving artificial intelligence and transforming industries such as cybersecurity and healthcare. If we can overcome the current barriers to quantum computing, it could become one of the most powerful tools humanity has ever created.

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TOPIC : SCIENCE & TECHNOLOGY

SCIENCE AND TECHNOLOGY

“The good thing about science is that it’s true whether or not you believe in it.”

— Edward Teller

I am going to discuss about science and technology. In this era science and technology has become an important part of our daily life. Everything we use from day to night is gift of science and technology. Science provides the knowledge, and technology applies that knowledge. Both science and technology have led to immense improvements in quality of life. We can be say in one word that science is refer to the systematic study of the structure and behavior of the physical and natural world through observation and experimentation. Technology, on the other hand, is the application of scientific knowledge for practical purposes, the environment and human welfare. The interrelation between science and technology is that scientific discoveries can often lead to new technologies, and technology helps advance scientific research.

1. Historical Development of Science and Technology:

James Watson and Francis Crick’s discovery of DNA’s double helix structure revealed the fundamental basis of life. And this thesis enabled major breakthroughs in genetics, molecular biology, and biotechnology.

In 1950 Alan Turing’s pioneering work starts. 1960s first AI programs and rule-based systems, in 1970-80 Expert systems and machine learning emergence. AI evolved from foundational concepts to practical applications, driven by advances in computing, data, and algorithms. And thus way Auto Intelligence and Machine Learning develop in day by day.

2. Contributions of Science and Technology to Society:

Science and Technology have transformed society, improving lives and fostering progress. In medical department medicine, vaccines, treatments, and diagnostic tools are improved. Our communication system is upgraded for Internet, mobile devices, and social media. Now transport system is faster, safer, and more efficient. For Accessible information and online learning platforms our education system also become updated. Science and Technology have improved healthcare outcomes, increased food security, enhanced economic development, protected the environment, and mainly inspired future generations.

3. Advantages in Medical:

Doctors and other staffs are using technology to diagnose diseases, run test and for finding the cure for any type of diseases. Also they are able to find a cure for many diseases because of “Technology”

4. Technology & Science in Defence System:

For any country, his defence system is most important for the safety and security of its people. Science and technology is also in this field to help agencies to detect a threat which can be harmful in the future. Technology helps us to upgraded security system of our country. All the defend industry use technology to keep surveillance on our enemy.

5. Advanced Robotics in Technology:

Advanced robotics combines AI, sensors, and actuators to create intelligent machines, boosting precision, efficiency, and autonomy in manufacturing, healthcare, transportation, and service industries. Human-robot collaboration, machine learning, and adaptive control enable flexible production, improved patient care, and enhanced safety. Next-generation robots will revolutionize work, daily life, and societal interactions, driving innovation and economic growth.

6. Conclusion:

Science and technology have revolutionized human life, fostering unprecedented progress and innovation. Though it have many dark side but we should choose only it's good things. Breakthroughs in medicine, energy, transportation, and communication have improved quality of life, connecting people globally. Continued advancements will address complex challenges, drive sustainable development, and shape a brighter future for generations to come, ensuring a better world through science and technology.

Computer and Technology

Raghab Hord

➤ Essay on Computer and Technology:-

- ❖ We are going to discuss some useful things about computers . The modern day computer has become an important part of our daily life. Also their usage has increased much fold during the last decade . Nowadays use the computer in every office weather, private and government. Mankind is using computers for over many decades now . Also they are used in many fields like agriculture, designing, machinery making, defense and many more. Above all they have revolutionize the whole world.

- History of computer-

It is very difficult to find the exact origin of computers . But according to some experts computer exists at the time of world war . Also at that time they were used for keeping data . But it was for only government use and not for public use. Above all, in the beginning, the computer was a very large and heavy machine.

- Working of a computer –

The computer runs on a three steps cycle normally - input , process , output. Also the computer fallows this cycle in every process it was asked to do. In simple words the process can be explained in the way. The data which we feed into the computer is input, the work CPU do is process and the results which the computer give us output .

