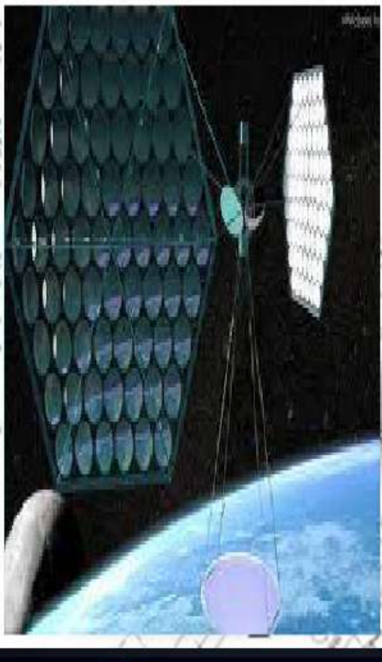
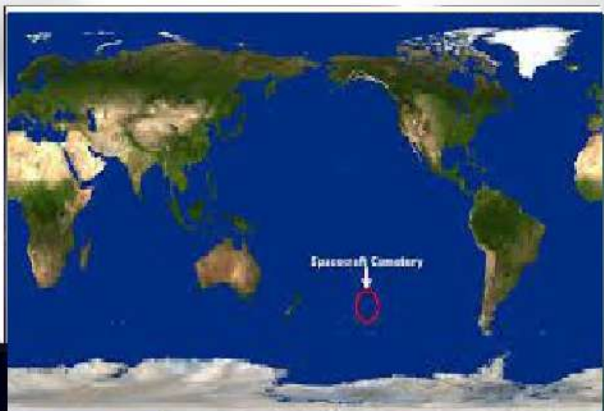
ELECTRONICS & COMMUNICATION ENGINEERING

TECH CONNECT

March,2022





LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING
MYLAVARAM

Contents

1. Space craft Cemetery

1. Introduction

The spacecraft cemetery, known more formally as the South Pacific Ocean Uninhabited Area, is a region in the southern Pacific Ocean east of New Zealand, where spacecraft that have reached the end of their usefulness are routinely crashed. The area is roughly centered on "Point Nemo", the oceanic pole of inaccessibility, the location farthest from any land.

Fig1 : Space craft cemetery in Pacific Ocean

A total of more than 263 spacecraft were disposed in this area between 1971 and 2016. The defunct space station Mir and six Salyut stations are among the nearly 200 pieces of Russian spacecraft debris in this region, making Russia the largest contributor of spacecraft in the cemetery. The remaining pieces of debris in the cemetery belong to the United States, Europe, Japan, as well as certain private organizations. Among American spacecraft, remnants of the Skylab space station were deposited into the spacecraft cemetery.

The decommissioning of Tiangong-1, the first Chinese space station, was an unsuccessful targeted re-entry at Point Nemo. During an extended mission phase, control was lost due to a power failure, leading to an uncontrolled landing outside of the spacecraft cemetery. According to the U.S. guidelines dictating which spacecraft pose enough risk to require a controlled landing, it is recommended that the International Space

Station undergo a controlled de-orbit at the end of its life. The same is recommended for the Hubble Space Telescope.

For more than two decades the International Space Station has been the mainstay of human presence and research in space. More than 100 metres long, it is the largest object ever placed in space, and its construction brought together the space agencies from the United States, Europe, Russia, Japan and Canada. The International Space Station has hosted research that could not have been done anywhere else, in the fields of microgravity, space biology, human physiology and fundamental physics. It also provides a base for deep space exploration.Now, the end of its life has been planned. According to the National Aeronautics and Space Administration, the station is expected to be de-orbited by 2031 (an extension from the original plan to de-orbit by 2020).

