



THE ECE HERALD

Volume: 3

Issue Date: 11/08/2020

Issue: 1



SMARTPHONE PROCESSOR

- B. Y. C Vardhan Kumar (611808)

Hello techies, Have you ever bought a Smartphone for yourself? Obviously yes right, so from the past few years we have been noticing that buying scenario has been completely changed in the mind-set of buyers. Considering the concern of specifications, these days every penny is being spent merely on the processor (Not everyone but technologically versed techies do so). Considering this interest, Let us have a view of tree called processors.

In 1965 Gordon E. Moore (co-founder of INTEL corporation) made an observation that *The number of transistors embedded on a chip exponentially doubles every year* - later it came to be known as Moore's Law. In reality it's been observed that this law has been applied every 18 months. The technology that is prevailing in manufacturing technology is called "Nanometre Technology" (nanometre refers to the 'size of transistor' that is being embedded on to a chip.)

SPECIFICATIONS OF A PROCESSOR:-

The ranking of the mobile processors is to be done based on performance i.e., how efficiently and quickly the operation is being executed. In this context I specify major attributes to rank a processor:

- CPU
- Graphics
- Multimedia(ISP)
- Memory
- Connectivity

□ CPU (CENTRAL PROCESSING UNIT)

The main divisions are:

- **Type:** Describes the Architecture of CPU.
- **Number of Cores:** A core, or CPU core, is the "brain" of a CPU. It receives instructions, and performs calculations, or operations, to satisfy those instructions.
- **Frequency:** It refers to the Instructions performed per second.
- **Instruction Set:** An instruction set (used in what is called ISA or Instruction Set Architecture) is code that the computer processor (CPU) can understand. It contains instructions or tasks that control the movement of bits and bytes within the processor.
- **Cache Memory:** A cache is a smaller, faster memory, located closer to a processor core, which stores copies of the data from frequently used main memory locations. L1-Cache is the

fastest memory in the computer and closest to the processor core.

L2-Cache is a memory bank built into the CPU chip, packaged within the same module or built on the motherboard. The L2 cache feeds the L1 cache, which feeds the processor. L2 memory is slower than L1 memory.

► **Manufacturing Process:** It mainly refers to the size of transistors that are being embedded on.

□ GRAPHICS

A Graphics Processing Unit (GPU) is designed specifically for performing the complex mathematical and geometric calculations that are necessary for graphics rendering. As this is similar to CPU this too has some specifications which are taken into consideration for ranking. These are Architecture

► **GPU clock speed:** GPU clock speed indicates how fast the cores of a graphics processing unit (GPU) are i.e., the higher the GPU clock speed, the faster the processing.

► **Number of ALU's:** A GPU (unlike a CPU, which traditionally has had one execution unit per instruction) has many execution units per instruction. These groups of execution are called warps. GPU don't schedule to individual ALU's, but rather groups of them.

► **Vulkan Version:** The Vulkan API is a low-overhead, explicit, cross-platform graphics API that provides applications direct control over the GPU hence maximizing application performance.

► **OpenCL version:** OpenCL (Open Computing Language) is a framework for writing programs that execute across heterogeneous platforms consisting of CPUs, GPUs, DSPs, FPGAs and other processors or hardware accelerators.

► **DirectX version:** DirectX is an API for creating and managing graphic images and multimedia effects in applications such as games or active web pages that will run in system.

□ MULTIMEDIA

Significant multimedia features in a smartphone are:

► **Neural Processor:** A neural processor or a neural processing unit (NPU) is a specialized circuit that implements all the necessary control

and arithmetic logic necessary to execute machine learning algorithms.

► Display Resolution

► **Video Capture:** Video capture is the process of converting analog video signal to digital data are (referred to as a digital video stream, or simply video stream).

► Video Playback

► **Audio & Video Codecs:** A video codec is software or an electronic circuit that compresses or decompresses digital video. Audio Codec refers to a single device that encodes analog audio as digital signals and decodes digital back into analog.

□ MEMORY

Main attributes are

► Memory type & frequency

► **Bus:** Connects the memory to all other systems.

