SIDDAGANGA INSTITUTE OF TECHNOLOGY

SIGMA

The Newsletter of Department of CSE

-Summing Up Talents

Editorial

To quote an old saying: Time and tide waits for none. Neither thus technology, in todays fast paced world we see new technologies like quantum computing, artificial intelligence,5g networks are already making a dent in the universe. Sometimes a technology that is a boon for any particular issues also turns out to be bane for other situations. But the race of technology is all about solving old problems and in turn creating new ones, hence the cycle goes on.

Talking more about the impact of technology on our lives we can notice the effects that it has on our climate. It's first major impact was in the 1880s during the Second Industrial Revolution also known as the "Technological Revolution" when coal was first used to generate electricity for homes and factories. With new knowledge and discoveries after the 1800s, society is in a much better position to maximize energy production and consumption in an energy efficient manner. Modern planes, cars, trains and ships have made it possible for us to travel all around the world but they also have led to more carbon emissions and ultimately making way for global warming .But, the time is changing also the mindset of people, The people behind today's technological advancements are starting to shift their focus towards stopping global warming in its tracks. With major corporations dedicating funds and resources to solar and wind technology, our society can position itself to reduce global warming.

With the coldest days of the winter season upon us, not all is jolly and bright now that January is coming to an end. Along with the ongoing changes comes in the winter edition of SIGMA 2020, being the official newsletter of CSE department it consist of various sections. With challenging sections such as the crossword and hunting in C/C++ which has been specifically designed to check your technical vocabulary and coding skills, we also bring in the Sci-Fi for the lovers of science fiction and novel readers. The newsletter starts with a cover story on the trending topic quantum computing, it tells us how quantum computing is achieving supremacy in todays world, then comes in the ever interesting Open source section which tells us about the free and open source alternatives of the propriety software that we use in our daily lives. The Do-it-yourself section is specially designed for people with a knack of getting their hands dirty with technology. Almost all agree that some amount of reading is vital to becoming a good reader. The fact that you are paying interest to this newsletter shows that you want to improve and hence we encourage you to solve each and every challenge given in the coming sections and make the most of this edition. Wish you a Happy new year.

-KESHAV MISHRA

Quantum Supremacy: Inception of Quantum Computing

One of the most meaningful "hello world" moment in the process to make Quantum Computing a reality happened when researchers at Google achieved a big breakthrough in this field known as "Quantum Supremacy". This term simply means that they have used a quantum computer to solve a problem that would take a classical computer for a long period of time. In the modern era of fast evolving technologies, quantum computing has the capacity to set its own realm by engulfing all the fundamental techniques that are used in classical computers. The fundamental unit of a classical computer is called a bit, i.e., 0 or 1. In contrast to these computers, Quantum computers use qubits, a qubit can be both 0 and 1 at the same time. Quantum mechanics defines this property of the qubit as superposition. The google team developed a new 54-qubit processor, named "Sycamore", that is comprised of fast, high-fidelity quantum logic gates, in order to perform the benchmark testing. Their machine performed the target computation in 200 seconds, and from measurements, in their experiment they determined that it would take the world's fastest supercomputer 10,000 years to produce similar output.

To understand the ground-breaking concept of Quantum computing we can take an example of 4 bits arranged in every possible way that would produce 16 ways to represent it. We set one of these 16 numbers as the password for a machine, take one number each time and put it in the machine and see which one matches with the machine's password. A normal computer tries each one of these individual numbers and checks which one matches with the password. Now, when we use a quantum computer for this example, we replace these 4 normal bits with the qubits. We put these 4 quantum bits in the machine to get the correct arrangement of bits which matches with the machine's password. The machine will have the correct arrangement and all the wrong answers at the same time because quantum bits are being used. To eliminate all the wrong answers "Grover Operator" can be used and choose the correct arrangement that matches with the machine's password. This method provides a much faster and efficient way to tackle situations like these when compared with the classical methods of computing.