2. ISS is ageing:

The first components of the International Space Station were launched in the 1990s. And although many parts have been updated and replaced, it is not feasible to replace everything.In particular, the main structural components cannot be replaced. While they are checked, monitored and repaired, there are limits to this. The International Space Station was not designed to last forever.It survives in a harsh environment, travelling at 27,500 km/h, with a day/night cycle every 90 minutes (the time it takes the space station to orbit Earth).

Fig 2: International Space station

The temperature differences experienced during each cycle put a small fatiguing load on the structure. Over a few years, this is not significant. But over the course of decades, this can cause fatigue failures in the metal structure.o there comes a time when the costs and risks of maintaining the International Space Station become too high, and this has been determined to be in 2030.

3. De-orbiting space station:

As with all objects under the influence of gravity, given time the International Space Station would simply fall down to Earth. This is because, even at the orbital altitude of 400 km, there is some drag due to small particles. In fact, the space station currently requires a regular boost to lift its orbital altitude, which is slowly – but constantly – decreasing.

A natural re-entry would be a completely uncontrolled process, and there would be no way of predicting where this would take place. The responsible (and planned) approach is to use thrusters to slow the space station down, causing the de-orbit to happen much faster and in a specific location decided in advance.

The slowing down will initially be done using thrusters on the station and on support vehicles docked to the station. This process may take a few months and will slowly reduce the orbital altitude of the space station, preparing it for the final re-entry phase. In the final phase, the deceleration will be much more rapid and will determine the space station's final re-entry trajectory. Although it has not been decided exactly how the International Space Station will reach its final deceleration, the favoured option is to use three modified Russian Progress spacecraft.

The spacecraft will be docked to the International Space Station and fire their propulsion systems to achieve the required deceleration – controlling the trajectory of the re-entry and the re-entry location.

4. Artificial fireballs:

It will take a couple of minutes for the ISS to pass through the atmosphere. It is likely the higher-altitude phase of this will take place near or above Australia.The re-entry will be a visually spectacular event, resembling multiple large shooting stars. An increasing number of space debris breakup events have been observed and videoed over the last few years.But these re-entries have been small objects, sized in the order of metres, such as the ATV-1 and Cygnus spacecraft. Meanwhile, the International Space Station is about the size of a football field, and will be correspondingly more spectacular.

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~Dr.G.L.N.Murthy

2. Space-based solar power

1. Introduction:

Space-based solar power (SBSP, SSP) is the concept of collecting solar power in outer space by solar power satellites (SPS) and distributing it to Earth. Sunlight is brighter outside the atmosphere, and can shine all (or almost all) the day. Space-based solar power systems convert sunlight to some other form of energy (such as microwaves) which can be transmitted through the atmosphere to receivers on the Earth's surface. It is attractive to those seeking large-scale solutions to anthropogenic climate change or fossil fuel depletion (such as peak oil).Various SBSP proposals have been researched since the early 1970s, but none is economically viable with present-day space launch costs. Some technologists speculate that this may change in the distant future with space manufacturing from asteroids or lunar material, or with radical new space launch technologies other than rocketry.

Besides cost, SBSP also introduces several technological hurdles, including the problem of transmitting energy from orbit to Earth's surface. Since wires extending from Earth's surface to an orbiting satellite are not feasible with current technology, SBSP designs generally include the wireless power transmission with its concomitant conversion inefficiencies, as well as land use concerns for the necessary antenna stations to receive the energy at Earth's surface. The collecting satellite would convert solar energy into electrical energy, powering a microwave transmitter or laser emitter, and transmit this energy to a collector (or microwave rectenna) on Earth's surface.

Contrary to appearances in fiction, most designs propose beam energy densities that are not harmful if human beings were to be inadvertently exposed, such as if a transmitting satellite's beam were to wander off-course. But the vast size of the receiving antennas that would be necessary would still require large blocks of land near the end users. The service life of space-based collectors in the face of challenges from long-term exposure to the space environment, including degradation from radiation and micrometeoroid damage, could also become a concern for SBSP.

