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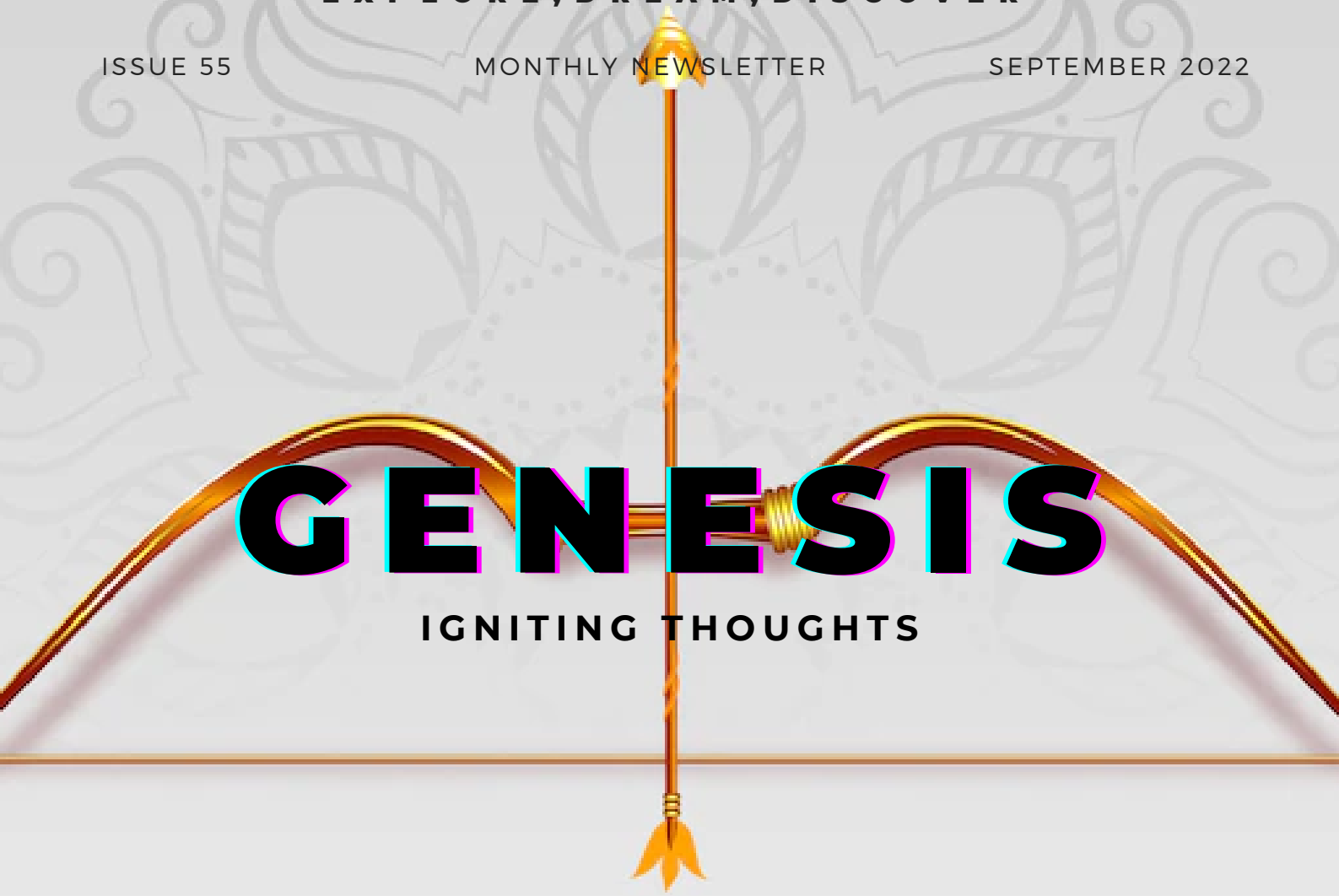
DEPARTMENT OF ELECTRONICS AND COMMUNICATION

EXPLORE, DREAM, DISCOVER

ISSUE 55 MONTHLY NEWSLETTER SEPTEMBER 2022



GENESIS

IGNITING THOUGHTS

HAPPY Dussehra

Contents

Vision

- To be recognized at the national and international level for excellence in education and research in Electronics and Communication Engineering.

Mission

- Inculcating leadership qualities, adaptability, and ethical values
- Imparting quality education in the field of electronics, communication, and related areas to meet the challenges in the industry, academia, and research
- Nurture the growth of each individual by providing a dynamic and conducive learning environment.

DEPARTMENTAL ACTIVITIES

PYTHON WORKSHOP

Workshop on Python programming was conducted for S7 EC students in association with The Institution of Engineers , India (IEI) students' chapter. It was a 4 day programme which started on 26th September 2022. The main objective of the workshop is to equip the students with practical skills in python programming which benefits them in upcoming placements and final year project. Mr. Albins Paul and Ms. Arya Paul, Assistant Professors; ECE department served as the resource persons for the workshop.