- Components and type of computer –

The simple computer basically consists of CPU , monitor , mouse , and keyboard. Also there are hundreds of other computer parts that can be attached to it. These other part include a printer , laser pen , scanner , etc . The computer is categorized into many different types like – supercomputer , mainfranes personal computer (desktop) , PDAs , laptop , etc . The mobile phone is also a type of computer , because it fulfills all the criteria of being a computer.

- Use of computer in various fields –

As the usage of computer increased it become a necessary for almost every field to use computers for their operation. Also they have made working and sorting things easier. Bellow we are mentioning some of the important fields that use a computer in their daily operation.

Medical field:- They use computers to diagnose diseases , run test for finding the cure for deadly diseases . Also they are able to find a cure for many diseases because of computer technology.

Research:- Weather it's scientific research, space research , and any social research computer help in all of them . Also due to them we are able to keep a check on the environment , space and society. Space research helped us to explore the galaxies. While scientific research has helped us to locate resources and various other useful resources from the earth.

Defense:- For any country, his defense is most important for the safety and security of its people. Also computer in this field helps the countries security agencies to detect a threat which can be harmful in the future. Above all the defense industries use them to keep surveillance on our enemy.

- Threats from a computer –

Computers have become a necessity also , they have become a threat too . This is due to hackers who steal your private data , information and hack them on internet. Also any one can access this data a part from that . There are other threats viruses , spam , bug and many other problems.

Turning Waste into Wealth: The Future of Zero-Waste Economy

Swastik Kundu

Introduction — In a rapidly changing world, waste management is central to the conceptualization and realization of an environment. Landfills are full, and our oceans are choked with plastic, making it clear that the traditional economy is no longer tenable. However, a new model is becoming popular: the zero-waste economy. It reimagines a world with no waste and considers how to understand waste as a resource rather than an end product. The zero-waste economy offers the opportunity to transform waste into wealth, guiding us toward a circular economy in the long term.

The Zero-Waste Vision: The Circular Economy The zero-waste vision is a mindset inspired by the circular economy. The circular economy emphasises closing resource cycles through reuse, recycling, and regeneration. Products are no longer seen as reaching the end of their life but are designed for recycling or repurposing. Some companies, like Patagonia and IKEA, have already embraced this shift by using recycled materials and offering take-back programs. As this model spreads, waste will no longer be viewed as a problem but as an untapped resource.

Waste-to-Wealth: Technological innovation is driving the use of waste for wealth.

- ï% **Plastic to Fuel Conversion:** Plastic waste is pervasive, but new methods, such as pyrolysis, convert plastic into usable fuels. In this process, plastic waste is heated in an oxygen-deprived environment, breaking it into liquid fuels, gases, and char for energy production or recycling.
- ï% **Biodegradable Materials and Bioengineering:** Bioplastics made from organic substances like corn starch or algae can reduce reliance on fossil-fuel-based plastics, breaking down naturally and aiding soil health. Bioengineered organisms can also degrade harmful waste products, offering new pollution clean-up methods.
- ï% **E-Waste Recycling:** Electronic waste (e-waste) presents both challenges and opportunities. Precious metals like gold, silver, and platinum can be

recovered from discarded electronics through urban mining, reducing the need for new raw materials and creating a profitable recycled metals market.

¶ **Waste-to-Energy Plants:** Modern waste-to-energy facilities convert municipal solid waste into energy, contributing to zero-waste infrastructure. By using combustion, gasification, or anaerobic digestion, even non-recyclable waste can generate energy.

Economic opportunities in a zero-waste future transitioning to a zero-waste economy bring significant economic benefits. The waste management industry is evolving from disposal to material recovery and resource management. As recycling and waste-to-energy technologies advance, new markets are emerging for sustainable products and services. Green jobs are also increasing in sectors like recycling, sustainable manufacturing, and environmental engineering. Countries like the Netherlands, which aims to be fully circular by 2050, are driving economic growth through innovation in sustainable design, reducing raw material costs, and fostering new industries.