► **Maximum Band Width:** Bandwidth is the amount of data that can be transferred from one point to another within a network in a specific amount of time. It is measured in bits per second.

► Maximum Size

□ CONNECTIVITY

► **Modem:** Modem is short for "Modulator-Demodulator." It is a hardware component that allows a computer or another device, such as a router or switch, to connect to the Internet. It converts or "modulates" an analog signal from a telephone or cable wire to digital data.

► 4G/5G support

► **Bluetooth:** Bluetooth enables the connectionless or connection-oriented point-to-point transfer of voice and data between various digital devices.

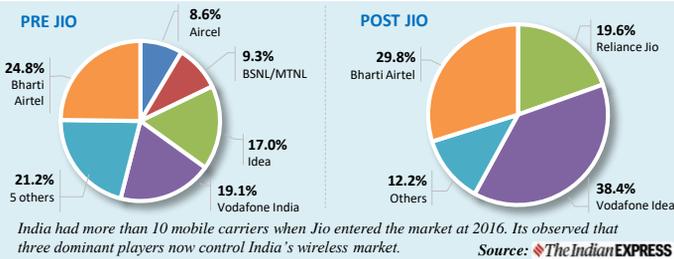
► Navigation features ► Download Speed

Based on above attributes the top 5 grossing smartphone processors are

1. Snapdragon 865+ by QUALCOMM
2. Snapdragon 865 by QUALCOMM
3. A13 Bionic by APPLE
4. Exynos 990 by SAMSUNG
5. Dimensity 1000+ by MEDIATEK

IS RELIANCE JIO ALL SET TO CONQUER INDIA??

-V. V. Anil Kumar Reddy (611780)



As we all know that telecom service is now being ruled by Jio with over 348 million customers at present and has the highest monthly growth rate of 2.49% in comparison to other operators. It has grown its market in different sectors. Now it has its eyes on 5G.

5G networks are cellular networks during which the topographic point is split into small geographical areas called cells. All 5G wireless devices are connected to the web and telephone network by radio waves through an area antenna within the cell.

Once 5G is fully deployed and operational, you'll not need any quite wire or cable to deliver communications to your mobile device, to any of your fixed devices (HDTV, security system, smart appliances), to your automobile. The main advantage of the new networks is that they're going to have

greater bandwidth, giving higher download speeds, eventually up to 10 gigabits per second. The economic benefits from the 5G technology also are quite immense. As per the OECD (Organization for Economic Cooperation and Development) Committee on Digital policy, it's been stated that 5G technologies rollout will help in increasing GDP, creating Employment, Digitizing the economy.

For India, 5G provides a chance for the industry to succeed in bent global markets, and consumers to realize with the economies of scale. Also, Reliance Jio has sought spectrum in certain frequencies from the Department of Telecom for holding trails of the latest 5G technology. On 17th July they have requested for 800MHz of frequencies in the 26GHz and 24GHz band as well as 100 MHz in 3.5 GHz band for running field trials in urban centres like Delhi and Mumbai.

Jio not only confined to developing 5G communication but also has something huge in its mind. With the collaboration big market giants like google, Facebook it has become much stronger. In the company's annual meeting last week, it has announced that it is going to build an Android operating system (OS) to power a low-cost "4G or even 5G" smartphone in collaboration with google. As India is in the process of removing the Chinese products this deal is going to play a crucial role for **Make in India**. Google will invest \$4.5 billion in Reliance's digital which houses telecoms and fibre business as well as music and movie apps. Neeta Ambani came up with a statement that Reliance will ensure that COVID vaccine will be made available to everyone once after its release. Reliance not only winning the digital market race but also the hearts of Indians which is making them a huge power.

GATE PROBLEMS

- 1) A real (4×4) matrix A satisfies the equation $A^2 = I$, where I is the (4×4) identity matrix. The positive eigen value of A is
- 2) A transmission line is feeding 1 W of power to a horn antenna having a gain of 10 dB. The antenna is matched to the transmission line. The total power radiated is
- 3) The capacity of a binary symmetric channel (BSC) with cross-over probability 0.5 is

Editors Note

Hello readers!! Let's start this academic year with a new version of the newsletter which includes many modifications and also welcoming new members to the family. Through this we want to thank each and every member of the newsletter for their contribution and expecting the same enthusiasm for the upcoming days. We hope you will cherish our efforts.

