INFOLINE

DEPARTMENT OF COMPUTER TECHNOLOGY AND INFORMATION TECHNOLOGY

KONGU ARTS AND SCIENCE COLLEGE
(Autonomous)
Affiliated to Bharathiar University, Coimbatore.
Approved by UGC and AICTE and Re-accredited by NAAC
ISO 9001:2015 Certified Institution
Nanjanapuram, Erode – 638 107.

CONTENTS

3D HOLOGRAPHY WITH HIGH-PERFORMANCE COMPUTERS

Japanese computer scientists have succeeded in developing a special purpose computer that can project high-quality three-dimensional (3D) holography as a video. The research team led by Tomoyoshi Ito, who is a professor at the Institute for Global Prominent Research, Chiba University, has been working to increase the speed of the holographic projections by developing new hardware.

Holography has a long history. Since 1960 when the first laser was invented, many works involving laser holograms have been produced. For digitalizing these analog technologies and developing electron holography techniques to project 3D holography images as video, computing powers with more than 10 frames per second and 1 trillion pixels per frame are required.

Therefore, hardware development, as well as corresponding software development, represents some of the biggest challenges for researchers in this field.

Also, to make a 3D object from two-dimensional (2D) data, it is necessary to properly consider several factors including the binocular parallax, motion parallax, convergence angle, focus adjustment, and estimates made based on human experience. Currently, general 3D televisions (TVs) use the binocular parallax for the stereoscopy, but children cannot use this technology because it has the potential to damage their health, a risk that is related to the difference between the distances that a brain perceives and those that the eyes' focus on. Many researchers in various countries around the world, including Ito in Japan, have been investing in video holography, which may allow more people to enjoy 3D TVs safely. Tomoyoshi Ito, who is an astronomer and a computer scientist, began working on specially designed computers for holography, called HORN, in 1992. The HORN-8, which adopts a calculation method called the "amplitude type" for adjusting the intensity of light, was recognized as the world's fastest computer for holography in a publication in the international science journal Nature Electronics on April 17, 2018.

With the newly developed "phase type" HORN-8, the calculation method for adjusting the phase of light was implemented and the

researchers were successful at projecting holography information as a 3D video with high-quality images. This research was published in Optics Express on September 28, 2018.

Takashi Nishitsuji, a former student of Ito's lab and now assistant professor at Tokyo Metropolitan University, who led the experiment, said "HORN-8 is the fruit of many people's wisdom, skills, and efforts. We want to continue the research of HORN and try other methods from various perspectives for its practical application."

In the latest phase type of HORN-8, eight chips are mounted on the FPGA (Field Programmable Gate Array) board. This enables one to avoid a bottleneck problem for the processing speed with the calculation method, by which the chips are prevented from communicating with each other. With this approach, HORN-8 increases the computing speed in proportion to the number of chips, so that it can project video holography more clearly.

SRIDHARSHINI R K
III B.Sc. (Information Technology)

AMBIDEXTROUS ROBOTS COULD DRAMATICALLY SPEED E-COMMERCE

E-commerce continues to expand and achieve new levels during the recent holiday season. To rapidly fulfill the enormous volume and variety of orders, companies such as Amazon, Walmart, and Alibaba are investing heavily in new warehouses. To address the shortage of workers, many companies are considering robots. However, reliably grasping a diverse range of products remains a Grand Challenge for robotics.

"Any single gripper cannot handle all objects," said Jeff Mahler, a postdoctoral researcher at UC Berkeley. "For example, a suction cup cannot create a seal on porous objects such as clothing and parallel-jaw grippers may not be able to reach both sides of some tools and toys." Mahler works in the lab of Ken Goldberg, a UC Berkeley professor with joint appointments in the Department of Electrical Engineering and Computer Sciences and the Department of Industrial Engineering and Operations Research.

The robotic systems used in most e-commerce fulfilment centres rely on suction grippers which can limit the range of objects they can grasp. The UC Berkeley paper introduces an "ambidextrous" approach that is compatible with a variety of gripper types. The approach is based on a common "reward function" for each gripper type that quantifies the probability that each gripper will succeed. This allows the system to rapidly decide which gripper to use for each situation. To effectively compute a reward function for each gripper type, the paper describes a process for learning reward functions by training on large synthetic datasets rapidly generated using structured domain randomization and analytic models of sensors and the physics and geometry of each gripper.

When the researchers trained reward functions for a parallel-jaw gripper and a suction cup gripper on a two-armed robot, they found that their system cleared bins with up to 25 previously unseen objects at a rate of over 300 picks per hour with 95 percent reliability.

G.LOKESHWAR
III B.Sc. (Information Technology)

KEY ADVANCE FOR FUTURE TOPOLOGICAL TRANSISTORS
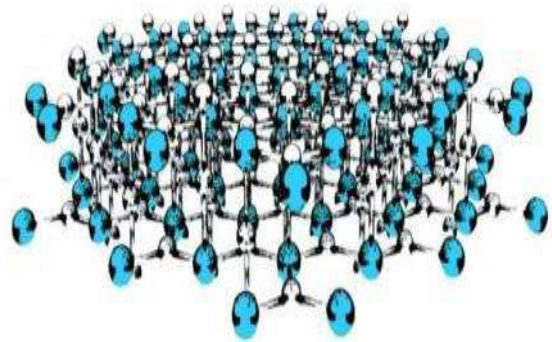
Over the last decade, there has been much excitement about the discovery, recognised by the Nobel Prize in Physics. Only two years ago, there were two types of insulators: normal insulators which do not conduct electricity, and topological insulators newly discovered materials that conduct electricity only on their edges.