Director : Dr. R. Sumathi
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Although we don't have a practical quantum computer as of yet, still there are many theoretical models proposed in the field of Quantum computing that will completely change our underlying views on nature at the surface level. The properties of quantum mechanics hold huge potential for computing. One such model can be put forward for the google maps which finds the shortest path or the most optimum path among all the possibilities. The current model checks for the best possible route between two destinations one by one which takes a lot of time in computing. With a quantum computer, we can check for the most optimum route at the same time and pick the best one. Imagine the rise of self-driving cars which will have a very fast system and the roads would be traffic free all because of quantum computer's efficiency and speed. Moving towards the field of artificial intelligence, computers don't know the best way to reprogram themselves because they would have to apply the trial and error method for each circuit design inside their system. With a quantum computer, we can check for the possibility of every single circuit design at the same time through which the AI machine finds itself a way to become better every time by itself.

One more potential application of the quantum uncertainty principle can be to make private keys for encrypting messages sent from one place to another. The hackers would face a hard time in hacking these keys because for doing this they would have to break the laws of quantum physics which is not beatable. Quantum computers can be used in the teleportation of information from one place to another without physically transmitting the information. Although this idea might sound a bit of science fiction but it is possible in the real world and several research works are being carried on for this topic. The fluid identities of quantum particles can get entangled across space and time in such a way that if you change one particle, it can impact the other and that creates a channel for teleportation. This could be a part of future quantum internet. Quantum computing can be used to transform healthcare and medicine.

In the analysis of molecules in drug development, exactly describing and calculating all of the quantum properties of all the atoms and molecules is a difficult task computationally. But a quantum computer could do better because it operates using the same quantum properties as the molecules is trying to simulate. In the future, using this technology can treat diseases like Alzheimer's which affects thousands of people.

It's a universal law, everything has its positive as well as negative. And quantum computing is no exception to it. While labs all over the world are racing to create first commercially viable quantum computers, fundamental question remains how it could be misused after its launch. At present, the problem quantum engineer's face is that as the number of qubits and gates increase, so does the error rate. Well, when error rate goes too high they lose their edge over the classical computers. The most crucial one is the error that accumulates in a computation each time the circuit performs a gate operation. By constant modification, the best quantum gates have reduced error rate to 0.5%, there's one error to every 200 operations. So, there are serious problems being faced by all of the different approaches to making superconducting quantum circuits.

Quantum supremacy has been the buzzword for a couple of years now. The anticipation of the onlookers is at the highest. Will a milestone be created? Will it take us to a new era portrayed in scientific fantasy? Can it be used for a real cause like finance, AI? All these are the question that we have been seeking the answer to for so long. Well, the good news is Google has knocked the door of Quantum Supremacy and soon we will have exceptional cutting edge technologies all around us. Technological giants and governments are pushing the frontiers of quantum computing forward, and it's of upmost importance to keep the momentum going on.

- DHIRAJ & PRANJAL

MESSAGE FROM HOD

Views on current technology trends:

Technology is now evolving in exponential manner such that annual predictions of trends will become obsolete before publishing an article. However technology based careers do not change at the same speed & role of IT profession will not be same all the time. My advice to our students who are going to become IT professionals is that stay updated with the current technology trends by your constant learning. It means keep your eyes on the future to know which technology you will need to solve the industry problem.

Placement scenarios and Internships:

As for the placements are concerned, 90% of our students are placed in reputed companies. Also few of our students got placed in core companies such as Cisco, OneDirect, Target Corporation , Shell India and many more with a salary above 10 LPA.

Students carried out their internship at FIU and in industries namely Amazon, CDAC, DRDO, Zscaler, Informatica, CGI, Siemens, Redbus, Aricent, Cisco, JP Morgan and many more with stipend.

Views on sigma :

Sigma Newsletter comprises of various sections which enhances the readers technical knowledge and their communication skills. Students are contributing essential materials and contents to all the sections present in this newsletter. I take this opportunity to congratulate the Sigma Team for working hard to publish the Sigma Newsletter.