GPS Map Camera
Kalady, Kerala, India
5CHJ+6F6, Mattoor, Kalady, Kerala 683574, India
Lat 10.178174°
Long 76.431059°
Google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Long 76.431059°
26/09/22 09:27 AM GMT +05:30
Google

ONAM CELEBRATIONS @ASIET

CONGRATULATIONS

PLACEMENTS

Manikandan A.R

Sona Paul

Sneha V Iyer

Vivek Shankar

Congratulations to the students of S7 ECE to be placed in IBS.

ibs

Inventing future

SEMESTER 1 RESULTS (2021-25 BATCH)

S1 KTU RESULTS (2021-25)

ANEESA SALIM
CGPA : 9.59

C A ADITHYA
CGPA : 8.8

KEERTHY KRISHNA
CGPA : 8.5

HANNA MARIYA THOMAS
CGPA : 8.44

ASLAHA FARHA
CGPA : 8.38

BALAGOPAL M
CGPA : 8.38

GOPIKA UNNIKRISHNAN
CGPA : 8.35

KAVYA P NAIR
CGPA : 8.29

ABHINI RAMESH
CGPA : 8.21

GAYATHRI VISHWANATH
CGPA : 8.06

ANN TREASA GEORGE
CGPA :8.03

ALEENA EBY KAVAT
CGPA : 8

JEFFIN PAUL
CGPA : 8

TECH TALKS

TEACHER'S ZONE

Ms Neetha K
Assistant Professor Department of ECE

THE 5G LEAPFROG TO 6G

India is all set to get 5G networks in the coming months. Ahead of the big launch, Hon. Prime Minister has made big announcements about 6G services in India. PM Modi said that the nation is preparing to launch the 6G services by the end of this decade. The announcement was made during the Smart India Hackathon 2022 event. Earlier , Telecom Minister Ashiwini Vaishnaw announced that the 5G services will be rolled out in India by October. India needs to streamline its R&D efforts and investments from academia, private and public institutions towards the larger cause of being self-reliant. Several consortiums and alliances in North America, European Union, Japan.As of now, 6G-related standardization activities are assumed to start around 2025, while first 6G deployments can be expected for 2030. Market force would advance the timelines, but private 6G deployment and experiments may happen much earlier.

According to the experts, 6G will use the millimeter-wave (24GHz-52GHz) which may be extended to 100GHz, while the 7-24GHz could be used for sharing purposes. 6G networks will underpin services such as ubiquitous mobile ultra-broadband (uMUB), ultra-high-speed with low-latency communications (uHSLLC), massive machine--type communication (mMTC), and ultra-high data density (uHDD).

1G to 6G

As we progress towards this next generation of mobile network, let us look at the experiences that each generation brought with it and what the future – 6G – might hold.

1G: Voice calls

It was a time when phones were thick, heavy, and bulky. They had no screens, and came with big antennas and massive batteries. The network reception was sketchy and the on-battery time was abysmal. Nevertheless, this is where the mobile network story started.

The first generation enabled communication between two supported devices using a wireless network. Based on the analog system, 1G supported only voice calls, and those too of poor quality because of interference. Besides, 1G worked in a fixed geographical area because of lack of roaming support by the network.

2G: Telephony services

The second generation fixed the issues that marred the first-generation mobile network, and introduced new capabilities. The analog system of the first generation was now replaced by a much advanced digital technology for wireless transmission called the Global System for Mobile communication (GSM). With digital underpinning, the 2G supported better quality voice calls and data services such as short message service (SMS) and multimedia messaging service (MMS).

Besides, this mobile network enabled roaming facility, allowing users to attend calls, send and receive texts and multimedia content on the go. The 2G network enabled true telephony services. It later received internet support in the form of GPRS (General Packet Radio Service) and EDGE (Enhanced Data GSM Evolution), but that alone wasn't enough for a generational shift. Therefore, there was also 2.5G before the world moved to 3G.

3G: Age of apps

The third-generation mobile network introduced high-speed internet services, which set the stage for smartphones and app ecosystems. While 3G enabled the concept of mobile television, online radio services and emails on phones, it is video calling and mobile phone apps that really define the 3G era.

This was the time when iPhones and Android smartphones started making inroads. The early iteration of 3G supported internet speed in kilobytes-per-second (Kbps).
Like 2G, there was no direct shift from 3G to 4G. There was a 3.5G, which was earmarked for better internet speeds in megabyte-per-second (Mbps) with the introduction of technologies such as HSDPA (High Speed Downlink Packet Access) and HSUPA (High Speed Uplink Packet Access).

