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1

Cyber Physical System

Introduction:

The transformation of physical infrastructures into more smarter and intelligent ones have been fuelled by rapid research and development in cyberphysical systems (CPS) and Industry 4.0. The Smart Grid (SG), smart transportation, mobile health and smart manufacturing are a few of the areas that have already witnessed this transformation. CPS involves the networking of cyber components with the objects in physical realm thus provides and greater adaptability, flexibility, robustness, reliability, safety and efficiency.



Our main contribution in this paper are as follows: The need for securing the CPS has been meticulously explored by careful and diligent study of more than 100 research papers. A comprehensive analysis of various attacks namely data integrity attack, delay attack, intrusion attack, replay attack and sensor and actuator attack has been presented. Since attack models play a vital role in understanding the characteristics, intensity and detection of faults, a thorough analysis on various approaches required to model and detect the attacks that commonly affect CPS has been carried out. Since CPS has pervaded into a very wide spectrum of applications, the broad purview of the various security scenarios has been presented. This throws open a plethora of research challenges that are yet to be explored.

Modelling CPS security attacks:

Attack modelling is imperative as it helps in understanding the type of attack mechanism, its behaviour, the intensity and extent of attack, and so on, thus preventing detection after the damage.

A comprehensive survey on the developments and challenges involved in modelling and control of CPSs that are prone to cyberattacks was presented by Mahmoud et al. They discussed about the existing models of DoS, deception and replay attacks on a CPS. They presented the different ways of filtering and controlling CPS when subjected to these attacks. The CPS attacks modelling approaches can be classified into cryptography-based approaches, mathematical approaches which includes probabilistic, statistical and optimisationbased approaches, control system-based approaches and other approaches like game theory-based models etc.

Mathematical approaches:

The mathematical approaches include various stochastic, probabilistic and statistical approaches to model various security attacks in CPS. Ding et al. Presented an exhaustive survey on security issues and detection for industrial CPS. The studied the various system models of CPSs in terms of distributed parameter systems, hybrid systems and Markovian decision process. They also analysed the DoS, replay and detection attacks on the CPS. They used robustness, security and resilience as performance metrics. They examined the various attack detection mechanisms including Bayesian detection, weighted least squares approach, chisquare detection and quasi-fault detection and isolation approaches. They also reviewed various security control methods and state estimation techniques applicable to industrial CPS.

Cryptography-based approach:

Zhou al et proposed а cryptography-based logarithmic encryption scheme using Fibonacci Q-matrix for CPSs . The proposed lightweight scheme was suitable for resource constrained CPSs and was validated both theoretically and practically. Nguyen et al. Conducted systematic mapping study on model-based security engineering for CPSs. Prathiba and Bhaaskaran proposed the footprints of S-box symmetric block ciphers in especially for information security in IoT and CPS..

Data integrity attacks:

Attacks on Supervisory control and Data Acquisition (SCADA) control system include internal and external threats. Depending on the resources available with the attackers, attacks can also be classified as intelligent attacks and brute-force attacks. Table 4 presents a summary of the data integrity attacks on CPS.

CPS security scenarios:

In this section, the various security scenarios of CPS in Smart Grid networks, communication networks, medical, vehicular and robotic system have been discussed in detail.

Smart Grid security

Smart grids heavily rely on the associated cyber infrastructure to be benefitted with improved monitoring and control. Due to this, the Cyber Physical Energy System (CPES) is subjected to cyberattacks which are targeting critical application software of the power system and causing malfunctioning or black-out of power grids. Protecting CPES's cyber infrastructure against cyberattack is a great challenge. Cyber events that disturb the entire power grid operation are classified as events affecting physical equipment, communication channels, application routines and the data.





What is computer forensics?

Computer forensics is the application of investigation and analysis techniques to gather and preserve evidence from a particular computing device in a way that is suitable for presentation in a court of law. The goal of computer forensics is to perform a structured investigation and maintain a documented chain of evidence to find out exactly what happened on a computing device and who was responsible for it.

Computer forensics -- which is sometimes referred to as computer forensic science -- essentially is data recovery with legal compliance guidelines to make the information admissible in legal proceedings. The terms digital forensics and cyber forensics are often used as synonyms for computer forensics.