Dr. R. Sumathi
(Professor & Head)

SCI-FI

NEURALINK

- SHRUTI & ASHUTOSH

Gilfoyle, a common IT guy had a common 9 to 5 life. He worked in a company which did product testing for its clients. Gilfoyle was approached by neuralink Inc. to test their product "neuralink". This device was a leap into time, its manufacturers called it the ultimate synchronous merge between man and machine. Human cognition has two major systems limbic system where our emotion, needs are processed and then the cortex which provides thinking and planning, neuralink adds a third digital super-intelligence layer augmenting our cells. Until now fingers and speech were two major slow and low band of communication between man and machine. Which seemed to be a bottleneck. Neuralink used a brain-machine interface (BMI). For this Gilfoyle has to go for a brain surgery in which thousands of tiny electrodes with size of a neuron are to be implanted in his brain by robots. Since no one really cares about Gilfoyle he is an expendable member of his team so he goes under this surgery. After 1 day of surgery when Gilfoyle opens his eyes he seems pretty confused as he feels no difference. This means two things either Gilfoyle was super smart prior to the surgery or doctors screwed up somewhere. The doctors came in and gave him a pod(containing an N1 sensor), this pod when attached behind ear, would activate the nuera-net inside his brain. Remove the pod and you are back to normal. Gilfoyle had to test this product for 6 months and provide a feedback. At first he didn't really knew where to use it. He started by trying to control his laptop with his brain. Its was fairly simple and he just had to think what he wanted to do. In next few days Gilfoyle started streaming videos directly to his visionary nerves, granting him access to play videos or even listen to music by just thinking about it. neuralink also had an app store. The games on neuralinkAppStore was something above Virtual Reality and Augmented Reality, it was a real experience. Every punch was felt by the player playing it, every simulation from surfing, skiing to skydiving everything felt real. Being a loner in his life Gilfoyle started to spend more and more time in this next gen neuralink experience.

Neuralink also provided skill upgradation, if anyone didn't know how to cook for 10k USD you could download that skill into your pod and now your brain knows how to make any dish on the planet. Gilfoyle opted for martial arts and within an hour his synch was completed and he knew every move better and any shaolin monk. Gilfoyle started becoming possessed by neuralink. Every day he would think of something out of nothing and learn that skill, from flying a plane to underwater scuba-diving. Gilfoyle learned everything in a week. But still whenever he removed his pod, he used to forget all his skills. Gilfoyle decided not at all to remove it. With his every wish in his hand he was not less than any superhero. His obsession with neuralink was so much that he forgot who he really was and started living his all knowing-all possible personality as his real one. Neuralink also allowed users to buy memories of other people. Which would provide user with same experience. As Gilfoyle had no life he started downloading lives of celebrities, memories of someone marrying their childhood crush. These memories were too strong and more Gilfoyle got involved more he slipped away from reality into his new world with all those synthetic memories and skills. To transfer any data to the brain neuralink would stimulate the electrodes to produce eletrochemical pulse near the synapse, which had it's drawbacks, with more than usual bursts, the prefrontal cortex started to damage neurons permanently. Gilfoyle as being anti social or expendable as much as he could, didn't really cared much about anything. He kept on using it without checks. After few months he slipped into comma. His neurons were destroyed and permanently replaced by electrodes. Now he was dead in outside world but was very much alive in his own world, the world he made inside his brain. Human desires know no limit.

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HUNTING IN C//C++

- PRANAV & DEEKSHA

1.

```
#include <stdio.h>
int main ()
{
    char c=48;
    int i, mask=01;
 for(i=1; i<=5;i++)
    {

printf("%c",c|mask);
    mask=mask<<1;
    }
    printf("\n");
    return 0;
}
```

Output:12480

2.

```
#include <stdio.h>
#include <stdlib.h>
int main()
{

printf("%c\n",~('C'*-1));
    return 0;
}
```

Output : B

3.

```
#include <stdio.h>
#include <string.h>
int main()
{
   char str1[]="Hello";
    char str2[10];
    char *t,*s;
   s=str1;
    t=str2;
    while(*t=*s)
        *t++ = *s++;
    printf("%s\n",str2;
return0 ;

}
```

