Maratha Vidya Prasarak Samaj's
Karmaveer Adv. Baburao Ganapatrao Thakare
College Of Engineering
Nashik-13.
(NAAC ACCREDITED INSTITUTE WITH 'A' GRADE)

DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGG.

Departmental TeChronicle

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Department Vision:-

To recognize as excellent department offering competent technical education to create competent electronics & telecommunication engineers for benefits of common masses.

Department Mission:-

Committed to serve the needs of society through innovative teaching learning process, promoting industry- institute interaction to provide competent and cultured electronics and telecommunication engineers.

Greeting,

Department of electronics and telecommunication is unveiling technical newsletter "TeChronicle" on 4th April, occasion of Birth Anniversary , of **Late Dr. V. N. Pawar**, recipient of the prestigious Dr. B.C. Roy award, Sarchitnis of Maratha Vidhya Prasarak Samaj (MVP, Nashik).He was Seating MLC Maharashtra State (2004-2006, 2006-2012) & Ex Member of Parliament: (Loksabha 1991-1996). With his visionary leadership ability he still enlighten us to Indigenous work.

The Magazine will open a platform for the students and faculty to express their views on state of art , trending & upcoming Tech-Events, Technologies, Industry Requirements, We as a department always encourage our students to learn and express the new technologies. This will provide a very good platform for the same.

We take this opportunity to ask every student and faculty to positively contribute for TeChronicle.

Regards,
Editorial Team

M. K. Birmani : A Socialistic Technologist

Editorial Team [22 Feb 2019]

In Nashik region one of the major Electronics manufacturers is Sivananda Electronics which has been manufacturing products with breakthrough technologies since 1970 in the field of Electronics Test & Measuring Instruments and Security Systems. 100% indigenous Metal detector was developed for the first time in India by Sivananda Electronics in 1975, using innovative design and supplied to every user in the Country including all National & International airports, paramilitary forces, state police, customs, ordnance depots etc. We have developed Full Height Turnstile and Tripods for the first time in India in 1988. Their one of the biggest achievement was to supply 300KMs of Electric Power Fence to Indian Army in record time of four months and installed at LOC at J & K. More than 150 different types of Electronic Test & Measuring instruments have been indigenously developed for industries in the field of power, cable, communication, petroleum, railways etc., and are exported to more than 72 Countries. They have largest installed base for Turnstiles in India since last 25 years.

Driven by Dynamic leadership of Mr. M K Birmani , Managing Director , a graduate from IIT Kharagpur with a passion of research and innovative solutions interacted enthusiastically about his journey with our students.

While interacting with him students came to know that, it was not his decision to start a business, but cousin idea to make a product for Indian army which supported by his father, retired army officer from where this all began. Further he extended how the name Shivananda was given to their company in the memory of Swami Shivananda who became a saint in Malaysia thereby forming a huge heritage in Rishikesh.

(T. E. E & TC Students with Mr. M. K. Birmani & Mr. B. Nimbalkar)

Shivananda who not only excels in industrial sectors but also has its footprints in social works, they have developed a charity home in Triambakeshwar and Deolali for the poor which has the facilities of education, health centers, food, clothing and shelter.

Mr. M. K. Birmani does not only inspire our students with his technical work but also become role model for his social work.

The First Telephone Call: March 10, 1876

Ms. Tejaswini S. Deshmukh, Mr. Viraj R. Sonawane [Assistant Professor]

What were the first words ever spoken on the telephone? They were spoken by Alexander Graham Bell, inventor of the telephone, when he made the first call on March 10, 1876, to his assistant, Thomas Watson: "Mr. Watson--come here--I want to see you." What would you have said?

(Bell on the telephone in New York (calling Chicago) in 1892)

Born in 1847 in Edinburgh, Scotland, Bell became an expert in sound and public speaking. His understanding of sound helped him to teach the deaf and then invent the telephone.

Bell was a man of vision. After the telephone's success, he wrote to his father about a future when "friends converse with each other without leaving home." How often do you talk with your friends on the phone? Can you imagine how life would be different without it?