As of 2020, SBSP is being actively pursued by Japan, China, Russia, India, the United Kingdom and the US. In 2008, Japan passed its Basic Space Law which established space solar power as a national goal[5] and JAXA has a roadmap to commercial SBSP.

In May 2020 the US Naval Research Laboratory conducted its first test of solar power generation in a satellite. In August 2021, the California Institute of Technology (Caltech) announced that it planned to launch a SBSP test array by 2023, and at the same time revealed that Donald Bren and his wife Brigitte, both Caltech trustees, had been since 2013 funding the Institute's Space-based Solar Power Project, donating over $100 million.

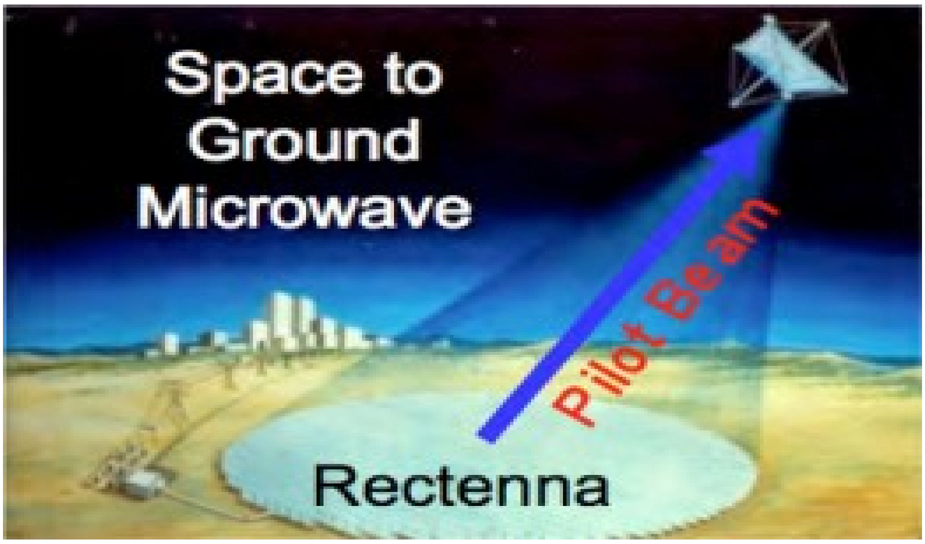

Fig1:Power transmission

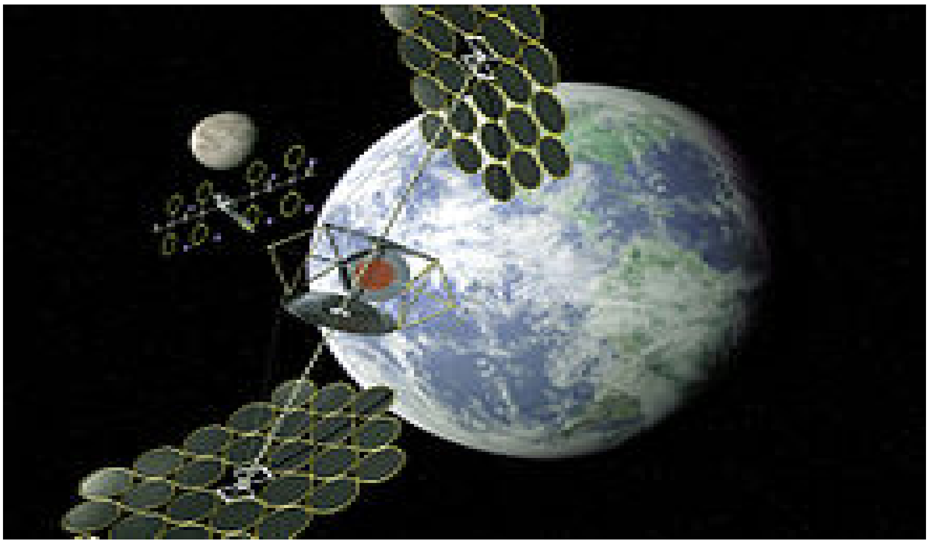

Fig 3:SERT Integrated Symmetrical Concentrator SPS

In 1999, NASA's Space Solar Power Exploratory Research and Technology program (SERT) was initiated for the following purposes:

- Perform design studies of selected flight demonstration concepts.