Challenges and the Road Ahead Despite its promise, turning waste into wealth faces obstacles. The high cost of recycling technologies and infrastructure makes it cheaper to rely on virgin materials. Public participation in recycling programs must improve for zero-waste economies to scale. Additionally, achieving a zero-waste society requires significant shifts in consumer behaviour, transitioning from useless to resource preservation. With growing environmental awareness and a focus on green technologies, governments, businesses, and consumers must work together to create a system where waste is viewed as a valuable resource.

Conclusion: Waste is the new wealth a zero-waste economy represents a radical shift in how society views resources and waste. By transforming waste into wealth, we can reduce environmental degradation, stimulate economic growth, and create a sustainable future. As waste management and resource recovery technologies advance, the dream of a world without waste is coming closer to reality. In a zero-waste future, every discarded material will have value, contributing to a circular economy where everything is part of a regenerative cycle.

The Miracles of Science

Krishnaarpita Bakshi

Science and technology are deeply intertwined, driving advancements that shape our modern world. Science provides the foundational knowledge of natural phenomena through systematic observation and experimentation. This understanding fuels technological innovation which applies scientific principles to develop tools, systems, and processes that solve real-world problems.

The iterative relationship between these fields is evident in various domains. For example, medical science has led to breakthroughs in biotechnology, resulting in advanced therapies and diagnostic tools that improve healthcare outcomes. Similarly, advancements in computer science have revolutionized industries by enhancing data processing, artificial intelligence, and machine learning capabilities, leading to more efficient solutions across sectors.

Moreover, technology accelerates scientific research by providing sophisticated instruments and computational methods that enable complex analyses. This synergy fosters interdisciplinary collaboration, as scientists and engineers work together to address global challenges like climate change, energy sustainability, and public health.


However, this relationship also raises ethical and societal concerns. Issues such as data privacy, environmental impact, and equitable access to technology necessitate careful consideration. As we advance further into the 21st century, the continued collaboration between science and technology will be crucial in fostering innovation while addressing the ethical implications of our advancements. Balancing these elements will define the trajectory of human progress.

Science and Civilization

Kana Ganguly

Technology is the practical application of science that improves the quality of life, whereas science is a system of approach that uses observation and experimentation to gain information and develop abilities. We get up in the morning from the ringing of our alarm clocks and go to bed at night after switching our lights off. All these luxuries that we are able to afford are a resultant of Science and Technology. Technology is a product of systematic research when we look around us, we can see that we are surrounded by technology everywhere electricity, school, office, bus, train etc. Science and Technology have introduced us to the establishment of modern civilization. This development contributes greatly to almost every aspect of our daily life. Hence, people get the chance to enjoy these results, which make our lives more relaxed and pleasurable. Science and Technology have enabled man to look further than our planet. The discovery of new planets and the establishment of satellites in space is because of the very same Science and Technology. Science and Technology have also made an impact on the medical and agricultural fields, the various cures being discovered for diseases have saved millions of lives through science. Moreover technology has enhanced the production of different crops benefiting the farmers largely. Everyday new technologies keep coming, making life easier and more comfortable.

Ever since British rule, India has been in talks all over the world. After gaining independence, it is Science and Technology which helped India advance through times. Now, it has become an essential source of creative and foundational scientific developments all over the world. In other words, all the incredible scientific and technological advancements of our country have enhanced the Indian economy. Subsequently, Science and Technology have assisted in advancing various fields including Mathematics, Astrophysics, Space technology, Nuclear energy and more. Some fine examples of these developments are the railway system, smartphones, the metro system, and many more. Science and Technology work hand in hand for us to be a developed society. There are good and bad effect that came with it but surely if we use it in the right way



wherein don't abuse it, it will be an avenue for us to be more developed in the future. Science and Technology have had an immensurable influence on the formation of our understanding of the world, our view of society and our outlook on nature in the present squarely addressing the relationship between science and technology and society is an essential challenge to the sound development of Science and Technology, one which it is important to continue addressing in the future based on historical and civilized perspectives, while also maintaining a deep awareness of the needs of the time we should keep it use as a tide on so that it does not affect us in big way and we should develop ourselves as we were before without Science and Technology.