Digital forensics starts with the collection of information in a way that maintains its integrity. Investigators then analyse the data or system to determine if it was changed, how it was changed and who made the changes.



Types of computer forensics:

There are various types of computer forensic examinations. Each deals with a specific aspect of information technology. Some of the main types include the following:

♦ Database forensics:

The examination of information contained in databases, both data and related metadata.

Email forensics:

The recovery and analysis of emails and other information contained in email platforms, such as schedules and contacts.

Solution Malware forensics:

Sifting through code to identify possible malicious programs and analysing their payload. Such programs may include Trojanhorses, ransomware or various viruses.

Solution Memory forensics:

Collecting information stored in a computer's random access memory (RAM) and cache.

Solution Mobile forensics:

The examination of mobile devices to retrieve and analyse the information they contain, including contacts, incoming and outgoing text messages, pictures and video files.

4

Network forensics:

Looking for evidence by monitoring network traffic, using tools such as a firewall or intrusion detection system.

Techniques forensic investigators use :

Investigators use a variety of and proprietary forensic techniques applications to examine the copy they've made of a compromised device. They search hidden folders and unallocated disk space for copies of deleted, encrypted or damaged files. Any evidence found on the digital copy is carefully documented in a finding report and verified with the original device in preparation for legal involve proceedings that discovery, depositions or actual litigation .:



Reverse steganography:

Steganography is a common tactic used to hide data inside any type of digital file, message or data stream. Computer forensic experts reverse a steganography attempt by analyzing the data hashing that the file in question contains. If a cybercriminal hides important information inside an image or other digital file, it may look the same before and after to the untrained eye, but the underlying hash or string of data that represents the image will change.

♦ Stochastic forensics:

Here, investigators analyze and reconstruct digital activity without the use of digital artifacts. Artifacts are unintended alterations of data that occur from digital processes. Artifacts include clues related to a digital crime, such as changes to file attributes during data theft. Stochastic forensics is frequently used in data breach investigations where the attacker is thought to be an insider, who might not leave behind digital artifacts.

✤ Cross-drive analysis:

This technique correlates and crossreferences information found on multiple computer drives to search for, analyze and preserve information relevant to an investigation. Events that raise suspicion are compared with information on other drives to look for similarities and provide context. This is also known as anomaly detection.

✤ Live analysis:

With this technique, a computer is analysed from within the OS while the computer or device is running, using system tools on the computer. The analysis looks at volatile data, which is often stored in cache or RAM. Many tools used to extract volatile data require the computer in to be in a forensic lab to maintain the legitimacy of a chain of evidence.



Artificial intelligence (AI) is firstly an academic discipline with various, often conflicting, views on what constitutes its area of research, as well as goals and used. approaches including logical, knowledge-based approach, on one hand, and machine learning approach, on the other. When probabilistic systems were plagued by theoretical and practical problems of data acquisition and representation.



Knowledge-based approach prevailed and artificial neural networks research had been abandoned by AI and continued outside the AI, as "connectionism", by researchers from other disciplines including Hopfield, Rumelhart, and Hinton.

By lay persons, however, the term is mostly used to mean AI applications, such as advanced web search engines (e.g., Google Search recommendation systems (used by YouTube, Amazon, and Netflix), understanding human speech (such s Siri and Alexa), self-driving Cars (e.g., Waymo), generative or creative tools(ChatGPT and AI art), and competing at the highest level in strategic game systems (such as chess and Go).

Artificial intelligence was founded as an academic discipline in 1956, and in the years since it has experienced several waves of optimism, followed bv disappointment and the loss of funding (known as an "AI winter"), followed by new approaches, success, and renewed funding. AI research has tried and discarded many different approaches, including simulating the brain, modeling human problem solving, formal logic, large databases of knowledge, and imitating animal behavior. In the first decades of the 21st century, highly and mathematical statistical machine learning has dominated the field, and this technique has proved highly successful, helping to solve many challenging problems throughout industry and academia.



Why is artificial intelligence important?

AI is important for its potential to change how we live, work and play. It has been effectively used in business to automate tasks done by humans, including customer service work, lead generation, fraud detection and quality control. In a number of areas.



AI can perform tasks much better than humans. Particularly when it comes to repetitive, detail-oriented tasks, such as analyzing large numbers of legal documents to ensure relevant fields are filled in properly, AI tools often complete jobs quickly and with relatively few errors. Because of the massive data sets it can process, The rapidly expanding population of generative AI tools will be important in ranging fields from education and marketing to product design.