FLEET researchers at Monash University, Australia, have for the first time successfully 'switched' a material between these two states of matter via application of an electric-field. This is the first step in creating a functioning topological transistor a proposed new generation of ultra-low energy electronic devices.

Ultra-low energy electronics such as topological transistors would allow computing to continue to grow, without being limited by available energy as we near the end of achievable improvements in traditional, silicon-based."Ultra-low energy topological electronics

are a potential answer to the increasing challenge of energy wasted in modern computing," explains study author Professor Michael Fuhrer.

Information and Communications Technology (ICT) already consumes 8% of global electricity, and that is doubling every decade. This new study is a major advance towards that goal of a functioning topological transistor.

<div align="right">

S.AISWARYA

II B.Sc. (Computer Technology)

</div>

---

7 SURPRISING FACTS ABOUT GOOGLE

FACT 01

When you perform a Google search, the machine checks the Google index to determine the relevant search results to be displayed to you. The search engine considers 200 factors before displaying you the best results for your query. Google uses a special algorithm called the Googlebot to generate search results. Somemes, the results are rather surprising.

FACT 02

Google owns a cluster of domains such as Google.com, Gogle.com and Googlr.com which directs to Google.com which is completely reasonable. However, Google also owns 466453.com. If you take a look at your telephone keypad, you will notice that the numbers match up to the leers as so: 4 - GHI, 6 – MNO, 6 – MNO, 4 – GHI, 5 – JKL. 3 – DEF, thus making 466453 as Google. So, if on typing any of these knowingly or unknowingly, it doesn't take you to some strange page. Instead, you'll land up on Google.com only.

FACT 03

When Google was founded in September 1998, it served ten thousand search queries per day. Currently, there are more than 2 million Google searches per second. The search engine finds a trillion unique URL's on the web. Crawls many billion sites a day and processes numerous searches every month.

FACT 04

Google takes on the best projects that could change the world for millions of people. In 2012, Google introduced the Cherokee language in Gmail, which is the first Nave American Tribal language added to its list. As part of this effort, Google also added Cherokee to its recently launched virtual keyboards for Gmail.

FACT 05

On August 30, 1998 the concept of the Google Doodle was formed when company co-founders Larry Page and Sergey Brin placed a

simple figure drawing behind the second "o" in the word "Google". To notify the Google users that the founders were "out of once" at the Burning Man festival in the Nevada desert they made the first Google logo art.

FACT 06

Google's search index is so huge (100 million gigabytes) in size that it would require about 100,000 one-terabyte personal drives to store the same amount of data.

FACT 07

The only company with a clear goal to reduce the amount of me people spend on its site might be Google. Google engineers are encouraged to spend about 20 percent of their work on projects that interest them using a policy called as Innovation Time O .

ArcGIS

ArcGIS is a geographic information system (GIS) for working with maps and geographic information. It is used for making use of maps; compiling the geographic data; analyzing the mapped information sharing and discovering geographical information using maps and geographical information in a variety of range of applications; and managing geographical information in a database. The system provides infrastructure for making maps and geographical information available within an organization, across a community, and freely on the Web.

➤ ArcReader, which allows one to view and query maps created using other ArcGIS products.

➤ ArcGIS for Desktop, which is licensed under three functionality levels.

➤ ArcGIS for Desktop Basic (formerly known as ArcView), this tool allows a person to view spaal data, create layered maps, and perform basic spaal analysis.

➤ ArcGIS for Desktop Standard (formerly known as ArcEditor), which in addition to the functionality of ArcView, includes advanced tools to manipulate shape files and geo-databases.

➤ ArcGIS for Desktop Advanced (formerly known as ArcInfo), which includes capabilities for manipulation of data, editing, and analysis.
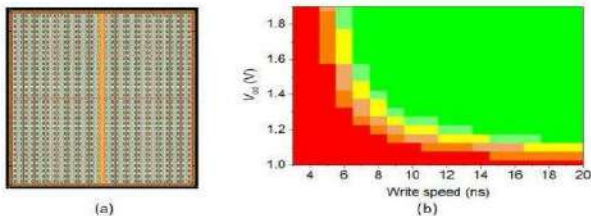
Key features:
➤ Conduct Spaal Analysis
➤ Manage Your Data More Efficiently
➤ Explore a World of Content
➤ Automate Advanced Workflows
➤ Easily Create Maps
➤ Start Geocoding

KEERTHANA R
III B.Sc. (Computer Technology)

128MB STT-MRAM WITH WORLD'S FASTEST WRITE SPEED FOR EMBEDDED MEMORY

(a)

(b)

STT-MRAM is capable of high-speed operation and consumes very little power as it retains data even when the power is off. Because of these features, STT-MRAM is gaining traction as the next-generation technology for applications such as embedded memory, main memory and logic. Three large semiconductor fabrication plants have announced that risk mass-production will begin in 2018.

As memory is a vital component of computer systems, handheld devices and storage, its performance and reliability are of great importance for green energy solutions.

The current capacity of STT-MRAM is ranged between 8Mb-40Mb. But to make STT-MRAM more practical, it is necessary to increase the memory density. The team at the Center for Innovative Integrated Electronic Systems (CIES) has increased the memory density of STT-MRAM by intensively developing STT-MRAMs in which magnetic tunnel junctions (MTJs) are integrated with CMOS. This will significantly reduce the power-consumption of embedded memory such as cache and eFlash memory.

MTJs were miniaturized through a series of process developments. To reduce the memory size needed for higher-density STT-MRAM, the MTJs were formed directly on via holes -- small openings that allow a conductive connection between the different layers of a semiconductor device. By using the reduced size memory cell, the research group has designed 128Mb-density STT-MRAM and fabricated a chip.