The Co-Relation Between Science and Technology

Meghna Pal

- **Introduction :-** Science is a Systematic way that involves observation and experimentation to get knowledge and improve skills, whereas technology is the practical application of science that helps improve the quality of life. The life of everyone of us is highly dependent on scientific invention and modern -day technologies. We get up in the morning from the ringing of our alarm clock and go to bed at night after switching our lights off. The importance of science and technology in people's life is very old from the time of Indus Valley Civilization.
- **Brief about science:-** Throughout history science has come a long way. The evolution of the person is the contribution of science. Science helped human to find vaccine, medicines and scientific aids . Over the centuries humans have faced many diseases and illness taking many lives . With the help of science medicines are invented to bring down the effect or element of these illness.
- **Brief of technology:-** Technology has changed our day- to -day lives. Technology has brought the world closer and better connected. There have been many technological developments which have made our work much more easier like – computer , mobile and many more. All things we use like television, washing machine, bicycle are also technology. Internet is probably the most famous means to spread information.
- **Advantages of science and technology:-**
 - 1) **Education:-** science and technology have made significant contribution in the education field. Science has given us immense knowledge and therefore we have got important matter to study. Technology has made education itself easier. It provides us option like -smart classes multimedia, device, e-libraries , e-book etc.
 - 2) **Health:-** Science is the only hope of men against diseases, without the inventions of science and technology and the ceaseless efforts of scientists many diseases such as – malaria , dengue , COVID etc .Were considered incurable disease. Science and technology helps in monitoring our health and providing cures for our diseases.

- 3) **Provide us devices for comfortable:-** By discovering science, scientist are able to create something that can immeasurably improve the quality of life for example – computer , telephones , televisions , planes and so on. With the discovery of inventions, people can achieve their aspiration much more easily.
- 4) **Internet:-** Information technology including internet is an excellent gift of technology. With the help of internet we do not only get immense knowledge on science and other objects, but also get to stay connected with our friends .

Science and technology make our life easier. Due to the development of science and technology impossible have become possible. Man have become advanced by using various new technology. Traveling has become also easy and fast in minutes.