4G: Internet calling

3G set the base for 4G, which is the generation of mobile network we are currently on. The concepts introduced by 3G such as high-definition voice calls, video calls and other internet services become a reality in 4G – thanks to a higher data rate and advanced multimedia services that the mobile network supports. It perfected the LTE (Long Term Evolution) system, which significantly improves data rate and allows simultaneous transmission of voice and data. Internet calling, or VoLTE (Voice over LTE), is one of the many advantages of the 4G mobile network. The network also enables voice over Wi-Fi (VoWi-Fi), which allows voice calls in areas with low or no network reception.

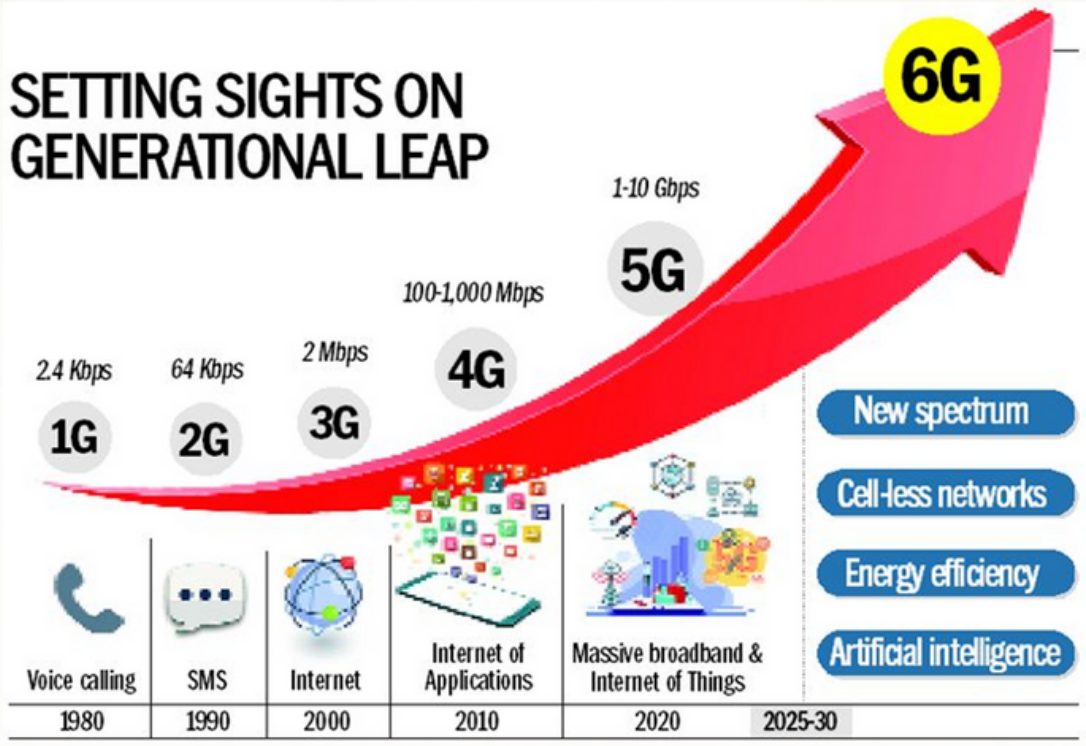
5G: IoT and enterprises

From 1G to 4G, each successive generation of communication technology brought about significant changes in the network, perfecting the use-cases of the previous generation and introducing new ones. 5G, however, is expected to be a little different, in the sense that it will not just be another mobile network geared towards smartphone users but also enterprises.