Academic note: For the GATE aspirants eligibility criteria has been modified visit the official website for more details. Firstly, A thought provoking article regarding smartphone processor is drafted. An article about Reliance Jio conquering India through its latest upgradation in telecom industry is written in the newsletter. Secondly, an article regarding the best free cloud storage services is penned. A short note about the latest camera built based on fish eyes is drafted.

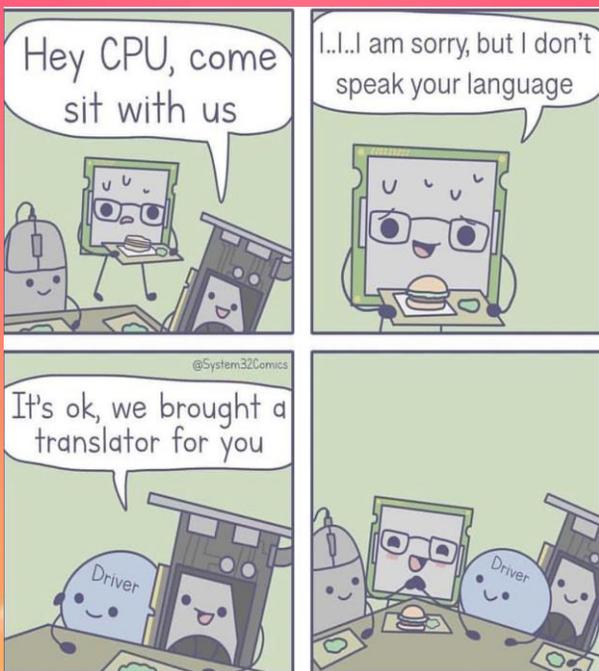
An article about plasma- the mysterious state of matter is been put forward. Some more interesting and creative stuff like gate problems, techtoon, Art works and pic of the month add on its own elegance to the newsletter. Lastly, An article about the Apple's new ARM based processor is penned. All your recommendations will be considered and are always welcomed. We are expecting an enthusiastic contribution to the newsletter, be it an article of your own interest or artworks or any other interesting stuffs.

For any questions, suggestions, ideas, articles or artworks please contact us at theceherald@nitandhra.ac.in

Keep reading and keep contributing!!

Stay safe & Happy reading!!

TECHATOON



BEST FREE CLOUD STORAGE SERVICES

- P. N. S. Meghana(611756)



When you click pictures and record videos on your mobile, those photos or videos take the form of data. Habitually, people stockpile loads of that data that they run out of space or memory on their mobiles and even their personal computers or laptops. That's where cloud storage plays the part.

Using cloud storage, you can upload that data to a third party, which will then host it in the cloud. The "cloud" is in general, a cluster of data centers that could be located anywhere. Those data centers can host far more data than any person could even work out storing locally. Here are the best cloud storage options that let you accumulate the most photos and videos for free



1. Google drive

Google Drive provides a massive 15 GB of free cloud storage just for signing up for a Google account. Google Drive lets you upload, share, and access your files on any device, from all corners of the world.



2. MediaFire

MediaFire allows you store up to 10 GB of any kind of file for free, lets you access the files from anywhere and share them through email, link, or social media.



3. pCloud

pCloud provides 10 GB of free storage and widely used by people working for Nike, Twitter, Coke, and several other high-profile organizations

4. Microsoft OneDrive:

Microsoft provides 5 GB of free cloud storage via its OneDrive Basic plan. The plan offers "a high-speed search" of your files and "supreme web-based features" while accessing your files.



5. Sync.com

Sync.com provides 5 GB of free storage and allows you to access your files from any corner of the world with "end-to-end" safeguarding, using any device.

6. Amazon Drive

Amazon Drive has the best "free" storage option going, but there's a requirement: You have to be a member of Amazon Prime to opt for it. If you are, you can stockpile a countless number of photos and 5 GB of video at no extra cost.