Inspired by his scientific curiosity, Bell went on to create other new inventions, including the photophone in 1880. This first wireless telephone transmitted sound on a beam of light instead of electrical wires. It is the forefather of the cordless phone and 80% of today's telephone systems that use fiber optics.

Bell's first telephone call was so famous, he repeated the phrase in 1915 in the formal opening of the completed transcontinental telephone lines connecting America's East and West coasts. Picking up the phone in New York, Mr. Bell said, "Mr. Watson, come here, I want you." But this time Watson replied that it would take him a week; he was on the other end of the line in San Francisco.

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Fast Forward to the future with 5G networks

Rutuja S. Rajole & Iramsaba M. Shaikh [S.E. E&TC]

If taken a stroll outside today, you'll see a lot of people with mobile phones, phablets or tablets in their hands making calls, using the internet to catch up on the news, watch videos, or interacting with others via Facebook, Tumblr or Twitter including you. In doing so, we all are using a mobile data network. Many of these applications particularly video consume a lot of bandwidth, so telecommunications companies across the world always try to talk about upgrading to the latest generation of mobile data to help speed things up. As we approach 2020 it is likely that there will be more than 50 billion connected devices worldwide and The Internet of Things will no longer be something we think about but will be all around us. Everything from home appliances to our cars will be connected to the network and 5G is being designed and built with this in mind. 5G is not just a mobile technology, its ubiquitous access to high & low data rate services. The technology is still a long way from becoming a reality, but it has the potential to completely change the way we interact with wireless devices, from the smartphones in our pockets to the cars we drive.

- WHAT WAS MISSING OUT IN 4G?
  - Battery uses are harder to implement need complicated hardware Expensive equipment required to implement next generation network.
  - Limited Use of Internet and Smartphone
  - Battery Consumption
  - Limited 4G network towers
  - Higher data consumption

- 5G ROLLOUT FOR 2020 LOOKS PROMISING

Ericsson created the first 5G platform earlier last year that claims to provide the first 5G radio system, although it started 5G testing in 2015.In early 2017, Nokia launched "5G First", a platform aiming to provide end-to-end 5G support for mobile carriers. 5G has the potential to be 20 times faster than 4G, meaning you can download things 20 times faster or download more in less time.

- 5G has a peak speed of 20 GB/s, while 4G's is only 1 GB/s.
- 5G will offer much higher bandwidth and capacity than 4G service.
- In 5G router or switch will be used which can provide high connectivity with the wireless device.
- It has an expected speed of minimum of 1gbps.
- Lower cost expected than the previous version.
- Large Phone Memory and Dialing Speed with clarity in Audio/Video.
- STANDARDS: Single Unified Standards
- TECHNOLOGY: Unified IP & Seamless Combination of High resolution and bi-directional large bandwidth shaping.

“Simply put, 5G means that the network will be ready for millions of devices and not just the smartphone in your hand," said Bhaskar Ramamurthi, who helms the Centre of Excellence in Wireless Technology at IIT Madras.

In order to set a roadmap for the rollout of 5G, the government had in September last year set up a high-level forum.

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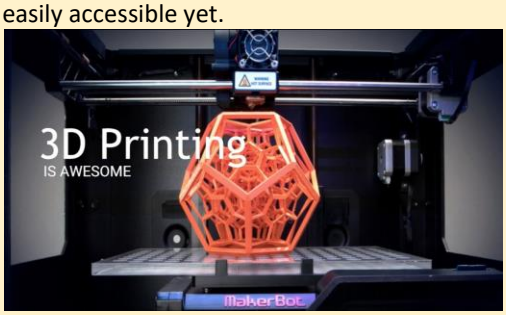
How does 3D Printing Work?

Lalit S. Khachane[T.E. E&TC]

3D printing is also called additive manufacturing. This term accurately describes how this technology works to create objects. "Additive" refers to the successive addition of thin layers between 16 to 180 microns or more to create an object. In fact, all 3D printing technologies are similar, as they construct an object layer by layer to create complex shapes.