How does AI work?

As the hype around AI has accelerated, vendors have been scrambling to promote how their products and services use it. Often, what they refer to as AI is simply a component of the technology, such as machine learning. AI requires a foundation of specialized hardware and software for writing and training machine learning algorithms. No single programming language is synonymous with AI, but Python, R, Java, C++ and Julia have features popular with AI developments.



What are the uses of artificial intelligence?

AI is important for its potential to change how we live, work and play. It has been effectively used in business to automate tasks done by humans, including customer service work, lead generation, fraud detection and quality control. In a number of areas, AI can perform tasks much better than humans.

Artificial Intelligence Is a system that enables a machine to think and act like a human. The first Artificial Intelligence was designed in 1955 by Simon and Newell. A machine with artificial intelligence can determine the cause of action. It can also react accordingly or as commanded by the user.



Future In The Field Of IT. Digital Inclusion and Accessibility:

What is digital inclusion?

Digital inclusion is the capability of individuals or groups to enjoy the benefits of being online and use technology confidently to improve their day-to-day lives. Those who lack this capability are considered "digitally excluded" .Digitally excluded people miss out on the social and economic benefits the internet provides. To combat exclusion, and create a more inclusive community, three elements must be addressed:

- 1. Access the availability of the internet and connected devices.
- 2. Affordability the financial means to get online.
- Digital Ability confidence to use the internet safely. By making the to use it we can bridge the digital



Divide and empower every individual to feel included online.

The importance of digital inclusion:

Digital is unavoidable in our daily lives.



A quick Uber ride across town, a healthy dinner prepared using a recipe you found online, an email exchange with an old friend or claiming money back from Medicare online. These little interactions make a real difference to how we function in today's society. But to digitally excluded individuals – the challenges these online tools alleviate (like basic transportation and social interaction) can become major obstacles to overcome.

In fact, a report by **Carnegie Trust** concluded that loneliness, depression and economic deprivation were significantly higher among the digitally excluded. Access to information: Digital inclusion provides individuals with access to vast amounts of information available online.



Economic opportunities: Digital inclusion opens up a wide range of economic opportunities. It enables individuals to search for jobs online, access remote work options, and participate in the digital economy.

Communication and social connections: Digital inclusion facilitates communication and social connections, especially for individuals who may be geographically isolated or have limited physical mobility.

Access to services: Digital inclusion enables individuals to access essential services conveniently.

Education and skill development:

Digital inclusion plays a vital role in education and skill development. It provides opportunities for online learning, e-learning platforms, and digital resources, making education more accessible and flexible. **Inequality:** Digital inclusion can exacerbate existing inequalities. Those who lack access to digital technologies or have limited digital literacy skills may find themselves left behind, widening the digital divide.

Cost: Digital inclusion often requires access to internet services, computers, smart phones, and other digital devices.

Technological barriers: Not everyone is comfortable or proficient with digital technologies. Elderly individuals, people with disabilities, or those from disadvantaged backgrounds may face challenges in adapting to and effectively utilizing digital tools.

Privacy and security concerns: Increased digital inclusion means more personal information is shared and stored online.

Environmental impact: The rapid expansion of digital technologies and the internet can contribute to increased energy



ROBOTS,

What is robotic process automation (RPA)?

Robotic process automation (RPA) software .also known as robotics. uses automation technologies to mimic back-office tasks of human workers, such as extracting data, filling in forms, moving files, et cetera. It combines APIs and user interface (UI) interactions to integrate and perform repetitive tasks between enterprise productivity applications. and By deploying scripts which emulate human processes, RPA tools complete autonomous execution of various activities and transactions across unrelated software systems.

This form of automation uses rulebased software to perform business process activities at a high-volume, freeing up human resources to prioritize more complex tasks. RPA enables CIOs and other decision makers to accelerate their digital transformation efforts and generate a higher return on investment (ROI) from their staff.



According to Forrester, RPA software tools must include the following core capabilities:

- Low-code capabilities to build automation scripts.
- Integration with enterprise applications
- Orchestration and administration including configuration, monitoring and security

Automation technology, like RPA, can also access information through legacy integrating well with other systems, applications through front-end integrations. This allows the automation platform to behave similarly to a human worker, performing routine tasks, such as logging in and copying and pasting from one system to another. While back-end connections to databases and enterprise web services also assist in automation, RPA's real value is in its quick and simple front-end integrations.