In the fabricated chip, the researchers measured a write speed of subarray. As a result, high-speed operation with 14ns was demonstrated at a low power supply voltage of 1.2 V. To date, this is the fastest write speed operation in an STT-MRAM chip with a density over 100Mb in the world.

VARSHA R
II B.Sc. (Information Technology)

A NEW METHOD TO DETECT FALSE DATA INJECTION (FDI) ATTACKS
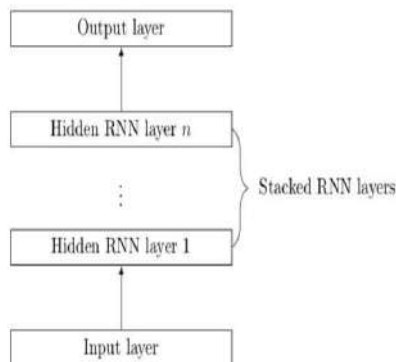
Researchers at Beijing Institute of Technology (BIT) have recently developed a new method to detect the false data injection (FDI) attacks on critical infrastructure such as power grids. Their solution, outlined in a paper presented at the 44th Annual Conference of the IEEE Industrial Electronics Society, uses a recurrent neural network (RNN) with several hidden layers, which is harder for FDI attacks to fool.

Cyber attacks on cyber physical systems (CPSs), particularly on infrastructure such as power grids, can cause significant chaos and disturbance for the people living in affected areas. For instance, in December 2015, the hack of a power grid in Ukraine affected over 230,000 people, leaving them without electricity for several hours.

While there are several existing methods to prevent cyber attacks, one particular type of attack, called false data injection (FDI), can bypass all conventional surveillance and security techniques. When successful, FDI attacks allow the attacker to compromise measurements from grid sensors, hindering a power grid's normal functioning and sometimes even damaging devices connected to it.

In recent years, researchers have been trying to develop effective tools to detect FDI attacks to prevent them from causing serious infrastructural disruptions. Many of these recently developed methods employ machine learning techniques, such as supervised and semi-supervised learning algorithms.

Despite the promising results achieved by some of these approaches, most of them have a variety of flaws and limitations. For instance, some of these algorithms are prone to vulnerabilities exploited by variants of FDI attacks, while others cannot be effectively trained due to the limited amount of data related to real-world compromised measurements.

Recent studies have found that RNNs can be particularly effective for time-series forecasting and anomaly detection, thus they could help to detect cyber-attacks. These prior findings are what encouraged Deng and Sun to develop an RNN that can detect FDI attacks.

The RNN proposed by the researchers does not require labelled data to function and

this makes it easier to apply in real-world scenarios. In an evaluation on the IEEE-14 bus test system, it attained remarkable results, effectively identifying compromised measurements with a small false alarm rate (FAR).

In the future, the RNN developed by Deng and Sun could help to detect FDI attacks on power grids and other critical infrastructure, preventing resulting issues, commotion and inconvenience. Further research could help to further develop the system, so it can achieve higher precision rates and a lower FAR.

VARSHA R
II B.Sc. (Information Technology)

BLOCKCHAINS IN REAL TIME
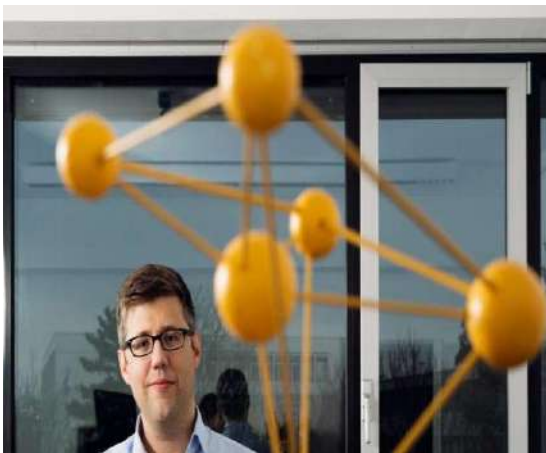
Blockchains promise widescale open Internet applications that are organised decentrally, but this comes at the price of slow performance for every transaction processed by the system. Cryptography researchers working with Professor Sebastian Faust have achieved global awareness with their approach to facilitating real-time transactions using blockchains such as Ethereum.

Paying by credit card is a quick process: the money transfer is completed only a few seconds after customers place a card in a reader or enter their details online. This process enables a centrally organised company such as Visa to handle over 50,000 transactions per second at peak times. Using a cryptocurrency such as Bitcoin where transactions are processed locally via a blockchain, a maximum of seven transactions can be processed per second, a tremendous difference that greatly hinders applicability of the technology. Even worse, it can also take several minutes to process a single transaction. These drawbacks do not only apply to Bitcoin. Even more complex applications that are processed using smart contracts over Ethereum are expensive and slow as well.

Yet the blockchain is designed for just these cases. Any user can upload and distribute something via a blockchain, and anyone can become part of it. It is decentralised, neutral and effectively the perfect combination of intermediary and judge – but it is also slow. To interact with it inexpensively and in real-time – that is the vision of Sebastian Faust, Professor of Applied Cryptography, and his team. The challenge is that the increase of performance must not be at the expense of safety. The research is part of the Collaborative Research

Centre CROSSING, which is supported by the German Research Foundation.