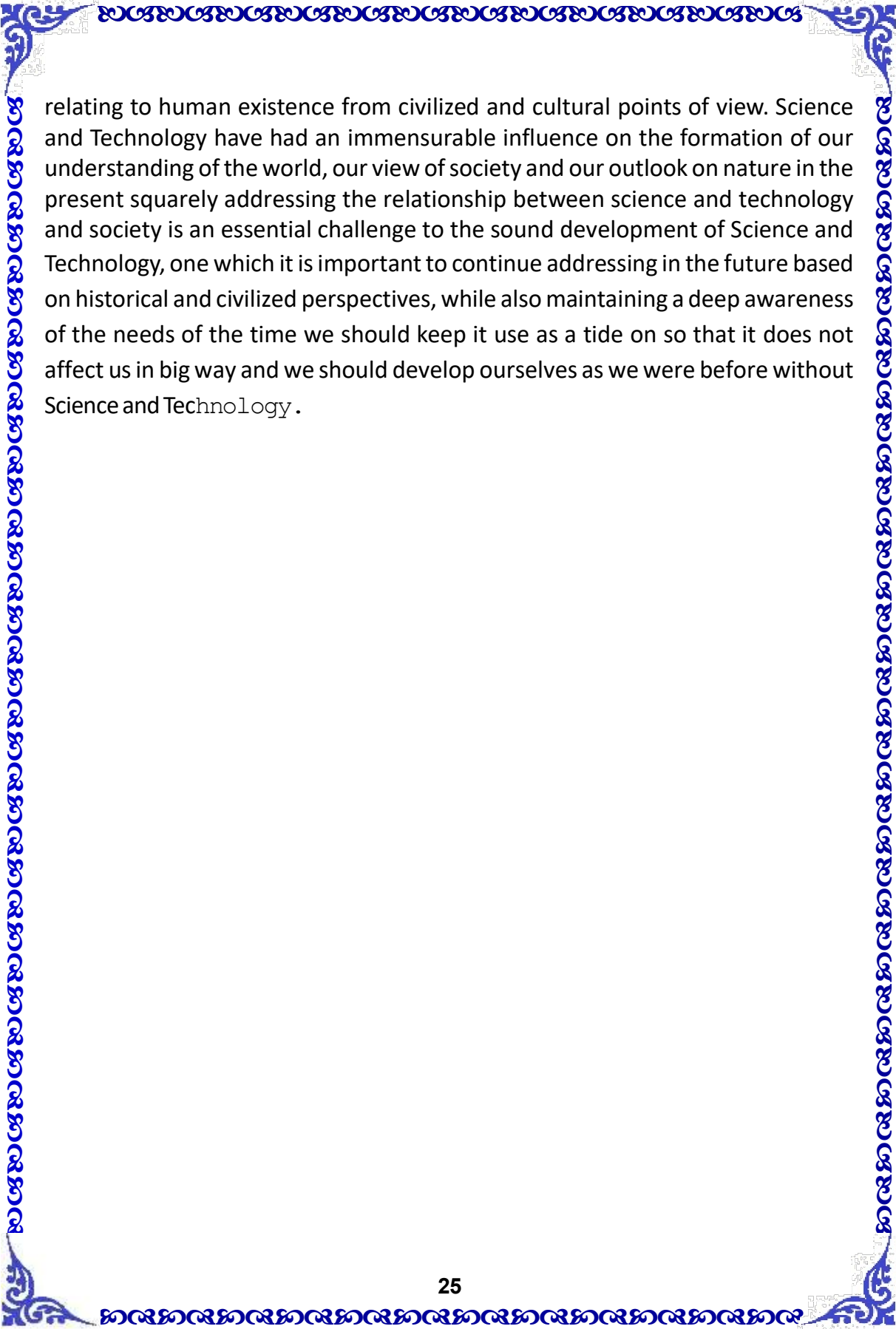
- **Disadvantages of science and technology :-** Although there are so many advantages of science and technology, but there are also some disadvantages.
 - 1) It destroys our physical health.
 - 2) Man had misused the technology and used in destructive purpose.
 - 3) New technology like mobile, I-podsete are creating bad effect on students.
 - 4) It has not only affected man but it also affected plants and creatures also.
- **Conclusion:-** Undoubtedly, science and technology have made our life easier and faster. We can have fruitful uses and results if we use it for right purpose for the welfare of ourselves. Hence , with the help of science and technology, let's make world a better place for you , me and the entire human race!

The Gifts of Science and Technology

Rimi Garai

Technology is the practical application of science that improves the quality of life, whereas science is a system of approach that uses observation and experimentation to gain information and develop abilities. We get up in the morning from the ringing of our alarm clocks and go to bed at night after switching our lights off. All these luxuries that we are able to afford are a resultant of science and technology. Technology is a product of systematic research when we look around us, we can see that we are surrounded by technology everywhere electricity, school, office, bus, train etc. Science and technology have introduced us to the establishment of modern civilization. This development contributes greatly to almost every aspect of our daily life. Hence, people get the chance to enjoy these results, which make our lives more relaxed and pleasurable. Science and Technology have enabled man to look further than our planet. The discovery of new planets and the establishment of satellites in space is because of the very same science and technology. Science and Technology have also made an impact on the medical and agricultural fields, the various cures being discovered for diseases have saved millions of lives through science. Moreover technology has enhanced the production of different crops benefiting the farmers largely. Everyday new technologies keep coming, making life easier and more comfortable. Ever since British rule, India has been in talks all over the world. After gaining independence, it is Science and Technology which helped India advance through times. Now, it has become an essential source of creative and foundational scientific developments all over the world. In other words, all the incredible scientific and technological advancements of our country have enhanced the Indian economy.