Benefits of RPA: There are multiple benefits of RPA, including:

Less coding:

RPA does not necessarily require a developer to configure; drag-and-drop features in user interfaces make it easier to onboard non-technical staff.

Rapid cost savings:

Since RPA reduces the workload of teams, staff can be reallocated towards other priority work that does require human input, leading to increases in productivity and ROI.

Higher customer satisfaction:

Since bots and chatbots can work around the clock, they can reduce wait times for customers, leading to higher rates of customer satisfaction.

Improved employee morale:

By lifting repetitive, high-volume workload off your team, RPA allows people to focus on more thoughtful and strategic decision-making. This shift in work has a positive effect on employee happiness.

Challenges of RPA

While RPA software can help an enterprise grow, there are some obstacles, such as organizational culture, technical issues and scaling

Organizational culture

While RPA will reduce the need for certain job roles, it will also drive growth in new roles to tackle more complex tasks, enabling employees to focus on higherlevel strategy and creative problemsolving. Organizations will need to promote a culture of learning and innovation as responsibilities within job roles shift. The adaptability of a workforce will be important for successful outcomes in automation and digital transformation projects. By educating your staff and investing in training programs, you can prepare teams for ongoing shifts in priorities.

Difficulty in scaling:

While RPA can perform multiple simultaneous operations, it can prove difficult to scale in an enterprise due to regulatory updates or internal changes. According to a Forrester report, 52% of customers claim they struggle with scaling their RPA program. A company must have 100 or more active working robots to qualify as an advanced program, but few RPA initiatives progress beyond the first 10 bots.



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INTERNET OF THINGS

INTERNET OF THINGS

Internet of Things (IoT) technology has a wide variety of applications and use of Internet of Things is growing so faster. Depending upon different application areas of Internet of Things, it works accordingly as per it has been designed/developed. But it has not a standard defined architecture of working which is strictly followed universally. The architecture of IoT depends upon its functionality and implementation in different sectors. Still, there is a basic process flow based on which IoT is built.

Over the past few years, IoT has become one of the most important technologies of the 21st century. Now that we can connect everyday objects—kitchen appliances, cars, thermostats, baby monitors—to the internet via embedded devices, seamless communication is possible between people, processes, and things.



INDUSTRIAL IOT

Industrial IoT (IIoT) refers to the application of IoT technology in industrial settings, especially with respect to instrumentation and control of sensors and devices that engage cloud technologies.

Refer to this Titan use case PDF for a good example of IIoT. Recently, industries have used machine-to-machine communication (M2M) to achieve wireless automation and control. But with the allied emergence of cloud and technologies (such as analytics and machine learning), industries can achieve a new automation layer and with it create new revenue and business models. IIoT is sometimes called the fourth wave of the industrial revolution, or Industry 4.0.

FEATURES

We have listed some of the features that make IoT what it is in the present digital scenario. IoT devices have several sets of features that are common. The heart and soul of IoT is its connectivity. Connectivity means the establishment of a connection between different devices (or nodes) so that they can communicate on their own. In IoT, various devices, sensors, computers, and data busses need to interact and communicate with each other. IoT systems are designed in such a way that the number of devices, sensors, or computers can be scaled up and down according to the need. An IoT system should be elastic enough so that it can handle workload during peak demand hours and can resort back to the normal state when the demand is low.

IoT devices gather information about their surroundings (such as temperature, light, sound, acceleration, pressure) and then, after analyzing the data, take a decision. Thus, sensors help in automation by gathering information and taking actions that would otherwise, be done by humans.



LIMITATIONS

Although cyber security is a high priority, IoT devices aren't always included in the strategy. Devices must be protected from physical tampering, internet-based software attacks, networkbased attacks and hardware-based attacks. Data privacy is another concern, especially because IoT devices are being used in sensitive industries. such more as healthcare and finance. Information

privacy laws are coming into effect globally, too, meaning that not only does it make good business sense to protect data, but businesses are legally required to do so. Companies tend to consider IoT as only a technology and don't realize the implications it has on business processes. This means they often leave implementation and maintenance exclusively to IT teams without regard to any legal, industry or internal team effects.