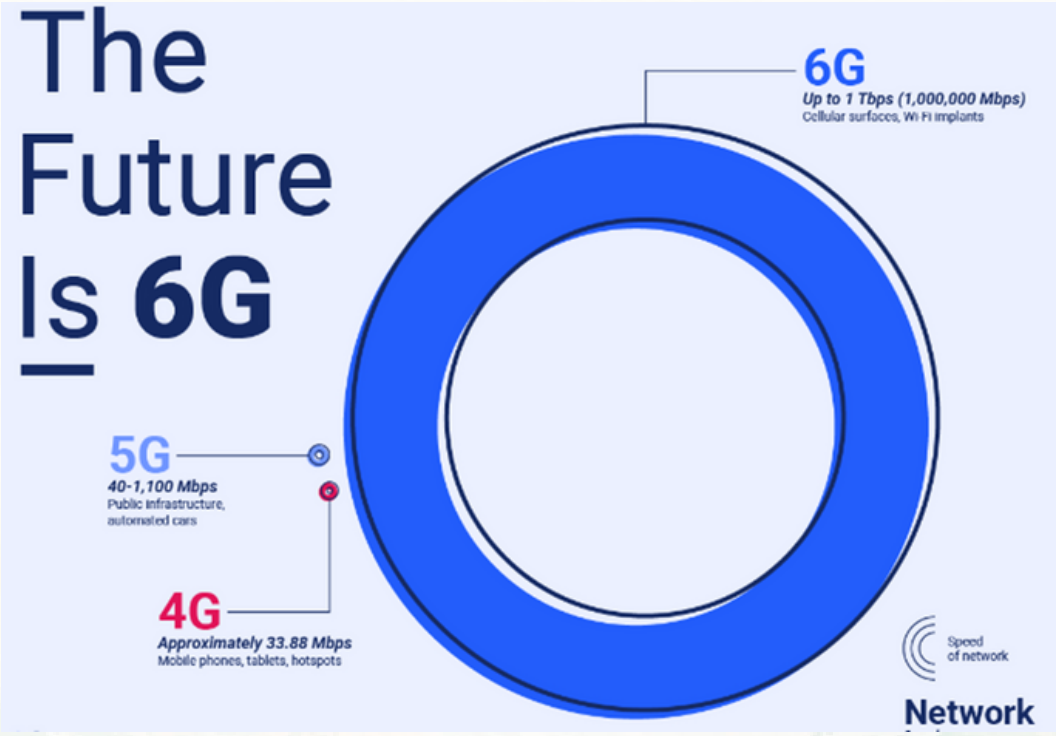
This is because the next generation of network would not just bring improvement in data speeds but also latency and throughput. The low latency and high throughput make the network ideal for enterprise use, especially with regard to automation and connected ecosystem. On the consumer side, the network would deliver high internet speeds and would likely play a crucial role in enabling technologies such as the metaverse.

6G: Connected ecosystem

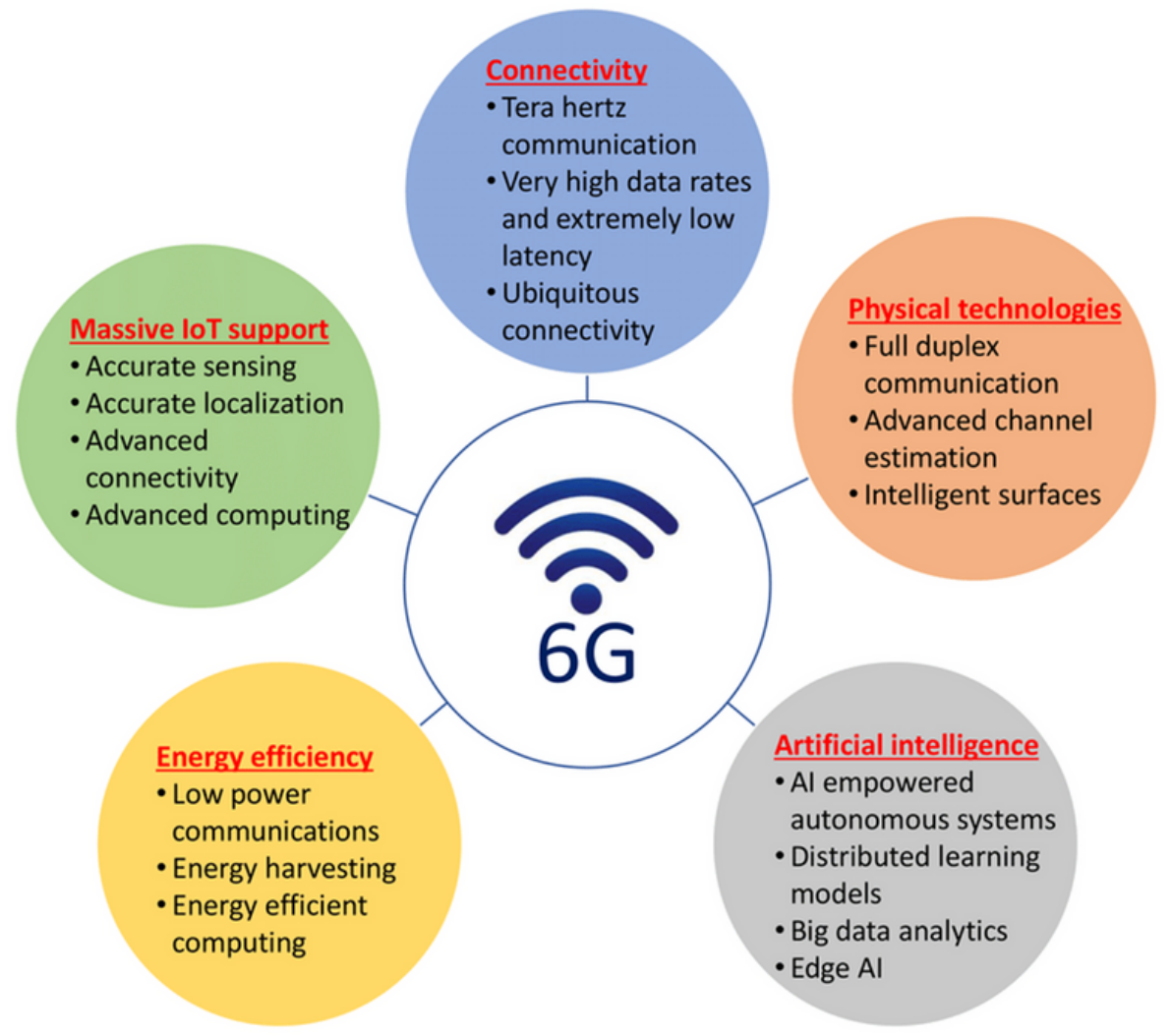
6G is touted to drive the adoption of 5G use cases at scale through optimisations and cost-reduction, especially at the enterprise level.
Take the concept of the metaverse, for example. It is one of the 5G use cases, which promises to disrupt both traditional and digital spaces. With 6G, the metaverse would not just evolve into a final model but is also likely to unify with the physical world with the help of artificial intelligence and machine learning.
This is because the most notable aspect of 6G would be its ability to sense the environment, people and objects.