A blockchain is a chain of blocks that contains the state of the decentralized system. In case of a currency such as Bitcoin, this would be payment transactions: who is paying whom and how much. Each block also contains a so-called hash of all the data in the block, a kind of fingerprint of the data. If any of the data is changed, this changes the hash value. Furthermore, each block contains a cryptographic hash of the previous block. This results in a linked chain. A new Bitcoin block is created by a network participant – known as a miner – on average every ten minutes. This block is then checked by all the other participants and accepted as a new block in the chain if all the transactions and calculations are correct. This makes the block part of the blockchain, based on which all the miners attempt to find the next block. If the block is incorrect it is ignored. A transaction in a block is only accepted if it has been published in the blockchain and ideally confirmed by several blocks, usually six. This prevents an attacker from being able to publish incorrect transactions or blocks. While this process offers strong security guarantees one of its main shortcomings is that users may have to wait up to 60 minutes for confirmation of new transactions.

S.AISWARYA

II B.Sc. (Computer Technology)

MATHEMATICAL SOLVER FOR ANALOG COMPUTERS

Your computer performs most tasks well. For word processing, certain computations, graphic arts and web surfing, the digital box on your desk is the best tool for the job. But the way your computer works, with its style of mathematics that relies on the binary code system of "on" and "off" 1s and 0s, isn't ideal for solving every problem.

That's why researchers such as Zoltán Toroczkai, a professor in the Department of Physics and concurrent professor in the Department of Computer Science and Engineering at the University of Notre Dame, are interested in reviving analog computing at a time when digital computing has reached its maximum potential.

Toroczkai and collaborators have been working toward developing a novel mathematical approach that will help advance computation beyond the digital framework. His most recent paper, published in Nature Communications, describes a new mathematical, analog "solver" that can potentially find the best solution to NP-hard problems.

NP-hardness is a theory of computational complexity with problems that are famous for their difficulty. When the number of variables is large, problems

associated with scheduling, protein folding, bioinformatics, medical imaging and many other areas are nearly unsolvable with known methods. After testing their new method on a variety of NP-hard problems, the researchers concluded their solver has the potential to lead to better, and possibly faster, solutions than can be computed digitally.

Analog computers were used to predict tides from the early to mid-20th century, guide weapons on battleships and launch NASA's first rockets into space. They first used gears and vacuum tubes, and later, transistors, that could be configured to solve problems with a range of variables. They perform mathematical functions directly. For instance, to add 5 and 9, analog computers add voltages that correspond to those numbers, and then instantly obtain the correct answer. However, analog computers were cumbersome and prone to "noise" disturbances in the signals and were difficult to re-configure to solve different problems, so they fell out of favor.

Digital computers emerged after transistors and integrated circuits were reliably mass produced, and for many tasks they are accurate and sufficiently flexible. Computer algorithms, in the form of software, are sets of instructions that tell the computer hardware how to perform. Because the process is restricted to the use of 0s and 1s, this also makes their programming simpler, and allowed digital computing to dominate for nearly 70 years.

However, their restrictions may prevent digital computers from solving NP-hard problems with many variables. One such problem is the "Travelling Salesman" problem, in which a salesperson must start in one city and return to that city at the end of a trip, but in between, must travel to all the different cities on a list. What's the most efficient route among all the points? The problem becomes exponentially more challenging with the addition of more cities. The difficulty with such optimization problems, Toroczkai noted, is "while you can always come up with some answer, you cannot determine if it's optimal. Determining that there isn't a better solution is just as hard as the problem itself."

A challenge for analog computing rests with the design of continuous algorithms. Unlike digital computing, which has a long history in algorithm development, algorithms for analog computers lack a similar knowledge base and thus are very difficult to design. Toroczkai's approach is different from the types of algorithms for digital computers, in all aspects.

The next step is to design and build devices based on this approach, a process that will be tackled within Notre Dame's College of Engineering. The analog computers would be built for specific tasks and not for everyday

computing needs. This work is part of a larger-scale, multi-institutional effort called Extremely Energy Efficient Collective Electronics (EXCEL), led by Notre Dame's Suman Datta, Freimann Chair of Engineering and professor of electrical engineering, in collaboration with Sharon Hu, professor of computer science and engineering.

"There are mostly engineering problems that need to be solved at this point, such as spurious capacities and better noise control, but it's going to get there," Toroczkai said. "Ideally I would like to see that you have this box on your desk that is your scheduler. And it is going to do much better of a job than your regular computer."

<div align="right">

SELVA BHARATHI A
II B.Sc. (Computer Technology)

</div>

MICROSOFT NEW INTELLIGENT SECURITY INNOVATIONS

Securing a new generation of connected devices: announcing Azure Sphere

Microsoft is harnessing the power of the intelligent cloud to address emerging threats against a new class of connected devices those relying on a chip the size of a thumbnail called a microcontroller unit (MCU). MCU-powered devices are already the most populous area of computing with roughly 9 billion new devices every year. They are found in everything from toys and household appliances to industrial equipment and attackers are starting to target them. To bring security to this next generation of connected devices, Microsoft is introducing Azure Sphere, the industry's first holistic platform for creating highly secured, connected MCU devices on the intelligent edge. Featuring an entirely new class of MCUs with more than five times the power of legacy MCUs, an OS custom built for IoT security, and a turnkey cloud security service that guards every Azure Sphere device. With Azure Sphere, Microsoft extends the boundaries of the intelligent edge, to power and secure an entirely new category of devices.

Microsoft 365 Intelligent Security Solutions: Simplifying Security

As security threats become more complex, companies are increasingly finding that the intelligence and threat protection tools they need to remain a step ahead of attackers are in the cloud. Today, Microsoft introduced several new intelligent security features for its Microsoft 365 commercial cloud offering designed to help IT and security professionals simplify how they manage security across their enterprises:

Advanced tools that make it easier to prevent threats before they happen

- To help teams stay prepared and ahead of threats, Microsoft today released Microsoft Secure Score and Attack Simulator. Secure Score makes it easier for organizations to determine which controls to enable to help protect users, data and devices by quickly assessing readiness and providing an overall security benchmark score. It will also let organizations compare their results to those with similar profiles using built-in machine learning. Attack Simulator, a part of Office 365 Threat Intelligence, lets security teams run simulated attacks including mock ransomware and phishing campaigns to event-test their employees' responses and tune configurations accordingly.