The first step is the preparation just before printing, when you design a 3D file of the object you want to print. This 3D file can be created using CAD software, with a 3D scanner or simply downloaded from an online marketplace. Once you have checked that your 3D file is ready to be printed, you can proceed to the second step.

The second step is the actual printing process. First, you need to choose which material will best achieve the specific properties required for your object. The variety of materials used in 3D printing is very broad. It includes plastics, ceramics, resins, metals, sand, textiles, biomaterials, glass, food and even lunar dust! Most of these materials also allow for plenty of finishing options that enable you to achieve the precise design result you had in mind, and some others, like glass for example, are still being developed as 3D printing material and are not easily accessible yet.



The third step is the finishing process. This step requires specific skills and materials. When the object is first printed, often it cannot be directly used or delivered until it has been sanded, lacquered or painted to complete it as intended.

The material chosen for the project will determine which printing methods are most suitable. Among these, the most commonly used techniques for each group of materials

Fused Deposition Modeling (FDM) Technology: This process works by material being melted and extruded through a nozzle to 3D print a cross section of an object each layer at a time. The bed lowers for each new layer and this process repeats until the object is completed. Layer thickness determines the quality of the 3D print. Some FDM 3D printers have two or more print heads to print in multiple colors and use support for overhanging areas of a complex 3D print.

SLS Technology: Laser sintering is a 3D printing technique consisting of the fabrication of an object by melting successive layers of powder together in order to form an object. The process most notably facilitates in the creation of complex and interlocking forms. It is available for Plastic and Alumide

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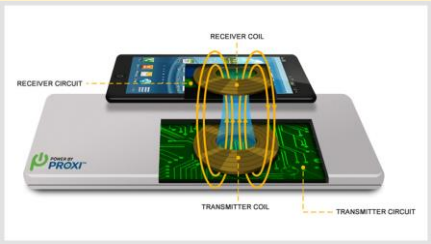
Wireless Charger: A World without Wires

Vaijayanti R. Holkar[T.E. E&TC]

Wireless charging is a technology which enables charging of your devices without them actually being in contact. Yes, you heard it right, in the process of wireless charging we don't require the bulky and long USB to attach every time to your phone to get your phone charged but through this technology, the power is transmitted through free space.



How it actually works? There are charging pads that use tightly-coupled electromagnetic inductive or non-radiative charging; charging bowls or through-surface type chargers that use loosely-coupled or radiative electromagnetic resonant charging that can transmit a charge a few centimeters; and uncoupled radio frequency (RF) wireless charging that allows a trickle charging capability at distances of many feet.

Both tightly coupled inductive and loosely-coupled resonant charging operate on the same principle of physics stated by ***Faraday: a time-varying magnetic field induces a current in a closed loop of wire.***

It works like this: A magnetic loop antenna (copper coil) is used to create an oscillating magnetic field, which can create a current in one or more receiver antennas. If the appropriate capacitance is added so that the loops resonate at the same frequency, the amount of induced current in the receivers increases. This is resonant inductive charging or magnetic resonance; it enables power transmission at greater distances between transmitter and receiver and increases efficiency. Coil size also affects the distance of power transfer. The bigger the coil, or the more coils there are, the greater the distance a charge can travel.

We are observing commercial roll out of mobile wireless charger and expecting The ideal future of wireless charging is fairly obvious: a world without wires

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Introduction to Multi Gate MOSFET/FinFET

Ms. Jagtap Sarika Madhukar [Assistant Professor]

The basic requirement of battery- operated portable gadgets like laptops, cellular phones are less area, low power consumption, & cheaper development. The world's biggest chip maker runs its business on Moore's Law the prediction in 1965 made by Intel chairman Gordon Moore that the number of transistors on a chip will be double every year. By making the transistor smaller & smaller, the more circuit can be fabricated on the silicon wafer & therefore the circuit become cheaper. This reduction of transistor size is called scaling. What we basically expected from the scaling is low power consumption, low cost, less design time, portable size but there is in Finite complexity. Here Moore's law helps us to achieve scaling target to improve circuit performance & make a portable device.