- Evaluate studies of the general feasibility, design, and requirements.
- Create conceptual designs of subsystems that make use of advanced SSP technologies to benefit future space or terrestrial applications.
- Formulate a preliminary plan of action for the U.S. (working with international partners) to undertake an aggressive technology initiative.
- Construct technology development and demonstration roadmaps for critical space solar power (SSP) elements.

SERT went about developing a solar power satellite (SPS) concept for a future gigawatt space power system, to provide electrical power by converting the Sun's energy and beaming it to Earth's surface, and provided a conceptual development path that would utilize current technologies. SERT proposed an inflatable photovoltaic gossamer structure with concentrator lenses or solar heat engines to convert sunlight into electricity. The program looked both at systems in sun-synchronous orbit and geosynchronous orbit.

2. Key features of SERT:

- The increasing global energy demand is likely to continue for many decades resulting in new power plants of all sizes being built.
- The environmental impact of those plants and their impact on world energy supplies and geopolitical relationships can be problematic.
- Renewable energy is a compelling approach, both philosophically and in engineering terms.
- Many renewable energy sources are limited in their ability to affordably provide the base load power required for global industrial development and prosperity, because of inherent land and water requirements.
- Based on their Concept Definition Study, space solar power concepts may be ready to reenter the discussion.
- Solar power satellites should no longer be envisioned as requiring unimaginably large initial investments in fixed infrastructure before the emplacement of productive power plants can begin.
- Space solar power systems appear to possess many significant environmental advantages when compared to alternative approaches.

- The economic viability of space solar power systems depends on many factors and the successful development of various new technologies (not least of which is the availability of much lower cost access to space than has been available); however, the same can be said of many other advanced power technologies options.
- Space solar power may well emerge as a serious candidate among the options for meeting the energy demands of the 21st century.
- Launch costs in the range of $100–$200 per kilogram of payload from low Earth orbit to Geo synchronous orbit are needed if SPS is to be economically viable.

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~Syed Sameer(20761A04B8)

3. Incredible India

~D.Nandini(20761A0413)

4. Right to freedom

~A.Jasmitha(19761A04D5)

5. *5G Technology*

1. Introduction:

5G Technology stands for 5th generationmobile technology. 5G represent the next major phase of mobile telecommunication ethics beyond the upcoming 4G standards. 5G technology is contributionthe service in Product Manufacturing, Documentation, supporting electronic communications, etc. As the purchaser become more and more aware of the mobile phone technology, he or she will look for a decent package all together including all the advanced features a cellular phone can have. Hence the search for new technology always the main motivation of the top cell phone colossuses to out innovate their competitors.

Fig 1: 5G scenario

The aim of a 5G based telecommunication network would perfectly answer the challenges that a 4G prototypical would present once it has entered ubiquitous use. No one company or person owns 5G, but there are numerous companies in the mobile ecosystem that are causative to bringing 5G to life.