Automated threat detection and remediation to free up security operations teams

- With the latest Windows 10 update, now in preview, Windows Defender Advanced Threat Protection (ATP) works across other parts of Microsoft 365 to include threat protection and remediation spanning Office 365, Windows and Azure. Also available today in preview, and with the upcoming Windows 10 update, are new automated investigation and remediation capabilities in Windows Defender ATP, leveraging artificial intelligence and machine learning to quickly detect and respond to threats on endpoints, within seconds, at scale.

- Conditional Access provides real-time risk assessments to help ensure that access to sensitive data is appropriately controlled, without getting in the way of users' productivity. Microsoft 365 is now adding the device risk level set by Windows Defender ATP to Conditional Access in preview to help ensure that compromised devices can't access sensitive business data.

Stronger partnerships to give customers more integrated solutions

- The intelligence data used to quickly detect and respond to threats improves as more relevant signals are added. Machine learning tools are only as good as the data they receive. Microsoft's security products are informed by the trillions of diverse signals feeding into the Microsoft Intelligent Security Graph. Today, Microsoft announced a preview of a new security API for connecting Microsoft Intelligent Security Graph-enabled products as well as intelligence from solutions built by customers and technology partners to greatly enhance the fidelity of intelligence.

Most security tools report an attack from a single limited perspective, offering insight into one piece of a potentially larger threat. By connecting individual tools to the Intelligent Security Graph, security teams get new perspectives and more meaningful patterns of data to speed up threat investigation and remediation. The new API is in early testing with a select group of cybersecurity industry leaders that are collaborating with Microsoft to shape its development. The group, which includes Anomaly, Palo Alto Networks and PwC, joined Microsoft today to share their own early exploration of the API and how it may improve each company's ability to protect their mutual customers.

- Microsoft also is announcing a new Microsoft Intelligent Security Association for security technology partners so they can benefit from, and contribute to, the Intelligent Security Graph and Microsoft security products. Members of the association will be able to create more integrated solutions for customers that provide greater protection and detect attacks more quickly. Palo Alto Networks and Anomali join PwC and other existing partners as founding members of the new association.

Microsoft is partnering with customers through their digital transformation by making it easier for them to help keep assets secure from the cloud to the edge.

SINDUJA T
II B.Sc. (Computer Technology)

NEW TECHNIQUE IMPROVES ACCURACY OF COMPUTER VISION TECHNOLOGIES

Researchers from North Carolina State University have developed a new technique that improves the ability of computer vision technologies to better identify and separate objects in an image, a process called segmentation. Image processing and computer vision are important for multiple applications, from autonomous vehicles to detecting anomalies in medical imaging.

Computer vision technologies use algorithms to segment, or outline the objects, in an image. For instance, separating the outline of a pedestrian against the backdrop of a busy street. These algorithms rely on defined parameters programmed values to segment images. For example, if there is a shift in color that crosses a specific threshold, a computer vision program will interpret it as a dividing line between two objects. And that specific threshold is one of the algorithm's parameters.

But there's a challenge here. Even small changes in a parameter can lead to very

different computer vision results. For example, if a person crossing the street walks in and out of shady areas, that would affect the color a computer sees and the computer may then "see" the person disappearing and reappearing, or interpret the person and the shadow as a single, large object such as a car.

"Some algorithm parameters may work better than others in any given set of circumstances, and we wanted to know how to combine multiple parameters and algorithms to create better image segmentation by computer vision programs," says Edgar Lobaton, an assistant professor of electrical and computer engineering at NC State and senior author of a paper on the work.

Lobaton and Ph.D. student Qian Ge developed a technique that compiles segmentation data from multiple algorithms and aggregates them, creating a new version of the image. This new image is then segmented again, based on how persistent any given segment is across all of the original input algorithms.

J.JANSI RANI
III B.Sc. (Computer Technology)

## BIOMETRICS TECHNOLOGY AND ITS SCOPE IN FUTURE

The term Biometrics is a combination of two words- bio i.e. life and metrics i.e. measurement. It refers to the metrics related to the human characteristics, particularly the physical and behavioural aspects. The technology is implemented to measure and statistically analyse people's biological information mainly for their identification, access control or surveillance. Every individual is unique and carries a separate identity in the form of traits like fingerprints, hand geometry, iris recognition, voice, etc.

Biometric verification is gaining a lot of popularity among the public security systems as well as in the commercial market. In our daily life, we witness the use of biometric in so many places such as the digital attendance system at offices, security checkpoints at airports, wearable tech gadgets retrieving our biological information, and even our national ID cards aka Aadhaar cards are created using biometrics technology. In fact, this national ID program holds the largest biometric database in the world.
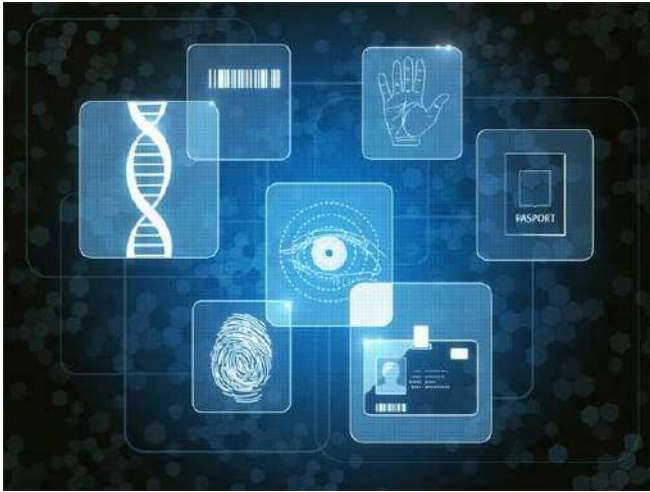
In order to undertake biometric authentication, there are several methods of collecting the data. Each of these methods has its own importance whether performed separately or combined with other forms of data collection. Interestingly, some forms of biometric authentication can be performed even without the knowledge of the subject under surveillance.