The traditional transistor or normal MOSFET require significant amount of power so the circuit present on the chip will also require a large amount of power due to the presence of many transistors in the circuit on the chip. Technology node has shrunk from 10µm in 1971 to 90nm in 2004 and will shrink to below 10nm in 2018. Technology upgradation is as follows:

MOSFET – The MOSFET or metal oxide semiconductor field effect transistor, is a form of FET that offers an exceedingly high input impedance. The concept of the MOSFET has been known for many years but they only became important in mid to late 1960s.

CMOS – CMOS circuits were invented in 1963 by Frank Wanlass at Fairchild Semiconductor. The first CMOS IC was made by in 1968 by a group led by Albert Medwin. Originally a low-power but slow alternative to TTL, CMOS found early adopters in the watch industry and in other fields where battery life was more important than speed.

FinFET – The term FinFET (fin field-effect transistor) was coined in 2001 by University of California, Berkeley, researchers (Profs. Chemming Hu , Tsu-Jae King-Liu and Jeffrey Bokor) to describe a nonplanar, double-gate transistor built on an SOI substrate, based on the earlier DELTA (single-gate) transistor design.

As MOSFET are scaled to the nm regime, the gate control on the channel reduces and undesirable effects such as hot carrier effects, high gate control and short channel effects are occurring. Technology node has shrunk from 10µm in 1971 to 90nm in 2004 and will shrink to below 10nm in 2018.

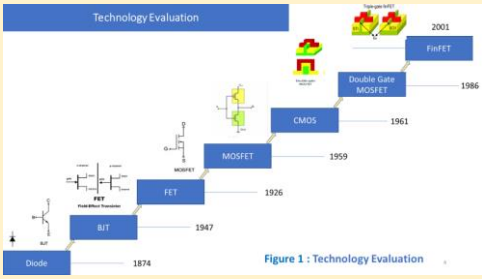


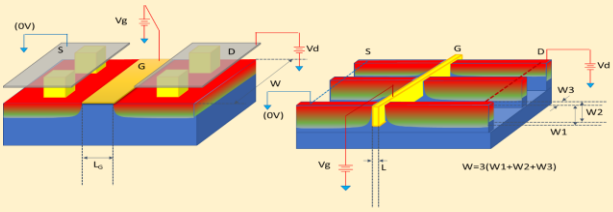
Figure 1 : Technology Evaluation

As we reduce the size of the transistor more unwanted side effect occurs and that effect is called short channel effect.

Multi gate field effect transistors such as Fin shaped FETs have been considered as prominent device in place of conventional bulk planar transistors. **FinFET**s has better electrostatic control of the gate over the entire semiconductor channel, which reduction of Short Channel Effects.

FinFET Device: Scaling

The channel of the planar device i.e. MOSFET is horizontal, the FinFET channel is a thin vertical Fin with the gate fully "wrapped" around the channel formed between the source and the drain. The current flows parallel to the plane whereas the conducting channel is formed around the Fin edges. With this structure, the gate is able to fully deplete the channel thus having much better electrostatic control over the channel.



In 2018, Samsung proudly announced the Exynos 9 Series (9810), a mobile processor built on the 2nd generation 10nm FinFET process. However, it's not the first processor that Samsung utilized FinFET technology.

In January of 2015, Samsung began mass production of Exynos 7 Octa (7420), the industry's first mobile processor using the 14nm FinFET process technology. The Samsung Exynos processor will continue to be built on the industry's most advanced process technology to create infinite possibilities on mobile life.

Using 10nm FinFET, the Snapdragon 835 processor will offer a smaller chip footprint, giving OEMs more usable space inside upcoming products to support larger batteries or slimmer designs.

Intel has started high-volume 10 nm production and TSMC has considered 10 nm to be a short-lived node mainly dedicated to processors for Apple during 2017–2018, moving on to 7 nm in 2018.

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