6G: The network behind the complete metaverse experience



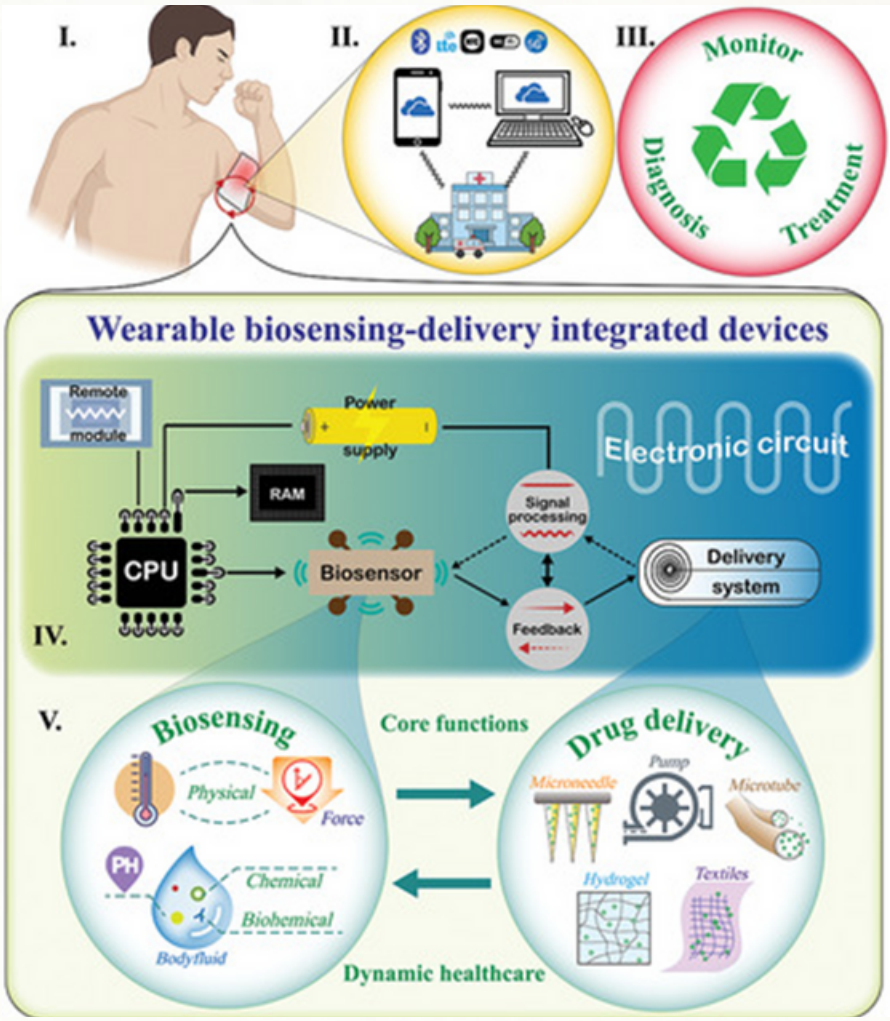
The metaverse I'm talking about is one where the physical, human and digital realities are conjoined. Through extended reality (XR), we can bring the metaverse wherever we go, rather than confine it to our homes and offices. This metaverse will embrace mobility; it will be equally at home in the consumer, enterprise and industrial realms; and it will be built on the foundation of detailed digital twins mirroring our physical surroundings.



Modern society is influenced by intelligent and smart machines. These machines can communicate with each other and with human beings. They can be utilized to help human-being in various aspects of life ranging from medical/e-health, transport, food industry, agriculture, education, etc. In this section,it introduces some of the important use cases of 6G that will utilize the ideas mentioned above.