Output: Hello

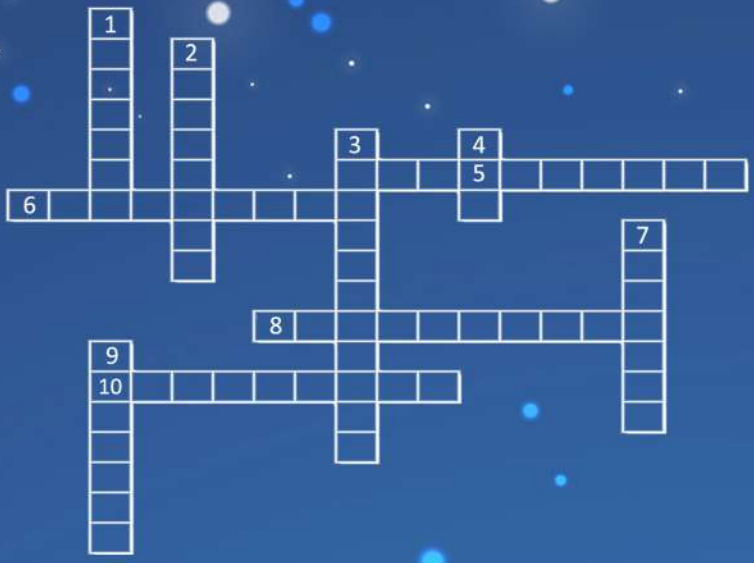
4.

```
#include <stdio.h>
#include <string.h>
int pr(int **ptr)
{
    int b;
    b=**ptr***ptr;
    return(b);
}
int main()
{
    int a=5,*aa;
    aa=&a;
    a=pr(&aa);
    printf("%d\n",a);
    return 0;}
}
```

Output: 25

CROSSWORD

- KASTHURI & SIDDHANT



Across:

5.The first microprocessor.

6.A malicious program for recording computer user keystrokes to steal passwords and other sensitive information.

8.A growing list of records,called blocks,that are linked used cryptography.

10.Web Service used to create and run Virtual machines in the cloud.

Down:

1.Initial Alternative name for Tesla Co.

2.Name of Android's logo.

3.Group of 12 engineers that designed IBM PC were called.

4.Process of increasing the visibility of a webite on a search engine.

7.i stands for in Intel i series processors.

9.A computer program or system intended to distinguish .

ANSWERS:
Across: 5.Intel 4004 6.Keylogger 8.Blockchain 10.AmazonAWS
Down: 1.Faraday 2.Bugdroid 3.DirtyDozens 4.SEO 7.Itanium 9.Captcha

TIPS AND TWEAKS

- MRUNALINI & ANOOP

1. Use Snap Assist for Split-Screen View

To use two windows using a split-screen, drag the first window to either end of your screen. When you release the button of your mouse, the window will automatically get fitted on the one-half of your screen. Then, Snap Assist will show the thumbnails of the other windows which are already open.

2. Shutdown your PC at a certain time

The "shutdown" command can be used with a range of switches to shutdown, reboot and more, including the ability to force applications closed, to display a message on shutdown, and to specify the number of seconds you'd like before the operations happens. Example: shutdown -s -t 3600 would shutdown your PC in one hour.

3. Oops did you accidentally closed a tab you didn't want to?

Press ctrl+shift+T to undo a closed tab. Pressing this key combination more than once will bring back multiple closed tabs. This feature works in all major browsers including Google chrome, Mozilla firefox, Microsoft internet explorer and opera.

4.How to enable WhatsApp fingerprint unlock feature on Android smartphone

Step 1: Open WhatsApp and tap on three dots at the top right corner
Step 2: Settings> Account> Privacy> Fingerprint lock
Step 3: Turn on the toggle for fingerprint lock
Step 4: Verify your fingerprint when prompted
Step 5: You can choose the automatic lock time span from — Immediately, After 1 minute, and After 30 minutes
And that is it. Now your WhatsApp fingerprint lock is activated.

5. If you save your Power point presentation in .pps instead of .ppt, your file automatically goes into slideshow mode when you open it.

6. Too lazy to read an entire article?

To get quick summaries of an article. Get and use the chrome extension TLDR (Too long didn't read) the plugin shows you the gist of article so you can figure it out if you want to read the entire article or not.