7. Apple iCloud

Apple's iCloud is another free storage option that comes with a requirement. If you own an Apple product and have an Apple ID, you undoubtedly get 5 GB of free cloud space. In the absence of an Apple ID, you can still sign up for 1 GB of free space.

There are numerous services out there that will offer you free cloud storage space for your data. If you take benefit from one or more of these options and use them in a proper way, you can easily come over your storage problems.

QUIZVID'20

1. Who invented Java?
2. Who is known as the Human Computer of India?
3. What is the first web browser invented in 1990?
4. Analytical Engine was invented by ?
5. What is part of a database that holds only one type of information?
6. Who developed Yahoo?
7. The sampling rate, (how many samples per second are stored) for a CD is?
8. In what year was the "@" chosen for its use in e-mail addresses?
9. Where is the headquarters of Intel located?
10. The input used by an antenna or cable to a TV set uses frequencies called?

Answers: 1) James A Gosling 2) Shakuntala Devi 3) Nexus 4) Charles Babbage 5) Field 6) David Filo & Jerry Yang 7) 44.1kHz 8) 1972 9) Santa Clara, California 10) Radio Frequency

CAMERA BUILT BASED ON FISH EYES!!

-G. Thishitha (991107)

Recent advances in the mobile electronics have dramatically increased the demand for the light weight cameras, with a capability of the wide field-of-view (FOV) imaging. In addition, such cameras are extremely important for the next generation mobile devices.

The eyes of aquatic animals attracted our attention, especially fish. Fish eyes have a single lens and a curved retina and are known to have wide angle capabilities. Most fish are also known to have high visual acuity and a deep depth of field, all desired features in an artificial wide-field-of-view camera. Researchers built a core-shell type monocentric lens that had separate refractive indices for the shell and the core.

They built a silicon nano-rod photodiode in hemispherical form which matches the focal plane of the monocentric lens. Now, putting these two parts together and adding an aperture, resulted in a small wide-field-of-vision imaging device. The tests have proved that it has optical characteristics that are comparable to the current cameras. It also has a 120° field of view and depth of field between 20cm and infinity.

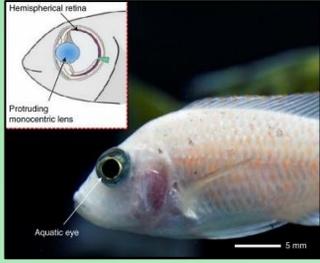


Fig a: An anatomical illustration of aquatic eye

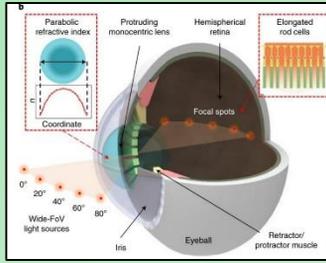


Fig. b: Schematic of the aquatic eye with its key features.

Researchers built a core-shell type monocentric lens that had separate refractive indices for the shell and the core. They built a silicon nano-rod photodiode in hemispherical form which matches the focal plane of the monocentric lens. Now, putting these two parts together and adding an aperture, resulted in a small wide-field-of-vision imaging device. The tests have proved that it has optical characteristics that are comparable to the current cameras. It also has a 120° field of view and depth of field between 20cm and infinity.

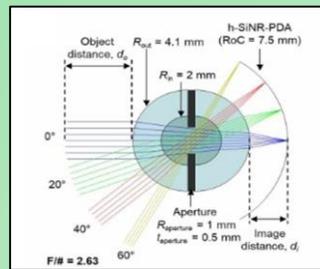


Fig. a: Schematic illustration of monocentric lens

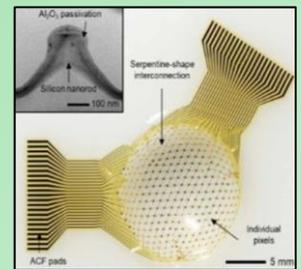


Fig. b: Photograph of a hemispherical silicon nanorod photodiode array

They even took pictures with the camera, capturing images from wide angles at various distances. The fish eye lens camera is used for indoor and outdoor 3D modelling, drones and computer vision applications. The disadvantage of this camera is, it has a strong distortion in the image. This provides much wide-angle view than any other lens and is more beneficial for our security.