E-health and Digital/Bio sensing

Recently, a widespread pandemic of coronaviruses, a class of viruses that cause sickness in human and animal species, has emerged as a serious threat to the health and life of mankind. The COVID-19 is linked to the family of Severe Acute Respiratory Syndrome (SARS) which affects the respiratory system of humans and animals . With the growing number of COVID-19 infections, there is a requirement for the development of biosensors that are precise, accurate, sensitive, easy-to-use, and specific to detect and monitor infectious diseases. With the development of 6G, these biosensors can be integrated into the smartphones to give an early warning and control the pandemics.



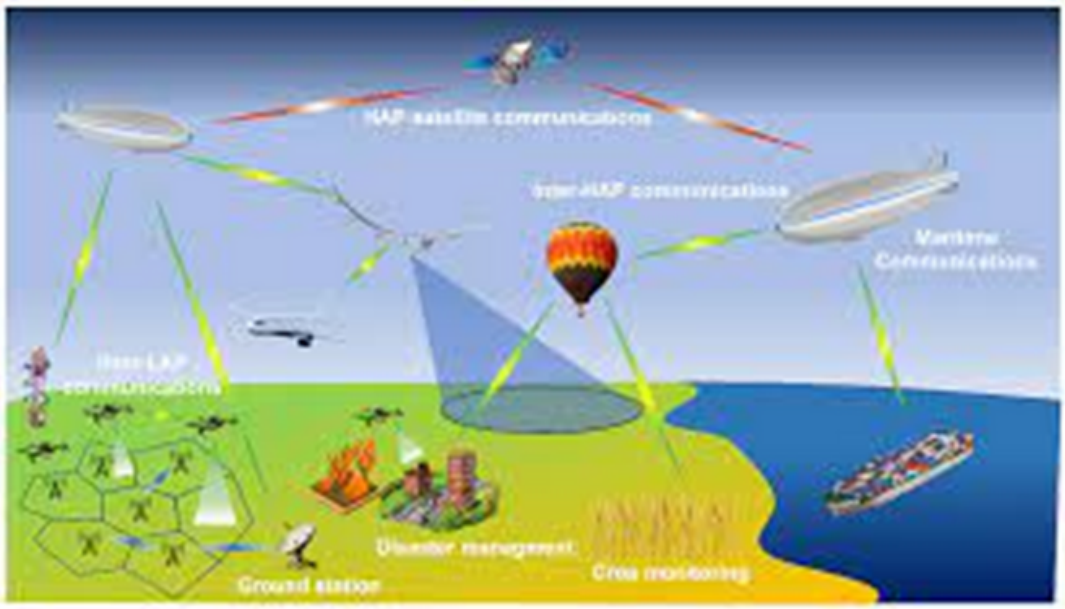
With the integration of QC, ML, and biotechnology, 6G networks can be capable of effectively detecting viral diseases by observing the body temperature of infected individuals efficiently. Optical biosensors may also be used to track the pathological functioning of biorecognition substances, such as antibodies, enzymes, whole cells, and DNAzymes, to better detect multiple diseases . In other areas of electronic health (e-health) such as control of environmental conditions (e.g., temperature, percentage of gases, and light condition), 6G can also be helpful. In various health operations such as emergency care, medical checkups, cleaning contaminated floors, and the supply of medication in rural areas, autonomous robotics can be used.

HolographicTransmission

Holography is a technique for capturing an object's full 3D image. The methodology was suggested in 1947 by Gabor . The term holography derives from the Greek words 'Holo' implies 'complete' and 'graphic' implies 'writing'. An ordinary photograph records the picture's two-dimensional image because it records only the distribution of amplitude or intensity. Therefore, in holography, both the intensity and the phase of light waves are recorded. Physical light effects such as interference, reflection, refraction, and diffraction were recorded in holography, and the archive is called the hologram . It is possible to play each hologram repeatedly. Although a hologram does not have an object resemblance, it has all the object information in optical forms. Just as mobile cameras have replaced still cameras, video calling and video recording, such as movies, will be replaced by holography.

Communication in space and Deep sea

Space tourism has the immense potential for the next decade both in economic and scientific perspective . Humans from every aspect of life will be traveling to space. Several firms are planning to launch sub-orbital commercial flights for space tourism. After some successful and profitable space launches, the next step will be to ensure the availability of space hotels and space hospitals for the customers . Apart from commercial space flights, space research is another potential application .



6G will expand the range of activities throughout the globe with the availability of easy and effective tools of communication. Autonomous and intelligent robots will be placed in the harsh environmental areas for communication and research purposes . The mysteries of the globe could be solved with the aid of the powerful and enormous capabilities of 6G networks. Deep-sea exploration such as oil exploration and mineral exploration can become a reality.

Robotics and Automated vehicles for beyond industry 4.0 era

Industry 4.0 is the term used for the fourth industrial revolution . Industry 4.0 factories have fully automated machines that can self-organize and self-optimize and include processes such as cloud computing, NFV, slicing, and industrial IoT. 6G will bring a new industrial revolution termed as beyond the Industrial 4.0 era.