7. Saving an Excel file as an .XSLB will shrink the size by half or 75%.

8. Want to access the sites that are blocked by college? Use Google Translate!

Google Translate allows you to translate website content from one language to another but what you might not know is that if you enter the URL of a blocked site on the Google Translate, then click the URL on the right side, the blocked site will be opened with translation language. Then you can click view: Original to retain the original language.

9. Stumped by a math problem?

Get the PhotoMath app and scan the math problem with your phone and the app will solve it for you.

DO IT YOURSELF

TENNIS-AMP

- SVWAROOPANANDA

Materials Required:

1) Sharp Knife
2) Tennis Ball
3) Elastic Vacuum Cap
4) Super Glue

Procedure:

A. Cut a tennis ball into two parts of different sizes by using a sharp knife. If the speakers of your phone or tablet are at the base of the phone use the bigger part.

B. If the speakers of your phone or tablet are at the rear end of the phone use the smaller part.

Speaker at the base of the phone or tablet:

1) Cut a slice through the bigger part of the tennis ball such that your phone or tablet may tightly fit in,
2) Insert the base of your phone through the slit such that only your speakers enter the tennis ball.

Speakers at the rear end of the phone:

1) Create a small hole of the size of your phone/tablet's speaker at the top of the smaller part of the tennis ball.
2) Create the same sized hole at the closed end of an elastic vacuum cap.
3) Attach one end of the vacuum cap to the tennis ball by using super glue.
4) Press the other end of the vacuum cap against the speaker.

Now play any songs or videos and enjoy your very own TennisAMP!

THE DARK WEB

- SHRUTI

What a tangled web we weave, indeed. About 40 percent of the world's population uses the Web for news, entertainment, communication and myriad other purposes. Yet even as more and more people log on, they are actually finding less of the data that's stored online. That's because only a sliver of what we know as the World Wide Web is easily accessible. The internet has, in its storied history, been compared to many things: a river; a superhighway; and, perhaps most famously, a series of tubes. But as it turns out, the most apt comparison of all just might be an iceberg. Like the mighty floes that break off from glaciers, only 4% of the network we call "the internet" is visible to the general public.

Hidden below the virtual waterline lies a tangled and secretive network known as The Dark Web. Unindexed by search engines, and accessible only with special browsers such as The Onion Router (Tor), the Dark Web is made up of peer-to-peer connections, which allow users to share files directly (and secretly). The Dark Web has a strong appeal to privacy advocates, who have taken advantage of the lack of tracking to shield their anonymity from advertisers and officials alike. The secretive nature of the network has made it a haven for criminals of various stripes, trafficking in everything from illegal drugs to stolen credit cards. The Silk Road, an online marketplace driven by internet currency bitcoin, dominated headlines in 2013 when FBI authorities succeeding in shutting it down.

The internet is basically divided into three parts: The Surface Web, The Dark Web, The Deep Web.

The so-called surface Web, which all of us use routinely, consists of data that search engines can find and then offer up in response to your queries. But in the same way that only the tip of an iceberg is visible to observers, a traditional search engine sees only a small amount of the information that's available -- a measly 0.03 percent. As for the rest of it? Well, a lot of it's buried in what's called the Deep Web. The Deep Web (also known as the undernet, invisible Web and hidden Web, among other monikers) consists of data that you won't locate with a simple Google search.

There's a flip side of The Deep Web that's a lot murkier and, sometimes, darker which is why it's also known as The Dark Web. In The Dark Web, users really do intentionally bury data. Often, these parts of the Web are accessible only if you use special browser software that helps to peel away the onion-like layers of the dark Web. The users on the opposite side try to get the personal information about people from their systems which is followed by threatening calls and murder attempts. Smuggling, drug dealing, stealing important data is why The Dark Web is famous for. Many stories of crime have been heard regarding the Dark Web. It's like a real web you can't get rid of. Either you stay there forever, depressed and sick, else you lose your life. It's an online platform for doing crime anonymously. The Dark Web is many times larger than the surface web. However, since more information and sites are always being added, it can be assumed that The Dark Web is growing exponentially at a rate that cannot be quantified.