These cameras are finding a greater number of applications over the recent years. These are easy to use and are of light weight. They do not require maintenance. As the technology is heading towards development faster, people across the world don't want digital cameras as their mobile phones are equipped with cameras. However, high accuracy must be maintained while designing these cameras. This can be obtained by few logical, mathematical equations and calculations which involves projection of figures. Many experiments, based on the given statements by the researchers, were done to improve the quality of these devices.

The most important term, while designing these cameras and which must be taken into account is the 'focal length' of the lens. Even a slight difference of this measurement may lead to other distractions, which make the camera less useful for other purposes.

This has become a major step towards the development of wide-field-of-view cameras. Smartphone researchers are in their process of finding other new features for this product to make it more beneficial to the people.



'PLASMA'-THE MYSTERIOUS STATE OF MATTER

-Pedada Vaibhav (611868)

-B Sai Teja(611810)

We often study about the three states of matter: solid, liquid and gas found on few planets like Earth, which account for 0.1% of the matter in Universe, then what about the remaining 99.9% of the matter? Well, it is the fourth state - **plasma**.

Plasma is a state of matter which is completely different from the other familiar states. Plasmas have no fixed shape or volume, and are less dense than solids and liquids, as of ordinary gases. But unlike ordinary gases, plasmas are made up of atoms in which few or all of the electrons have been stripped away and positively charged nuclei, called ions, move freely. Hence it is in an ionized state of matter similar to a gas.



Plasma is neutral overall as there are equal amounts of oppositely charged particles, but not at the level of individual particles. Being made of charged particles, plasmas are capable of doing things which gases cannot, like conduct electricity and, since plasma is made up of moving charges, produces magnetic field. That means the electrostatic forces between the particles and the effect of magnetic fields in the plasma become significant at that level.

Since particles in plasma (electrons and ions) can interact via electricity and magnetism, they can do so at far greater distances than an ordinary gas. That in turn means waves become a more important aspect while discussing what goes on in plasma. One such wave is called an Alfvén wave, named after a

Swedish physicist and Nobel laureate Hannes Alfvén. An Alfvén wave is created when the magnetic field in a plasma is disturbed, due to which a wave that travels along the field lines is produced. There's no such phenomenon in ordinary gases.

There is a possibility that Alfvén waves are the reason the temperature of the solar corona- also plasma - is millions of degrees, while on the surface, it is only thousands.

There are some examples where you can see plasmas in action. The Sun is a giant Plasma and stars are also luminous spheres of plasma. The lightning that strikes during the thunderstorm, or the magical phenomenon of the aurora borealis, is also a Plasma. In case of a fluorescent light bulb or neon sign, the gas (neon for signs) is subjected to a high voltage, and the electrons are either separated from the atoms of the gas or pushed into higher energy levels. The gas inside the bulb becomes conductive



The excited electrons that drop back into their previous energy levels emit photons - the light we see in a neon sign or fluorescent lamp. Another one is kind of a more famous example-Plasma TVs. These also work in the same way as of a light bulb. An inert gas (usually argon, neon or xenon) is injected into a sealed gap between two glass panels. An electrical current is passed through the gas, which causes it to glow. The plasma excites red, green and blue phosphors, which combine to emit corresponding colors.

Hence, this might only be the fourth physical state on the earth, but surely the first-Big Boss state.

REFERENCES: click on the following links:-



PICS OF THE MONTH



K. Lalitha - 611739



Revanth - 611704



Sai Anurag - 611773

Apple's venture into ARM based processors

Karisma Panda (611736)

Recently Apple has ratified its headway from Intel-based processors to ARM-based processors across the Mac platform, which will certainly leave its footprint on consumers for the impending years. Needless to say, this year's ARM-powered Mac Book Pro will be the pioneer of a metamorphic plan. But the alteration wouldn't be promptly done. Not only the new Intel-powered machines will remain on sale, but MacOS will be fortifying the older architecture for upcoming years.



Advantages of the changeover

1.The MacBook will become thinner: Although the state-of-the-art MacBook pro will be having a keyboard and screen shrouded in aluminium with a glass trackpad and minimal ports, the ARM-powered MacBook will be having a different blueprint.

