Wonders of Electronics

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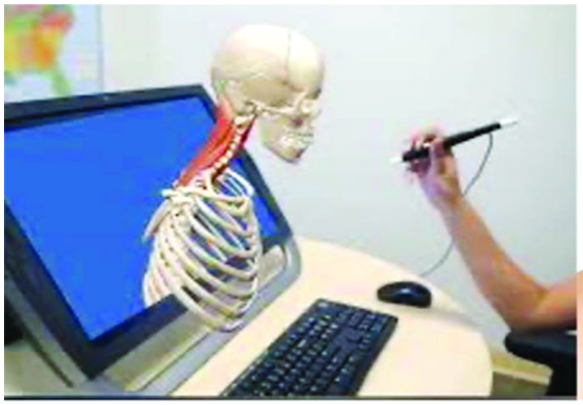

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"Logic will get you from A to B. Imagination will take you everywhere" – Albert Einstein

Electronics is a simple word but has affected recent human history probably more than any other field. It is indeed the mother of numerous new technologies spans from Computer Science, Nanotechnology, 3D Printing, Augmented Reality, IoT (Internet of Things), Robotics, Artificial Technology (AI) and the list is endless. From advanced manufacturing to intricate consumer wearable devices, Electronics are the heartbeat of many industries today.

In today's world who could imagine life without the involvement of Electronics. Can you dare to think, what could our world be today if we don't know anything about "Electronics"? We are really privileged today that the development in Electronics makes our day to day life easy, simple and comfortable. All we just have to do is to press buttons on the machines and they will do all the hard work for us. Electronics scientists and engineers are developing innovative consumer technologies that includes cellphones, cameras, drug delivery devices, personal security sensors, drones for security surveillances, robots for domestic and industrial usages and many more. However, with the popularity of Raspberry Pi, Arduino, etc., there is hope for a new generation of electronic enthusiasts. Initiation of projects like Smart City and Digital India by GOI give further impetus to the rapidly expanding electronics industry. National Policy on Electronics by Department of Electronics and Information Technology (DEIT), GOI aims to give special treatment to domestic electronic products, in order to build a globally trusted electronics market and provide new opportunities for job growth throughout India. According to experts, India's electronics market is anticipated to reach $400 billion by 2025.

Next Generation Technological Developments

Electronic Skin

E-skin generally refers to the flexible, stretchable and self-healing electronics that has the capacity to mimic human skin. Skin is the largest organ in the human body whose job is to interact with external environments through numerous receptors interconnected with the nervous system. Scientists are exploring various applications areas, but the main applications are in the robotics, wearable or skin attachable devices, and prosthetics. To fully mimic human skin, it is necessary to interconnect a large number of sensors and this is the biggest research challenge in the development of electronic skin.

Internet of Things (IoT)

The latest innovations in Electronic components and smart sensors are the basis for the success of IoT (Internet of Things). Now a days, IoT systems are not conventional devices that simply convert physical quantity into electrical signals, rather they are highly sophisticated systems that perform various roles across industries spans from WiFi-connected home appliances, to manufacturing machines that use sensors to time tasks on an assembly line, to warehouses that rely on automation to manage inventory, to surgeons who can perform precise surgeries with robots. IoT have opened up new prospects for science enthusiastic as you don't require a college degree to program a microcontroller and design things.

Advance Drones

Scientists have developed a bio-inspired wing design for small advanced Drones. The designed was inspired by natural flyers like birds and insects which helps drones fly more efficiently and make them more robust to atmospheric

turbulence. These wings also provide an aerodynamically efficient flights that ultimately saves battery life and enhance flight times.

Electronics on Human Skin

The day is not far away when we can monitor our health conditions by drawing a simple design on our skin. Scientists have demonstrated that simple pencil drawing could be used to create bioelectronic sensors that might be used as devices to monitor health conditions. Compared to the conventional approach to produce biomedical electronic devices, this new approach is very simple, low-cost and moreover does not require any sophisticated laboratory equipment. This innovative technique has wide future applications in home-based personalized health care, education, and remote scientific research such as during the COVID-19 pandemic.

Augmented Reality and AI

Augmented Reality combines with Artificial Intelligence (AI) to provide a virtual learning platform to keep students engaged and provide detailed explanations of models and virtual labs. With a 3D hologram, students can pinch, zoom, and rotate equipment related to the experiment, enhancing a student's learning experience. There are laptops available that combines augmented and virtual reality to enhance how we study and learn. These computers enhance the ability to look around virtual objects as if they are real. The position and orientation of the objects are updated in real-time as the person moves their head, creating both a realistic and comfortable viewing experience. With the additional feature is perception of depth, virtual objects look real as they appear both into and out of the computer screen.

Artificial Humans

Recently scientists from NTU, Singapore used a brain inspired approach to develop 'mini-brains' in robots to have the artificial intelligence (AI) to recognize pain and to self-repair when damaged. It is possible because they embed AI into the network of sensor nodes, connected to multiple small, less-powerful, processing units, that act like 'mini-brains' distributed on the robotic skin. This is an important step for the development of Humanoids i.e. human-like robots.

3D printing

This is the process of making a physical object from a three dimensional (3D) digital model. 3D printing also called additive manufacturing (AM) is a radically different manufacturing method based on advanced technology that build up parts additively, in layers at the sub mm scale. This is fundamentally different from any other existing traditional manufacturing techniques. The applications of 3D printing have been anticipated in almost every field, but the medical sector is viewed as being one that has early adopted the 3D printing technology. Research is also going on to develop 3D printing of skin, bones, tissues, pharmaceuticals and even human organs. Apart from this, 3D printing has also applications in aerospace industry, automotive, jewellery designing, art/design/ sculpture, architecture, fashion, 3D printed food and many more. To our surprise, a company in China has used giant 3D printers to make 10 full-sized, detached single-storey houses in a day.

All these advance scientific researches in Electronics will surely change the way we see, work and understand our world. To be honest, advance scientific research demands the knowledge of all the basic science. But, to explore the imagination beyond boundaries, expertise in Electronics along with knowledge of basic sciences has an edge. In the developed countries, people are taking Electronics as hobby and many startups have come up in this field. I am sure, India will be a next big market in the field of hobby Electronics. There will be plenty of opportunities for young generation to explore research fields, teaching, and even to venture their startups in the field of Electronics. India's Technology minister recently stated that "India has the resources it needs to become a global electronics manufacturing hub and a competitive partner to the world economy". Hence, this is the right time to generate skilled manpower in Electronics to become a global leader in world economy. The transition is imminent, either we can lead, or we follow the world.

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