Robots and fully automated vehicles will take part in the real-time diagnostics, operations, monitoring, and maintenance processes in a very efficient and cost-effective manner. Extremely high reliability and self-organizing feature of automation will come into all aspects of daily life. Swarms of UAVs, through advanced hardware, ML, and QML algorithms, will be used in various operations such as fire control, construction, emergency first response, and agriculture.

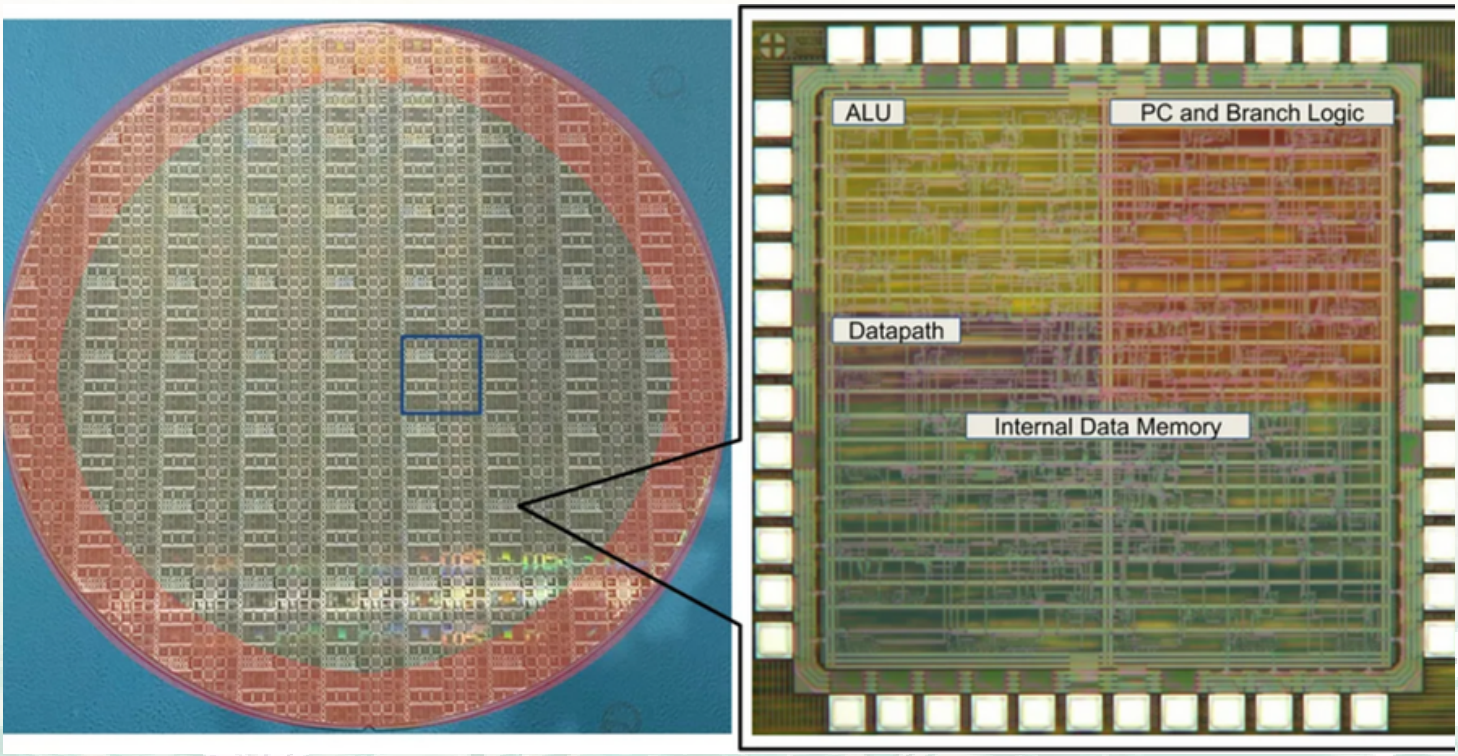
STUDENT ZONE

SIDHARTH A.J
S7 ECE-B

FLEXIBLE PLASTIC MICROPROCESSORS

Researchers from The Grainger College of Engineering at the University of Illinois Urbana-Champaign (UIUC), in collaboration with PragatiC Semiconductor, a flexible electronics manufacturer, have claimed the first commercially viable flexible plastic microprocessors. For less than a penny each, these Flexi Core chips can make low-cost smart consumer products. In addition, the flexible technology enables the chips to meet size constraints in these applications.

Instead of using silicon, the researchers decided to use plastic as the foundation of its chips. The Flexi Cores are built on thin-film transistors (TFTs) made with indium-gallium-zinc oxide (IGZO), a semiconductor material that works even when bent and is compatible with plastic.