Qualcomm has played a major role in originating the many introductory technologies that drive the industry forward and make up 5G, the next wireless standard.Huawei Technology Co. owns the at most copyrights on the next-generation of 5G technology, confirming the Chinese company will get paid despite Trump administration exertions to erase it from the supply chain, according to a new study. Wireless systems using Orthogonal Frequency Division Multiplexing (OFDM) with extensive area coverage, high amount at millimeter waves (10 mm to 1 mm) covering a frequency range of 30 GHz to 300 GHz, and permitting a 20 Mbps data rate to distances up to 2 km. The millimeter- wave band is the most active solution to the current surge in wireless Internet usage. These provisions are capable of providing wireless world wide web (WWWW) applications.5G technology is a breakthrough. The next-generation of telecom networks (fifth generation or 5G) has started beating the market end of 2018 and will continue to increase worldwide. 5G networks use the USIM tender to achieve strong mutual authentication between the user and the connected devices and the networks. The entity introducing the USIM application can be a removable SIM card or an embedded UICC chip. This strong mutual authenticationis decisive to enable trusted services. Today, security solutions are already a mix of security at the device and security at the network. Profuse security frameworks may co-exist in the future, and 5G is likely to re-use remaining solutions

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~E.Manohar Reddy (21765A0407)

7. *Virtual reality*

1. Introduction:

Virtual Reality (VR) is a computer-generated environment with scenes and objects that appear to be real, making the user feel they are immersed in their surroundings. This environment is perceived through a device known as a Virtual Reality headset or helmet. VR allows us to immerse ourselves in video games as if we were one of the characters, learn how to perform heart surgery or improve the quality of sports training to maximize performance.

Although this may seem extremely futuristic, its origins are not as recent as we might think. In fact, many people consider that one of the first Virtual Reality devices was called Sensorama, a machine with a built-in seat that played 3D movies, gave off odors and generated vibrations to make the experience as vivid as possible. The invention dates back as far as the mid-1950s. Subsequent technological and software developments over the following years brought with them a progressive evolution both in devices and in interface design.

Fig 1: Virtual reality

2. VR—Entering New Worlds Through Equipment

In VR design, your goal is for users to experience an alternative existence through whichever senses your design can access. The more your design reaches your users through sight, hearing and touch, the more immersed they will be in virtual reality. You therefore want to isolate users as far as possible from the real world.

VR's history began with the View-Master (a stereoscopic visual simulator) in 1939 and Morton Heilig's 1950s' Sensorama multi-experience theatre. The development of the first head-mounted display (HMD) followed in 1968. Then, designers focused on professionally geared applications in the 1970s and 1980s. With more sophisticated technology, they could tailor computerized VR experiences to the fields of military training, medicine and flight simulation. After 1990, just after "Virtual Reality" became popularly known, VR entered the wider consumer world through video-games. VR has since become progressively more affordable and sophisticated.