Subsequently, science and technology have assisted in advancing various fields including Mathematics, Astrophysics, Space technology, Nuclear energy and more. Some fine examples of these developments are the railway system, smartphones, the metro system, and many more. Science and Technology work hand in hand for us to be a developed society. There are good and bad effect that came with it but surely if we use it in the right way wherein don't abuse, it will be an avenue for us to be more developed in the future. Science and Technology inventions and discoveries including the theory of the origin of the universe the theory of evolution and the discovery of genes, have given humanity many hints



relating to human existence from civilized and cultural points of view. Science and Technology have had an immensurable influence on the formation of our understanding of the world, our view of society and our outlook on nature in the present squarely addressing the relationship between science and technology and society is an essential challenge to the sound development of Science and Technology, one which it is important to continue addressing in the future based on historical and civilized perspectives, while also maintaining a deep awareness of the needs of the time we should keep it use as a tide on so that it does not affect us in big way and we should develop ourselves as we were before without Science and Technology .

Science and Technology in Our Daily Life

Sanchari Dutta

Science and technology play significant roles in our daily lives. We turn out the lights at night and get out of bed when our alarm clocks ring in the morning. Science and Technology have enable us to purchase all of these luxuries. Most importantly, the development of science and technology alone is the reason we can do most things in our lives in such a short period. Without science and technology, our modern way of life is difficult to imagine. Indeed, it is now essential to our continued survival. New technologies are developing daily that make life easier and more comfortable.

We are in a scientific and technological age. Due to science and technology, many civilizations have been established. This establishment grows everyday. People benefit from these , which makes life more enjoyable and relaxing.

Brief about Science –

Throughout history, science has come a long way. The evolution of the person is the contribution to science. Science helped humans to find vaccines, potions, medicine and scientific aids. Over the centuries, humans have faced many diseases and illnesses taking many lives. With the help of science, medicines are invented to bring down the effect or element of these illnesses.

Brief of Technology –

The mobile, desktop or laptop which you are using for reading this essay, mobile you use for connectivity or communication or the smart technology which we use in our daily life, are a part of technology. From the machinery used in the factory to the robots created all fall under tech invention. In simpler words, technology has made life more comfortable.

Advancement in science and technology has changed the modern culture and the way we live our daily life.

Advantages of Science and Technology –

Science and technology changed this world. From TV to planes, cars to mobile, the list keeps on going how there two inventions have changed the world we see through. For instance, the virtual talks we do use our mobile, which

was not possible earlier. Similarly, there are electrical devices that have made life easier.

Furthermore, the transportation process we use has also seen the contribution of science and technology. We can reach our destination quickly to any part of the world.

Science and technology are not limited to this earth. It has now reached mars. NASA and ISRO have used science and technology to reach mars. Both organizations have technologies to explore life in the mars.

Other Benefits –

1. Life is much simpler with science and technology.
2. Interaction is more comfortable and faster
3. Human is more sophisticated.

Disadvantages of Science and Technology –

With the progress in science and technology, we humans have become lazier. This is affecting the human mind and health. Moreover, several semi-automatic rifles are created using the latest technology, which takes maximum life. There is no doubt that the third world war will be fought with missiles created using technology.

1. Man has misused the tech and used it for destructive purposes.
2. Man uses them to do illegal stuff.
3. Technology such as a smartphone etc. hurts children.
4. Terrorists use modern technology for damaging work.

India and Science and Technology –

India is not behind when it comes to science and technology. Over the centuries, the country has witnessed reliable technology updates giving its people a better life. The Indian economy is widely boosted with science and technology in the field of astronomy, astrophysics, space exploration, nuclear power and more. India is becoming

more innovative and progressive to improve the economic condition of the nation.

The implementation of technology in the research work promotes a better life ahead. Similarly, medical science in India is progressing rapidly, making life healthy and careful. Indian scientists are using the latest technology to introduce new medical products for people and offer them at the lowest price.

We must acknowledge that technology and science have helped human civilization reach the highest living level and will continue to do so. However, we must use everything sparingly and in moderation. Technology and science misuse can have advance effects and we are dealing with some of those. Therefore, we must keep an eye on usage and exercise caution while using the gift of science and technology.