• Face Recognition
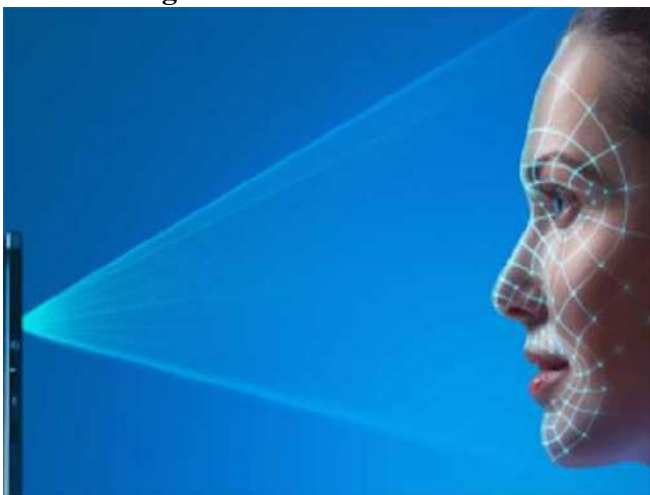
This system works by analyzing specific features of the individuals through a digital camera. These characteristics include information like the distance between eyes, the position of cheekbones, jaw line, chin, the width of the nose, etc. The data is gathered in the form of numerical quantities and then combined in a single code which is then used to uniquely identify each individual.

• Fingerprint

Fingerprint identification refers to the procedure of comparing the pattern of ridges, furrows and minutiae points of the fingers. It has been reported that after comparing the database of fingerprints collected in more than 140 years, no two fingerprints were found to be the same, not even for the identical twins.

• Hand Geometry Biometrics

Hand geometry readers measure the user's hands along with many dimensions and they are compared to the measurements stored in a file. Since this method is not as unique as fingerprints or other similar methods, it's not preferred at places with a large population or with high-security applications. Rather it is suitable to be used alongside other forms of biometrics or for simple applications like attendance operations.

• Retinal Scan

It's a biometric technique that analyses unique patterns on an individual's retina blood vessels. In this method, a beam of infrared light is cast into the person's eye when he looks through the scanner. As the retinal blood

vessels readily absorb light, the amount of reflection varies. It is then digitized and stored in the database.

• Iris Recognition

In this method of biometric identification, mathematical pattern-recognition techniques are used on the video images of the individual's irises. It utilises video camera technology with subtle near-infrared illumination to capture the intricate structures of the iris. Then these patterns are subject to mathematical and statistical algorithms to encode digital templates for the identification of the individuals.

• Signature

Signature recognition is a form of behavioural biometric which digitizes the signatures of individuals for identification and authentication purpose. It is performed in two ways. In the first one, the signature is taken on paper and then digitized through an optical scanner and then the signature is analysed through its shape. The second way is to take signatures on tablets which acquire information in real-time.

• Voice Analysis

It's the study of speech sounds for purposes like speech recognition. Such studies involve medical analysis of the voice along with speaker identification. Much like face recognition, it offers a way to authenticate the identity of the subject without his/her knowledge.

Applications of Biometrics

The applications of biometrics can be divided into three categories:

• Commercial: It includes applications like computer network login, e-commerce, ATM/credit cards, PDA, etc.

• Government: It includes applications such as driver's license, border control, passports, nation ID cards, etc.

• Forensic: It encompasses activities like corpse identification, terrorist identification, identifying missing children, criminal investigation, etc.

The most common applications of biometrics are described in the list below -:

Logical Access Control

It refers to granting access to a computer network either at a workstation or remotely from a distant location. The conventional methods of getting registered through usernames and passwords can be easily hacked or manipulated. So, to avoid the growing number of cyber crimes, the method

has been replaced with two modalities namely fingerprint and iris recognition.

Either these devices are connected to the workstations through USB or the sensor is embedded into the device itself. The method is quick and there is no fear of data getting stolen or hacked. Referred as Single Sign On Solutions, totally eliminates the financial expenses of password resets.

Physical Access Entry

It refers to giving an employee the access to an office building for a secure entry. Earlier, keys and badges were given to individuals followed by the smart cards. However, these can be easily replicated, lost or stolen. So, in order to resolve such issues, fingerprint recognition accompanied by hand geometry scanning act as Multimodal Biometric solution. In such methods, the biometrics is hardwired to an electromagnetic lock strike.

Time and Attendance

All kinds of businesse irrespective of the industry need to keep a track of the employees as to how much time they are contributing to the organisation so that they are paid accordingly. Following the traditional methods can lead to a lot of data manipulation. In such a situation, hand geometry along with fingerprint recognition are the most commonly used methods. Besides, Vein Pattern Recognition and Iris Recognition are also gaining popularity owing to their non-contactless nature.

Law Enforcement

All the law enforcement agencies across all levels of Federal Government use biometric technology to identify the suspects. The most traditional method used for this purpose is the Fingerprint Recognition, but nowadays facial and vein pattern recognition methods are also being used in the market.