Uses of Internet of Things :

Commercial and Industrial IoT devices can help with supply chain management, including inventory management, vendor relationships, fleet management, and scheduled maintenance. Shipping companies use Industrial IoT applications to keep track of assets and optimize fuel consumption on shipping routes.

Use of IoT is also exploding in the consumer sector. Dishwashers, refrigerators, smart TVs, smart watches, cars and trucks, heating and cooling systems, fitness machines and trackers are examples of IoT-enabled products with which you may have personal experience!

LEARN A TOOL

Threads is designed to facilitate communication and sharing between a user and their selected close friends on Instagram.

It allows users to create a dedicated space for messaging and sharing photos, videos, and status updates with their closest contacts. The app places a strong emphasis on privacy and control over the content shared, allowing users to choose specific people with whom they want to communicate.



One of the main features of Threads is the "Status" feature, which enables users to share their current activity or mood with their close friends. The app can automatically update a user's status based on their location, movement, and other factors, providing an easy way to keep friends updated without actively sharing content. Please note that my knowledge cutoff is in September 2021, so there may have been updates or changes to the Threads app since then. It's always a good idea to check the latest information from official sources or app stores for the most up-to-date details.

ADVANTAGES OF THREADS:

Close Friends Communication: Threads allows you to connect and communicate with your closest friends on Instagram in a more focused and private setting. It provides a dedicated space for sharing content, messaging, and staying in touch with a select group of individuals.

Privacy and Control: Threads emphasizes privacy by enabling you to choose exactly who can see your content and communicate with you. You have control over who is included in your close friends list and who can view your shared updates and stories.

Convenient and Focused Messaging: The app provides a streamlined and convenient messaging experience with your close friends. You can quickly send text messages, photos, videos, and other content without the distractions of a larger social media platform. Automatic Status Updates: Threads has a feature called "Status" that can automatically update your close friends about your current activity or mood. This feature can be helpful for sharing your whereabouts or providing updates without actively posting content.

Integration with Instagram: Threads is developed by Instagram, so it seamlessly integrates with your Instagram account. You can easily share content between the two platforms, including photos and videos, and view your friends' Instagram Stories directly within the Threads app.



DISADVANTAGES THREADS:

OF

Limited User Base: Threads is a separate app from Instagram, and not all Instagram users may be using or have access to Threads. This can limit the number of people you can connect with and communicate with through the app.

Fragmented Messaging Experience: Using Threads for communication with close friends may result in a fragmented messaging experience. If your close friends are using different messaging platforms or prefer to communicate through the main Instagram app, it can be challenging to keep track of conversations across multiple platforms.



Threads provide a way to improve application performance through parallelism. Threads represent a software approach to improving performance of operating system by reducing the overhead thread is equivalent to a classical process. Each thread belongs to exactly one process and no thread can exist outside a process.

When we insert an ATM card, it starts a thread to perform your operations. A very good example of thread-based multithreading is a word processing program that checks the spelling of words in a document while writing the document. This is possible only if each action is performed by a separate thread.

Threads is an app from Instagram where you can post threads, reply to others and follow profiles you're interested in. Threads and replies can include short pieces of text, links, photos, videos or any combination of them. People can also follow you to see your threads and replies in their feed and from your profile.



Apple Releases Revised iOS and macOSSecurityUpdates to Fix ActivelyExploited Vulnerability and Safari Bug

Apple today released updated Rapid Security Response (RSR) fixes that are available for iPhone and iPad users running the iOS and iPadOS 16.5.1 updates and the macOS Ventura 13.4.1 update.

Rapid Security Response Feature :

Rapid Security Response updates are designed to provide iOS and macOS users with security fixes without the need to install a full software update. Today's updates address an actively exploited WebKit vulnerability, so it is a good idea to update as soon as possible.



iOS Security Response 16.5.1 © and macOS Ventura Security Response 13.4.1 © are available through the standard Software Update mechanism in the Settings app. These are quick updates, requiring just a couple of minutes to

download the update and then a restart for the install process.Once the Rapid Security Response update is installed, iOS 16.5.1 users and macOS Ventura 13.4.1 users will see an updated version of the software, and tapping on the version in the About section of Settings will display information about the installed OS version and the Rapid Security Response update. Those who want to disable Rapid Security Response updates on iPhone can do so by following our how to. The updates can also be disabled on the Mac.