The Legacy of Science and Technology

Priya Ghosh

Science calls for observation and experimentation to acquire knowledge and improve aptitude, whereas technology is the pragmatic application of science that helps develop the quality of life. Science is a systematic study, and technology is what comes out of it. Science and technology go hand in hand; that is, technological advancements always follow scientific progress, and the latter is only the implication of the former.

Today, Science and Technology play a very significant role in the overall development of a country. The two define the progress made in almost every field, i.e., infrastructure development, communications, defense, industrialization, etc. the world is developing fast, at an unprecedented rate, because of scientific and technological developments. The ever-progressive world will leave behind anyone who lags behind in science and technology.

Advancement in science and technology in many areas has made the lives of people more advanced than the ancient time. Advancement in science and technology is directly and positively affecting people's way of living on the one hand; however, it is also affecting indirectly and negatively the people's health on the other hand. New inventions in science and technology are necessary in such a modern world for a country to be strong and more well-developed than others. In this competitive world, we need more technology to go ahead and become successful people in life.

Human or country development is linked to technology's proper growth and development in many ways. Technological advancement happens when there become new inventions in science by highly skilled and professional scientists. We can say that technology, science, and development are equally proportional. Development in science and technology is necessary for the people of any nation to go hand in hand with the people of other countries. The development of science and technology depends on the analysis and proper understanding of facts. The development of technology depends on the way of application of various scientific knowledge in the right direction.

To enhance the economy and the betterment of the people of any nation, up-to-date knowledge, technology, science, and engineering are the fundamental requisites. A nation can be backward, and the chances of being a developed country become minimal in the lack of science and technology.

Science and technology have become a debated topic in society. On the one hand, it is necessary for the modern life where other countries continuously develop in science and technology. It becomes necessary for other countries to grow in the same way to be strong and well-developed as other countries for future safety and security. It is science and technology which helps other weak countries to develop and be strong.

We have to take support science and technology forever to improve the way of life for the betterment of humanity. Suppose we do not take the help of technologies such as computers, the internet, electricity, etc. In that case, we cannot be economically strong in the future and will be backward forever, even if we cannot survive in such a competitive and technological world.

Advancements in medicine, agriculture, education, economy, sports, games, jobs, tourism, etc., are the examples of science and technology. All such advancements show us how both are equally beneficial for our life. We can see a clear difference in our lifestyle while matching the old and modern way of life. High level of scientific and technological advancement in medicine has made treating various lethal diseases easy, which was not possible earlier. It has helped doctors find effective ways to cure diseases through medicine or operations and research vaccines to cure diseases such as cancer, AIDS, diabetes, Alzheimer's, Leukemia, etc.

The Contribution of Science and Technology on Human Life

Sanhita Mondal

The age, we are living in is the age of science and technology. We get up in the morning from the ringing at our alarm clocks and go to bed at night switching our lights off. Science and technology have made life easier, more comfortable, and possible for us to live a modern lifestyle. It is hard to imagine our life now without science and technology. Everyday new technologies are coming up which are making human life easier and more comfortable. Thus we live in an era of science and technology.

The advantages of science and technology have helped man travel outside the earth. The same science and technology have enabled the creation of satellites in orbit and the discovery of new planets.

If we think about it, they range from the little things to the big ones. For instance, the morning paper which we read that delivers us reliable information is a result of scientific process. In addition, the electrical devices without which life is hard to imagine like a refrigerator, AC, microwave and more are a result of technological advancement.

Furthermore, if we look at the transport scenario, we notice how science and technology play a major role here as well. We can quickly reach the other part of the earth within hours, all thanks to advancing technology.

Similarly, science and technology have also made an impact on the medical and agricultural fields. The various cures being discovered for diseases have saved millions of lives through science. Moreover, technology has enhanced the production of different crops benefitting the farmers largely.

In conclusion, we must admit that science and technology have led human civilization to achieve perfection in living. Therefore, we must monitor the wise and be wise in our actions.

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