It is not illegal to just "browse" The Dark Web alone, in theory, unless you are watching at sites that host prohibited content such as child pornography, human trafficking sites. If you do it frequently, then it is. There are also many websites that sell drugs, guns, and stolen goods, but even if you are on such a site, just browsing it is not illegal. Buying something from it, on the other hand, is because you are either intentionally receiving stolen property, or purposely purchasing illegal goods.

However, it's not at all safe to go to the Dark Websites. Either you are naive or a techie, going through the Dark Web is not recommended since the results can be unexpectedly dangerous. On the other hand, some measures can be taken to protect your files/information from being shared on the Dark Web. Following are few of them. While using Internet on your Phone, make sure you're connected to a Secure Network which have a Firewall. Do not download Apps from third party websites, people often download pirated / modded apps instead of buying it from Playstore / iTunes and compromise the security of their personal data. If you're using Windows OS on your Laptop / PC, keep your antimalware programs updated, Prefer Windows Defender (preinstalled AV from Microsoft) than any other AV program.

Regardless of if the Dark Web exists or not, the aforementioned activities still occur. The Dark Web just provides an easy way to connect with people of similar interests, and to facilitate further interaction. Online privacy and security is one of the most important things we often take lightly or aren't aware about the problems and consequences due to ill use of it. On the other side, Internet is full of new things of which we can make a good use of to make this world a better place.

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TEAM WORK

The open Source Section

– EESHAN & AAKASH

TESTDISK & PHOTOREC

PhotoRec is a free and open-source utility software for data recovery with text-based user interface using data carving techniques, designed to recover lost files from various digital camera memory, hard disk and CD-ROM. It can recover the files with more than 480 file extensions (about 300 file families). It is also possible to add custom file signature to detect less known files. PhotoRec does not attempt to write to the damaged media the user is about to recover from. Recovered files are instead written to the directory from which PhotoRec is run, any other directory may be chosen. It can be used for data recovery or in a digital forensics context. PhotoRec is shipped with TestDisk.

TestDisk is powerful free data recovery software! It was primarily designed to help recover lost partitions and/or make non-booting disks bootable again when these symptoms are caused by faulty software: certain types of viruses or human error (such as accidentally deleting a Partition Table). Partition table recovery using TestDisk is really easy.

SEARCH EVERYTHING

Windows' built-in search function doesn't quite cut it. It never has and maybe never will. But that's okay because the plucky devs at voidtools have done something that the presumably very well-paid bunch at Microsoft couldn't: create an incredibly efficient search tool that can find absolutely anything on your PC in seconds.

It builds a database upon your first search, indexing everything to make it accessible moving forward, then filters down results as you type your search query. You can add various conditions to your searches and view results in thumbnails and so on, but for most searches you can just type your query as soon as you open the tool, making it almost as instantaneous as Windows' search function.

RETROARCH

RetroArch is a free, open-source and cross-platform front-end for emulators, game engines, video games, media players and other applications. It is the reference implementation of the libretro API, designed to be fast, lightweight, portable and without dependencies. It is licensed under the GNU GPLv3.

PENCIL

Prototyping is a key part of any project.

Pencil is a GUI open-source prototyping tool that lets you handle prototyping efficiently. It is available on all platforms, including Windows, Linux, and Mac.

It is a desktop tool which means you need to download it to use it. The key features of Pencil include easy GUI prototyping, built-in shape collections, diagram drawing support, output format exporting, link inter-page, and clip arts.

HYPER

Hyper is an interactive command-line interface. It is built on top of the open web standards and is all about speed, stability, and APIs.

It also comes with tons of extensions. Furthermore, you can do keymaps and configure the tool according to the operating system.

BITWARDEN

Bitwarden is a free and open-source password management service that stores sensitive information such as website credentials in an encrypted vault. The Bitwarden platform offers a variety of client applications including a web interface, desktop applications, browser extensions, mobile apps, and a CLI. Bitwarden offers a cloud-hosted service as well as the ability to deploy the solution on-premise.

SLIM

The Slim Framework is a PHP micro framework that helps PHP developers quickly and easily write web applications and APIs. Typically, a micro framework facilitates receiving an HTTP request, routing the HTTP request to an appropriate controller, dispatching the controller, and returning an HTTP response