The fingerprint of the suspect is taken and run through a massive database known as Automated Fingerprint Identification System aka AFIS. This system has now been replaced with Integrated Automated Fingerprint Identification System. It offers the following advantages:

• The results from criminal searches can be sent to the concerned law enforcement agency within 24 hours.

• Latent fingerprint images collected from crime scenes are stored into IAFIS databases.

• Highly digitized criminal photographs can be obtained upon request anytime.

• These databases also support remote connectivity in a way that the law enforcement officers can connect to the required database through a secured Wi-Fi connection.

Surveillance

Surveillance is basically keeping an eye on a large group of people through devices from an established baseline so as to determine any kind of abnormal behaviour. The most common technique used for this purpose is the facial recognition. This modality can be easily and secretly deployed through CCTV cameras and it's largely followed by a lot of places. It

offers a great chance of identifying a suspect or criminal in heavily crowded areas.

The techniques used for surveillance where people know that they are being watched or it can be covert where they have no clue that their activities are being recorded. The latter method usually utilizes facial recognition technique for authentication and identification of individuals.

Latest Biometric Market Trends

• Smartphones

The smartphone market is one of the most potential spaces for biometrics applications. Right from unlocking the phone through fingerprint recognition to the use of voice recognition and face recognition, a smartphone is highly integrated with biometrics. It not only eases the operation but also increases security and safety of your data.

• E-Commerce

With the rise of e-commerce, people are undoubtedly very happy to avail the facility of online shopping but the online payment methods are often subject to a lot of threat. So it is being proposed that instead of accessing the user account through credentials, the use of fingerprints, iris, and facial recognition can go a long way in ensuring a secure login. Moreover, it will save the store managers from numerous queries every time a customer forgets his/her account.

• Cloud-based Biometrics

Cloud computing is gaining a lot of popularity in the corporate world irrespective of the size and nature of business. This is because it offers a highly convenient, secure and mass storage space for all the valuable data. However, there is still a need to ensure security which can be done by deploying biometrics possibilities like smart spaces, access control applications, ambient intelligent environments.

MOHANRAJ E

III B.Sc. (Information Technology)

COGNITIVE NETWORKING
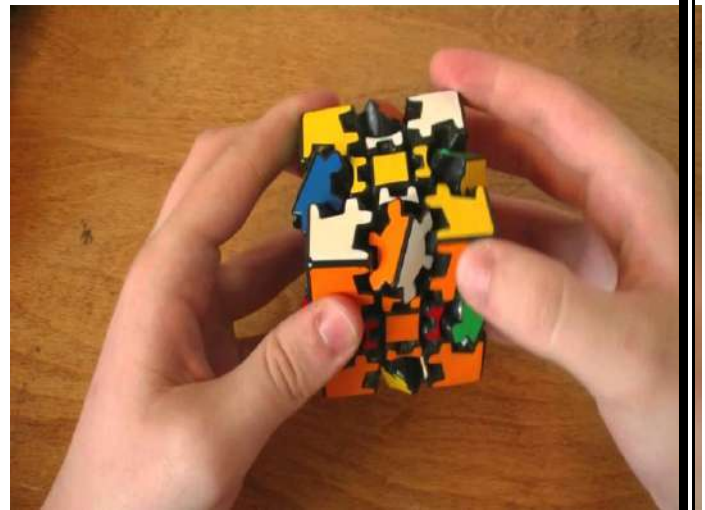
Essentially a type of data network, cognitive networks have grown to prominence in recent years for its extensive use in communication networks. This networking technique combines cutting-edge technologies from different research areas, viz., computer network, network management, machine learning, and knowledge representation, to address issues current networks are facing.

Cognitive networks employ a cognitive process that can not only perceive current network conditions, but also plan, decide, and act on those conditions. Besides, this kind of networks learns from the consequences of its actions, while following the end-to-end goals. The loop, also known as the cognition loop can sense the environment and plan actions, based on the inputs obtained from sensors and network policies.

There are limitations to the present technology used for data networking.

Limitations surrounding response, state, and scope mechanism are the chief networking concerns which bother users. These limitations may lead to incapability of network elements such as nodes, protocol layers, and policies. Cognitive Networking plays a crucial role here by replacing conventional networks with modern and intelligent ways of communication, information, and learning.

The concept of cognitive networking grew out of research conducted in cognitive radios which combines intelligent, or cognitive processing with a platform. Besides, sensing the radio environment, the platform reflects ability to react and change its configuration.

Advantages of Cognitive Networking

Cognitive networking technique can be applied across any type of network– fixed or wireless, thus offering better protection against security attacks and network intruders. Essentially, this technique proves useful for both service operators and customers.

Such networks can adapt their operational parameters to respond to user's needs, or to address changing environmental conditions. Moreover, they can learn from these adaptations, and exploit the knowledge obtained to execute decisions in future. Cognitive networking gives devices the ability to transmit more data, while reducing energy consumption, and efficiently using available bandwidth.

With the passage of time, researchers are stumbling upon many possible civilian and commercial applications of flexible and adaptable networks. Cognitive Networking is the future, allowing users to focus on core activities, while all the network configuration and management is automated. The space will witness huge competition in the years to come, as companies like Google among others are exploring the ideas of integrating intelligence or learning system in networks.

Undoubtedly, cognitive networking proposes numerous advantages over conventional networks. However, there are few challenges which must be addressed before we realize comprehensive benefits of implementing the technology. System stability, resilience, correctness, and robustness are some of the existing challenges enterprises are striving to address. The characteristic ability of cognitive networks to adapt easily to environmental changes will not only provide

consistency, but also help in maintaining optimality of the system.