Apple initially introduced these Rapid Security Response updates earlier in the week, but the way theywere named caused issues with Safari. Select websites like Facebook, Instagram, WhatsApp, Zoom, and more began giving a warning about not being supported on the Safari browser following the software installation.As a result, Apple pulled the RSRs pending a fix and provided information to users on how to remove the updates. The new © RSRs will not cause the same Safari issue.



1.Do you know what you can hold without ever touching it?

2.In a year, there are 12 months. Seven months have 31 days. How many months have 28 days?

3. What word is spelled wrong in the dictionary?

4.Add right symbols.



5. What comes once in a minute, twice in a moment, but never in a thousand years?

6. What comes next? 25,20,16,13,11,...

7.If you drop a white hat into the red sea what does it become?

8. You are in a room with 3 monkeys. One monkey has a banana, one has a stick, and one has nothing. Who is the smartest primate?

9.Where can you find roads without cars, forests without trees, and cities without houses (without people)?

10. How many triangles are in the picture?





- 1. Which mobile company first introduced the Emoji internationally on their mobile devices?
- 2. Which of the following does not work on the principles of magnetization?
- 3. First computer virus is known as_
- 4. Which of the following programming language is used to create programs like applets?
- 5. Identify



- 6. Who is known as the father of Free Software Foundation?
- 7. What is the name of India's first indigenous super computer developed by CDAC named?
- 8. What is Youtube 's Slogan?
- 9. Identify the logo



10. Which one is the first search engine in internet





Sridhar Vembu (born 1968) is an Indian billionaire business magnate and the founder and CEO of Zoho Corporation. According to Forbes, he is the 55th richest person in India with a net worth of \$3.75 billion, as of 2021. He was awarded India's fourth highest civilian award, the Padma Shri, in 2021.

Vembu was born in 1968 in a middle class Tamil family from a village in Thanjavur district, Tamil Nadu. He graduated with a bachelor's degree in Electrical Engineering from the Indian Institute of Technology, Madras in 1989, and earned his MS and PhD degrees from Princeton University in New Jersey.

Vembu launched his professional career working for Qualcomm as a wireless engineer in San Diego, California, before moving to the San Francisco Bay Area. He has lived in San Jose and Pleasanton. In 1996, Vembu, along with two of his brothers, founded a software development house for network equipment providers called AdventNet.The company was renamed Zoho Corporation in 2009, focusing on providing SaaS support to Customer relationship management services. Vembu moved to Tenkasi, India in 2019.As of 2020, he held an 88 percent stake in the company. Forbes estimated his net worth at USD \$2.44 billion.In 2021, Sridhar Vembu was appointed to National Security Advisory Board. Despite being a unicorn, Zoho has been completely bootstrapped by Vembu and his co-founder Tony Thomas to avoid external influence.

Sridhar Vembu is noted [further explanation needed] for taking software and product development functions from urban centers into rural villages in India. Specifically, his company, Zoho, its offices established in rural Mathalamparai, Tenkasi district, Tamil Nadu and in suburban Renigunta, Andhra Pradesh. He moved from the Bay Area to Mathalamparai at this time.

In 2004, he set up Zoho Schools[clarification needed] to provide vocational software development education to rural students as an alternative to formal university education. A statement from the company states that 15 to 20 percent of its engineers have no college degree, but have received vocational education from Zoho Schools.

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MIND PUNCH

IT VITA

- 1. Your breath
- 2. They all do
- 3. Wrong
- **4.** 5+2-1
- 5. The letter "m".
- **6.** 10
- **7.** Wet
- 8. You.
- **9.** A map.
- **10.** 16

1.	Apple
2.	Pen Drive
3.	Creeper Virus
4.	Java
5. `	Michael Dell(CEO of Dell Technologies)
6.	Richard Mathew
	Stallman
7.	Param
8.	Broadcast yourself

- Linux Multi Media Studios (LMMS)
- 10. Archie

The Editorial Board expresses its sincere gratitude to all those who are responsible, either by being on the stage or behind the screen for the successful launch of the magazine....!!

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IT UNLIMITED MAGAZINE (A BIMONTHLY BONANZA)