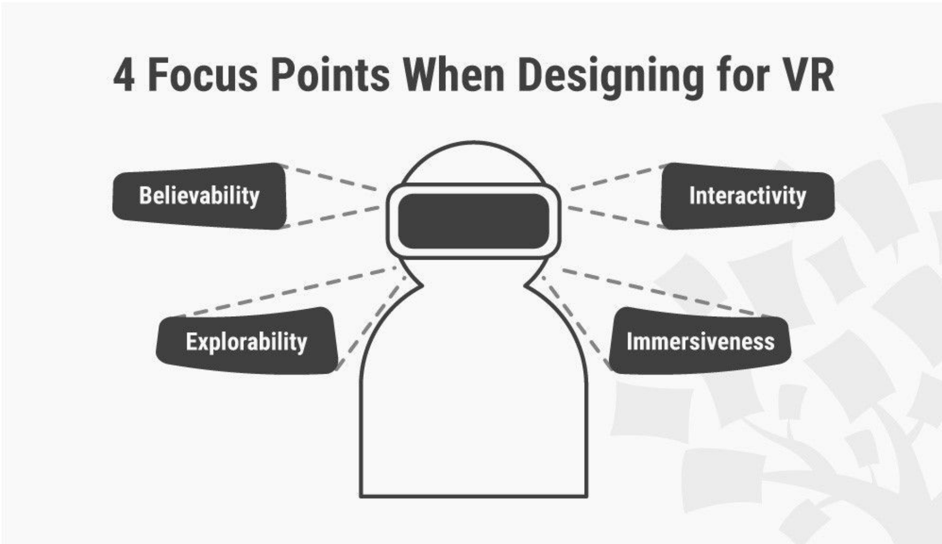

Fig.2: Key accepts

VR differs from augmented reality, where users remain anchored in the real world but experience computerized overlays. AR and VR—along with mixed reality (MR), where users interact with digital elements which are anchored to the real world—come under the umbrella term extended reality (XR). In AR, users employ devices (e.g., smartphones) to find parts of the real world (e.g., a room) overlaid with computer-generated input. Designers insert a range of digital elements such as graphics and GPS overlays which adjust to changes in the user's environment (e.g., movement) in real time. In MR, users have a more sophisticated experience where digital interplays with real-world content—e.g., surgeons operating on patients via projected ultrasound images. In VR, users' real-world movements translate fully to preprogrammed environments, letting them play along with convincing VR illusions. Virtual Reality is really a new communication platform. By feeling truly present, you can share unbounded spaces and experiences with the people in your life. Imagine sharing not just moments with your friends online, but entire experiences and adventures.

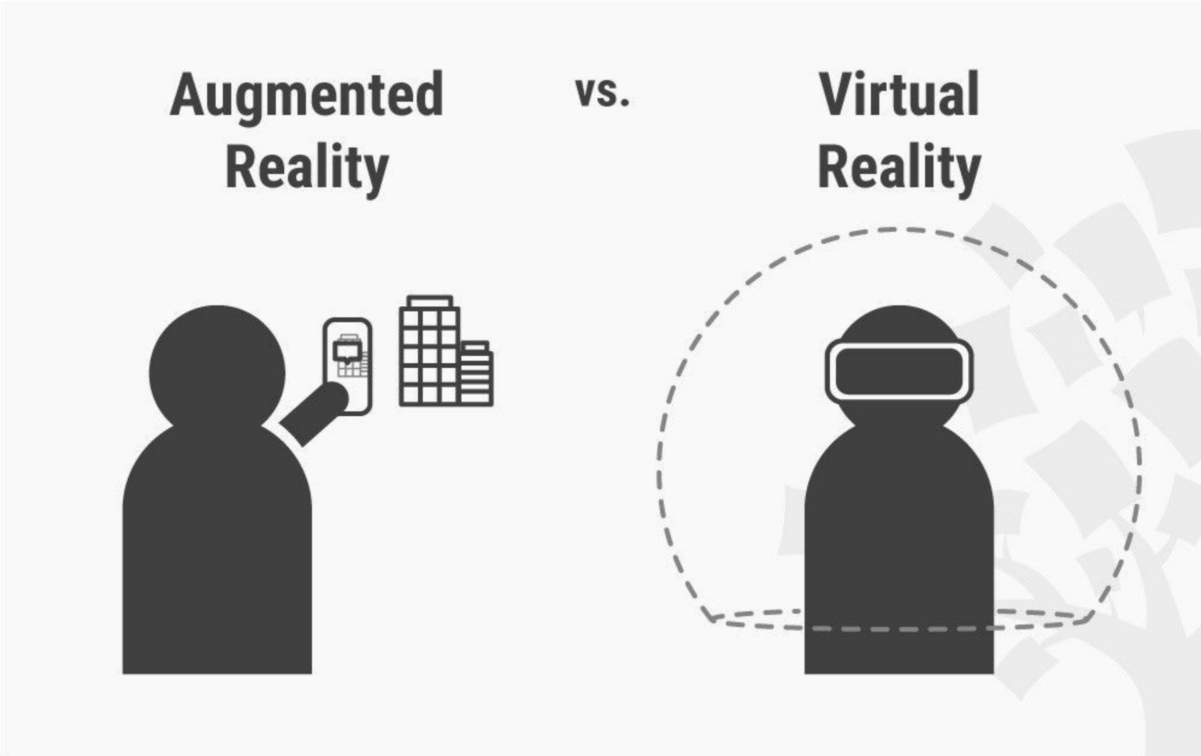

Fig 3: Virtual reality Vs Augmented Reality

~Adarsh Sriram.Y(20761A04C6)