The researchers tested the cores at 12.5 kHz at 3 V and 4.5 V. The cores consumed 3.9/4.9 mW on average. The FlexiCore4 and FlexiCore8 cores measure 5.56 mm2 and 6.05 mm2, respectively. Both were tested on wafer and unpackaged.

Application	Sample Rate (Hz)	Prec. (bits)	Duty Cycle Period	Application	Sample Rate (Hz)	Prec. (bits)	Duty Cycle Period
Blood Pressure Sensor [70]	< 100	< 8	Hours [19]	Body Temperature Sensor [70]	< 1	< 8	Minutes [44]
Odor Sensor [70]	16-25	< 8	Minutes [73]	Smart Bandage [65]	< 0.01	< 8	Continuous to Hours [23
Heart Beat Sensor [70]	< 4	1	Seconds [90]	Tremor Sensor [33]	< 25	16	Seconds [20]
Pressure Sensor [31]	1-5.5	12	Continuous to Hours [81]	Oral-Nasal Airflow [70]	< 25	< 8	Seconds
Light Level Sensor [70]	< 1	< 8	Continuous to Hours [22]	Perspiration Sensor [47]	< 25	< 8	Minutes [99]
Trace Metal Sensor [47]	25	16	Minutes	Pedometer [72]	< 25	1	Seconds [72]
Food Temp. Sensor [70]	< 1	< 8	5 minutes [82]	Timer [40]	1	1	Single Use
Alcohol Sensor [48]	1	< 8	Single Use [64]	POS Computation [63]	< 100	< 8	Single Use [63]
Humidity Sensor [34]	10	16	Continuous to Hours [80]	Smart Labels [7]	1	< 8	Seconds
Pseudo-RNG	n/a	< 8	Seconds	Error Detection Coding	< 100	< 8	Continuous to Hours

Example applications and their performance requirements for the Flexi Core flexible plastic microprocessors. Click for a larger image. (Source: University of Illinois Urbana-Champaign)

The unit cost of a processor scales super linearly with the processor's size, and the material cost is directly proportional to processor size, he added. "So larger processors cost more per built processor and require building more processors to meet a production target. This means that to get ultra-low pricing, we need a very small processor, but the processor still needs to be able to support the flexible applications that require computation."

Other prototypes

There are a few competitive flexible plastic microprocessors that have been announced over the past year, including Arm's PlasticArm and IMEC's 8- bit 6052 plastic processors. But there are several key differences among the prototypes.

UIUC's project differs from Arm's work in several fundamental ways: It is truly a microprocessor capable of executing arbitrary programs written in its ISA. We leveraged this fact in our post-silicon testing and validation, where we rigorously tested each chip with >100,000 instructions from directed and randomized tests that exercise every single chip path.

The original MOS 6502 was built on an 8-µm technology [process] node — i.e., 10× bigger than used in these flexible works — but could still operate in the low-megahertz frequency range. Further, MOS 6502 can address 64 KB of memory — ARMv6m can address 4 GB of memory. Despite this, Arm includes only about 128 B of memory in its SoC. In flexible electronics, there is currently no need to be able to address huge (or even paltry) amounts of memory, since only tiny amounts of flexible memory can be built at this time.

While all commercial ARMv6m cores are pipelined, the PlasticArm, like the 6502, uses a multi-cycle design to minimize area — multi-cycle design allows temporal multiplexing of structures. Each instruction takes multiple cycles to execute. This is an acceptable trade off in technologies, like legacy silicon technologies, which are dominated by dynamic power.

But this flexible technology is dominated by static power, meaning increasing the number of cycles per instruction corresponds to doubling, tripling, quadrupling, etc., the energy needed to execute an instruction.

The UIUC team still has work ahead with t key goals: The researchers want to enable full systems that deliver confidential and authenticated communications to/from flexible applications. They also want to develop circuit and micro-architectural power reduction solutions and explore intermittent computing (i.e., computing in the presence of power failures) in the context of flexible electronics.

STAFF ACHIEVEMENTS

Dr. Bobby Mathews C, Professor & Head

Attended a Faculty Development Program(FDP) " Amazon Web Services" organized by AISSMS Institute. of Information Technology (online).

Mr. PRAJEESH P A, Assistant Professor

Attended an International Faculty Development Program (FDP) on "Advanced Research and Quality Publication" from the Faculty Development Program organized by the FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY, Angamaly.

Ms. Divya V Chandran, Assistant Professor

Attended an International Faculty Development Program (FDP) on "Advanced Research and Quality Publication" from the Faculty Development Program organized by the FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY, Angamaly.

Ms. Neetha K, Assistant Professor

Attended an International Faculty Development Program (FDP) on "Advanced Research and Quality Publication" from the Faculty Development Program organized by the FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY,Angamaly.

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