Additionally, enterprises find it a challenging job to combine cognitive networking with "Internet of Things." Connecting networks wirelessly to electronics and software, without using human interaction can be utilized to power several smart applications, such as networking air and water quality monitors, tracking devices' energy consumption, and optimizing the operation of next-generation "smart grid" electricity systems.

Another primary concern perturbing researchers is the need to address security and privacy. These intelligent networks will be able to make decisions on their own, and connect to whatever network they see fit. This could result in compromise of personal or sensitive information. Thus, security surfaces as a chief concern that needs to be addressed before we implement such networks comprehensively.

Most importantly, cognitive networks must undergo laborious and careful engineering to assure the system's validity, consistency, and correctness from the time of its development, until operation and removal. Monitoring is also a chief aspect about cognitive networking, and is performed to ensure that the system functions properly.

**Enabling the vision for a Cognitive Network**

The software defined networks existing today allow network links at layer 2 or layer 3 to be configured on the fly through human intervention, or by using software through an API. Through cognitive networking, AI will be easily able to recognize the network state and usage patterns. This will enable easy reconfiguration of such networks.

The intelligence associated with Cognitive Networking will assist towards predicting and optimizing data transfer. This transfer will consider aspects such as historical information, quality of service, needs of users, and the current state of the network. Furthermore, recommendations about optical network configurations can also be furnished to the user.

KARTHIKEYAN S
III B.Sc. (Computer Technology)

PROGRESSIVE WEB APP
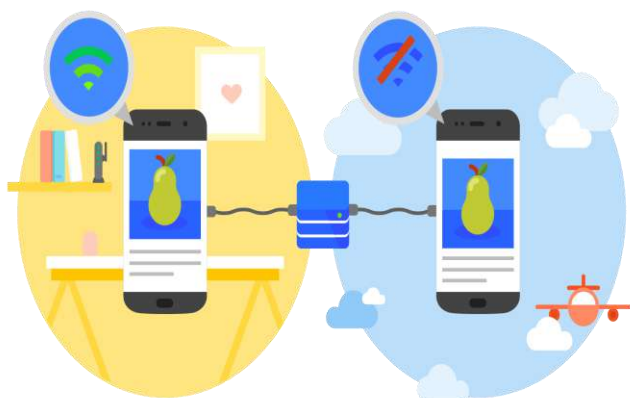
Progressive web app (PWA) would be another emerging software development trend in 2018. In the past year, you have seen a solid growth of progressive web-based applications, so there is no reason to think that this will going to change in 2018 and in the upcoming years. Progressive web apps are the utmost way for app developers by which they can make their web apps load faster and more performance. Basically, a PWA is a web application that can easily be installed on your devices. They work comfortably offline and thus, you don't need a stable internet connection to use these apps. You can easily develop progressive web apps without any hassle and their maintenance is also easier as compared to the native applications. They contain the best features of the web and mobile apps. They make use of the vast web ecosystem, plugins and community. So, you can expect that in upcoming years,

progressive web-based applications will be able to establish their presence firmly in the market.

Progressive Web Apps are user experiences that have the reach of the web, and are:

Reliable

When launched from the user's home screen, service workers enable a Progressive Web App to load instantly, regardless of the network state.

A service worker, written in JavaScript, is like a client-side proxy and puts you in control of the cache and how to respond to resource requests. By pre-caching key resources you can eliminate the dependence on the network, ensuring an instant and reliable experience for your users.

Engaging

Progressive Web Apps are installable and live on the user's home screen without the need for an app store. They offer an immersive full screen experience with help from a web app manifest file and can even re-engage users with web push notifications.

SURESHKUMAR K
I B.Sc. (Computer Technology)

RIDDLES

1.How can you add eight 8's to get the number 1,000? (only use addition)

Answer: The key to this math riddle is realizing that the one place must be zero. $888 + 88 + 8 + 8 + 8 = 1,000$

2. I come in square package, but i'am round. I contain lots of information for your computer. Handle me carefully. what am i?

Answer: compact disc

3. A merchant can place 8 large boxes or 10 small boxes into a carton for shipping. In one shipment, he sent a total of 96 boxes. If there are more large boxes than small boxes, how many cartons did he ship?

Answer:

11 cartons total
7 large boxes (7 * 8 = 56 boxes)
4 small boxes (4 10 = 40 boxes
11 total cartons and 96 boxes

4. Take the given words, and by moving a single letter from one word to the other, make a pair of synonyms, or near synonyms. For example, given: Boast - Hip, move the 's' from 'Boast' to 'Hip' creating two synonyms: Boat - Ship.

1. Burn - Bead
2. Rid - Tripe
3. Grove - Rout
4. Charm - Rush
5. Cream – Sweep

Answer:

1. Bun - Bread
2. Ride - Trip
3. Groove - Rut
4. Harm - Crush
5. Scream – Weep

5. Slice the six 3-letter words in Group A into individual letters. Then create three 6-letter words for Group B. Each of the Group B words is constructed by splicing one letter from each of the Group A words together. The letters can be spliced in whatever order necessary to create a word in the English language. Each letter from Group A can only be used one time. The Group B words share a common characteristic. One letter of each Group B word is provided.
Group A: GEM, GET, PEN, PER, PUN, RIG
Group B: G*****, *E****, ***M**

Answer

The Group B words are spices. GINGER, PEPPER, NUTMEG

KRISHNAKUMAR K

I B.Sc. (Information Technology)

"It is Important to Follow Your Dreams and Heart Do Something that Excites You".

-Sundar Pichai.