8. Microprocessor

1. **Introduction:**

A microprocessor is a computer processor where the data processing logic and control is included on a single integrated circuit, or a small number of integrated circuits. The microprocessor contains the arithmetic, logic, and control circuitry required to perform the functions of a computer's central processing unit. The integrated circuit is capable of interpreting and executing program instructions and performing arithmetic operations.[1] The microprocessor is a multipurpose, clock-driven, register-based, digital integrated circuit that accepts binary data as input, processes it according to instructions stored in its memory, and provides results (also in binary form) as output. Microprocessors contain both combinational logic and sequential digital logic, and operate on numbers and symbols represented in the binary number system.

The integration of a whole CPU onto a single or a few integrated circuits using Very-Large-Scale Integration (VLSI) greatly reduced the cost of processing power. Integrated circuit processors are produced in large numbers by highly automated metal-oxide-semiconductor (MOS) fabrication processes, resulting in a relatively low unit price. Single-chip processors increase reliability because there are much fewer electrical connections that could fail. As microprocessor designs improve, the cost of manufacturing a chip (with smaller components built on a semiconductor chip the same size) generally stays the same according to Rock's law.

Before microprocessors, small computers had been built using racks of circuit boards with many medium- and small-scale integrated circuits, typically of TTL type. Microprocessors combined this into one or a few large-scale ICs. The first commercially available microprocessor was the Intel 4004 introduced in 1971.

Continued increases in microprocessor capacity have since rendered other forms of computers almost completely obsolete (see history of computing hardware), with one or more microprocessors used in everything from the smallest embedded systems and handheld devices to the largest mainframes and supercomputers.

2. Transistors to integrated circuits:

In 1951 the company changed its name to Texas Instruments Incorporated (TI) in order to reflect growing diversification in the company's business. The following year TI purchased a license from Western Electric to manufacture transistors, which Haggerty believed could be integrated into a profitable new generation of consumer goods. To prove his point, Haggerty established the TI semiconductor division and oversaw the development and production of the world's first transistor radio. Designed by TI and manufactured and marketed by Industrial Development Engineering Associates, the Regency radio was a best seller for the 1954 Christmas season. The use of transistors reduced the radio's size and power consumption, enabling it to fit in a large pocket or purse. Profits were considerable, and TI was established as a major electronics firm. From 1954 to 1958 TI was the only firm capable of producing silicon transistors in quantity.

In 1958 Jack Kilby, a researcher at TI, coinvented the integrated circuit (IC). (Robert Noyce of Fairchild Semiconductor Corporation independently invented the IC later that same year.) Haggerty, who had just become TI's president, recognized that developing the IC would demand resources far beyond his company's funding capabilities. Fortuitously for TI, the U.S. Air Force began a major program to close the "missile gap" following the launch in 1957 of a ballistic missile by the Soviet Union. TI, already a prime supplier of semiconductor circuits for the military, received funding to develop ICs for use in ballistic missile guidance systems. The Minuteman missile, which became the principal American land-based nuclear missile following its deployment in 1962, relied on ICs made by TI. In 1964 the first consumer product containing an IC appeared, a hearing aid designed and manufactured in collaboration with Zenith Radio Corporation

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~Sasirekha.Y(20761A04C8)

Editorial

Artificial intelligence , Machine Learning or Deep learning name can be anything but a major breakthrough is being seen in the technology. Starting from the day to day functioning to global wars , everywhere automation is being spread at a faster manner. Unlike the earlier generation, the current one is having the advantages being exposed to the latest developments more resulting in better carrier opportunities if caught at right time. Hesitation, shyness, laziness are to be thrown out with a zeal to survive better.

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