Switch to ARM will perhaps serve Apple's inclination for slender and light machines. Similar to iPad and iPad Pro, there will be no need for a fan to help cool the laptop.

The thermal design will still be a salient consideration, but with less heat to draw away from the core, Apple can pack the MacBook board as densely as the iPad Pro board.

2.Performance: The relative performance of the ARM processor compared to the Intel-powered Macs is a big question mark. The focus will be on revamping the performance of raw power and the efficient utilization of battery power.

Perhaps the target will be to reach around twenty hours of battery life while in use keeping the battery size the same. It could stay in the current endurance window and reduce the capacity, which will be a stepping stone in making a thinner and lighter machine. Moreover, they can set their sights on enhancing connectivity, especially LTE.

Long Term Evolution (LTE) ensures the development of a high-performance air interface for cellular mobile communication systems. Many 'Pro' styled Windows 10 machines have cellular connections available. However, we can't find it on MacBook Pro. So the addition of LTE support will make a significant difference.

3.Security: What will be next in the line-up is providing additional security along with improved graphical performance. The ability to run iOS and iPadOS apps directly on the desktop have been their holy grail.

4.Control on the Eco-system of the devices: Apple would perhaps have finer control over the entire Eco-system.

Major apprehensions in this transition

There is a possibility that certain applications would be left behind. Certain software ecosystems such as 3D compositing software, 3D modelling software, professional software for special effects or video compositing seem to be falling apart and the ARM transformation will eventually lead to those apps go away absolutely.

Moreover, the feasibility of AAA games in Macs will diminish with the switch to ARM. The major peril is loading Windows on Mac using Boot Camp might not be an option anymore. If something doesn't work Mac, one could switch to Windows and run applications on full speed. But after moving to ARM this might not be attainable anymore.

Art Works



Sneha(611771)



Meghana(611756)

Maddula Ravi Sai Prakash- 17th August
Kottisa Gayatri Sumam- 17th August
Gudivada Hanuma Naga Sai Sreenivas - 18th August
R. Tejaswi - 25th August

SENDING YOU SMILES FOR EVERY MOMENT OF YOUR SPECIAL DAY

Editors

S. Kartheek (3rd ECE)
 P. N. S. Meghana (3rd ECE)
 Apoorva (2nd ECE)

Designers

Raghavendra (2nd ECE)
 Dileep(2nd ECE)
 Venkateswara Rao (2nd ECE)
 Uma Amrutha Valli(2nd ECE)
 Anuhya(2nd ECE)
 Spandana(2nd ECE)

Herald Team

1) By Cauchy's integral formula, we have

$$\oint_c \frac{f(z)}{(z-z_0)^{n+1}} dz = \frac{2\pi j f^{(n)}(z_0)}{n!}$$

since $f(z)=1$ & $f^{(n)}(z)=0$ at any z_0 , the equation simplifies to

$$\oint \frac{dz}{(z-z_0)^{n+1}} = \frac{2\pi j}{n!} \times 0 = 0$$

2) $A = \begin{bmatrix} 2 & -1 \\ 0 & -4 \end{bmatrix}$, $B = \begin{bmatrix} 3 \\ -1 \end{bmatrix}$, $C = [3 \quad -2]$

$$H(s) = c(sI - A)^{-1} B$$

$$= [3 \quad -2] \begin{bmatrix} s-2 & 1 \\ 0 & s+4 \end{bmatrix}^{-1} \begin{bmatrix} 3 \\ -1 \end{bmatrix}$$

On simplifying $\Rightarrow \frac{11s+35}{(s-2)(s-4)}$

3) $I_s = 10^{-15}$ Amp, $V_{BE} = 0.7$ Volts, $V_T = 25$ mV

$$I_c = I_0 e^{\left(\frac{V_{BE}}{V_T}\right)}, I_E = \frac{\beta+1}{\beta} I_c$$

I_E is maximum for $\beta = 50$

$$I_E = 1.02 \times 10^{-15} \times e^{\left(\frac{700 \times 10^{-3}}{25 \times 10^{-3}}\right)}$$

$$= 1475 \mu\text{Am}$$